

**Forest Department  
The State of Himachal Pradesh, India**

**The Preparatory Study  
on  
Himachal Pradesh Forest Ecosystems Management  
and  
Livelihoods Improvement Project  
in India**

**Final Report  
Volume 1 Part I: Study**

**February 2018**

**Japan International Cooperation Agency (JICA)**

**NIPPON KOEI CO., LTD.**

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**Forest Department  
The State of Himachal Pradesh, India**

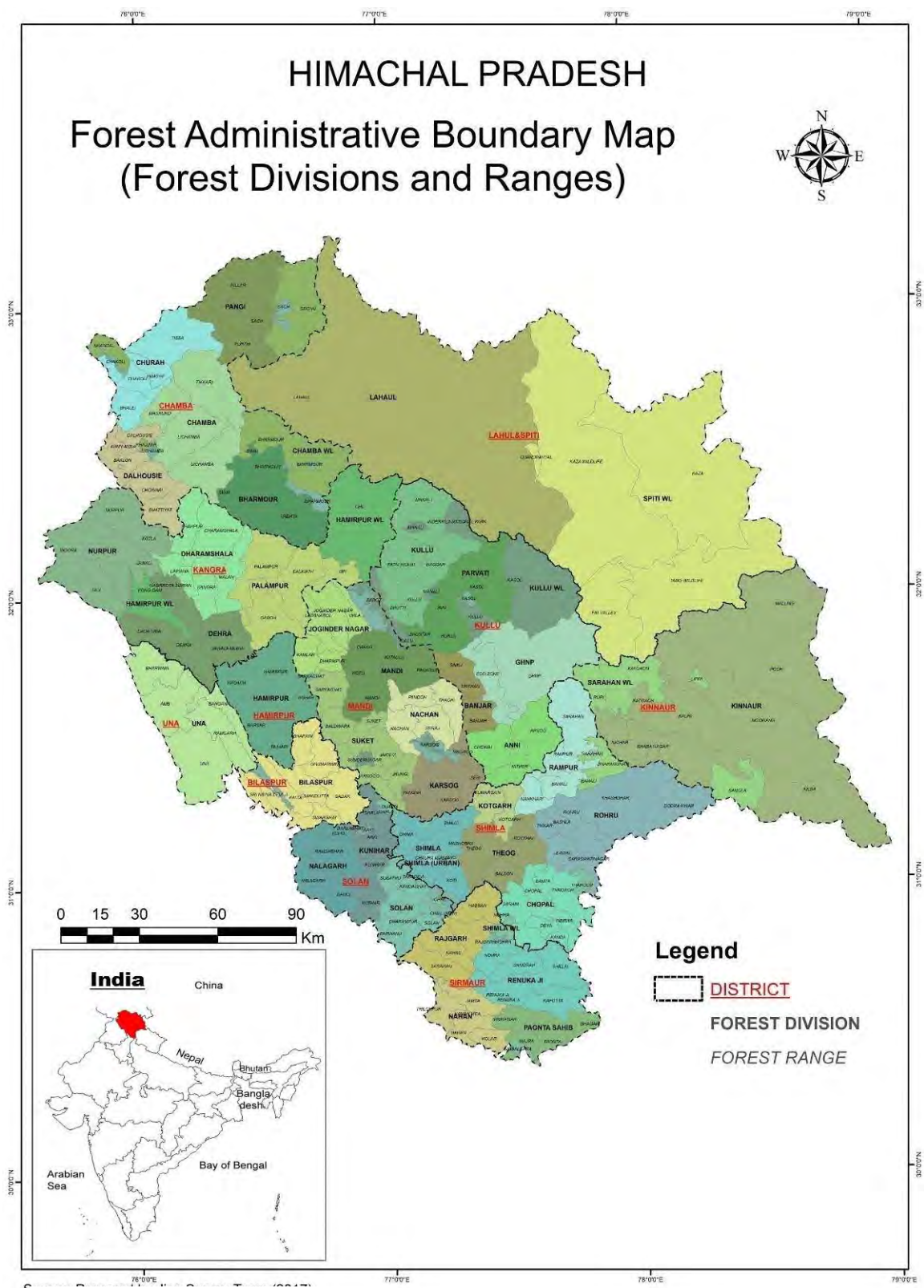
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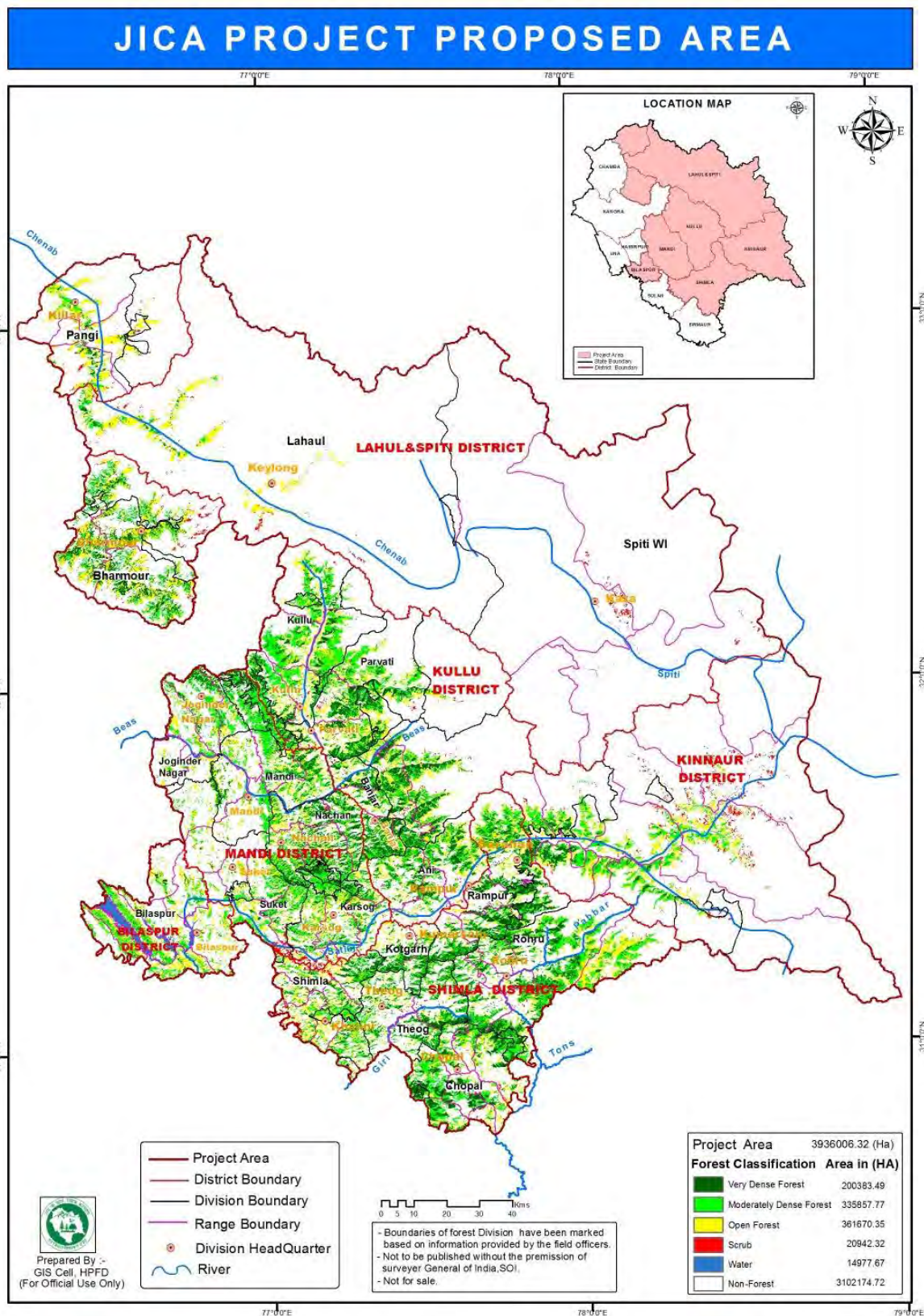
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Note: The description and use of boundaries, geographic names and related data shown on map do not necessarily imply official endorsement or acceptance by JICA

Source: Prepared by JICA Study Team (2017) based on information from HPFD

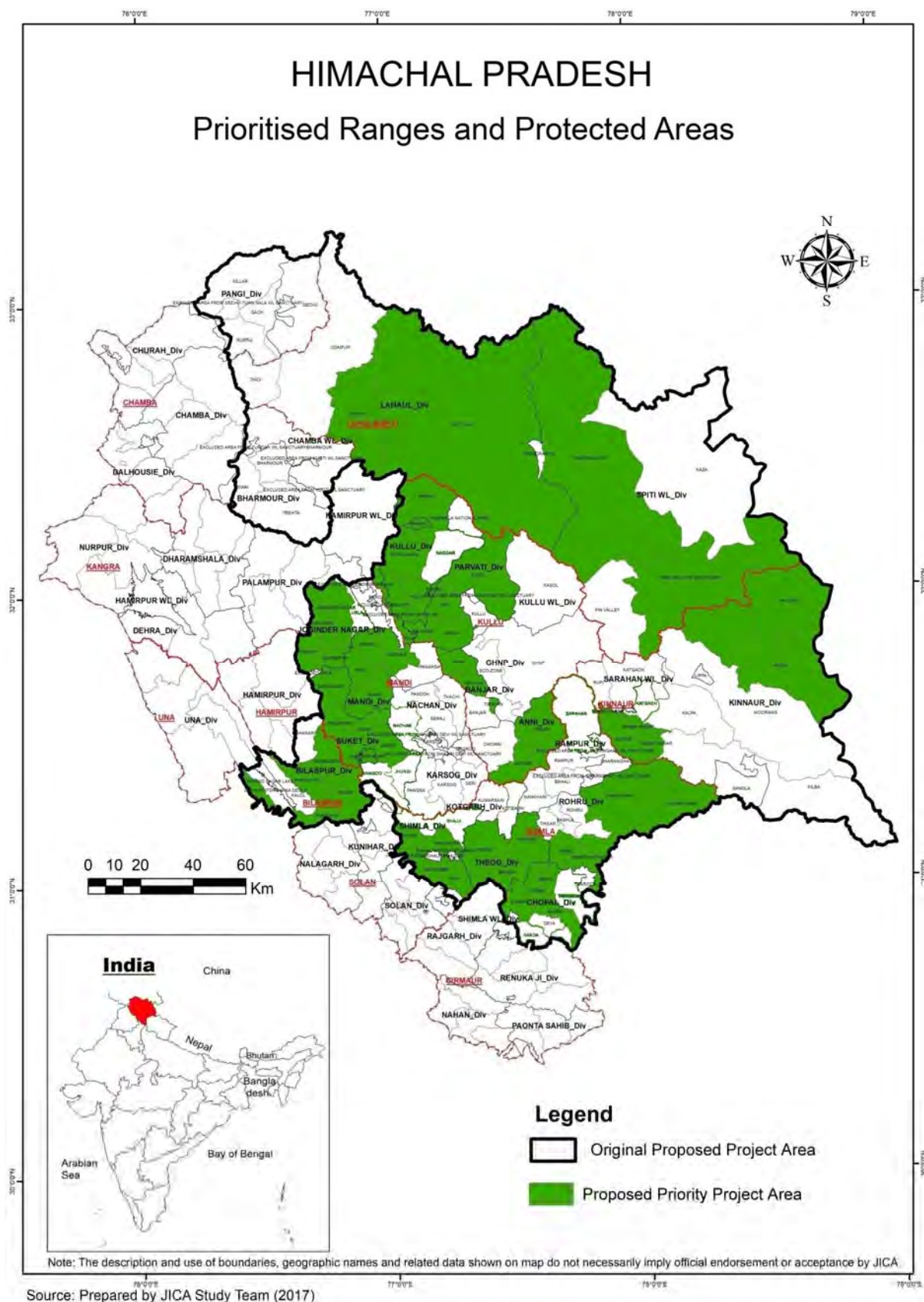
**Figure 1: Forest Administrative Boundaries of Himachal Pradesh**



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**Figure 2: Proposed Project Area by HPFD for Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project**



**Figure 3: Prioritised Project Area for Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project**

### Photographs taken during the Study



Kick-off Meeting in PCCF Office HPFD, Shimla District  
(30 May 2017)



Discussion with Dharot JFMC, Nachan Range, Nachan  
Division, Mandi District (11 June 2017)



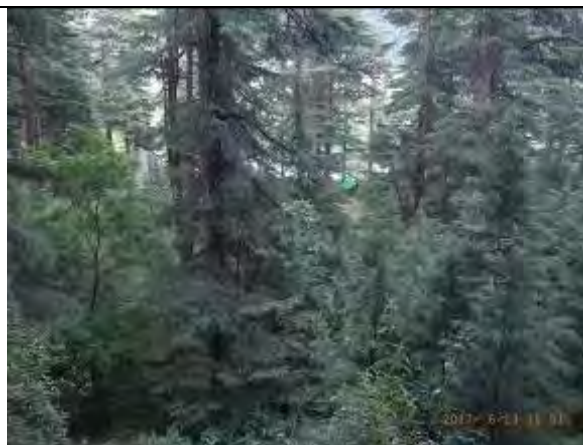
Kothi Nursery, Manali Range, Kullu Division, Kullu  
District (13 June 2017)



Nomadic Tribe in Lahaul Division, Lahaul & Spiti  
District (12 June 2017)



Wage Employment for Local People in Road  
Construction on Rohtang Pass, Kullu District  
(13 June 2017)



Manali Nature park, Kullu Division, Kullu District (13  
June 2017)



Visiting Bebeli Nature Park, Manali, Kullu Division, Kullu District (14 June 2017)



Road Blocked due to the Land Slide on the way from Pangti, Chmaba District to Udaipur, Lahaul & Spiti District (14 June 2017)



Compost Site Supported by Mid Himalayan Watershed Development Project, Mandi District (14 June 2017)



Interaction with Kotadhar SHGs to Review Mid Himalayan Watershed Development Project, Mandi District (14 July 2017)



Proposed Regional Office for the Project, Kullu District (15 June 2017)



Discussion with NABRAD SHGs, Banjar Division, Kullu District (25 July 2017)



Bee Keeping, Kullu District (26 June 2017)



PRA in Ribba Village, Moorang Range, Kinnaur Division, Kinnaur District (1 July 2017)



Apple Orchards near Shimla, Shimla District (2 July 2017)



Nursery, Kalpa Range, Kinnaur Division, Kinnaur District (5 July 2017)



PRA in Tikkal Hamlet, Pannaul Village, Ghumarwin Range, Bilaspur Division, Bilaspur District (5 July 2017)



Institute of Himalayan Bio-resource Technology (IHBT) - Nurseries for Germplasm Conservation of Medicinal Plants, Palampur Division, Kangra District (6 July 2017)





Land Slide, Kinnaur District (5 July 2017)



Alpine Zone, Kullu District (27 June 2017)



Forest Area Landscape, Bilaspur District (5 July 2017)



Landscape near Settlements, Bharmour, Chamba District (7 July 2017)



Landscape in Cold Desert Area, Kaza, Lahaul & Spiti District (6 July 2017)



Landscape of the Area, Udaipur, Lahaul & Spiti District (13 June 2017)



Interaction with SWAN Women Federation, Una District  
(20 June 2017)



NABRAD SHG, Manglour Village, Kullu District  
(25 July 2017)



Workers in the Wheat Field, Kibber Village, Lahaul & Spiti District  
(22 September 2017)



Grazier and Livestock, near Pooh, Kinnaur District  
(20 September 2017)



Terrace Fields and Orchards, Lahaul & Spiti District  
(21 September 2017)



Bamboo Products Sold at the Road Side, Kullu District  
(15 September 2017)

## **Preparatory Study on Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project in India**

### **Final Report Volume 1 & Volume 2 Table of Contents**

Figure 1: Forest Administrative Boundaries of Himachal Pradesh	
Figure 2: Proposed Project Area for Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project	
Figure 3: Prioritised Project Area for Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project	
Photographs taken during the Study	
List of Abbreviations	

#### **Executive Summary**

#### **Data Summary**

#### **Part I: Study**

CHAPTER 1 INTRODUCTION.....	I-1-1
1.1 Background of the Study .....	I-1-1
1.2 Objective of the Study .....	I-1-2
1.3 Scope of the Study.....	I-1-2
1.3.1 Study Areas .....	I-1-2
1.3.2 Scope of Work.....	I-1-2
1.3.3 Study Period.....	I-1-3
1.4 Overall Framework of the Study .....	I-1-3
1.4.1 Composition of the Study Team.....	I-1-3
1.4.2 Counterpart Agency .....	I-1-3
CHAPTER 2 FOREST SECTOR IN INDIA .....	I-2-1
2.1 Overall Forest Status in India .....	I-2-1
2.2 Central Government Institution Relevant to Forestry Sector .....	I-2-2
2.2.1 The Ministry of Environment, Forests and Climate Change (MoEF&CC) .....	I-2-2
2.2.2 The Ministries of Rural Development, Tribal Affairs, and Social Justice and Empowerment .....	I-2-3
2.3 Forest Research and Extension.....	I-2-4
2.4 Forest Inventory and Monitoring.....	I-2-4
2.4.1 Bi-annual Forest Cover Mapping.....	I-2-4
2.4.2 National Forest Inventory (NFI) .....	I-2-5
2.4.3 Monitoring of Aforestation/ Reforestation.....	I-2-6
2.4.4 Monitoring of Forest Fires .....	I-2-6
2.4.5 Biodiversity Information System .....	I-2-7

2.4.6	Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance” (OSMEFWC).....	I-2-7
2.5	National Level Policies, Laws/Regulations, and Plans relevant to the Proposed Project.....	I-2-8
CHAPTER 3 THE STUDY AREA (THE STATE OF HP).....		
3.1	Overview .....	I-3-1
3.2	Administration.....	I-3-1
3.2.1	State Administrative Structure .....	I-3-1
3.2.2	Panchayati Raj Institutions (PRI).....	I-3-2
3.2.3	Fiscal Conditions .....	I-3-5
3.2.4	Governance and Government Initiatives for its Reforms .....	I-3-7
3.3	Socio-Economic Conditions.....	I-3-7
3.3.1	Demography.....	I-3-7
3.3.2	Education and Literacy .....	I-3-9
3.3.3	Economic Status.....	I-3-10
3.3.4	Poverty .....	I-3-14
3.3.5	Gender.....	I-3-15
3.3.6	Rural Development .....	I-3-17
3.3.7	Financial Inclusion.....	I-3-18
3.3.8	Household Amenities .....	I-3-22
3.3.9	Major Infrastructure: Electricity, Road Network and Transportation .....	I-3-24
3.3.10	Security Situations and Areas Required for Protected Area Permit (PAP) and Inner Line Permit .....	I-3-28
3.4	Natural Conditions.....	I-3-31
3.4.1	Zoning.....	I-3-31
3.4.2	Land Use .....	I-3-34
3.4.3	Topography and Soil .....	I-3-36
3.4.4	Geology.....	I-3-38
3.4.5	River System and Catchments .....	I-3-38
3.4.6	Climatic Conditions .....	I-3-42
3.4.7	Natural Disasters.....	I-3-46
3.5	Development Planning .....	I-3-49
3.5.1	12th Five-Year Plan (2012-17).....	I-3-49
3.5.2	Beyond 12th Five-Year Plan .....	I-3-49
CHAPTER 4 FORESTS AND FOREST AREAS IN HIMACHAL PRADESH.....		
4.1	Forest Laws and Policies .....	I-4-1
4.1.1	Legal Regime .....	I-4-1
4.1.2	Forest Policy .....	I-4-1
4.1.3	Major State Level Laws and Policies related to Forest Management and Forest Products .....	I-4-2
4.1.4	Major State Level Laws and Policies related to Wildlife and Biodiversity .....	I-4-4
4.1.5	Major State Level Laws and Regulations related to Felling of Trees .....	I-4-5

4.1.6	Laws and Policies on Scheduled Castes and Scheduled Tribes .....	I-4-6
4.2	Forest Administration .....	I-4-7
4.2.1	Institutional Setup of HPFD.....	I-4-7
4.2.2	Human Resources of HPFD.....	I-4-9
4.2.3	Training Mechanism of HPFD Staff.....	I-4-11
4.2.4	Budget of HPFD .....	I-4-12
4.2.5	Financial Procedure of HPFD .....	I-4-13
4.2.6	Monitoring and Evaluation in HPFD .....	I-4-14
4.2.7	GIS/MIS Expertise of HPFD .....	I-4-15
4.2.8	Relevant Organisations of HPFD.....	I-4-18
4.3	Present Condition of Forests .....	I-4-19
4.3.1	Forest Area Classification .....	I-4-19
4.3.2	Forest Cover.....	I-4-20
4.3.3	Forest Type.....	I-4-22
4.3.4	Culturable and Non- Culturable Forest Areas.....	I-4-24
4.3.5	Land Conversion from Forest to Non-Forest Uses .....	I-4-24
4.4	Wildlife and Biodiversity .....	I-4-26
4.4.1	Biodiversity Profile of HP State.....	I-4-26
4.4.2	Protected Areas .....	I-4-27
4.4.3	Himalayan Biodiversity Hotspot.....	I-4-29
4.4.4	Key Biodiversity Areas in HP State .....	I-4-31
4.4.5	Other Important Biodiversity Areas in HP State .....	I-4-32
4.4.6	Human-Wildlife Conflict.....	I-4-33
4.4.7	Invasive/Exotic Species .....	I-4-37
4.4.8	Biodiversity Conservation and Eco-development.....	I-4-39
4.4.9	Eco-tourism.....	I-4-42
4.4.10	Ecosystem Services.....	I-4-44
4.4.11	On-going Schemes/Projects Related to Biodiversity Conservation and Wildlife Management .....	I-4-46
4.5	Forest Management and Forestry .....	I-4-47
4.5.1	Forest Management System .....	I-4-47
4.5.2	Forest Management of Natural Forest and Artificial Forest .....	I-4-50
4.5.3	Grasslands and Pastures Management .....	I-4-52
4.5.4	Cold Desert/Permanent Snow Area Management.....	I-4-59
4.5.5	Forest Management Related Infrastructure.....	I-4-60
4.5.6	Soil and Water Conservation.....	I-4-64
4.5.7	Forest Damages and Encroachment.....	I-4-66
4.5.8	On-going Schemes/Projects Related to Forest Management.....	I-4-71
4.6	Participatory Forest Management in HP State.....	I-4-74
4.6.1	Participatory Forest Management Policy and Legal Framework.....	I-4-74
4.6.2	Himachal Pradesh Participatory Forest Management Regulations 2001 .....	I-4-74
4.6.3	Implementation of Participatory Forest Management in HP .....	I-4-75

4.6.4	Status of Participatory Forest Management in HP .....	I-4-76
4.7	Community Forest Management, Forest Rights Act, Timber Distribution to Right Holders ...	I-4-77
4.7.1	Community Forest Management.....	I-4-77
4.7.2	Implementation of Forest Rights Act in HP State .....	I-4-78
4.7.3	Timber Distribution to Right Holders .....	I-4-79
4.8	Forest Produces and Markets.....	I-4-82
4.8.1	Major Forest Products.....	I-4-83
4.8.2	NTFPs .....	I-4-84
4.8.3	Forest Based Industries in HP State .....	I-4-91
4.9	Farm Forestry, Social Forestry and Tree Planting Outside of Forest Area .....	I-4-93
4.10	Livelihood Pattern .....	I-4-96
4.11	On-Going Government/ Donor Interventions for Livelihood Improvements .....	I-4-98
4.11.1	Government Livelihood Improvement related Programmes/ Schemes .....	I-4-98
4.11.2	Programmes and Schemes for ST/ SC .....	I-4-99
4.11.3	Community Level Institutions Relevant for Livelihood Improvement.....	I-4-101
4.11.4	Microfinance and Financial Inclusion through Self-Help Groups.....	I-4-106
CHAPTER 5 REVIEW OF PAST AND ON-GOING FORESTRY RELATED PROJECTS/ SCHEMES SIMILAR TO THE PROJECT.....		
I-5-1		
5.1	Major ODA Forestry Project in India .....	I-5-1
5.1.1	Introduction.....	I-5-1
5.1.2	Review of JICA's Forestry Projects in India .....	I-5-2
5.1.3	9th Annual Workshop on Forestry and Natural Resource Management Projects, and Impact Assessments .....	I-5-8
5.2	Reviews of Past and On-going Similar Projects.....	I-5-10
5.2.1	Forest Ecosystem Climate Proofing Project (KfW).....	I-5-10
5.2.2	Swan River Integrated Watershed Management Project (JICA).....	I-5-12
5.2.3	Mid-Himalayan Watershed Management Project (World Bank) .....	I-5-14
5.2.4	Indo-German Changar Eco-development Project (GTZ).....	I-5-19
5.2.5	National Social Forestry Project (World Bank/ USAID).....	I-5-22
5.2.6	Himachal Pradesh Forest Sector Reform Project (DFID).....	I-5-23
5.2.7	Central and State Schemes and Programmes.....	I-5-24
5.3	Reviews of Pipeline Projects .....	I-5-27
5.3.1	Himachal Pradesh Forests for Prosperity Project (World Bank).....	I-5-27
5.3.2	Catchment Treatment for Source Sustainability and Climate Resilient Rainfed Agriculture (World Bank) .....	I-5-28
5.3.3	Green India Mission.....	I-5-29
CHAPTER 6 ISSUES AND LESSONS LEARNED FROM FOREST MANAGEMENT IN THE STATE .....		
I-6-1		
6.1	Overview of Forest Management and Livelihood Status in HP .....	I-6-1
6.2	Forest Administration .....	I-6-3
6.2.1	Institutional Setup .....	I-6-3

6.2.2	Human Resources .....	I-6-3
6.2.3	Training Mechanism .....	I-6-4
6.2.4	Information Technology.....	I-6-4
6.2.5	Monitoring and Evaluation in HPFD.....	I-6-9
6.3	Forest Management and Forestry .....	I-6-10
6.3.1	Forest Management System.....	I-6-10
6.3.2	Departmental Natural Forest Management, Reforestation, Afforestation.....	I-6-11
6.3.3	Joint Forest Management.....	I-6-13
6.3.4	Community Forest Management, Forest Rights Act, Timber Distribution to Right Holders	I-6-16
6.3.5	Grassland / Pasture Management.....	I-6-18
6.3.6	Cold Desert /Permanent Snow Area Management.....	I-6-18
6.4.	Wildlife and Biodiversity .....	I-6-19
6.4.1	Lack of Sufficient Scientific Data/ Information Required for Planning and Management of Biodiversity Conservation .....	I-6-19
6.4.2	Necessity of Biodiversity Corridors.....	I-6-20
6.4.3	Necessity of Community Based Biodiversity Conservation.....	I-6-20
6.5	Forest Products and Markets .....	I-6-21
6.5.1	Issues in NTFP Collection from the Wild, Cultivation and Marketing.....	I-6-21
6.5.2	Issues in Functioning of Forest Based Industries.....	I-6-24
6.6	Farm Forestry .....	I-6-24
6.7	Socio Economic Perspectives in Forest/ Forest Ecosystem Management.....	I-6-25
6.7.1	Livelihoods and Forest Resources .....	I-6-25
6.7.2	Grazing.....	I-6-25
6.7.3	Forest Dependence.....	I-6-26
6.7.4	Gender and Forest Resources Management.....	I-6-26
6.7.5	Self Help Groups (SHGs) .....	I-6-26
6.7.6	Micro Finance and Financial Inclusion.....	I-6-31
6.8	District-wise Key Issues and Possible Measures related to Forest Management and Forest Areas.....	I-6-32
CHAPTER 7 REVIEW OF DRAFT PROJECT REPORT (DPR) .....		I-7-1
7.1	Overall Review of Proposed Project by HPFD .....	I-7-1
7.2	Project Needs and Rationale.....	I-7-3
7.3	Project Objectives and Approaches .....	I-7-3
7.4	Component-wise Review of Proposed Project by HPFD .....	I-7-3
7.4.1	Overview.....	I-7-3
7.4.2	Institutional Capacity Building including Orientation/ Sensitisation & General Preparedness .....	I-7-4
7.4.3	Forestry (Department mode and JFM mode).....	I-7-5
7.4.4	Soil & Moisture Conservation .....	I-7-11
7.4.5	Livelihood Activities.....	I-7-11
7.4.6	Wildlife Habitat Improvement .....	I-7-16
7.4.7	Environmental Rehabilitation .....	I-7-19

7.4.8	Research, Studies and Documentation.....	I-7-20
7.4.9	Strengthening of ICT in HPFD .....	I-7-20
7.4.10	Monitoring and Evaluation.....	I-7-21
7.4.11	Project Management Unit (PMU) .....	I-7-21
7.4.12	Office Building for the Project.....	I-7-22
7.4.13	Consulting Service .....	I-7-22
7.4.14	Environmental and Social Consideration.....	I-7-23
CHAPTER 8 ENVIRONMENT AND SOCIAL CONSIDERATIONS.....		I-8-1
8.1	Legal Framework and Institutional Arrangement of Environmental and Social Considerations in India and HP State .....	I-8-1
8.1.1	Major State Level Laws, Regulations Relevant to Environmental and Social Considerations.....	I-8-1
8.1.2	Comparison between the JICA Guidelines and ESC Framework in India.....	I-8-5
8.1.3	Institutions Relevant to Environmental and Social Considerations.....	I-8-6
8.1.4	Environmental Impact Assessment: Environmental Clearance .....	I-8-8
8.1.5	Land Acquisition and Involuntarily Resettlement .....	I-8-13
8.2	Baseline Information for Environmental and Social Consideration.....	I-8-15
8.2.1	Social Environment.....	I-8-15
8.2.2	Natural Environment.....	I-8-17
8.2.3	Environmental Pollution .....	I-8-17
<b>Part II: Project</b>		
CHAPTER 1 PROJECT AREA PRIORITISATION AND PRIORITISED PROJECT AREAS .....		II-1-1
1.1	Project Areas Proposed by HPFD.....	II-1-1
1.2	Prioritised Project Areas .....	II-1-2
1.2.1	Project Area Prioritisation Criteria.....	II-1-2
CHAPTER 2 PRELIMINARY SITUATIONAL ANALYSIS OF THE POTENTIAL PROJECT AREA .....		II-2-1
2.1	Forest Administration .....	II-2-1
2.2	Present Conditions of Forest and Forest Area .....	II-2-2
2.2.1	Forest Cover.....	II-2-2
2.2.2	Major Ecosystems in the Prioritised Project Area .....	II-2-3
2.3	Forest Management .....	II-2-7
2.3.1	Forest Management System.....	II-2-7
2.3.2	Departmental Natural Forest Management, Reforestation, Afforestation .....	II-2-10
2.3.3	Joint Forest Management.....	II-2-11
2.3.4	Community Forest Management, Forest Rights Act and Timber Distribution to Right Holders .....	II-2-14
2.3.5	Grassland / Pasture Management.....	II-2-17
2.3.6	Cold Desert /Permanent Snow Area Management.....	II-2-17
2.4	Wildlife and Biodiversity .....	II-2-18
2.4.1	Protected Area.....	II-2-18



2.4.2	Biodiversity Richness .....	II-2-20
2.4.3	Human-Wildlife Conflict .....	II-2-21
2.4.4	Invasive/Exotic Species .....	II-2-22
2.4.5	Eco-development and Ecotourism .....	II-2-23
2.4.6	Ecosystem Services.....	II-2-25
2.5	Forest Products and Markets .....	II-2-25
2.5.1	Major Forest Products.....	II-2-25
2.5.2	NTFPs .....	II-2-26
2.5.2.1	NTFP Procurement in Project Area.....	II-2-26
2.5.2.2	Marketing/ Value Chain of NTFPs in the Project Area .....	II-2-30
2.5.3	Forest Based Industries in the Prioritised Project Districts.....	II-2-33
2.6	Farm Forestry and Social Forestry .....	II-2-33
2.7	Socio Economic Characteristics .....	II-2-35
2.7.1	Livelihood.....	II-2-37
2.7.2	Access to Financial Services.....	II-2-49
2.7.3	Forest Uses.....	II-2-56
2.7.4	Gender and Community Forest Management .....	II-2-60
2.7.5	SHGs and SHG based Livelihood Interventions.....	II-2-64
2.7.6	Microfinance .....	II-2-66
CHAPTER 3 PROJECT FRAMEWORK.....		II-3-1
3.1	Project Plan Outline of the Prioritised Project.....	II-3-1
3.2	Major Changes from DPR Made in the Project Framework .....	II-3-2
3.3	Project Needs and Rationale.....	II-3-3
3.3.1	Relevance and Linkages with Government Policies and Priorities .....	II-3-3
3.3.2	Need to Enhance Forest Quality .....	II-3-4
3.3.3	Need to Enhance Biodiversity Conservation .....	II-3-5
3.4	Project Objectives and Approaches .....	II-3-5
3.5	Project Log Frame .....	II-3-8
3.6	Project Components Framework .....	II-3-11
3.7	Project Components.....	II-3-12
3.7.1	“Component 1: Sustainable Forest Ecosystem Management” .....	II-3-12
3.7.1.1	“Component 1.1: Preparatory Works for Component 1” .....	II-3-12
3.7.1.2	“Component 1.2: Participatory Forest Management (PFM) Mode” .....	II-3-20
3.7.1.3	“Component 1.3: Training for VFDSs”.....	II-3-27
3.7.1.4	“Component 1.4: Departmental Mode”.....	II-3-29
3.7.1.5	“Component 1.5: Training of Project related Staff of HPFD” .....	II-3-35
3.7.1.6	“Component 1.6: Research” .....	II-3-37
3.7.2	“Component 2: Biodiversity Conservation” .....	II-3-38
3.7.2.1	“Component 2.1: Scientific Biodiversity Management”.....	II-3-39
3.7.2.2	“Component 2.2: Training of Project related Staff of HPFD” .....	II-3-50
3.7.2.3	“Component 2.3: Research” .....	II-3-51

3.7.2.4	“Component 2.4: Community Based Biodiversity Management”	II-3-52
3.7.2.5	“Component 2.5: Training of DMUs/ FTUs/ BMCs and Sub-committee”	II-3-60
3.7.3	“Component 3: Livelihood Improvement Support”	II-3-61
3.7.3.1	“Component 3.1: Community Development”	II-3-61
3.7.3.2	“Component 3.2: NTFP based Livelihood Improvement”	II-3-66
3.7.3.3	“Component 3.3: Non NTFP based Livelihood Improvement”	II-3-86
3.7.4	Component 4: Institutional Capacity Strengthening	II-3-92
3.7.4.1	“Component 4.1: Preparatory Works”	II-3-92
3.7.4.2	“Component 4.2: Capacity Development”	II-3-99
3.7.4.3	“Component 4.3: Monitoring and Evaluation”	II-3-104
3.7.4.4	“Component 4.4: Research”	II-3-118
3.7.4.5	“Component 4.5: PMC”	II-3-119
3.7.4.6	“Component 4.6: Phase-out/ Sustainability Mechanism”	II-3-119
CHAPTER 4 PROPOSED INSTITUTIONAL FRAMEWORK		II-4-1
4.1	Analysis of Institutional Arrangements and Options	II-4-1
4.1.1	Historical Transact of HPFD under PFM Initiatives and Analysis of PFM Institutionalisation	II-4-1
4.1.2	Way Forward for Evolving Institutional Set-up under the Project	II-4-1
4.1.3	Options Considered for Institutional Arrangement for the Project	II-4-3
4.1.4	Further Consideration for Priority Institutional Arrangements	II-4-6
4.2	Overview of Proposed Institutional Arrangements for the Project	II-4-7
4.2.1	Overall Framework	II-4-7
4.3	Details of Proposed High Power Committee and Management Bodies of PMU	II-4-10
4.3.1	High Power Committee (HPC) of the Project	II-4-10
4.3.2	Society mode for Project Implementation	II-4-11
4.4	Details of Proposed Project Implementation Units	II-4-15
4.4.1	Proposed Structure of Project Management Units (PMU)	II-4-15
4.4.2	Proposed Structure of Forest Circle Coordination Unit (FCCU)	II-4-19
4.4.3	Proposed Structure of Divisional Management Unit (DMU)	II-4-20
4.4.4	Proposed Structure of Field Technical Unit (FTU)	II-4-23
4.4.5	Other Implementing/ Facilitating Institutions	II-4-25
4.5	Proposed Community Implementation Organisation: Village Forest Development Society (VFDS)	II-4-26
4.5.1	Overview	II-4-26
4.5.2	Further Option for Long Term Perspective	II-4-27
4.6	Key Managerial Features of Proposed Institutional Arrangements	II-4-28
4.6.1	Budgetary Provision	II-4-28
4.6.2	Accounting Procedures	II-4-29
4.6.3	Auditing	II-4-30
4.6.4	Compliances of General Financial Rules and General Rules of Business	II-4-31
4.6.5	Structural Integrity	II-4-32

4.6.6 Procurement .....	II-4-32
4.6.7 Corpus/ Revolving Fund .....	II-4-32
CHAPTER 5 PROPOSED IMPLEMENTATION SCHEDULE.....	II-5-1
CHAPTER 6 PROPOSED PROCUREMENT AND IMPLEMENTATION METHOD .....	II-6-1
CHAPTER 7 PROJECT COST.....	II-7-1
7.1 Summary of Cost Estimate.....	II-7-1
7.2 Conditions and Assumptions .....	II-7-1
7.3 Cost Component.....	II-7-2
7.3.1 Cost Per Project Component.....	II-7-2
7.3.2 Cost of Consulting Services.....	II-7-3
7.3.3 Administrative Cost .....	II-7-4
7.4 Annual Cost Schedule .....	II-7-4
7.5 Financing Plan .....	II-7-5
CHAPTER 8 PROJECT EVALUATION .....	II-8-1
8.1 Expected Economic Benefits.....	II-8-1
8.1.1 Project Economic Benefits.....	II-8-1
8.1.2 Other Intangible Benefits.....	II-8-2
8.2 Basic Assumptions for Cost-Benefit Analysis.....	II-8-2
8.3 Calculation of EIRR .....	II-8-4
8.4 Sensitive Analysis.....	II-8-5
8.5 Employment Opportunities .....	II-8-6
CHAPTER 9 OPERATION AND MAINTENANCE.....	II-9-1
CHAPTER 10 OPERATION AND EFFECT INDICATORS .....	II-10-1
CHAPTER 11 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS OF THE PROJECT .....	II-11-1
11.1 Overview .....	II-11-1
11.2 Institutional Arrangement and Capacities of Implementing Agency for Environmental and Social Consideration.....	II-11-1
11.2.1 Overview.....	II-11-1
11.2.2 Institutional Arrangement .....	II-11-2
11.2.3 Draft Environmental and Social Management System Checklist.....	II-11-5
11.3 Management and Mitigation of Environmental and Social Risks .....	II-11-10
11.3.1 Draft Environmental and Social Assessment Framework (ESAF) .....	II-11-10
11.3.2 Draft Vulnerable Scheduled Tribes Planning Framework (VSTPF).....	II-11-13
11.3.3 Draft Involuntary Resettlement Plan Framework (IRPF).....	II-11-16
CHAPTER 12 PROJECT RISKS AND ASSUMPTIONS.....	II-12-1

## List of Tables

### **Part I: Study**

Table 1.1.1 Composition of the Preparatory Study Team.....	I-1-3
Table 2.1.1 Forest Cover of India Class Area and Percent of Geographical Area.....	I-2-2
Table 2.1.2 Forest Cover Change Matrix for India between ISFR, 2013 and ISFR, 2015.....	I-2-2
Table 2.2.1 Regional Offices of MoEF&CC .....	I-2-2
Table 2.4.1 Details of ISFRs Published Over the Years along with Satellite Input and Methodology Used.....	I-2-5
Table 2.5.1 Policies, Laws/Regulations Related to Forest and Wildlife Relevant to the Project .....	I-2-8
Table 2.5.2 Policies, Laws/Regulations Related to Land, Resettlement and Tribes Relevant to the Project.....	I-2-11
Table 2.5.3 Policies, Laws/Regulations Related to Environment Protection and EIA Relevant to the Project.....	I-2-12
Table 2.5.4 Policies, Laws/Regulations Related to Water, Air and Pollution Relevant to the Project ..	I-2-13
Table 3.2.1 Outline of the Administrative Units in HP State.....	I-3-1
Table 3.2.2 Number of PRIs in the Rural Areas in HP State .....	I-3-2
Table 3.2.3 Summary of Fiscal Operations .....	I-3-6
Table 3.2.4 Trends in Revenue Receipts relative to GSDP .....	I-3-6
Table 3.3.1 District-wise Sex Ratio in HP (Census, 2011).....	I-3-8
Table 3.3.2 District-wise Distribution of OBC Population in HP State.....	I-3-9
Table 3.3.3 District-wise Literacy Levels among SC and ST Population .....	I-3-9
Table 3.3.4 District-wise Dropout Rates (2015-16) .....	I-3-10
Table 3.3.5 Sector-wise Gross State Domestic Product (At Current Prices).....	I-3-11
Table 3.3.6 Gender-wise Work Participation Ratio .....	I-3-12
Table 3.3.7 Gender-wise Workers by the Type of Work Engaged.....	I-3-12
Table 3.3.8 Status of MGNREGS in HP State (as of 11th August 2017) .....	I-3-13
Table 3.3.9 Tourists Visited in HP State (2013 - 2015) .....	I-3-14
Table 3.3.10 Poverty Head Counts by the Social Group.....	I-3-14
Table 3.3.11 Gender Status in HP State (2005-06/ 2015-16).....	I-3-15
Table 3.3.12 Representation of Women in Panchayati Raj Institutions (2010-11).....	I-3-16
Table 3.3.13 Outline of the Schemes for Women.....	I-3-16
Table 3.3.14 Rural Development Schemes/ Programmes .....	I-3-18
Table 3.3.15 Progress under Microfinance in HP State.....	I-3-19
Table 3.3.16 Reach of Banking Institutions in HP State, as on 31st March, 2017 .....	I-3-21
Table 3.3.17 Financial Inclusion Programmes by Government .....	I-3-21
Table 3.3.18 Sources of Energy for Cooking .....	I-3-23
Table 3.3.19 Sources of Drinking Water .....	I-3-23
Table 3.3.20 Access to Internet/ Mobile Phones .....	I-3-24
Table 3.3.21 Installed Power Generation Capacity in HP State .....	I-3-24
Table 3.3.22 Number of Villages Electrified in HP State .....	I-3-25
Table 3.3.23 Electricity Supply and Consumption in HP State.....	I-3-25
Table 3.3.24 District-wise Road Length in HP State.....	I-3-26
Table 3.3.25 Travel Comparison from Shimla to Major Destinations in HP State.....	I-3-26
Table 3.3.26 Number of Helipads in Different Districts of HP State .....	I-3-28
Table 3.3.27 Crimes in HP State (2014-15 and 2015-16).....	I-3-29

Table 3.3.28 List of Areas in HP State where PAP is Mandatory Required .....	I-3-29
Table 3.4.1 Bio-geographic Zones and Provinces .....	I-3-31
Table 3.4.2 Land Use Classification in HP State (2010-11) .....	I-3-34
Table 3.4.3 District-wise Land Use Pattern (2010-11) .....	I-3-35
Table 3.4.4 River Catchments and River Basin in HP State .....	I-3-39
Table 3.4.5 Population Distribution in Eight Major River Basins in HP State.....	I-3-41
Table 3.4.6 Max and Min Temperature in Selected Stations/ Centres in HP (2015-16).....	I-3-42
Table 3.4.7 Winter Air Temperature Trend.....	I-3-43
Table 3.4.8 Rainfall Trend in HP State (1951-2005).....	I-3-44
Table 3.4.9 Basin-wise Loss of Glacier Area in HP State (1962-2004) .....	I-3-45
Table 3.4.10 Major Past Earthquakes in HP State .....	I-3-48
Table 3.4.11 Major Past Landslides in HP State.....	I-3-48
Table 3.4.12 Major Landslides due to Flash Floods.....	I-3-49
Table 3.4.13 Major Past Flash Floods in HP State .....	I-3-49
Table 3.4.14 Major Past Avalanches in HP State.....	I-3-49
Table 3.5.1 Summary of the Review of 12th Five-Year Plan by NITI Aayog.....	I-3-50
Table 3.5.2 Scheme Specific Recommendation based on the 12th Five-Year Plan Review .....	I-3-51
Table 3.5.3 Regional Strategies for Northern Himalayans States (Jammu & Kshimir, Himachal Pradesh and Uttarakhand).....	I-3-52
Table 3.5.4 Targets and Indicators Identified to Achieve SDG 15 .....	I-3-53
Table 4.1.1 Main Policy Measures in HP Forest Sector Policy and Strategy 2005 .....	I-4-1
Table 4.1.2 Major State Level Laws and Policies related to Forest Management and Forest Products..	I-4-2
Table 4.1.3 Major State Level Laws and Policies related to Wildlife and Biodiversity .....	I-4-4
Table 4.1.4 State Level Laws and Regulations related to Felling of Trees .....	I-4-5
Table 4.2.1 Status of Officers and Supporting Staff of HPFD as of January 31, 2017.....	I-4-10
Table 4.2.2 Functional Offices under HPFD .....	I-4-11
Table 4.2.3 Number of Vacant Positions under HPFD by Year.....	I-4-11
Table 4.2.4 Forestry Sector Budgets .....	I-4-12
Table 4.2.5 GIS Data Layers Availability and Present Status.....	I-4-15
Table 4.2.6 Key Web Enabled FMIS Systems Developed by HPFD .....	I-4-16
Table 4.2.7 IT Infrastructure in Major Offices in HPFD.....	I-4-17
Table 4.3.1 Status of Notified Forest Area in HP State .....	I-4-19
Table 4.3.2 Density Classification and Changes in Forest Cover in HP based on ISFR 2003 – 2015 ..	I-4-21
Table 4.3.3 Altitudinal Distribution of Forest Cover in HP.....	I-4-21
Table 4.3.4 Patch Size Distribution of Forest Cover in HP State .....	I-4-21
Table 4.3.5 Forest Cover 2015, Within and Outside on Green Wash Area in HP (km <sup>2</sup> ) .....	I-4-22
Table 4.3.6 Main Forest Classes and Forest Type-Groups in India.....	I-4-22
Table 4.3.7 Forest Type-Groups and Forest Types in HP State .....	I-4-23
Table 4.3.8 Culturable & Non-Culturable Forest Areas and Potential Forest/ Tree Cover Areas in Forest Sector Policy and Strategy 2005.....	I-4-24
Table 4.3.9 Forest Land Diversion for Non- Forestry Purpose till Jan 2016.....	I-4-25
Table 4.3.10 Diversion Approved under FRA 2006 as of 20 June 2017 .....	I-4-25
Table 4.4.1 Forest Type Groups with Dominant Tree Species in HP State .....	I-4-26
Table 4.4.2 Legal Definitions of Protected Area (PA).....	I-4-27
Table 4.4.3 Protected Areas in HP State .....	I-4-28
Table 4.4.4 Management Plan Status of Protected Areas in HP State (July 2017).....	I-4-29

Table 4.4.5	Indications of Himalayan Biodiversity Hotspot .....	I-4-30
Table 4.4.6	Species Diversity and Endemism of Himalayan Biodiversity Hotspot .....	I-4-31
Table 4.4.7	Wetlands Identified under National Wetlands Conservation and Management Programme .....	I-4-32
Table 4.4.8	UNESCO Natural World Heritage Site in HP State.....	I-4-33
Table 4.4.9	Biosphere Reserves in HP State.....	I-4-33
Table 4.4.10	Human-Wildlife Conflicts in HP State (2012-13 to 2016-17).....	I-4-34
Table 4.4.11	Wildlife Attacks on Humans in HP State (2012-13 to 2016-17).....	I-4-34
Table 4.4.12	Division-wise Human-Wildlife Conflicts in 2016-17.....	I-4-36
Table 4.4.13	Circle-wise Exotic Weed Infestation in Forest Lands (January-March 2011).....	I-4-37
Table 4.4.14	Possible Causes for Infestation of Invasive Species.....	I-4-38
Table 4.4.15	Key Functions and Responsibilities with SBB.....	I-4-40
Table 4.4.16	Ecotourism Sites Promoted by HPECOSOC.....	I-4-43
Table 4.4.17	Expenditure Under Wildlife Schemes .....	I-4-47
Table 4.5.1	Status of Working Plans in HP State (April 2017).....	I-4-48
Table 4.5.2	Types of Working Circle in HP State as of 2013 .....	I-4-49
Table 4.5.3	Amount Invested in Forestry and Afforestation Area in HP State under Plan Budget.....	I-4-51
Table 4.5.4	District-wise Planation Achievements by State Plan including Projects and Centrally Sponsored Schemes .....	I-4-51
Table 4.5.5	Circle-wise Pasture/ Grassland Distribution in HP State based on Vegetation and Land Use Type Map 2012.....	I-4-53
Table 4.5.6	District-wise Statistical Data of Pasture .....	I-4-55
Table 4.5.7	Motorable Forest Road in HP State .....	I-4-61
Table 4.5.8	Bridle Path in HP State .....	I-4-61
Table 4.5.9	Number of Forest Rest House and Inspection Hut .....	I-4-62
Table 4.5.10	Number of Buildings .....	I-4-62
Table 4.5.11	Number of Boundary and Chak Pillars.....	I-4-63
Table 4.5.12	Status of Survey and Demarcation of Un-demarcated Forest (2010 & 2016).....	I-4-64
Table 4.5.13	Recommended SWC Measures by the JICA Study Team .....	I-4-65
Table 4.5.14	The Year-wise Detail of Forest Fire in HP State (2004-05 to 2017-18).....	I-4-66
Table 4.5.15	Major Achievements of Intensification of Forest Management Scheme (2011-12 to 2016-17) .....	I-4-68
Table 4.5.16	Encroachment Cases on Forest Land up to 31 March 2017 .....	I-4-69
Table 4.5.17	Illicit Felling Cases between 1981- 2015 .....	I-4-70
Table 4.5.18	Plan Schemes in the Forestry Sector .....	I-4-71
Table 4.5.19	Recent and On-going Major Externally Aided Projects in the Forestry Sector.....	I-4-73
Table 4.6.1	JFM under NAP.....	I-4-74
Table 4.6.2	Summary of HP Participatory Forest Management Regulations 2001 .....	I-4-75
Table 4.6.3	Projects/ Schemes and Village Level Institutions Organised for Participatory Forest Management .....	I-4-76
Table 4.6.4	Status of JFMCs under FDA – A Case of Shimla Forest Division .....	I-4-76
Table 4.6.5	JFMCs under FDA .....	I-4-77
Table 4.7.1	Rules Governing Timber Distribution to the Right Holders.....	I-4-80
Table 4.7.2	Volume of Timber Distributed to the Right Holders in HP State.....	I-4-82
Table 4.7.3	Share of TD to the Total Production of Timber of HP State.....	I-4-82
Table 4.8.1	Outturn of Major Forest Produces and Their Values .....	I-4-84

Table 4.8.2	Outturn of Medicinal Herbs in HP State.....	I-4-84
Table 4.8.3	Volume of Medicinal Herbs Exported from HP State.....	I-4-85
Table 4.8.4	Outturn of Minor Forest Products during 2005-6 to 2014-15 .....	I-4-87
Table 4.8.5	Production of Katha/ Khair in HP State.....	I-4-88
Table 4.8.6	Production of Resin from the Forestland during Last 5 years .....	I-4-88
Table 4.8.7	Cedar Wood Oil Extraction Units in HP State .....	I-4-91
Table 4.8.8	Katha Industries in HP State .....	I-4-92
Table 4.9.1	Species on the Private Land Exempted from Tree Felling Permission.....	I-4-94
Table 4.9.2	Exempted Plant Species for Transit pass .....	I-4-95
Table 4.10.1	Proportion of Income by Source.....	I-4-96
Table 4.10.2	Means of Livelihoods in HP State .....	I-4-96
Table 4.11.1	Recent Livelihood Improvement Related Programme/ Schemes Implemented by the Government and other Relevant Agencies .....	I-4-99
Table 4.11.2	Key Observation on Institutional Set-up of GP during Mid-term Assessment .....	I-4-102
Table 4.11.3	Swan Women Federation and Cooperatives .....	I-4-103
Table 4.11.4	Mahila Mandals and Yuvak Mandals.....	I-4-105
Table 4.11.5	Number of Cooperatives in HP State .....	I-4-106
Table 4.11.6	Criteria and Provision for Intensive Blocks.....	I-4-107
Table 4.11.7	Intensive Blocks and their Progress of SHG Formation and Disbursement of RF and CIF, June 2017.....	I-4-108
Table 4.11.8	Capacity Building for IGA by NABARD.....	I-4-109
Table 4.11.9	Key Interventions of NABARD .....	I-4-110
Table 4.11.10	Financial Inclusion Programmes by NARARD.....	I-4-111
Table 4.11.11	Progress of SHG Formation and Linkage with Banks by WCD, March 2017 .....	I-4-113
Table 5.1.1	Review of JICA Forestry Projects (1).....	I-5-3
Table 5.1.2	Review of JICA Forestry Projects (2).....	I-5-5
Table 5.2.1	Review of Forest Ecosystem Climate Proofing Project (KfW).....	I-5-11
Table 5.2.2	Review of Swan River Integrated Watershed Management Project (JICA).....	I-5-13
Table 5.2.3	Review of Mid-Himalayan Watershed Management Project (World Bank) .....	I-5-16
Table 5.2.4	Review of Indo-German Changar Eco-development Project (GTZ).....	I-5-19
Table 5.2.5	Review of National Social Forestry Project (USAID) .....	I-5-22
Table 5.2.6	Review of Himachal Pradesh Forest Sector Reform Project (DFID).....	I-5-24
Table 5.2.7	Review of Sanjhi Van Yojna Scheme .....	I-5-25
Table 5.3.1	Review of Himachal Pradesh Forests for Prosperity Project (WB).....	I-5-27
Table 5.3.2	Review of Catchment Treatment for Source Sustainability and Climate Resilient Rain fed Agriculture (WB).....	I-5-28
Table 6.1.1	Overall Reviews of Forest Management and Livelihood Status in HP .....	I-6-1
Table 6.2.1	Status of Digitisation of Forest Compartment Boundaries in HP (March 2017).....	I-6-5
Table 6.2.2	GIS Data Layers: Key Issues and Recommendations .....	I-6-7
Table 6.2.3	Summary of IFMS .....	I-6-8
Table 6.7.1	Review of the Projects Related to Forest Management in HP State.....	I-6-27
Table 6.8.1	Indicative Key Issues and Possible Measures for Forest Management/ Forest Areas in Proposed Districts by HPFD .....	I-6-32
Table 7.1.1	Outline of the Project Proposed in DPR.....	I-7-1
Table 7.1.2	Tentative Proposed Outline of the Project before JICA Study .....	I-7-2
Table 7.4.1	Observation, Further Actions Required and Findings: Preparatory Work.....	I-7-4

Table 7.4.2 Observation, Further Actions Required and Findings: Forestry (Departmental Mode) .....	I-7-5
Table 7.4.3 Observation, Further Actions Required and Findings: Forestry (JFM Mode).....	I-7-10
Table 7.4.4 Observation, Further Actions Required and Findings: SMC .....	I-7-11
Table 7.4.5 Observation, Further Actions Required and Findings: Livelihood.....	I-7-11
Table 7.4.6 Observation, Further Actions Required and Findings: Wildlife .....	I-7-16
Table 7.4.7 Observation, Further Actions Required and Findings: Environmental Rehabilitation .....	I-7-19
Table 7.4.8 Observation, Further Actions Required and Findings: Research.....	I-7-20
Table 7.4.9 Observation, Further Actions Required and Findings: ICT .....	I-7-20
Table 7.4.10 Observation, Further Actions Required and Findings: M&E .....	I-7-21
Table 7.4.11 Observation, Further Actions Required and Findings: PMU.....	I-7-21
Table 7.4.12 Observation, Further Actions Required and Findings: Office .....	I-7-22
Table 7.4.13 Observation, Further Actions Required and Findings: Consulting Service.....	I-7-23
Table 7.4.14 Observation, Further Actions Required and Findings: Environmental and Social Consideration.....	I-7-23
Table 8.1.1 State Level Legal Framework for Environmental and Social Considerations.....	I-8-1
Table 8.1.2 Stages in Environmental Clearance Procedure as per EIA Notification 2006.....	I-8-9
Table 8.2.1 List of Villages inside National Parks and Wildlife Sanctuaries .....	I-8-17
Table 8.2.2 Noise Level Standards .....	I-8-19
Table 8.2.3 Primary Water Quality Criteria.....	I-8-20

## **Part II: Project**

Table 1.1.1 Forest Divisions and Protected Areas within Proposed Project Area .....	II-1-1
Table 1.2.1 Selection Process and Criteria .....	II-1-2
Table 1.2.2 Indicative Prioritised Divisions, Ranges and Protected Areas.....	II-1-5
Table 2.1.1 Brief of Territorial Divisions Located in the Prioritised Project Districts .....	II-2-1
Table 2.2.1 Division-wised Forest Cover of Divisions Located in the Prioritised Project Districts .....	II-2-2
Table 2.2.2 Division-wise Ecosystem (Vegetation) Type of Divisions Located in the Prioritised Project Districts .....	II-2-5
Table 2.3.1 Working Circle Areas of Divisions Located in Prioritised Project Districts (Except Protected Area).....	II-2-7
Table 2.3.2 Permanent Forest Nursery Status in Divisions Located in Prioritised Project Districts....	II-2-11
Table 2.3.3 JFMCs under FDA in Divisions Located in Prioritised Project Districts .....	II-2-12
Table 2.3.4 Summary of VFDS/ JFMCs Visited by the Study Team.....	II-2-12
Table 2.3.5 Preliminary Assessment of Areas Suitable for JFM Mode Forestry Operation.....	II-2-14
Table 2.3.6 Distribution of Timber to the Right Holders in Proposed Project Area .....	II-2-16
Table 2.4.1 Protected Areas Located in Prioritised Project Districts.....	II-2-18
Table 2.4.2 Current Status of Wildlife Divisions of Prioritised Project Districts.....	II-2-19
Table 2.4.3 Division-wise Biological Richness of Divisions Located in Prioritised Project Districts .....	II-2-20
Table 2.4.4 Division-wise Human Animal Conflicts of Project Districts Proposed by HPFD (2016-17).....	II-2-21
Table 2.4.5 Circle-wise Exotic Weed Infestation in Forest Lands (January-March 2011).....	II-2-22
Table 2.4.6 Ecotourism Sites Promoted by HPECOSOC in the Prioritised Project Districts .....	II-2-24
Table 2.4.7 Trekking Tours Conducted by HPECOSOC.....	II-2-24
Table 2.5.1 NTFPs Procured and Traded in the Proposed Project Districts .....	II-2-26
Table 2.5.2 Important NTFPs Exported from Nachan Forest Division, Mandi .....	II-2-27
Table 2.5.3 Important NTFPs Exported from Mandi Forest Division.....	II-2-27



Table 2.5.4 Important NTFPs Exported from Chamba Circle.....	II-2-27
Table 2.5.5 Important Markets for NTFPs .....	II-2-30
Table 2.5.6 Important Stakeholder Operating in the Project Area for NTFP Research, Procurement, Processing and Trade.....	II-2-32
Table 2.6.1 Operational Holdings in the Prioritised Project Districts .....	II-2-34
Table 2.6.2 Culturable Wasteland and Fallow Land in Prioritised Project Districts .....	II-2-35
Table 2.6.3 Area under Fruits Cultivation (2014-15) .....	II-2-35
Table 2.7.1 Sample Households – Livelihood Survey.....	II-2-36
Table 2.7.2 Villages Visited for PRA .....	II-2-36
Table 2.7.3 Economic Status by Ration Card.....	II-2-38
Table 2.7.4 Social Groups of Surveyed Households .....	II-2-39
Table 2.7.5 Demography of the Surveyed Households .....	II-2-40
Table 2.7.6 Households Engaged in Agriculture and Horticulture.....	II-2-41
Table 2.7.7 Households Engaged in Salaries and Wages .....	II-2-42
Table 2.7.8 Households Engaged in Animal Husbandry, Handicrafts and Other Activities.....	II-2-43
Table 2.7.9 Average Household Income among the Survey Households .....	II-2-44
Table 2.7.10 Average Household Income among the Survey Households by Economic Status .....	II-2-44
Table 2.7.11 Average Household Expenditure among the Survey Households.....	II-2-46
Table 2.7.12 Household Expenditure by Economic Status.....	II-2-46
Table 2.7.13 Various Community Institutions in the Surveyed Villages .....	II-2-48
Table 2.7.14 Mahila Mandal and Yuvak Mandal.....	II-2-48
Table 2.7.15 Government Programmes/ Schemes in the Surveyed Villages.....	II-2-49
Table 2.7.16 Status of Savings and Utilisation of Bank Accounts for Other Types of Transactions between April 2016 and March 2017 .....	II-2-50
Table 2.7.17 Status of Bank Loans taken by the Family Members .....	II-2-51
Table 2.7.18 Types of Household Energies Used .....	II-2-53
Table 2.7.19 Consumption of LPG in the Survey Villages.....	II-2-54
Table 2.7.20 Fuelwood Consumption in the Surveyed Villages.....	II-2-55
Table 2.7.21 Grazing Area and Pasture .....	II-2-57
Table 2.7.22 Grassland and Pasture Management Activities.....	II-2-57
Table 2.7.23 Issues Related to NTFP Harvesting, Processing and Marketing Identified by the Survey Households (Livelihood Survey).....	II-2-58
Table 2.7.24 NTFPs Harvested in the Surveyed Villages.....	II-2-59
Table 2.7.25 Land Holding in the Surveyed Villages.....	II-2-60
Table 2.7.26 Daily Time Schedule – Case of Malyawar Village, Bilaspur Forest Division.....	II-2-61
Table 2.7.27 Average Wages in the Surveyed Villages.....	II-2-62
Table 2.7.28 Summary of the Land Ownership.....	II-2-62
Table 2.7.29 Gender Roles in Forest Management .....	II-2-63
Table 2.7.30 SHGs Visited during the Study in the Target Districts .....	II-2-64
Table 2.7.31 Characteristics of SHGs in Project Area.....	II-2-65
Table 3.1.1 Project Plan Outline of the Prioritised Project.....	II-3-1
Table 3.2.1 Restructuring of Project Components in the DPR.....	II-3-2
Table 3.5.1 Log Frame: Narrative Summary (Version 4) .....	II-3-9
Table 3.6.1 Restructured Components/ Sub Components .....	II-3-11
Table 3.7.1.1 Indicative Broad Criterion of Selection of Project Intervention Areas.....	II-3-13
Table 3.7.1.2 Preparation of Maps for Micro Planning.....	II-3-14

Table 3.7.1.3 Indicative Criteria for Ward Prioritisation – Sustainable Forest Management .....	II-3-15
Table 3.7.1.4 Points to be Discussed and Expected Outcome of the Stakeholder Consultation .....	II-3-16
Table 3.7.1.5 Indicative Terms of Engagement - Ward Facilitators .....	II-3-17
Table 3.7.1.6 Overall Description of Forestry Operations in the Project .....	II-3-22
Table 3.7.1.7 Indicative Topics for Project Orientation and Forest/ Biodiversity Nexus.....	II-3-27
Table 3.7.1.8 Indicative Topics for Planning, Implementation and Group Management.....	II-3-28
Table 3.7.1.9 Proposed Exposure Visits by Community Institutions .....	II-3-29
Table 3.7.1.10 Annual and Quarterly Joint Workshops by VFDSs and BMC.....	II-3-29
Table 3.7.1.11 Indicative Description of Modern Nurseries to be Upgraded.....	II-3-32
Table 3.7.1.12 Indicative Description of Range Level Nurseries to be Upgraded.....	II-3-32
Table 3.7.1.13 Indicative Training for DMU Subject Matter Specialist/ FTU Coordinators for Community Planning and Livelihood Improvement .....	II-3-36
Table 3.7.1.14 Proposed Training for Ward Facilitators.....	II-3-37
Table 3.7.2.1 Brief Description of the Potential Activities under Scientific Biodiversity Management .....	II-3-40
Table 3.7.2.2 Animal-Habitat Associations of Characteristic Animals in HP .....	II-3-45
Table 3.7.2.3 Indicative Training for Divisional/ Range Staffs for Scientific Biodiversity Management .....	II-3-50
Table 3.7.2.4 Description of Key Activities under Community Based Biodiversity Conservation Sub-Component.....	II-3-52
Table 3.7.2.5 Indicative Criteria for Selection of BMCs.....	II-3-54
Table 3.7.2.6 Indicative Terms of Engagement of GP Mobiliser and Ward Facilitator.....	II-3-55
Table 3.7.2.7 Indicative Topics for Project Orientation and Forest/ Biodiversity Nexus.....	II-3-60
Table 3.7.3.1 Potential Activities under Community Development .....	II-3-63
Table 3.7.3.2 Indicative Outline of the Guidelines and Manuals and Training Programmes for Community Development .....	II-3-64
Table 3.7.3.3 Suggested Clusters for NTFP Enterprise Development.....	II-3-66
Table 3.7.3.4 Human Resources to be deployed with Jadi-Buti Cell .....	II-3-68
Table 3.7.3.5 Tentative List of NTFPs including Medicinal Plants to be Cultivated in Non-forestland.....	II-3-79
Table 3.7.3.6 Training programmes to be organised by the Jadi-Buti Cell .....	II-3-84
Table 3.7.3.7 Training and capacity building at the cluster level (for each cluster).....	II-3-85
Table 3.7.3.8 Mapping of Livelihood Options in the Proposed Project Areas .....	II-3-87
Table 3.7.3.9 Indicative Cluster Based Livelihood Activities .....	II-3-89
Table 3.7.3.10 Outline of Manuals- CIG/ SHG Capacity Building.....	II-3-90
Table 3.7.3.11 Proposed Training for SHGs and CIGs.....	II-3-91
Table 3.7.3.12 Proposed Exposure Visits by Community Institutions .....	II-3-92
Table 3.7.4.1 Proposed IT Infrastructure at PMU & IT Cell (Indicative) .....	II-3-93
Table 3.7.4.2 Proposed IT Infrastructure at FCCUs (Indicative) .....	II-3-95
Table 3.7.4.3 Proposed IT Infrastructure at DMUs (Indicative).....	II-3-96
Table 3.7.4.4 Proposed IT Infrastructure at FTUs (Indicative) .....	II-3-97
Table 3.7.4.5 Suggested Areas of Training and Sample Topics.....	II-3-102
Table 3.7.4.6 Evaluation Framework for the Project.....	II-3-108
Table 3.7.4.7 Key Reporting Requirement at Various Levels .....	II-3-110
Table 3.7.4.8 Indicative PMC Team Compositions.....	II-3-119
Table 4.1.1 Comparison of Institutional Arrangement Options and Recommendation.....	II-4-3

Table 4.3.1 Proposed Composition of HPC for the Project.....	II-4-10
Table 4.3.2 Proposed Composition of Governing Body.....	II-4-13
Table 4.3.3 Proposed Composition of Executive Committee of PMU.....	II-4-14
Table 4.4.1 Proposed PMU Staffing.....	II-4-16
Table 4.4.2 Responsibilities of Key Staff in PMU .....	II-4-17
Table 4.4.3 Proposed FCCU Staffing (Deputation/ Direct Hire/ Outsourcing).....	II-4-20
Table 4.4.4 Responsibilities of Key Staff in FCCU.....	II-4-20
Table 4.4.5 Proposed DMU Staffing (Deputation/ Direct Hire/ Outsourcing).....	II-4-22
Table 4.4.6 Responsibilities of Key Staff in DMU.....	II-4-22
Table 4.4.7 FTU Staffing (Proposed – Deputation/ Direct Hire/ Outsourcing).....	II-4-24
Table 4.4.8 Responsibilities of Key Staff in FTU .....	II-4-25
Table 4.6.1 Fund Flow and Control System for the Proposed Project .....	II-4-30
Table 5.1.1 Summary of Proposed Project Implementation Schedule .....	II-5-2
Table 6.1.1 Overall Procurement and Implementation Methods.....	II-6-1
Table 7.1.1 Summary of Cost Estimates .....	II-7-1
Table 7.3.1 Cost Components.....	II-7-3
Table 7.3.2 Project Component-wise Cost Ratio.....	II-7-3
Table 7.3.3 Cost for Consulting Service.....	II-7-4
Table 7.4.1 Annual Cost Schedule.....	II-7-4
Table 7.5.1 Summary of Project Fund Requirement in JPY .....	II-7-5
Table 8.1.1 Activities Expected to Generate Potential Economic Benefit from Project .....	II-8-1
Table 8.1.2 Anticipated Economic Benefits .....	II-8-1
Table 8.1.3 Other Expected Benefits by Implementation of Project .....	II-8-2
Table 8.2.1 Summary of the Conditions for Calculation of EIRR .....	II-8-3
Table 8.2.2 Financial Cost and Economic Cost by Project Component.....	II-8-4
Table 8.2.3 Estimate of Annual O&M/ Replacement Cost for the Project.....	II-8-4
Table 8.3.1 Results of Economic Analysis .....	II-8-4
Table 8.3.2 Expected Benefit from Each Project Activity.....	II-8-5
Table 8.4.1 Sensitivity Analysis by EIRR .....	II-8-5
Table 8.5.1 Base Cost of Project (by category) .....	II-8-6
Table 9.1.1 Operation and Maintenance Framework .....	II-9-1
Table 10.1.1 Operation Indicators .....	II-10-1
Table 10.1.2 Effect Indicators .....	II-10-4
Table 11.2.1 Institutional Structure for ESAF Implementation and Monitoring.....	II-11-2
Table 11.2.2 Draft ESMS Checklist .....	II-11-6
Table 11.3.1 Key Social Groups for ESAF .....	II-11-11
Table 11.3.2 Rationales to Determine the Target Social Groups under VSTPF .....	II-11-14

## List of Figures

### **Part I: Study**

Figure 3.2.1 Panchayati Raj Institutions in HP State.....	I-3-4
Figure 3.2.2 Hierarchies and Relationship of Revenue and PRI Structures Units in HP State .....	I-3-5
Figure 3.3.1 Protected Area Permit (PAP) Areas in HP State.....	I-3-30
Figure 3.4.1 Bio-geographic Regions in HP State.....	I-3-32
Figure 3.4.2 Elevations in HP State.....	I-3-37
Figure 3.4.3 River Catchments and River Basins in HP State.....	I-3-39
Figure 3.4.4 Rainfall Trend of Major Locations within HP State.....	I-3-44
Figure 3.4.5 Diagrammatic Representation of Hazard Profile of HP State.....	I-3-47
Figure 4.2.1 Administrative Hierarchy of Forest Administrative Units in HPFD.....	I-4-8
Figure 4.2.2 HPFD Overall Administrative Structure .....	I-4-9
Figure 4.2.3 Web Diagram of HPFD Expenditure Over Six Financial Years.....	I-4-13
Figure 4.2.4 Fund Flow of HPFD from the State Government .....	I-4-14
Figure 4.2.5 HPFD Monitoring & Evaluation Structure .....	I-4-15
Figure 4.4.1 A Map of Himalayan Biodiversity Hotspot.....	I-4-30
Figure 4.5.1 Grasslands and Pastures Distributions in HP State .....	I-4-54
Figure 4.5.2 Forest Fire Risk Zonation Map of HP State .....	I-4-68
Figure 4.11.1 Financial Assistance to SHG under NRLM .....	I-4-107
Figure 4.11.2 Monitoring Structure of WCD and Anganwari Centers.....	I-4-112
Figure 8.1.1 Major Institutions Involved in Environment and Social Considerations .....	I-8-7
Figure 8.1.2 Flow for Environmental Clearance Procedure as per EIA Notification 2006.....	I-8-10
Figure 8.1.3 Flow Diagram Depicting Forest Clearance Process.....	I-8-12
Figure 8.1.4 Flow Diagram for Land Acquisition Process .....	I-8-14
Figure 8.1.5 Flow Diagram for Resettlement and Rehabilitation.....	I-8-14
Figure 8.2.1 Annual Average of SO <sub>2</sub> and NO <sub>2</sub> in HP State During 2015-16 .....	I-8-18
Figure 8.2.2 Annual Averages of RSPM in HP State During 2015-16 .....	I-8-18

### **Part II: Project**

Figure 1.2.1 Indicative Prioritised Project Area .....	II-1-6
Figure 2.2.1 Ecosystem (Vegetation) Type Distribution in HP State (Indicative).....	II-2-6
Figure 2.3.1 Venn Diagramme in Surahan Range, Mandi Division .....	II-2-13
Figure 2.5.1 Existing Value Chain of NTFP in HP State.....	II-2-31
Figure 2.7.1 Cooking Stove and Hamam .....	II-2-56
Figure 3.1.1 Framework of Project Components and Flow of the Phases .....	II-3-2
Figure 3.7.1.1 Aggregation of FEMP and CD&LIP.....	II-3-18
Figure 3.7.1.2 Planning Process at Ward Level.....	II-3-19
Figure 3.7.1.3 Levels of Coordination for Convergence.....	II-3-20
Figure 3.7.3.1 Hydroponic Fodder Production Unit in ICAR Complex for Goa, Old Goa .....	II-3-65
Figure 3.7.3.2 Activities of Jadi-Buti Cell in PMU .....	II-3-70
Figure 3.7.3.3 Structure of Cluster Level Him Jadi-Buti Society/ Producer Group.....	II-3-72
Figure 3.7.3.4 Marketing Strategy.....	II-3-80
Figure 3.7.3.5 Procurement Arrangement of the NTFPs.....	II-3-81



## **List of Attachments**

### **Part I: Study**

- Attachment I.2.2.1 Major Roles and Responsibilities of the Key Institutions related to Forestry Sector
- Attachment I.3.2.1 State Revenue Sources
- Attachment I.3.2.2 Details of Government Initiatives for Good Governance
- Attachment I.3.3.1 District Wise Population (Census 2011)
- Attachment I.3.3.2 List of Scheduled Tribes of Himachal Pradesh and their Characteristics
- Attachment I.3.3.3 SC/ ST Population
- Attachment I.3.3.4 Block wise BPL Estimation
- Attachment I.3.3.5 Travel and Transportation Comparison among Major Cities/ Towns in HP State
- Attachment I.3.3.6 Security Information Civilians Killed/ Injured
- Attachment I.3.3.7 PAP Conditions and Procedures
- Attachment I.3.4.1 Changes of Land Use Pattern in HP State
- Attachment I.3.4.2 State-wise Land Holdings
- Attachment I.3.4.3 Major Soil Types in HP State
- Attachment I.3.4.4 Major Geological Features in HP State
- Attachment I.4.1.1 Legal Framework for Forest Sector at National Level
- Attachment I.4.3.1 Status of Forest Areas in HP State
- Attachment I.4.3.2 Major Forest Type Groups (Forest Groups) in HP State
- Attachment I.4.4.1 Data on Vegetation/ Forests in HP State
- Attachment I.4.4.2 Details on Fauna in HP State
- Attachment I.4.4.3 Protected Area Map of HP State
- Attachment I.4.4.4 Status of Management Plans for Protected Areas in HP State
- Attachment I.4.4.5 Key Biodiversity Areas (KBAs) in HP State
- Attachment I.4.4.6 Compensation Rates for Damages and Losses Caused by Wildlife
- Attachment I.4.4.7 Major Invasive Plants in HP State
- Attachment I.4.4.8 Lantana Status in HP State
- Attachment I.4.4.9 Strategy and Methodologies adopted by HPFD for Management of the Invasive Species
- Attachment I.4.4.10 Status and Key Achievements of the HP State Biodiversity Board
- Attachment I.4.4.11 Trekking Tours Conducted by HPESOSOC
- Attachment I.4.4.12 Major Wildlife Schemes in HP State
- Attachment I.4.5.1 Working Circle Information (2013)
- Attachment I.4.5.2 Descriptions of Working Circles in HP State
- Attachment I.4.5.3 Labour Supply Situations for HPFD and HPFDC based on Respective Working Plans
- Attachment I.4.5.4 Grasslands and Pastures Definitions Adopted in the Study
- Attachment I.4.5.5 Existing Classifications of Grasslands and Pastures
- Attachment I.4.5.6 Proposed Interventions in Grasslands and Pastures
- Attachment I.4.5.7 Reviews and Recommendations of SWC Measures
- Attachment I.4.5.8 Encroachment
- Attachment I.4.5.9 Division-wise Record of Illicit Tree Felling in HP State
- Attachment I.4.5.10 National Afforestation Programme (NAP): State Forest Development Agency (SFDA) and Forest Development Agency (FDA)

- Attachment I.4.5.11 CAMPA
- Attachment I.4.5.12 Catchment Area Treatment Plans (CAT Plans)
- Attachment I.4.6.1 Comparative Evaluation of PFM/ JFM Institutions Formed under Different Projects/ Programs in HP State
- Attachment I.4.11.1 Organisations Relevant to Livelihood Improvements
- Attachment I.4.11.2 National Rural Livelihood Mission (NRLM)
- Attachment I.4.11.3 National Bank for Agriculture and Rural Development (NABARD)
- Attachment I.5.1.1 Guiding Principles, M&E System and MIS of Mid-Himalayan Watershed Management Project
- Attachment I.5.3.1 Green India Mission
- Attachment I.6.2.1 Area Variation of Protected Area in HP State
- Attachment I.8.1.1 Labour Laws Pertinent to the Proposed Project
- Attachment I.8.1.2 Analysis of Indian Environmental and Social Consideration Framework against JICA Guidelines as well as the World Bank's Safeguard Policies
- Attachment I.8.1.3 Projects or Activities Requiring Prior Environmental Clearance
- Attachment I.8.1.4 Details of Stages in the Environmental Clearance as per the EIA Notification, 2006
- Attachment I.8.1.5 Details of Requirements and Systems related to Land Acquisition and Involuntary Resettlement
- Attachment I.8.2.1 National Ambient Air Quality Standards (NAAQS) as Notified in 18th November 2009, Annual averages of RSPM, SO<sub>2</sub> and NO<sub>x</sub> at all NAMP stations in HP for the year 2015-16.
- Attachment I.8.2.2 Water Quality Data in HP State

## **Part II: Project**

- Attachment II.2.3.1 Range-wise Permanent Forest Nursery Status in Proposed Project Divisions
- Attachment II.2.3.2 Status of Timber Distribution (Findings from the Livelihood Survey)
- Attachment II.2.4.1 Current Status of Protected Areas of Project Districts Proposed by HPFD
- Attachment II.2.4.2 The New List of the Threatened Plant and Animal Species of HP
- Attachment II.2.4.3 Status of Human Wildlife Conflict (Findings from the Livelihood Survey)
- Attachment II 2.7.1 (1) Livelihood Survey
- Attachment II 2.7.1 (2) Data Tables
- Attachment II.2.7.2 Seasonal Calendars
- Attachment II.2.7.3 Gender Roles in NTFP Harvesting and Processing – Panaul Village (Hlet Tikkal, Bilaspur Forest Division)
- Attachment II.2.8.1 Summary Table for SHGs
- Attachment II.2.8.2 Case Studies of SHGs and Lessons Learnt
- Attachment II.3.6.1 Indicative Project Work Quantity
- Attachment II.3.7.1.1 Indicative Terms of Reference of GP Mobiliser (BMC only) and Ward Facilitators (VFDS/ BMC)
- Attachment II.3.7.1.2 Potential Soil Water Conservation (SWC) Works
- Attachment II.3.7.1.3 Potential Species for Planation/ ANR Operations and Potential Medicinal Plant Species in HP
- Attachment II.3.7.1.4 Indicative Work Descriptions of ANR Operations
- Attachment II.3.7.1.5 Indicative Work Descriptions of Planation Operation
- Attachment II.3.7.1.6 Indicative Work Descriptions of Models for Improvement of Pastures and Grasslands

- Attachment II.3.7.1.7 Installation and Maintenance of Forest Boundary Pillars
- Attachment II.3.7.1.8 Indicative Seedling Production Information for Potential Species for the Project
- Attachment II.3.7.1.9 Indicative Tending Operations
- Attachment II.3.7.1.10 TOR for Monitoring Data Accumulation for Nursing /Planting of Tall Plants
- Attachment II.3.7.1.11 TOR for Monitoring Data Accumulation for Effective Pasture Management
- Attachment II.3.7.1.12 TOR for Study of Effective SWC and Land Slide Control Measures
- Attachment II.3.7.2.1 Indicative TOR for Pilot Projects on Biodiversity Corridor
- Attachment II.3.7.2.2 Indicative TOR for Basic Study for Designing Biodiversity Assessment
- Attachment II.3.7.2.3 Indicative Activities for Eco Tourism
- Attachment II.3.7.3.1 Indicative TOR for Pilot Projects on Hydroponic Fodder
- Attachment II.3.7.3.2 TOR for Assessment of potentiality and production of NTFPs and development of plan for conservation, resource development and sustainable management of NTFPs Indicative TOR for Pilot Projects on Hydroponic Fodder
- Attachment II.3.7.3.3 TOR for Development of Agro-Techniques of Selected NTFPs and Medicinal Plants
- Attachment II.3.7.3.4 TOR for Impact Assessment of 4-year extraction cycle of NTFPs
- Attachment II.3.7.3.5 TOR for Follow-up Assessment of Availability of NTFPs in the Target Clusters
- Attachment II.3.7.3.6 TOR for Market Survey
- Attachment II.3.7.3.7 TOR for Development of Publicity and Communication Materials
- Attachment II.3.7.3.8 Assessment of Non-NTFP Based Livelihood Options
- Attachment II.3.7.3.9 List of Potential Training Partners (HP and Other states in India)
- Attachment II.3.7.4.1 Indicative TORs for Pasture Management Specialist, NTFP/Value Chain /Marketing Specialist and Sustainable Tourism Specialist
- Attachment II.3.7.4.2(a) Indicative TOR for Gender Specialist
- Attachment II.3.7.4.2(b) Preliminary Gender Action Plan for HPFEM&LIP
- Attachment II.3.7.4.3 Basic TORs for Environmental and Social Consideration Expert and Environmental and Social Consideration Field Expert
- Attachment II.3.7.4.4 Terms of Reference for Training Needs Assessment (TNA)
- Attachment II.3.7.4.5 Indicative Capacity Development Programme for Environmental and Social Safeguards
- Attachment II.3.7.4.6 Indicative M&E System for the Project
- Attachment II.3.7.4.7 TOR for Basic Study for Strengthening of ICT at HPFD
- Attachment II.3.7.4.8 Terms of Reference for Project Management Consultant for Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project
- Attachment II.4.1.1 Priority Options Considered for Indicative Institutional Arrangements
- Attachment II.4.1.2 Gram Panchayat: Statutory Vehicle of Governance and Development
- Attachment II.4.1.3 Institutional Arrangement Option 4B: Engaging Gram Panchayats
- Attachment II.4.2.1 Roles and Responsibilities within Institutional Arrangements
- Attachment II.4.4.1 Indicative TORs for Programme Managers and Technicians at PMU
- Attachment II.4.4.2 Indicative TOR for FCCU Subject Matter Specialist (M&E - GIS/MIS)
- Attachment II.4.4.3 Indicative TORs for DMU Subject Matter Specialists
- Attachment II.4.4.4 Indicative TOR for FTU Coordinator (Livelihood Support and Inter-sectoral Convergence)
- Attachment II.4.5.1 Proposed Institutional Arrangement of VFDS
- Attachment II.5.1.1 Proposed Detailed Project Implementation Schedule
- Attachment II.6.1.1 Draft Detail Procurement and Implementation Methods



Attachment II.7.3.1 Activity-wise Cost (Indicative)

Attachment II.8.3.1 Economic Cash Flow of the Project

Attachment II.8.3.2 Benefit Valuation Methods

Attachment II.11.3.1 Draft Environmental and Social Assessment Framework (ESAF)

Attachment II.11.3.2 Draft Vulnerable Scheduled Tribes Planning Framework (VSTPF)

Attachment II.11.3.3 Draft Involuntary Resettlement Planning Framework (IRPF)

Attachment II.12.1.1 Risk Management Framework

**List of Abbreviations**

<b>Abbreviation</b>	<b>Full Name</b>
ABS	Access Benefit Sharing
ACF	Assistant Conservator of Forests
ACU	Adult Cattle Unit
AD	Administrative Department
AEPS	Aadhaar Enabled Payment System
AGM	Annual General Meetings
ANR	Assisted Natural Re-generation
APCCF	Additional Principal Chief Conservator of Forests
APL	Above Poverty Line
APO	Annual Plan of Operation
APY	Atal Pension Yojana
ARCBR	Advanced Research Centre for Bamboo and Rattan
AZE	Alliance for Zero Extinction
BADP	Boarder Area Development Programme
BCA	Business Correspondent Agents
BDO	Block Development Officer
BDS	Business Development Services
BHS	Biodiversity Heritage Sites
BIRD	Bankers Institute of Rural Development
BIS	Biodiversity Information System
BMC	Biodiversity Management Committee
BPL	Below Poverty Line
BR	Biodiversity Richness
BSBDA	Basic Saving Bank Deposit Account
CA	Compensatory Afforestation
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CAT	Catchment Area Treatment
CBA	Capacity Building Agency
CBC	Conservation Breeding Centre
CBD	Convention on Biological Diversity
CBET	Community Based Ecotourism
CBM	Community Based Biodiversity Management
CBMP	Community Based Biodiversity Management Plan
CBO	Community Based Organisation
CBSA	Capacity Building Support Agencies
CCF	Chief Conservator of Forests
CCU	Circle Coordination Unit
CD&LIP	Community Development and Livelihood Improvement Plan
CDBR	Cold Desert Biosphere Reserve
CDD	Community-driven Development
CDPO	Child Development Project Officers
CDSP	Capacity Development Strategy and Plan
CEPF	Critical Ecosystem Partnership Fund
CETPs	Common Effluent Treatment Plants
CF	Conservator of Forest
CFM	Community Forest Management
CFR	Community Forest Rights
CIF	Community Investment Fund
CIGs	Common Interest Groups
CLF	Cluster Level Federation
CLSs	Circle Level Societies
CMSWMF	Common Municipal Solid Waste Management Facility
CP	Construction Phase
CPCB	Central Pollution Control Board

<b>Abbreviation</b>	<b>Full Name</b>
CPD	Chief Project Director
CR	Capital Receipts
CRPs	Community Resource Persons
CSCs	Common Service Centres
CSD	Commission on Sustainable Development
CSR	Corporate Social Responsibility
CSSs	Centrally Sponsored Schemes
DC	District Collector
DCF	Deputy Conservator of Forest
DEA	Department of Economic Affairs
DEST	Department of Environment, Science and Technologies
DfID	Department for International Development, UK
DFO	Divisional Forest Officer
DIT	Department of Information Technology
DLAP	Digital Financial Literacy Awareness Program
DLCs	District Level Committees
DLT	Drainage Line Treatment
DM	Draftsman
DMU	Divisional Management Unit
DPC	Departmental Promotion Committee
DPF	Demarcated Protected Forest
DPO	District Program Officer
DPR	Detailed Project Report
DRD	Department of Rural Development
DRDA	District Rural Development Agency
DSS	Decision Support System
EA	Executing Agency (in some cases may also refer about “Environmental Assessment”)
EAC	Expert Appraisal Committees
EAP	Externally Aided Project
EBA	Ecosystem Based Approach
EBM	Ecosystem-Based Management
EC	Executing Committee (in some cases may also refer about “Environmental Clearance”)
EDC	Eco-development Committee
EEMIS	Employment Exchanges Management Information System
EG	Expert Group
EIA	Environmental Impact Assessment
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EPZs	Export Processing Zones
ES	Ecosystem Services
ESAF	Environmental and Social Assessment Framework
ESC	Environmental and Social Considerations
ESCAP	Economic and Social Council for Asia and Pacific
ESCE	Environmental and Social Consideration Expert
ESCFS	Environmental and Social Consideration Field Specialist
ESMS	Environmental and Social Management System
ESMSF	Environmental and Social Management System Framework
FAMS	Fire Alert Messaging System
FAO	Food and Agriculture Organisation
FC	Finance Commission
FCA	Forest Conservation Act
FCM	Forest Cover Map
FD	Forest Department
FDA	Forest Development Agency

<b>Abbreviation</b>	<b>Full Name</b>
FDST	Forest Dwelling Scheduled Tribes
FI	Financial intermediary
FIF	Financial Inclusion Fund
FLAP	Financial Literacy Awareness Programme
FLC	Financial Literacy Centers
FLS	Front Line Staff
FMIS	Forest Management Information System
FPC	Forest Protection Committee
FPIC	Free Prior Informed Consent
FRA	Forest Rights Act
FRC	Forest Rights Committee
FREEP	Forest Research and Education Project
FSI	Forest Survey of India
FTM	Forest Type Map
FWC	Forest Working Committee
FY	Financial Year
GB	Governing Board/Body
GEF	Global Environment Facility
GHG	Green House Gas
GHNP	Great Himalayan National Park
GIM	Green India Mission
GIS	Geographic Information System
GISD	Global Invasive Species Database
GIZ	Germany's Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
GMP	Good Manufacturing Practice
GoI	Government of India
GP	Gram Panchayat
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GSDP	Gross State Domestic Product
HBCFDC	Himachal Backward Classes Finance & Development Corporation
HDM	Head Draftsman
HFRI	Himalayan Forest Research Institute
HH	Households
HIMFED	HP State Co-operative Marketing and Consumer Federation
HIMSWAN	Himachal State Wide Area Network
HIPA	Himachal Pradesh Institute of Public Administration
HMNEH	Horticulture Mission for North East and Himalayan States
HOFF	Head of Forest Force
HP	Himachal Pradesh
HPC	High Power Committee
HPECOSOC	Himachal Pradesh Ecotourism Society
HPFD	Himachal Pradesh Forest Department
HPFELPS	Himachal Pradesh Forest Ecosystems and Livelihood Project Society
HPFP	HP Forestry Project
HPMHWDP	HP Mid-Himalayan Watershed Development Project
HPNRMS	Himachal Pradesh Natural Resource Management Society
HP-PFM	Himachal Pradesh Participatory Forest Management
HPPSC	Himachal Pradesh Public Service Commission
HPSFDCL	Himachal Pradesh State Forest Development Corporation Limited
HRTC	Himachal Road Transport Corporation
IA	Implementing Agency
IAY	Indira Awas Yojana
IBAs	Important Bird and Biodiversity Areas
ICDS	Integrated Child Development Service Scheme

<b>Abbreviation</b>	<b>Full Name</b>
ICFRE	The Indian Council of Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
ICT	Information Communication Technology
IEC	Information, Education and Communication
IFA	India Forest Act
IFMS	Integrated Forest Management System
IGA	Income Generation Activity
IGCP	Indo-German Eco-Development Project
IGFRI	Indian Grass and Fodder Research Institute
IHBT	Institute of Himalayan Bioresource Technology
IIRS	Indian Institute of Remote Sensing
INDC	Intended Nationally Determined Contribution
INR	Indian National Rupees
IP	Indigenous People
IPC	Indian Penal Code
IRPF	Involuntary Resettlement Planning Framework
ISFR	India State of Forest Report
IT	Information Technology
ITDP	Integrated Tribal Development Programme
IUCN	International Union for Conservation of Nature and Natural Resources
IWDP	Integrated Watershed Development Project
IWMP	Integrated Watershed Management Programme
J&K	Jammu and Kashmir
JDM	Junior Draftsman
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Areas
KCC	Kisan Credit Card Scheme
KLD	Kilo Litres per Day
KVIC	Khadi Village Industries Commission
LCB	Local Competitive Bidding
LEDP	Livelihood Enterprise Development Program
LI	Landscape Integrity
LPA	Land Preservation Act
LPG	Liquified Petroleum Gas
LULC	Land Use and Land Cover
MAB	Man and the Biosphere
MAP	Medicinal and Aromatic Plant
M&E	Monitoring and Evaluation
MADA	Modified Area Development Approach
MBT	Main Boundary Thrust
MCT	Main Central Thrust
MDG	Millennium Development Goals
MEDP	Microenterprise Development Program
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MHWIDP	Mid-Himalayan Watershed Development Project
MIDH	Mission for Integrated Development of Horticulture
MIS	Management Information System
MKSP	Mahila Kisan Sashaktikaran Pariyojana (A NRLM scheme to improve women's status in agriculture.
MLA	Members of Legislative Assembly
MM	Man Month
MMR	Maternal Mortality Rate
MOA	Memorandum of Association
MOD	Minutes of Discussion

<b>Abbreviation</b>	<b>Full Name</b>
MOEF	Ministry of Environment and Forests
MoEF&CC	Ministry of Environment, Forests and Climate Change
MoRD	Ministry of Rural Development
MoSJE	Ministry of Social Justice and Empowerment
MoTA	Ministry of Tribal Affairs
MOU	Memorandum of Understanding
MT	Metric Tons
NAAQS	National Ambient Air Quality Standards
NABARD	National Bank For Agriculture And Rural Development
NABET	National Accreditation Board for Education and Training
NABM	National Agro-forestry & Bamboo Mission
NAEB	National Afforestation and Eco- Development Board
NAP	National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NBA	National Biodiversity Authority
NBCFDC	National Backward Classes Finance and Development Corporation
NBM	National Bamboo Mission
NCBC	National Commission for Backward Classes
NCDNSNT	National Commission for Denotified and Semi-Nomadic Tribes
NCF	Nature Conservation Foundation
NCRB	National Crime Record Bureau
NCSC	National Commission for Scheduled Castes
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NFSM	National Food Security Mission
NGO	Non-Governmental Organisation
NGT	National Green Tribunal
NH	National Highway
NIC	National Informatics Centre
NISD	National Institute of Social Defense
NIELT	National Institute of Electronics & Information Technology
NITI	National Institution for Transforming India
NMAET	National Mission on Agricultural Extension and Technology
NMMU	National Mission Management Unit
NMPB	National Medicinal Plants Board
NMSA	National Mission on Sustainable Agriculture
NP	National Park
NPOP	National Programme for Organic Production
NPV	Net Present Value
NRLM	National Rural Livelihood Mission
NRM	National Resource Management
NRO	National Resource Organisation
NRRP	National Resettlement and Rehabilitation Policy
NRSC	National Remote Sensing Centre
NSFDC	National Scheduled Castes Finance and Development Corporation
NSKFDC	National Safai Karamcharis Finance and Development Corporation
NTFP	Non Timber Forest Product(s)
OBC	Other Backward Class
OBSDA	One Basic Saving Deposit Account
ODA	Official Development Assistance
OLTIS	Online Treasury Information System
OP	Operational Policy
OSMEFWC	Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance
OTFD	Other Traditional Forest Dwellers
PA	Protected Area

Abbreviation	Full Name
PACS	Primary Agriculture Credit Societies
PAP	Protected Area Permit
PBR	People's Biodiversity Register
PCCF	Principal Chief Conservator of Forest
PD	Project Director
PDCs	Panchayat Development Committees
PES	Payment for Ecosystem Services
PESA	The Provisions of the Panchayat (Extension to Scheduled Areas) Act
PFM	Participatory Forest Management
PHC	Primary Health Center
PISFR	Pre-investment Survey of Forest Resources
PMAY-G	Pradhan Mantri Awas Yojana: Gramin
PMC	Project Management Consultants
PMGSY	Pradhan Mantri Gram Sadak Yojana
PMJDY	Pradhan Mantri Jan Dhan Yojana
PMJJBY	Pradhan Mantri Jeevan Jyoto Bima Yojana
PMKSY	Pradhan Mantri Krishi Sinchai Yojana
PMSBY	Pradhan Mantri Suraksha Bima Yojana
PMU	Project Management Unit
PPP	Private Public Partnership
PRA	Participatory Rural Appraisal
Pre-CP	Pre-Construction Phase
PRF	Protected Reserve Forest
PRI	Panchayat Raj Institute
PRO	Public Relations Officer
PS	Panchayat Samiti
PWD	Public Works Department
QA/QC	Quality Assurance and Quality Control
QCBS	Quality and Cost Based Selection
QGIS	Quantum Geographic Information System
R&R	Resettlement and Rehabilitation
RBI	Reserve Bank of India
RD	Recurring Deposit
REC	Regional Empowered Committee
REDD+	Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
RF	Revolving Fund
RFCTLARRA	Right to Fair Compensation and Transparency in Land Acquisition and Rehabilitation and Resettlement Act
RFO	Range Forest Officer
RO	Range Officer
RoW	Right of Way
RP	Resettlement Plan
RR	Revenue Receipts
Rs.	Indian National Rupees
RSETI	Rural Self Employment Training Institutes
SA	Social Assessment
SAARC	South Asian Association for Regional Co-operation
SACEP	South Asia Co-operative Environment Programme
SAG	State Advisory Group
SBB	State Biodiversity Board
SC	Scheduled Caste
SCA	Special Central Assistance
SDC	State Data Centre
SDG	Sustainable Development Goals

<b>Abbreviation</b>	<b>Full Name</b>
SDLCs	Sub-Divisional Level Committees
SDM	Sub-Divisional Magistrate
SEAC	State Expert Appraisal Committee
SEIAA	State Environment Impact Assessment Authority
SEZs	Special Economic Zones
SFDA	State Forest Development Agency
SFM	Sustainable Forest Management
SGSY	Swarnjayanti Gram Swarozgar Yojana
SHG	Self Help Group
SHG-BLP	SHG Bank Linkage Programme
SHPI	SHG Promoting Institution
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SMC	Soil and Moisture Conservation
SMMU	State Mission Management Unit
SMS	Subject Matter Specialist (in some cases may also refer about “Short Message Service”)
SNPP	Suomi National Polar Orbiting Partnership
SoEs	Statement of Expenditures
SOF	Scale of Finance
SOI	Survey of India
SPA	State Procurement Agency
SPCB	State Pollution Control Board
SPV	Special Purpose Vehicle
SSA	Sub-Service Areas
SSO	Social Safeguards Officer
ST	Scheduled Tribe
SVY	Sanjhi Van Yojana
SWF	SWAN Women Federation
SWMCS	SWAN Women Multipurpose Cooperative Society
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCD	Ton of Cane per Day
TD	Timber Distribution
TDR	Timber Distribution Rights
TNA	Training Needs Assessment
TOR	Terms of Reference
ToT	Training of Trainers
TPD	Tons Per Day
TS	Threatened Species
TSP	Tribal Sub Plan
UAV	Unmanned Aerial Vehicle
UDPF	Un-Demarcated Protected Forest
ULBs	Urban Local Bodies
UNDP	United Nations Development Programme
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPNRM	Umbrella Programme on Natural Resource Management
USD	United States Dollar
UGs	User Groups
UTPCC	Union Territory Pollution Control Committee
VAT	Value Added Tax
VDC	Village Development Committee
VEDC	Village Eco- Development Committee
VFDS	Village Forest Development Society
VO	Village Organisation



<b>Abbreviation</b>	<b>Full Name</b>
VRF	Vulnerability Reduction Fund
VSTPF	Vulnerable Scheduled Tribes Planning Framework
WB	World Bank
WELPMIS	Welfare Pension Management Information System
WII	Wildlife Institute of India
WLS	Wildlife Sanctuary
WP	Working Plan
WPDF	Watershed Participatory Development Facilitator
WPG	Women's Production Group
WSHG	Women Self Help Group

**Measurement Units**

<b>Extent:</b>	<b>Weight:</b>
1 km <sup>2</sup> = 100 ha 1 acres = 0.40468ha	1 Quintal / qtl. = 100 kg
<b>Number:</b>	<b>Currency:</b>
Lakh = 100,000 Crore = 10,000,000	Rs = INR = Indian Rupees (INR) JPY = Japanese Yen USD = \$ = United State Dollars

## **EXECUTIVE SUMMARY**

## EXECUTIVE SUMMARY

This Executive Summary gives an overview of the Preparatory Study on Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project in India. It focuses on the project proposal and is divided into two sections as follows: Section 1: Study Overview, and Section 2: Project Overview. For reference, links to the Final Report Parts are noted.

Also, Data Summary covering data collection and analysis for Himachal Pradesh (HP) and for the proposed Project is attached to this Executive Summary.

## CONTENTS

### STUDY OVERVIEW

Reference to Final Report

1	Project Background & Necessity	Part I Chapter 1 & Part II Chapter 3
2	Study Objectives	Part I Chapter 1
3	Study Period	Part I Chapter 1
4	Study Area	Part I Chapter 1 & Part II Chapter 1

### PROJECT OVERVIEW

Reference to Final Report

1	Key Project Approaches	
2	Project Components	Part II Chapter 3
3	Project Outline	Part II Chapter 3
4	Proposed Institutional Framework	Part II Chapter 4
5	Proposed Implementation Schedule	Part II Chapter 5
6	Proposed Procurement & Implementation Method	Part II Chapter 6
7	Project Cost	Part II Chapter 7
8	Project Evaluation	Part II Chapter 8
9	Operation & Maintenance	Part II Chapter 9
10	Operation & Effect Indicators	Part II Chapter 10
11	Environmental & Social Considerations	Part II Chapter 11
12	Project Risk & Assumptions	Part II Chapter 12

## **STUDY OVERVIEW**

### **1 Project Background & Necessity**

The HP state is located in the North India at the foot of the Himalayas. The ratio of the notified (legal) forest area is high in HP since 66.52% of its geographical area is recorded as the notified forest area such as the reserved forest and the protection forest. Furthermore, 22.57% of the notified forest area (15.01% of the state area) is designated as protected area, such as the national park and the wildlife sanctuary.

According to the Atlas Forest Type of India 2011, 39 forest types are recorded within the state. Due to its undulating topography, the state possesses various types of ecosystems, mainly of forest ecosystems, and thus the ecosystem and biodiversity conservation (including water catchment conservation and rare species protection) are important issues in HP.

Natural resources are continually being lost due to the increasing population and adverse impacts to ecosystem including degradation of forest and pasture. The major necessity of the project is to urgently conserve and protect natural resources as follows:

- ◆ **Need to Enhance Forest Quality:** Forests in the state are under constant threats because of increased biotic pressure, hydropower projects and other development activities. Excessive usage of forest resources is also seen as one of concerns for adverse impacts to forest areas and their resources. The key to the improvement of the forest qualities in HP is to i) improve the quality of scrub and open forest areas and bring them under the moderately dense forest, and ii) improve existing moderately dense forests to higher crown density and diversified structure/composition.
- ◆ **Need to Enhance Biodiversity Conservation:** the main issue of the biodiversity in HP is the increasing human interferences into the ecosystems and negative impacts from them. Incidences of human-wildlife conflict are prevalent in some parts of the state, especially outside of the protected area, mainly due to the disruption in the habitat of the wildlife caused by the developmental activities and other human interferences.

The priority goal of the state is sustainable forest/ ecosystem management and livelihood improvement of local communities. This relevance and linkages with government policies and priorities are listed in The Himachal Pradesh Forest Sector Policy and Strategy 2005.

Hence, the Government of India requested Japan International Cooperation Agency (JICA) to support the Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project (the Project) for promoting sustainable forest management and socio-economic development in the forest based ecosystem areas within HP. Based on the request, JICA decided to dispatch a Study Team to undertake the preparatory study of the Project (the Study) to examine the Project's eligibility for a Japanese Yen Loan project.

## **2 Study Objectives**

The objectives of the Study were to undertake a study to collect and analyse information on project backgrounds, objectives, contents, costs, implementation framework, operation and maintenance setups, environmental and social considerations, etc. to fulfil the eligibility of a Japanese Yen Loan Project.

## **3 Study Period**

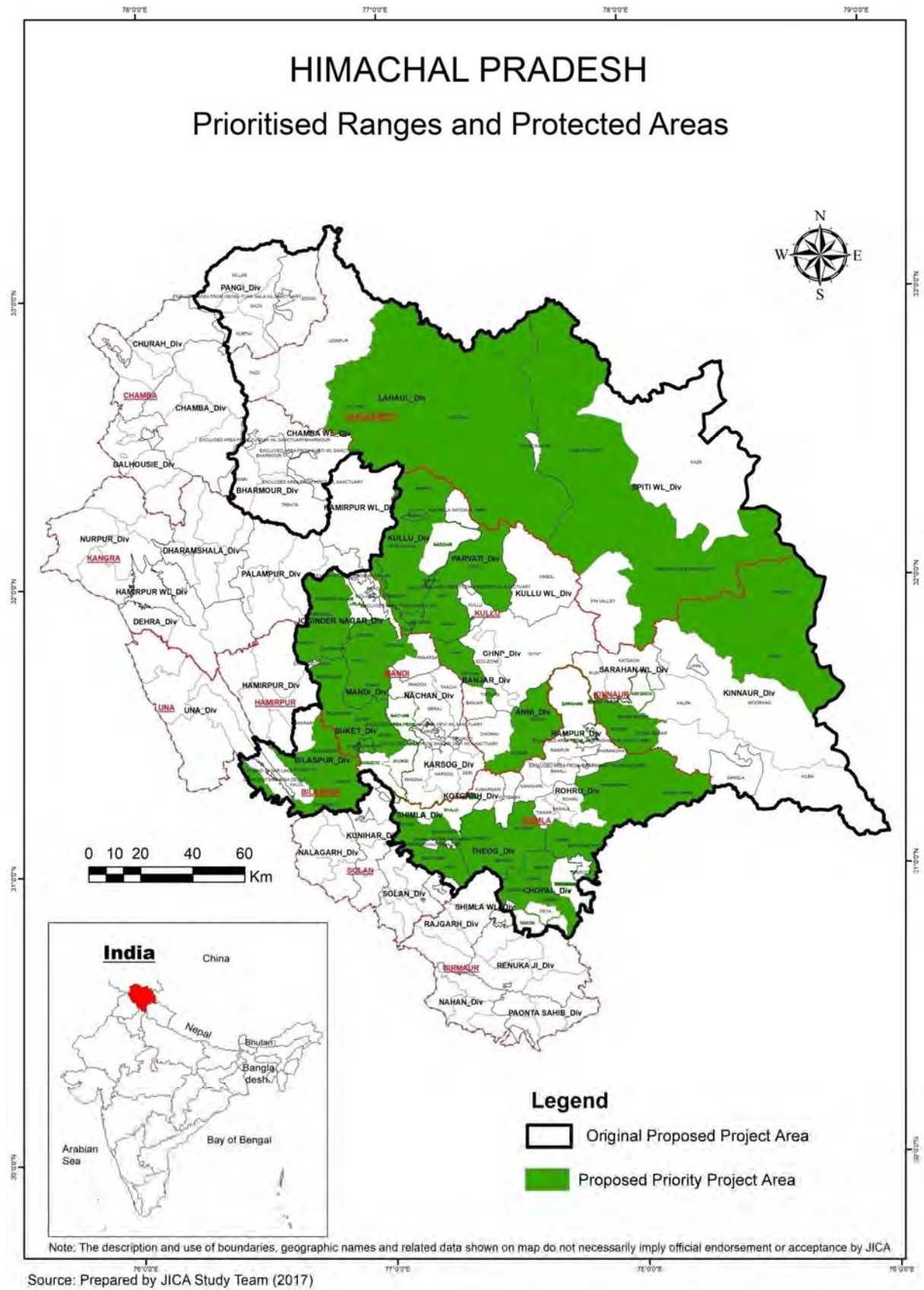
The Study was carried out from the middle May 2017 to the end February 2018, which is the final submission of the final report of the Study. The summary of data collection and analysis conducted during the Study is presented in the Appendix of this executive summary.

## **4 Study Area**

During the course of the Study, changes were made to the study area. In the end, the entire state has been considered as the study area.

Then as per the agreement made between JICA and HPFD prior to the commencement of the Study, a total of seven districts within HP namely Shimla, Bilaspur, Kullu, Kinnaur, Mandi, Lahaul & Spiti and Chamba (in case of Chamba district, only Bhramour and Pangi sub-divisions are included) were considered as districts for the proposed project area (see **Figure 1** area outlined by dark black line). In the proposed project area, there are 20 territorial forest divisions and 22 protected areas controlled by 6 wildlife divisions.

Finally, based on the project area prioritisation process and criteria developed during the Study, a prioritised project area was defined (see **Figure 1** areas in green). This area consists of a total of 14 territorial forest divisions (49 ranges) and two wildlife divisions (4 protected areas and 2 wildlife ranges). The project prioritised area compose of six districts (prioritised project districts).



**Figure 1 Proposed Project Areas**

## PROJECT OVERVIEW

### 1 Key Project Approaches

Based on the lessons learned from the past and on-going schemes/ projects relevant to the proposed Project and for the enhanced sustainability of the project impacts, the following key approaches shall be adopted in the proposed Project.

- i. Strengthening the Existing Platform for Participatory Forest Management – Village Forest Development Society (VFDS)
- ii. Micro Plan as a Community Development Plan
- iii. Creating Models for Community-Based Biodiversity Conservation
- iv. Gender Mainstreaming
- v. Livelihood Interventions to Mitigate Seasonal Vulnerability
- vi. Interventions to Mitigate Pressures on Forest Resource - Fuelwood and Fodder

### 2 Project Components

The Project has four components that are linked with the project outputs. Each component has three phases: the preparatory phase, implementation and phase-out phases.

Component 1: Sustainable Forest Ecosystem Management

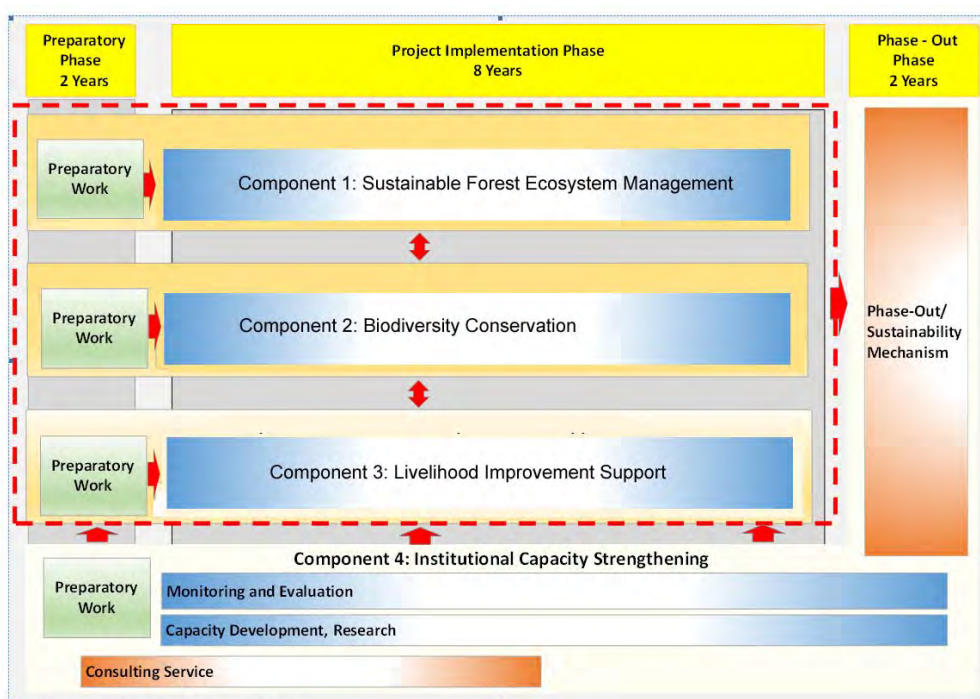
Component 2: Biodiversity Conservation

Component 3: Livelihoods Improvement Support

Component 4: Institutional Capacity Strengthening

Note: Component 4 is designed to establish project monitoring & evaluation, institutional capacity enhancement and technical and managerial advisory services extended by project management consultants (PMC).

The framework of project components with flow of the project phases is illustrated in **Figure 2**.



Source: JICA Study Team (2017)

**Figure 2 Framework of Project Components and Flow of Project Phases**



The component-wise proposed interventions are enumerated below.

**Table 1 Restructured Components/ Sub Components**

<b>Tentative Components</b>	
<b>Sub- Component</b>	<b>Possible Key Activities for Further Consideration</b>
<b>Component 1: Sustainable Forest Ecosystem Management</b>	
1.1 Preparatory Works for Participatory Forest Management	1.1.1 Identification and Selection of Interventions Areas 1.1.2 Identification of PFM mode or Departmental mode 1.1.3 Surveying and Mapping of Intervention Areas 1.1.4 Pre-Identification and Selection of Target Communities 1.1.5 Engagement of Ward Level Facilitators 1.1.6 Community Mobilisation 1.1.7 Preparation of Micro Plan (Forest Ecosystem Management Plan (FEMP) and Community Development & Livelihood Improvement Plan (CD&LIP)) 1.1.8 Annual Planning/ Revisiting of Micro Plan (4th Year)
1.2 Participatory Forest Management (PFM) Mode	1.2.1 Site Specific Planning and Monitoring 1.2.2 Drainage Line Treatment (ex-situ Soil & Water Conservation (SWC) work) 1.2.3 Improvement/ Densification of Moderately Dense Forest 1.2.4 Afforestation/ Improvement of Open/ Scrub Forest Fuelwood & Fodder Plantation 1.2.5 Improvement of Forest Quality at Key Concerned Forest Areas 1.2.6 Improvement of Pastures/ Grasslands (including in-situ SWC work) 1.2.7 Forest Fire Protection 1.2.8 Forestry Intervention at Outside of Forest Areas
1.3 Training of VFDSs	1.3.1 Training of VFDSs 1.3.2 Exposure Visits by the Community Institutions 1.3.3 Joint Workshops for Community Level Institutions
1.4 Departmental Mode	1.4.1 Site Specific Planning and Monitoring 1.4.2 Improvement of Forest Boundary Management at Project Intervention Areas 1.4.3 Improvement of Nurseries 1.4.4 Seedling Production 1.4.5 Non-PFM Drainage Line Treatment (ex-situ SWC work: including treatable surface Erosion Control) 1.4.6 Secondary Silvicultural Operations for Improvement of Existing Forests 1.4.7 Improvement/ Densification of Moderately Dense Forest 1.4.8 Afforestation/ Improvement of Open/ Scrub Forest 1.4.9 Improvement of Forest Quality at Key Concerned Forest Areas 1.4.10 Improvement of Pastures/ Grasslands (including in-situ SWC work) 1.4.11 Forest Fire Management
1.5 Training of Project related staff of HPFD	1.5.1 Training of Trainers (TTOT) for Divisional Management Unit (DMU)/ Forest Circle Coordination Unit (FCCU) Subject Matter Specialist/ Field Technical Unit (FTU) Coordinators for Field Facilitation 1.5.2 Training for Ward Facilitators
1.6 Research	1.6.1 Monitoring Data Accumulation for Nursing and Planting of Tall Plants 1.6.2 Monitoring Data Accumulation for Effective Pasture Management 1.6.3 Study for Effective SWC and Land Slide Control Measures
<b>Component 2: Biodiversity Conservation</b>	
2.1 Scientific Biodiversity Management	2.1.1 Preparatory Works 2.1.2 Protected area management improvement in core zone or buffer zone 2.1.3 Human-wildlife conflict mitigation/management 2.1.4 Wildlife habitat improvement 2.1.5 Recovery programmes for endangered wildlife
2.2 Training of Project related Staff of HPFD	2.2.1 TOT for DMU Subject Matter Specialist/ FTU Coordinators for Field Facilitation 2.2.2 Training for GP Mobilisers and Facilitators
2.3 Research	2.3.1 Pilot Project on Biodiversity Corridor (Baseline survey for biodiversity corridor) 2.3.2 Basic study for designing Biodiversity Census
2.4 Community Based Biodiversity Management	2.4.1 Preparatory Works 2.4.2 Community Based Biodiversity Management (CBM)
2.5 Training of DMUs/FTUs/ Biodiversity Management Committees (BMCs) and Sub-committees	2.5.1 Training of DMUs/FTUs 2.5.2 Training of BMCs and Sub-committees 2.5.3 Exposure Visits by Community Institutions 2.5.4 Joint Workshops for Community Level Institutions (VFDSs/BMCs and Sub-committees)
<b>Component 3 Livelihoods Improvement Support</b>	
3.1 Community Development	3.1.1 Preparation of CD&LIP 3.1.2 Transfer of Funds 3.1.3 Implementation of CD activities 3.1.4 Preparation of Guidelines Manuals and Training Programmes for Community

<b>Tentative Components</b>	
<b>Sub- Component</b>	<b>Possible Key Activities for Further Consideration</b>
	Development 3.1.5 Research: Pilot Project on Hydro Cultural Fodder Production
3.2 Non-timber Forest Product (NTFP) based Livelihood Improvement	3.2.1 Preparatory Works 3.2.2 NTFP Cluster and Enterprise Development 3.2.3 NTFP Research & Development 3.2.4 NTFP Cultivation 3.2.5 NTFP Market Research and Promotion 3.2.6 Training and Extension
3.3 Non NTFP based Livelihood Improvement	3.3.1 Preparation of Livelihood Improvement Strategy and Plan 3.3.2 Preparation of CD&LIP 3.3.3 Formation/ Reviving Common Interest Groups (CIGs)/ Self Help Groups (SHGs) 3.3.4 Implementation of Household/ Community level livelihood improvement 3.3.5 Promotion of Cluster based Livelihood Activities 3.3.6 Training Programmes for Livelihood Improvement 3.3.7 Capacity Development for CIGs/ SHGs and Cluster Based Organisation
<b>Component 4 Institutional Capacity Strengthening</b>	
4.1 Preparatory Works	4.1.1 Establishment of Project Management Unit (PMU) and Field Level Units 4.1.2 Strengthening of PMU and Field Level Units 4.1.3 Recruitment of the Personnel/ Subject Matter Specialists/ Resource Organisations 4.1.4 Preparation of Gender Action Plan 4.1.5 Environmental and Social Consideration
4.2 Capacity Development	4.2.1 Implementing Agency 4.2.2 Gender Training 4.2.3 Environmental and Social Consideration
4.3 M&E	4.3.1 Establishing and operationalising M&E System 4.3.2 Enhancement and Promotion of Geographical Information System (GIS)/ Management Information System (MIS)/ Information Communication Technology (ICT) 4.3.3 Communication and Publicity
4.4 Research	4.4.1 Basic Study for Strengthening of ICT at HPFD
4.5 PMC	4.5.1 Procurement of PMC 4.5.2 Deployment of PMC specialists 4.5.3 Provision of Technical and Managerial Advisory Services 4.5.4 Preparation of Reports
4.6 Phase Out	4.6.1 Implementing Agency 4.6.1.1 Preparation of Phase-Out/ Sustainability Mechanism Plan 4.6.1.2 Transfer of Assets and Resources 4.6.2 Community Based Organisations 4.6.2.1 Revisiting of FEMP and CD&LIP 4.6.2.2 Phase Out Training 4.6.3 FEMP/Community Based Biodiversity Management Plan (CBMP) Fund

Source: Prepared by JICA Study Team (2017)

### 3 Project Outline

**Table 2 Outline of the Proposed Project**

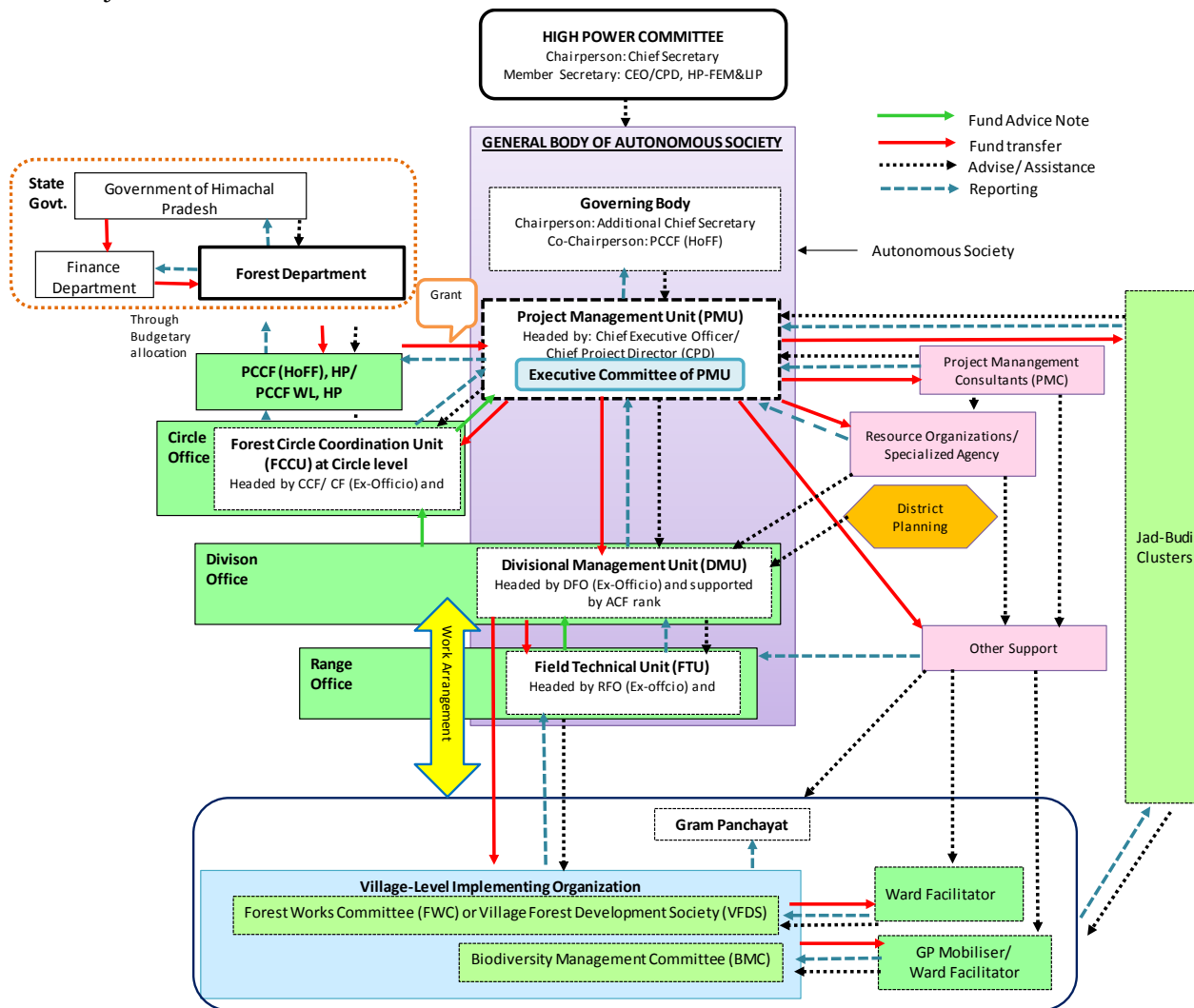
<b>Overall Goal:</b> Ecosystems services from forest areas are improved for sustainable socio-economic development in the state of Himachal Pradesh.
<b>Project Objective:</b> Ecosystems of forests in the project areas are sustainably managed and enhanced by the project interventions.
<b>Duration of the Project:</b> - 10 years - The following three phases are planned: Preparatory Phase, Implementation Phase, Phase-out Phase
<b>Major Work Areas:</b> Total Number of Territorial Divisions: 14 divisions Total Number of Territorial Ranges: 49 ranges Total Number of Protected Areas and Wildlife Ranges: 4 protected areas and 2 wildlife ranges No of VFDS to be covered: 400 No of BMC to be covered: 20 (60 sub-committees) Divisions, ranges, and protected areas have been prioritised through exclusion criteria and prioritisation criteria. If required, further prioritisation will be conducted.
<b>Project Components:</b> Component 1: Sustainable Forest Ecosystem Management Component 2: Biodiversity Conservation Component 3: Livelihoods Improvement Support Component 4: Institutional Capacity Strengthening

## 4 Proposed Institutional Framework

### Overall Institutional Arrangements for the Project

The institutional framework examined for the Project is shown below.

Figure 3 shows the detailed institutional arrangement envisaged for the implementation of the Project.



Source: JICA Study Team (2017)

**Figure 3 Proposed Institutional Set-up of the Project**

The Project Management Unit (PMU) of the Project will be established as autonomous registered society within HPFD, and be made responsible to manage, coordinate, implement and monitor the proposed activities. All offices created for this Project will exclusively work to assist and facilitate implementation of the proposed activities following the project implementation schedule, annual plan of operations and envisaged processes.

The High Power Committee (HPC) created for the Project will act as the highest decision-making body for the Project at the state government level, and will not form a part of the autonomous society to be created for project implementation. The Governing Body (GB) and the General Body of the Project will be the decision-making bodies for the Project within Society as per the

provisions in the HP Societies Registration Act, 2006.

To support project implementation at the field level, PMU will create and coordinate with two key offices viz., Divisional Management Units (DMUs) and Field Technical Units (FTUs) those will work as extended arms for the PMU. In addition, Forest Circle Management Units (FCCUs) to be created outside the society will provide overall guidance and supervise the project works at divisional and field levels. PMU including DMUs and FTUs will implement the project as well as assist and play facilitative roles. The main responsibility for project implementation will remain with the regular structure of HPFD, and in no way the project offices created within autonomous society will duplicate or substitute roles and responsibilities of HPFD. The existing divisional and range offices will operate within their respective jurisdictions for the project implementation, and will be supported and assisted by DMUs and FTUs respectively. The implementing arrangements will be through the forest divisions (DFOs) and through the Village Forest Development Society (VFDS) or Biodiversity Management Committee (BMC).

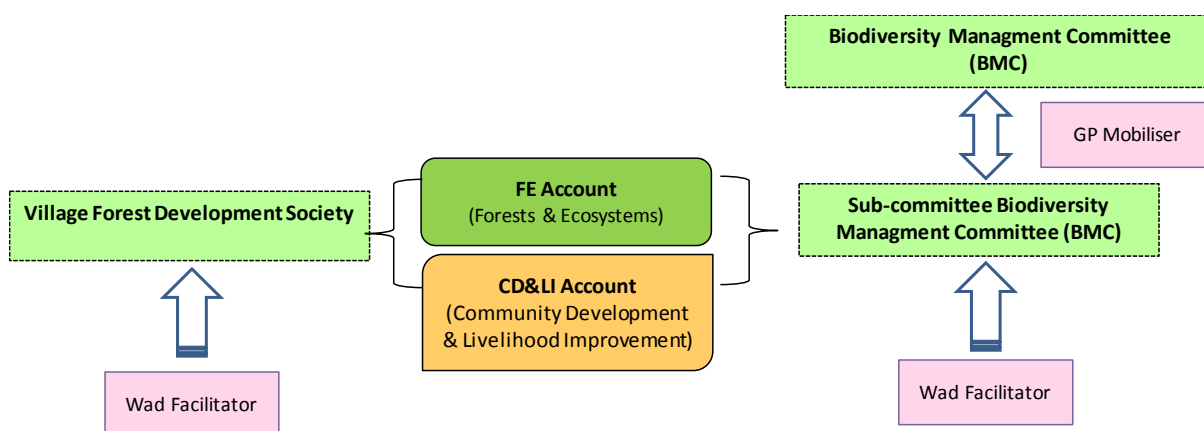
As required, resources organizations/ support agency will be engaged by PMU to support divisional and range project offices. Community level organisations (VFDS/ BMC) will also be supported by mobilisers and facilitators, to be identified from within the respective project Gram Panchayats/ wards by the community level organisations.

### Proposed Community Implementation Organisation

The key institution to be engaged in the Project will be VFDSs. The constitution of VFDS including its roles and responsibilities are well spelt out in the Participatory Forest Management (PFM) Regulations 2001.

At the same time, wherever required, and if possible under the Biological Diversity Act, 2002 provisions, the Project will take advantage of Biodiversity Management Committee (BMC), engaging for works especially in and around protected areas. For the Project, VFDS and sub-committees of BMC are regarded as ward level implementation organisation.

The proposed institutional arrangements at the community level is illustrated in the figure below.



Source: JICA Study Team (2017)

**Figure 4 Proposed Institutional Arrangements at Community Level**

## 5 Proposed Implementation Schedule

The summary of draft project implementation schedule is as follows (Table 3).

**Table 3 Summary of Proposed Project Implementation Schedule**

Item	Year 0 2017/18				Year 1 2018/19				Year 2 2019/20				Year 3 2020/21				Year 4 2021/22				Year 5 2022/23				Year 6 2023/24				Year 7 2024/25				Year 8 2025/26				Year 9 2026/27				Year 10 2027/28				Yr 11	Yr 12		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4								
L/A Period	[Timeline bar]																																															
Project Period	[Timeline bar]																																															
Project Implementation Period	[Timeline bar]																																															
Appraisal	[Timeline bar]																																															
Pledge	[Timeline bar]																																															
Signing of L/A	[Timeline bar]																																															
Pre-Qualification of Consultation Services	[Timeline bar]																																															
Consultation Services	[Timeline bar]																																															
<b>Component 1: Sustainable Forest Ecosystem Management</b>	[Component Header]																																															
1.1 Preparatory Works for Participatory Forest Management	[Timeline bar]																																															
1.2 Participatory Forest Management (PFM) Mode	[Timeline bar]																																															
1.3 Training of VFDSs	[Timeline bar]																																															
1.4 Departmental Mode	[Timeline bar]																																															
1.5 Training of Project related staff of HPPD	[Timeline bar]																																															
1.6 Research	[Timeline bar]																																															
<b>Component 2: Biodiversity Conservation</b>	[Component Header]																																															
2.1 Scientific Biodiversity Management	[Timeline bar]																																															
2.2 Training of Project related Staff of HPPD	[Timeline bar]																																															
2.3 Research	[Timeline bar]																																															
2.4 Community Based Biodiversity Management	[Timeline bar]																																															
<b>Component 3: Livelihood Improvement Support</b>	[Component Header]																																															
3.1 Community Development	[Timeline bar]																																															
3.2 NTFP based Livelihood Improvement	[Timeline bar]																																															
3.3 Non NTFP based Livelihood Improvement	[Timeline bar]																																															
<b>Component 4: Institutional Capacity Strengthening</b>	[Component Header]																																															
4.1 Preparatory Works	[Timeline bar]																																															
4.2 Capacity Development	[Timeline bar]																																															
4.3 M&E	[Timeline bar]																																															
4.4 Research	[Timeline bar]																																															
4.5 PMC	[Timeline bar]																																															
4.6 Phase Out	[Timeline bar]																																															

Source: JICA Study Team (2017)

## 6 Proposed Procurement and Implementation Method

In terms of the implementer, the majority of project activities will be divided into the following three categories:

- i) Departmental works conducted directly by PMU, DMUs, and FTUs
- ii) Works conducted by community based organisations (CBOs) such as VFDSs, BMC sub-committees, common interest groups (CIGs) and self help groups (SHGs)
- iii) Works conducted by resource organisations, support organisations, and other contracted organisations/individuals

Procurement and implementation methods for the above three categories in the Project is summarised in Table 4.

**Table 4 Overall Procurement and Implementation Methods**

Implementer (Type of work)	Procurement/ Implementation Method
i) Departmental Works	Mainly by direct work (partially on a contractual basis and by price quotation)
ii) Works by CBOs	Contractual basis through MOU (direct work by CBOs)
iii) Works by Resource Organisations and Others	Contractual basis

Source: JICA Study Team (2017)

## 7 Project Cost

### Total Project Cost

The total cost of the entire Project is estimated at 8,452 million INR as shown in **Table 5**.

**Table 5 Summary of Cost Estimates**

Breakdown of Cost (million INR)	Foreign Currency Portion			Local Currency Portion			Total		
	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others
Sustainable Forest Ecosystem Management	0	0	0	1,917	1,917	0	1,917	1,917	0
Sustainable Biodiversity Management	0	0	0	617	617	0	617	617	0
Livelihood Improvement Support	0	0	0	777	777	0	777	777	0
Institutional Capacity Strengthening	0	0	0	1,653	1,653	0	1,653	1,653	0
<b>Civil (Direct) Works Sub Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,964</b>	<b>4,964</b>	<b>0</b>	<b>4,964</b>	<b>4,964</b>	<b>0</b>
Price Escalation	0	0	0	1,130	1,130	0	1,130	1,130	0
Physical Contingency	0	0	0	305	305	0	305	305	0
Consulting Services	20	20	0	171	171	0	191	191	0
Land Acquisition	0	0	0	0	0	0	0	0	0
Administration Cost	0	0	0	1,097	0	1,097	1,097	0	1,097
VAT (Value Added Tax)	0	0	0	292	0	292	292	0	292
Import Tax	0	0	0	0	0	0	0	0	0
Interest during construction	460	0	460	0	0	0	460	0	460
Front End Fee	13	0	13	0	0	0	13	0	13
<b>Total</b>	<b>494</b>	<b>20</b>	<b>474</b>	<b>7,957</b>	<b>6,569</b>	<b>1,389</b>	<b>8,452</b>	<b>6,589</b>	<b>1,862</b>

Source: JICA Study Team (2017)

### Annual Cost Schedule

The annual cost disbursement schedule for the entire Project is summarised in **Table 6**.

**Table 6 Annual Cost Schedule**

Cost Component	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	Total
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	(million INR)
Direct Cost	465	547	547	547	547	547	547	547	503	165	4,964
Price Escalation	18	44	67	91	116	142	169	197	208	77	1,130
Physical Contingency	24	30	31	32	33	34	36	37	36	12	305
Consulting services	0	91	49	52	0	0	0	0	0	0	191
Administration Cost	85	118	115	120	116	120	125	130	124	42	1,097
Taxes and Duties	22	31	31	32	31	32	33	35	33	11	292
Interest During Construction	7	15	23	32	41	50	60	70	80	83	460
Front End Fee	13	0	0	0	0	0	0	0	0	0	13
<b>Total</b>	<b>634</b>	<b>876</b>	<b>862</b>	<b>906</b>	<b>884</b>	<b>926</b>	<b>970</b>	<b>1,016</b>	<b>985</b>	<b>392</b>	<b>8,452</b>
% against the total cost	8%	10%	10%	11%	10%	11%	11%	12%	12%	5%	100%

Source: JICA Study Team (2017)

## 8 Project Evaluation

### Project Evaluation

The Net Present Value (NPV) and Economic Internal Rate of Return (EIRR) were calculated for assessment of the economic viability of the Project based on the projected economic cash flow. The economic life of the Project is assumed to be 40-year. The results of NPV and EIRR are summarised below. EIRR at 10.6% is higher than the economic opportunity cost of capital at 10.0% indicating that the project is economically viable with a little margin.

**Table 7 Results of Economic Analysis**

Economic Index	Result
NPV (thousand INR )	228,052
EIRR	10.6%

Source: JICA Study Team (2017)

A sensitivity analysis is carried out to examine the viability of the proposed Project under enforceable changes to conditions by changing the benefit and cost levels. The results are summarised below.

**Table 8 Sensitivity Analysis by EIRR**

Change of Cost	Change of Benefit		
	0%	-10%	-20%
0% (Base cost)	10.6%	9.5%	8.3%
+10%	9.6%	8.5%	7.4%
+20%	8.7%	7.7%	6.6%

Source: JICA Study Team (2017)

### Economic Benefits

Benefits from each project activity are summarised below.

**Table 9 Expected Benefit from Each Project Activity**

Component	Project Activity	Benefit	Value (thousand INR)	
Sustainable Forest Management	Timber / Wood Production	Deodara ( <i>Ceduru deodara</i> )	153,478	
		Ban Oak ( <i>Quercus leucotrichophora</i> )	1,340	
		Chir pine ( <i>Pinus roxburghii</i> )	54,764	
	Fuelwood / Fodder Production	Fuelwood Production	63,695	
		Grass Extraction	5,688,975	
		Oak Foliage Collection	887,877	
	NTFP Development	Seabuckthorn berry ( <i>Hippophae rhamnoides</i> ) Production	6,402	
		mix NTFP development	5,595,228	
	Sustainable Forest Management	Soil Conservation: prevention of soil erosion from increased forest cover	CO <sub>2</sub> sequestration by afforestation	203,719
				5,953,460
Biodiversity Conservation	Scientific Protected Area	CO <sub>2</sub> emission reduction by prevention of forest degradation	150,124	

Component	Project Activity	Benefit	Value (thousand INR)
	Management		
Livelihood Improvement Support	Income Generation Activities (IGA)	Cluster based mushroom cultivation	575,280
		Cluster based poultry	6,914,710
		Cluster based handloom and traditional wool cloth making	673,883
		Cluster based NTFP development	678,802
	<b>Total</b>		<b>27,595,415</b>

Source: JICA Study Team (2017)

## 9 Operation and Maintenance

During the Study, the operation and maintenance framework for the Project was drafted for the following items.

- ◆ Participatory Forest Management (PFM) assigned area
- ◆ Treatment area by Departmental mode
- ◆ Nurseries under Departmental mode
- ◆ Infrastructures created under the Scientific Biodiversity Management
- ◆ Assets Created Under Community Based Biodiversity Management
- ◆ Village Forest Development Society (VFDS)
- ◆ Biodiversity Management Committee (BMC)
- ◆ Community Development and Livelihood Improvement Plan (CD&LIP) Fund (Revolving)
- ◆ Forest Ecosystem Management Plan (FEMP)/ Community Based Biodiversity Management Plan (CBMP) Fund
- ◆ Hydro cultural fodder production unit
- ◆ Non-timber Forest Product (NTFP)/ Non NTFP Cluster Organisations
- ◆ Jadi-Buti Cell
- ◆ Common Interest Group (CIG)/ Self Help Group (SHG)
- ◆ Geographical Information System (GIS)/ Management Information System (MIS) established by Project
- ◆ Assets created under the project for Project Management
- ◆ Project Society and Project Management Unit (PMU)

## 10 Operation and Effect Indicators

Tentative operation and effect indicators for the Project are presented in **Tables 10.11.1 and 10.1.2 of Part II Chapter 10** of the Final Report. Depending on the practicability of the methods of establishing indicators, PMU may finalise the Operation and Effect Indicators with assistance from PMC and concurrence of JICA shall be sought when revising.

## 11 Environmental and Social Considerations of the Project

### Positive Environmental Impacts

The proposed Project primarily focuses on restoration, rehabilitation and protection of forests, therefore the associated activities are expected to present various environmental benefits, including;



- ◆ Increase in the overall forest area in the state - proportionate increase in dense & moderately dense forests,
- ◆ Climate change mitigation through reduced emissions from deforestation and forest degradation,
- ◆ Improved ecosystem services as natural capital through watershed protection, protection of soils, moisture conservation measures, etc,
- ◆ Reduction in unsustainable utilisation of forest resources through improvements and support for NTFPs, medicinal herbs and plants, investments in alternative livelihoods and income generating opportunities, and
- ◆ Forest Department to be well equipped and strengthened to manage forest resources with active participation of empowered & organised communities.

### **Potential Negative Environmental Impacts**

The following aspects are confirmed as potential negative environmental impacts as a result of environmental screening and scoping. However, all of them could be minimised or eliminated by applying the Environmental and Social Assessment Framework (ESAF).

- ◆ Various minor, small-scale and temporary environmental impacts associated with construction/ rehabilitation of small-scale rural infrastructure
- ◆ Minor and small-scale environmental pollution associated with livelihood enhancement activities
- ◆ Habitat disturbance and biodiversity loss from inappropriate afforestation techniques, construction works, or misuse of chemical fertiliser/ pesticide.

### **Positive Social Impacts**

The Project also focuses on livelihoods of the local communities, thus it is anticipated to provide a number of social benefits that would include the following.

- ◆ Improvement of physical capital for rural communities with the help of renovation upgraded community infrastructure,
- ◆ Employment opportunities and income from forest protection activities that would contribute to enhanced financial capital,
- ◆ Improvements in range/pasture management that would cater for fodder requirements of the rural communities, and
- ◆ Improved livelihood opportunities through project support such as well managed forests, plantations and NTFP-based livelihoods.

### **Mitigating Potential Negative Social Impacts**

Impacts on the social setting occasionally may have significant implications on the society, which could overwhelm the same caused by the environmental impacts induced by the project activities. In order to mitigate such significant negative impacts on the individuals and communities in the project areas, ESAF as well as draft Vulnerable Scheduled Tribes Planning Framework (VSTPF) has been drafted which demands the project to fully comply with.

- ◆ Loss of assets or access to assets (e.g. grazing lands, customarily held resources, etc.) through construction works,

- ◆ Restricted access to protected areas resulting in adverse impacts on incomes and livelihoods,
- ◆ Health risks associated with construction works, local domesticated livestock foraging, solid wastes disposed in labour camps, and
- ◆ Conflict within the community due to the exclusion from and/ or inequitable distribution of project benefits

## **Environmental and Social Risk Management and Mitigation**

Based on data collection and review of legal, institutional arrangements, and baseline information in relation to environmental and social consideration at the union level as well state level, the draft ESAF, the draft VSTPF, and the draft Involuntary Resettlement Plan Framework (IRPF) were prepared. These frameworks will be further elaborated reflecting the reformulation of the proposed Project. The overviews of each framework is summarised as follows.

### **(1) Draft Environmental and Social Assessment Framework (ESAF)**

ESAF aims to manage and mitigate potential risks associated with the project activities during its implementation. Therefore, an assessment framework guiding the adequate environmental and social management and mitigation measures against environmental and social risks is prepared. The main safeguards instrument would be this ESAF that fully considered the existing environmental and social management systems in India and HP state as well as the JICA requirements.

### **(2) Draft Vulnerable Scheduled Tribes Planning Framework (VSTPF)**

VSTPF shall be particularly applied to the individuals and communities of Scheduled Tribes (STs) and Forest Dwellers as per The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 who could be severely affected their daily lives by project activities. The main objectives of VSTPF are (i) to ensure that the targeted social groups, affected by any additional project interventions, will receive culturally appropriate social and economic benefits from the Project, (ii) to ensure their participation in the entire process of project activities, and (iii) to prevent any adverse impacts on the concerned individuals and communities as a result of the Project.

### **(3) Draft Involuntary Resettlement Plan Framework (IRPF)**

The Project will not involve any physical relocation nor involuntary resettlement as long as ESAF is fully applied for the project preparation and its implementation. However, there might be certain sub-projects, which could potentially lead to acquisition of lands or involuntary resettlement for project activities. Therefore, the Involuntary Resettlement Plan Framework (IRPF) has been designed to clarify the required procedures.

## **12 Project Risks and Assumptions**

For the effective and smooth implementation of the Project, the following external conditions and requirements shall be met for the proper implementation of the Project, as otherwise there may be significant impacts to project implementation.

1. Political stability during the Project so that the establishment of a proper implementing organisation will be supported by the political willingness of the HP state government, with the necessary budget for the human resources and other administrative costs.
2. No delay in fund disbursement during the implementation.
3. No delay in procurement, approval and any other decision making by the High Power Committee and the Governing Body of the Project.
4. No change in strategies, policies, plans, and organizational structures in the forest sector.
5. Cooperation from other relevant line departments and Panchayat Raj Institutions.
6. No critical social conflicts or disputes occurring in the target divisions
7. No drastic economic recession in the national and regional economy.

The following external conditions and requirements shall also be met for the project investment and activities to achieve the desired and expected effects and impacts.

1. The macro-economy of the country will be stable.
2. No large-scale natural disasters, such as large-scale forest fire, landslides, severe flooding or earthquakes.
3. Climatic conditions in the target divisions are stable and unchanged.
4. Employment conditions in rural areas in the regions are not drastically changed.
5. The prices of NTFPs and other forest products do not drastically drop.

## **DATA SUMMARY**

## **DATA SUMMARY**

### **DATA COLLECTION AND ANALYSIS**

<b>SECTIONS</b>	Reference to Final Report
D- 1 Forest Sector in India	Part I Chapter 2
D- 2 The Study Area (The State of HP)	Part I Chapter 3
D- 3 Forests and Forest Areas in Himachal Pradesh	Part I Chapter 4
D- 4 Review of Forestry Related Projects/ Schemes Similar to the Project	Part I Chapter 5
D- 5 Issues and Lessons Learned from Forest Management in the State	Part I Chapter 6
D- 6 Review of Draft Project Report (DPR)	Part I Chapter 7
D- 7 Environment and Social Considerations	Part I Chapter 8
D- 8 Preliminary Situational Analysis of the Potential Project Area	Part II Chapter 2

## **PART I STUDY**

### **D-1 FOREST SECTOR IN INDIA**

#### **1.1 Forest Administration**

The major governmental organisations relevant to the forestry sector and community development at the central level are as follows.

- ◆ Ministry of Environment, Forests and Climate Change (MoEF&CC)
- ◆ Ministry of Rural Development
- ◆ Ministry of Tribal Affairs
- ◆ Ministry of Social Justice and Empowerment

#### **1.2 Forest Research and Extension**

MoEF&CC has established, and has been financially supportive the following autonomous bodies/ agencies in the areas of forestry, ecology, botany, environmental education, ornithology, etc.

- ◆ The Botanical Survey of India
- ◆ The Zoological Survey of India
- ◆ The Forest Survey of India
- ◆ The Indian Council of Forestry Research and Education (Forest Research Institute Dehradun, Tropical Forest Research Institute Jabalpur, Arid Forest Research Institute Jodhpur, Himalayan Forest Research Institute Shimla, Institute of Forest Genetics and Tree Breeding Coimbatore, Institute of Forest Productivity Ranchi, Rain Forest Research Institute Jorhat, Institute of Forest Biodiversity Hyderabad, Institute of Wood Science and Technology Bangalore, Centre for Social Forestry and Eco-Rehabilitation Allahabad, Centre for Forestry Research and Human Resource Development Chhindwara, Advanced Research Centre for Bamboo and Rattan (ARCBR) Aizawl)
- ◆ Indian Institute of Forest Management
- ◆ Wildlife Institute of India, Dehradun
- ◆ The Gobind Ballabh Pant Institute of Himalayan Environment and Development

#### **1.3 Forest Inventory and Monitoring**

Major forest inventory and monitoring mechanisms existing in India are as follows.

- ◆ Forest Survey of India (FSI), Bi-annual Forest Cover Mapping (India State of Forest Reports: ISFR)
- ◆ National Forest Inventory (NFI)
- ◆ CAMPA Monitoring System (e-green watch)
- ◆ Monitoring of Forest Fires: Forest Fire Alerts System
- ◆ Biodiversity Information System
- ◆ Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance” (OSMEFWC)

#### **1.4 National Level Policies, Laws/Regulations, and Plans relevant to the Proposed Project**

Major central level policies, rules, regulations, notifications, policies and guidelines related to the Project are listed below.

### Forest and Wildlife

- ◆ Indian Forest Act 1927
- ◆ National Forest Policy 1988
- ◆ Forest Conservation Act 1980 and Amendment 1988
- ◆ Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
- ◆ Wildlife (Protection) Act 1972 and Amendment 1993
- ◆ Biological Diversity Act 2002
- ◆ Joint Forest Management

### Land, Resettlement and Tribes

- ◆ Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013
- ◆ Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006
- ◆ Scheduled Caste and Scheduled Tribes (Prevention of Atrocities) Act 1989
- ◆ National Policy on Safety, Health and Environment at Work Place

### Environment Protection and Environmental Impact Assessment (EIA)

- ◆ Environment(Protection) Act, 1986 and Amendment 1991
- ◆ Environment (Protection) Rules 1986 and Amendments
- ◆ EIA Notification 2006 and Amendments 2007, 2008, 2009, 2011 and 2012
- ◆ The National Green Tribunal Act 2010

### Water, Air and Pollution

- ◆ Water (Prevention and Control of Pollution) Act 1974 and Amendment 1988
- ◆ Water (Prevention and Control of Pollution) Cess Act 1977
- ◆ Water (Prevention and Control of Pollution) Rules, 1975
- ◆ Air (Prevention and Control of Pollution) Act 1981

## **D-2 THE STUDY AREA**

### **2.1 Overview**

The total geographical area of HP is 55,673 km<sup>2</sup>; which is divided into 12 districts and Hamirpur is the smallest district of HP which covers an area of 1,118 km<sup>2</sup> (2.01%) and Lahaul & Spiti has the largest area of 13,835 km<sup>2</sup> (24.85%). The population of the state is 6.86 million (Census, 2011) which constitutes 0.57% of the country's population. The rural population in HP accounts for 89.96% of the total population and the urban population constitutes 10.04%. The overall population density is 123 persons per km<sup>2</sup>.

The HP state is bordered by Jammu & Kashmir in the north, Punjab in the west, Haryana on the south-west and Uttarakhand on the south-east. The eastern border of the state touches the Tibet on the east. The state is located between latitude 30° 22' 40" north to 33 ° 12' 40" north and longitude 75 ° 45' 55" east to 79 ° 04' 20" east.

### **2.2 Administration**

The state is divided into 12 districts. Under the districts, for the purpose of revenue collection, delivery of community development, and local governance, three lines of administrative units are established (see Table below).

**Table 2.2.1 Outline of the Administrative Units in HP State**

Level/ Particulars	Revenue	Rural Development	Panchayati Raj Institution (PRI)
Division	The state is divided into 3 divisions		
District			
Name	District Collectorate	District Rural Development Agency	Zila Panchayats
No of Units	12	12	12
Key Functions	<ul style="list-style-type: none"> <li>- Monitoring of rescue operation during various accidents.</li> <li>- To conduct the Lok Sabha, Vidhan Sabha and Panchayati Raj Institutions Elections. Monitoring of Law &amp; Order. Inspection of various offices.</li> <li>- Protocol duties by attending VVIPs and VIPs Monitoring of implementation of various policies and programmers of the Government in letter &amp; spirit.</li> <li>- To conduct various joint inspections.</li> </ul>	<ul style="list-style-type: none"> <li>- To oversee the implementation of different anti-poverty programmes.</li> <li>- To develop the capacity to build synergies among different agencies involved for the most effective results</li> <li>- To develop distinctive capabilities rather than perform tasks that are legitimately in the domain of the PRIs or the line departments</li> </ul>	<ul style="list-style-type: none"> <li>- To maintain District Development fund and utilise for any type of constructive work in District.</li> <li>- To implement the programmes as per directives of the State Government.</li> <li>- To look after safety, health, education, industry and financial aspect of the people living in the district. To render advisory service to their Panchayat Samities/ Approve the budgets, plans of the plans of the Panchayat Samities/ Plan for and prepare proposals for all items of developmental activities.</li> <li>- To supervise the work of different subjects undertaken by Panchayat Samiti in coordination. organise for various meetings of the members and officials, keep up to date records for various programme and documentation with the help of other Departments. It works for the areas where Panchayat Samiti are defunct.</li> </ul>
Intermediate			
Name	Sub-Divisions/ Tehsils/ Sub-Tehsils	Community Development Block	Panchayat Samiti / Gram Panchayat / Panchayat Wards
No of Units	62 Sub-divisions 141 Tehsils/sub-tehsils	78	77
Village			
Name	Revenue Village (Serves as the grass roots unit for government interventions.)		
No of Units	3,226		

Source: Economics & Statistics Department, Himachal Pradesh

## 2.3 Socio-Economic Conditions

Population and Population Density: The population of HP state has been growing continuously over the years; however, the growth rate of total population shows a slowing trend over the last three decades. In 2011, the total population of HP is 6,864,602 out of which 3,481,873 were males (51%) and 3,382,729 (49%) were females. The rural population accounted for nearly 90% of the total population and the growth of urban population over the period of time is also seen as a trend. The population density was recorded the highest in Hamirpur (407 persons per km<sup>2</sup>) and followed by Una (338 persons sq. km), Bilaspur (328 persons per km<sup>2</sup>) and Solan (300 persons per km<sup>2</sup>). On the other hand, the most sparsely populated area is Lahaul & Spiti with 2 persons per km<sup>2</sup>.



Scheduled Castes (SCs)/ Scheduled Tribes (STs) / Other Backward Class (OBCs): In the state, the Scheduled Caste (SC) and Scheduled Tribe (ST) population accounts for 25.19% and 5.71% respectively of the total population of the state. Bhot, Gaddi, Gujjar, Jad and several other tribal communities are known to reside in the state. Some of the communities are known for their nomadic way of life. They are seasonal migrants and pastoralists moving through the pastures along with their livestock. As per the Himachal Backward Classes Finance and Development Corporation, a Government of HP undertaking under the aegis of Ministry of Social Justice and Empowerment, established on 31 January 1994, reckons the population of Backward Classes as 927,452.

Literacy Rate: Literacy rate in HP is 82.8%; the male and female literacy rates are 89.5% and 75.9% respectively. Among the rural and urban folk of the state, the literacy rate is 81.9% and 91.1% respectively. Among the SC and ST communities the literacy level is 78.9% and 73.6% respectively.

Poverty: In HP state, 23.87% of the rural population was reported to be below poverty line (2002-2007)<sup>1</sup>. The highest incidences of poverty are observed in Chamba district (54.15%), followed by Lahaul-Spiti (43.50%). On the other hand, Shimla (29.07%), Sirmaur (19.44%), Una (16.92%) and Kullu (16.24%) had the lowest figures. The state has succeeded in reducing the poverty level in the recent years as reported in “Scaling the Heights (World Bank, 2015)”. The report highlighted that the poverty level in the rural areas of Himachal Pradesh has declined from 36.8% in 1993 to 8.5% in 2011, which are four-fold declines. This is better than any other state in the country. Furthermore, such improvement in overall poverty condition has permeated across the socio-economic groups.

Gender Situation: In comparison to the national average, the proportion of women who have gone through 10 or more years of education are much higher. Representation of women in Panchayati Raj Institution in the state is higher than that in other states of India. On the other hand, women’s work participation and ownership of a house/ land still significantly lags behind in comparison to the rest of India. Within HP state, the work participation of women is higher in the urban area, whereas the proportion of women owning house/ land are slightly higher in the rural areas. Gender status in HP is summarised in the Table below.

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<sup>1</sup> “Survey on Poor Families 2002-2007”. Rural Development Department, Himachal Pradesh.

**Table 2.3.1 Gender Status in HP State (2005-06/ 2015-16)**

Particulars	Himachal				All India			
	2015-16		2005-06		2015-16		2005-06	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Population (female) age 6 years and above who ever attended school (%)	89.8	77.9	79.0	73.1	80.6	63.0	68.8	58.3
Sex ratio of the total population (females per 1,000 males)	914.0	1,097.0	1,078.0	1,070.0	956.0	1,009.0	991.0	1,000.0
Sex ratio at birth for children born in the last five years (females per 1,000males)	1,151.0	920.0	936.0	913.0	899.0	927.0	919.0	914.0
<b>Adults (age 15-49)</b>								
Women who are literate	92.6	87.8	88.2	79.5	81.4	61.5	68.4	55.1
Men who are literate	95.0	96.4	96.2	94.0	90.8	82.6	85.7	78.1
Women with 10 or more years of schooling (%)	73.7	57.9	59.4	44.7	51.5	27.3	35.7	22.3
Currently married women who usually participate in household decisions	96.4	90.0	90.8	79.2	85.8	83.0	84.0	76.5
Women who worked in the last 12 months who were paid in cash	27.2	15.5	17.0	10.6	23.2	25.4	24.6	28.6
Women owning a house and/ or land (alone or jointly with others)	9.2	11.6	11.3	na	35.2	40.1	38.4	na
Women having a bank or savings account that they themselves use	77.5	67.5	68.8	22.2	61.0	48.5	53.0	15.1
Women having mobile phone that they themselves use	85.3	72.3	73.9	na	61.8	36.9	45.9	na

Source: National Family Health Survey-4 2015. Ministry of Health and Family Welfare, Government of India

## 2.4 Zoning

### Bio-Geographic Regions

In HP, four of the 26 bio-geographic provinces are represented in four zones as follows:

- ◆ Zone 1: The Trans-Himalaya: The area of Lahaul & Spiti district
- ◆ Zone 2A: The North-west Himalaya: The area on north of the Satluj River. It is characterised by a more ‘Mediterranean’ climate
- ◆ Zone 2B: The Western Himalaya: The area south of the Sutlej River. It is dry in general, and has harsh winters.
- ◆ Zone 4A: Shivalik (Semi-arid – Punjab Plains): South-western part of HP with lower elevation and is a semi-arid zone that is characterised by the hot dry foothills.

### Elevational Zoning

HP state has been divided into four elevational zones based on altitudes associated with different forest types with trees, shrubs and herbs species.

- ◆ Sub-tropical zone: comprising low hills up to 1,000 m.
- ◆ Sub-tropical zone: covering mid hills 1,000 - 1,500 m.
- ◆ Temperate Wet zone: representing high hills 1,500 - 3,000 m.
- ◆ Temperate dry zone: representing high hills above 3,000 m (alpine pasture zone).

### Zoning to be Applied in the Study for Reformulation of the Proposed Project

Since existing zoning classifications are originally developed for different purposes, there is no single zoning classification which fully covers all aspects of natural conditions as well as forest management which fits to the purpose of the Study. Hence, the following zoning classifications were adopted in the Study for further project area prioritisation and activities formulation.

- ◆ Bio-geographic region
- ◆ Dry Alpine Zone/ Non-Alpine Zone classification based on Forest Type-Group (**Part I, Section 4.3.3**) and Grassland/ Pasture distribution (**Part I, Section 4.5.3**) based on IIRS vegetation and land use map 2012

These classifications were highlighted in the Study, since i) classifications themselves and their sources of information are familiar within HPFD, and ii) polygon data are available or possible to process.

## 2.5 River Systems and Catchments

Various classifications of river catchments and river basins are available for different purposes. Accordingly, the Study Team adopted the classification based on river catchments and basins data/information provided by the GIS cell of HPFD. The classification is described the Table below.

**Table 2.5.1 River Catchments and River Basin in HP State**

River Catchment	River Basin
Satluji	- Satluj - Spiti
Beas	- Beas
Chenab	- Chenab - Ravi - Zaskar (Zanskar)
Yamuna	- Giri - Pabbar

Source: Prepared by JICA Study Team (2017) based on information from HPFD

## 2.6 Natural Disasters

HP state is prone to various hazards both natural and man-made. Main hazards consist of earthquakes, landslides, flash floods, snow storms and avalanches, droughts, dam failures, fires (domestic and wild), accidents (road, rail, air, stampedes, boat capsising, biological, industrial and hazardous chemicals) etc.

## D-3 FOREST AND FOREST AREAS IN HIMACHAL PRADESH

### 3.1 State Level Policies, Laws/Regulations, and Plans relevant to the Proposed Project

Major state level policies, rules, regulations, notifications, policies and guidelines related to the Project are listed below.

#### Forest and Wildlife

- ◆ Himachal Pradesh Forest Sector Policy and Strategy 2005
- ◆ Himachal Pradesh Forest Produce Transit (Land Routes) Rules, 2013 and Amendment Rules, 2014, 2017

- ◆ Himachal Pradesh Forest (Timber Distribution to the Right Holders) Rules, 2013 and Amendments 2015 and 2016
- ◆ Himachal Pradesh Participatory Forest Management (PFM) Regulations 2001
- ◆ PFM Rules Regulating the Grant in-Aid to the Village Forest Development Societies 2002
- ◆ The Himachal Pradesh Forest Fire Rules, 1999
- ◆ Transit Rule Notifications
- ◆ State Compensatory Afforestation Fund Management and Planning Authority (CAMPA)
- ◆ HP Forest FRA Rules, 2008
- ◆ Himachal Pradesh Forest (Sale Of Timber) Act, 1968 The Himachal Pradesh Forest (Sale Of Timber) Rules, 1960
- ◆ Himachal Pradesh Resin and Resin Products (Regulation of Trade) Act, 1981
- ◆ The Himachal Pradesh Land Preservation Act, 1978
- ◆ Himachal Pradesh Private Forest Act and Rules 1969

### **3.2 Forest Administration**

The HP Forest Department (HPFD) operates through wing/ office formations and autonomous bodies within the umbrella of the HP State Government. HPFD is headed by the Principal Chief Conservator of Forest (Head of Forest Force: PCCF (HoFF) and comprised of the forest (territorial) wing, wildlife wing and direction (functional) offices. The Himachal Pradesh State Forest Development Corporation Limited (HPSFCDL) acts as the commercial wing of HPFD and discharges the function of disposing various forest products like timber, bamboo, resin, non-timber forest products (NTFPs, etc).

The state has 9 forest circles and 37 territorial forest divisions<sup>2</sup> under the PCCF(HoFF), and 3 forest circles and 7 wildlife divisions with under the PCCF (Wildlife) cum the chief wildlife warden. The forest administrative units under divisions are further divided into “ranges”, “sections/blocks” and then to “beats”. Each level of forest administrative units is managed by different ranks of HPFD officers.

In total, 44 divisions (37 territorial divisions and 7 wildlife divisions), 197 ranges (167 territorial ranges and 30 wildlife ranges), 560 blocks (493 territorial blocks and 67 wildlife blocks) and 2,033 beats (1,840 territorial beats and 193 wildlife beats) exist within HPFD as of July 2017.

### **3.3 Forest Area Classification**

In HP, the ratio of the legal forest area is high, and 66.52% of its area is recorded as the notified forest area such as the reserved forest and the protection forest. Furthermore, 22.57% of the notified forest area (15.01% of the state area), areas with high biodiversity significance is designated as the protected area such as the national park and the wildlife sanctuary. The notified forest areas in HP is summarised in the table below.

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<sup>2</sup> This consist of 36 territorial divisions which prepare the working plan (section 4.10.1 of this report), and Shimla Urban division which currently does not prepare the working plan. The Shimla Urban Division is also influenced by HP Municipal Cooperation Act 1995 and its status as the division under HPFD or under the municipal cooperation changes from time to time depending on changes in policy of state government administration.

**Table 3.3.1 Status of Notified Forest Area in HP State**

No	Class of Forest	Area (km <sup>2</sup> )	%
<b>(a)</b>	<b>Forests Area Managed by Forest Department</b>		
1	Reserved Forest	1,897.86	5.12%
2	Protected Forest		
2-1	Demarcated	11,911.80	32.17%
2-2	Un-Demarcated	21,197.97	57.24%
2-3	Strip Forests	13.12	0.04%
3	Un-Classed Forests	886.34	2.39%
	Total (a)	35,913.90	96.98%
<b>(b)</b>	<b>Private Forest Areas Managed by Forest Department</b>		
1	Area under Section 38 of the India Forest Act (IFA)	108.67	0.29%
2	Area Managed under Land Preservation Act (LPA)	260.02	0.70%
3	Area under HP Private. Forest Act	0.80	0.00%
	Total of (b)	369.49	1.00%
<b>(c)</b>	<b>Private Forest Areas Not Managed by Forest Department</b>		
1	Municipal Forests	10.37	0.03%
2	Cantonment Forests	13.86	0.04%
3	Shamalat & Mustarqua Forests	169.97	0.46%
4	Other Forests (Private Individuals)	555.38	1.50%
	Total of (c)	749.58	2.02%
	Grand Total a + b + c	37,032.97	100.00%

Source: Annual Administrative Report, HPFD (2011-12), Department of Economics & Statistics HP; Statistical Outline of HP 2012-13[page 103].

### 3.4 Forest Cover

The forest cover of HP based on the interpretation of satellite data of October 2013 to February 2014 as per the India State of Forest Report (ISFR) 2015 is 14,696km<sup>2</sup> which is 26.40% of the state's area. In terms of forest canopy density classes, the state has 3,224 km<sup>2</sup> (5.79%) very dense forest, 6,381 km<sup>2</sup> (11.46%) moderately dense forest and 5,074 km<sup>2</sup> (9.14%) under open forest. Around 623 km<sup>2</sup> is area under 'Trees outside forests' and the forest/tree cover of HP sums up to 27.76%.

According to the forest cover data of HP between 2003 and 2015 as per ISFR by FSI, at the state level or district level, forest cover of HP tends to be in an increase and somewhat of stable forest conditions for dense forests. The change in the forest cover between 2009 and 2015 shows increase of the open forest cover by 30 km<sup>2</sup> which seems to be the result of improvement in vegetations of scrubs and non-forest areas through plantation and other forest management activities.

### 3.5 Wildlife and Biodiversity

#### Biodiversity Profile:

The forests of HP are abundant in vascular flora. Out of the total 45,000 species of plants found in the country, about 3,295 species (7.32%) have been reported in the state. Among these, over 95% species are native to the state and characteristic of Western Himalayan flora, while the remaining 5% (150 species) are exotic which were introduced in the last 150 years.

Like forest resources, HP is bestowed with a repository of fauna. Out of the 77,450 species of

animals, the state is home to 5,721 species, amounting to 7.4% of the Indian fauna. Among the fauna found in HP, invertebrates constitute 88.4% (5,055 species) and vertebrates 11.6% (666 species: 77 mammals, 447 birds, 44 reptiles, 17 amphibians, and 81 fishes) of the total found in HP<sup>3</sup>. Recent study by Sharma and Sidhu (2016)<sup>4</sup> indicates that among the vertebrates, 112 mammal species, 55 reptile species, 16 amphibian species, and 81 fish species are found in HP.

#### Protected Area:

As of April 2017, there are five national parks, 26 wildlife sanctuaries and three conservation reserves exist. The total area under the protected area network is 8,358.48 km<sup>2</sup> which is around 15% of the total forest area of the state.

#### Biodiversity Hotspot and Key Biodiversity Areas (KBAs):

A biodiversity hotspot is a bio-geographic area that has a significant reservoir of biodiversity and is consequently threatened by destruction. The Himalayan Biodiversity Hotspot is one such biodiversity hotspot and the HP state falls within the hotspot.

Key Biodiversity Areas (KBAs) are regarded as sites that contribute significantly to the global persistence of biodiversity and is suggested to be identified based on IUCN's "Global Standard for the Identification of Key Biodiversity Areas (IUCN 2016). In India, 531 KBA sites are identified by various organisations. Out of the 531 KBA sites in India, 28 sites are present in HP, which is 5<sup>th</sup> in terms of numbers of KBAs and 9<sup>th</sup> in area size among 36 states and union territories in India.

#### Human-Wildlife Conflicts:

In the last five years (2012-13 to 2016-17), annual averages involved 3.8 human death cases, 282 injury cases and 2.47 million INR (Indian Rupee) compensation paid for human casualties. In the same period, annual averages of animal/ cattle losses were 325 cases with 1,020 deaths with 1.48 million INR compensation paid. In terms of types of animals which caused the conflicts during 2012-13 to 2016-17, monkeys, bears and leopards were major causes of damages in the state, and the human death were caused by bear and leopard attacks.

### **3.6 Forest Management: Planation Management**

At the state level, there has been a declining trend in annual achievements over years from approximately 24,000 hto 32,800 ha in 1980s and 1990s to approximately 17,000 ha in up to early 2011-12. In the recent years (2015-16 and onward) the annual achievement has further declined gradually to around 11,000 ha per year.

District-wise artificial regeneration achievement of HP including projects and centrally sponsored schemes (CSSs) between 2011-12 to 2016-17 is summarised in the Table below. In the past six years the total area brought under plantation is 94,008 ha and total number of seedlings planted was 569.88 million.

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<sup>3</sup> State of Environment Report 2013 Himachal Pradesh; Department of Environment, Science & Technology

<sup>4</sup> I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", Biological Forum-A International journal 8(1):1-26 (2016)

**Table 3.6.1 Amount Invested in Forestry and Afforestation Area in HP State under Plan Budget**

	Plan Period	Plan Expenditure State Sector (Million INR)	Area Afforested (Ha)	Average Annual Afforestation (Ha)	Cumulative Afforestation (Ha)
1	First Five Year Plan (1950-56)	18	5,294	1,059	5,294
2	Second Five Year Plan (1956-61)	78	17,926	3,585	23,220
3	Third Five Year Plan (1961-66)	438	40,187	8,037	63,407
4	Annual Plans (1966-69)	310	27,321	9,107	90,728
5	Fourth Five Year Plan (1969-74)	929	73,349	14,670	164,077
6	Fifth Five Year Plan (1974-78)	1,308	73,599	14,720	237,676
7	Annual Plans (1978-79 & 1979-80)	1,095	44,897	22,449	282,573
8	Sixth Five Year Plan (1980-85)	4,698	120,399	24,080	402,972
9	Seventh Five Year Plan (1985-90)	10,883	163,826	32,765	566,798
10	Annual Plans (1990-91 & 1991-92)	6,475	58,945	29,473	625,743
11	Eighth Five Year Plan (1992-97)	23,420	142,732	28,546	768,472
12	Ninth Five Year Plan (1997-2002)	39,659	131,850	26,370	900,325
13	Tenth Five Year Plan (2002-07)	38,456	86,341	17,268	986,666
14	Eleventh Five Year Plan (2007-12)	59,508	88,661	17,732	1,075,327

Source: Compiled by JICA Study Team (2017) based on Himachal Forest Statistics 2013

### 3.7 Participatory Management in HP

As in other states in India, Joint Forest Management Committees (JFMCs) are established for implementation of National Afforestation Programme (NAP). As of July 2017, 1,562 JFMCs have been established at a village level, of which 963 are functional<sup>5</sup>.

In addition to the interventions under NAP, externally aided projects have also adopted the participatory mode of forest management and established the community based institutions under different names. Most of these community level institutions are considered to be dormant.

In the state, forest management engaging communities are implemented in compliance with the Himachal Pradesh Participatory Forest Management (HP-PFM) Regulations 2001. The rule calls for formation of a Gram Panchayat Ward based people's institution called Village Forest Development Society (VFDS), which is to be registered under the Societies Registration Act 1860. HP-PFM defines the composition of the VFDS, usufruct sharing, and other modalities of organisational management. One of the points that is worth highlighting from the PFM regulation of HP is that the member secretary of VFDS is to be elected from the general house of VFDS members themselves and not the forest guard or frontline staff which is often the case in other states. Furthermore, the HP PFM regulation defines that the benefits are to be shared between VFDS and Gram Panchayat, whereas in other states mostly the benefit sharing is to occur between the community based forest management committee such as VFDS or JFMCs and the forest department.

In HP, a number of village level forest management institutions were constituted by different projects since 1990s in the state. However, the sustainability of such organisations largely depends on the fund availability.

<sup>5</sup> Source: HPFD.

<http://hpforest.nic.in/pages/display/NGY2NTRniGZhNTZz-himachal-pradesh-participatory-forest-management-> (Accessed on 16th July 2017).

### 3.8 Timber Distribution Rights

Rights regimes of local communities were clearly defined in the forest settlement reports prepared during the pre-independence period. In the a) Forest Settlement in Kangra (1879 – 97) and b) Forest Settlement in Kullu (1866 – 96), definition of rights of local communities had been classified into following four types:

- 1) Proprietary body of the villages and *tikas* in whose name common waste land was recorded. These proprietors and their tenants are the right holders,
- 2) Right holders who purchased common waste and the seller retaining the agriculture land and paid no land revenue. They were given the rights of grazing, grass cutting, and collection dry fuel and stones (rights for non-agriculturists),
- 3) Right holders who paid land revenue and exercised the rights in demarcated forest, and
- 4) Right holders who exercised rights over un-demarcated waste (rights of non-agricultural residents – rights to graze few cattle, collect dry wood and cut grasses – only for own domestic requirements).

Right holders included both *bartandars* and *khewatdars*. While *bartandar* is a person entitled to right over land or trees in a protected forest, which may be a property of other, *khewatdar* is a person who has entitlement to rights by virtue of his/ her sole and/ or joint property in subject of right. The admitted rights are as follows:

- ◆ Grazing of cattle
- ◆ Grazing of sheep and goats by the Gaddis
- ◆ Timber for agricultural implements, domestic utensils
- ◆ Timber of construction and repair of dwelling houses, cattle sheds and other agricultural buildings
- ◆ Timber/ dry wood for fuel and daily use
- ◆ Timber for marriage, funeral ceremonies
- ◆ Timber for charcoal for manufacturing of agriculture implements or repair of implements
- ◆ Grasses and side branches of trees for fodder
- ◆ Brushwood for fences
- ◆ Branches, fallen leaves for manure
- ◆ Leaves of trees for tanning
- ◆ Barks of creepers and stumps of trees for torches
- ◆ Fruits, flowers, medicinal and edible roots and leaves
- ◆ Stones for house construction
- ◆ Earth for plastering, making vessels, bricks
- ◆ Wild honey

Especially the rights admitted were exercised for the *bonafide* agricultural and domestic purposes and these are subject to limitation, without endangering the existence of forest cover.

The rights and concessions included free grazing of all animals of the right holders in their respective chaks. If the right holders intend to graze their animals in other chaks and other divisions, then they have to pay *tirni/ cess* to the government. The rights and concessions included right to building timber against payment of nominal fee for different species and there was no mention of ceiling of trees to be sanctioned to the right holders.



## D-4 REVIEW OF FORESTRY RELATED PROJECTS/ SCHEMES SIMILAR TO THE PROJECT

### 4.1 Review of JICA's Forestry Projects in India

The existing study<sup>6</sup> states that “society” mode has certain advantages and recommends as reproduced below. A Project Management Unit (PMU) as a society provides following benefits for operational efficiency:

- ◆ Dedicated department
- ◆ Smoother fund flow
- ◆ Quick decision making
- ◆ Better M&E
- ◆ Able to mobilise experts and skill with good remuneration
- ◆ Able to generate more fund from donor and support agencies
- ◆ Free to decide own operational and HR policy
- ◆ When the PMU functions in Society mode, all the Project Directors play a pivotal role in efficient implementation and resultantly ensure the success of the project.

The study further recommends some of the processes the implementing agency needs to ensure in case, society mode is opted and prepare standard guidelines with regards to incorporation and other regular compliance need to be framed in consultation with tax & legal experts. These guidelines should cover the following issues:

- ◆ How to incorporate PMU and get it registered with Societies Act
- ◆ How to apply for income tax exemptions, so that grants, receipts or donations are exempt from income tax
- ◆ Conceptual clarity on issue of transfer of funds from PMU to divisional management units (DMUs) and field management units (FMUs) to community level implementation organisation such as VFC (village forest committee) when PMU is a society incorporated for Charitable Purposes while DMUs are a part of forest department and not a separate entity. Similarly, not only the PMU but also VFCs are registered societies. So how will such transfers be treated
- ◆ Further PMU formed for charitable purposes and it consolidates their financial statements with that of DMUs for submission with Income Tax Department for claiming exemption. Is it proper from income tax point of view
- ◆ Guidelines based on income tax provisions for fund management including application of receipts, so as to avoid unnecessary tax liabilities. Proper clarifications should be sought with regards to the Income Tax Rules for ‘application of funds’ as income tax authorities can disallow the exemption if the funds are not applied properly as per rules and can have severe tax liabilities and penalties
- ◆ Policy with regards to the proper documentation, compliances and timelines of the same
- ◆ Guidelines for annual compliances, requirements, roles and responsibilities
- ◆ Awareness of tax liability of non-compliance
- ◆ Clarity on who will bear the cost of non-compliance and taxes in case of delays
- ◆ Engagement of consultant for regular compliance, advice, changes in law and internal audit
- ◆ Clarity on taxation, legal process for transfer of assets after the term of PMU ends
- ◆ Clarity on process of support, sustenance and continuity of projects after the term of PMU ends in terms of roles, responsibility and financial support.

In addition to the above highlighted points in the impact study, there are some operational and

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<sup>6</sup> Impact Assessment Study of JICA assisted Projects (2016) by All State Finance services Pvt. Ltd. and BASIX Consulting and Training Services Ltd.

policy issues that are being suggested by the study for future projects. Essence of some of the key recommendations specific to the JICA assisted projects is presented below:

- ◆ Adoption of landscape approach for afforestation and conservation activities
- ◆ Use of improved technology and practices for raising quality planting material in nurseries
- ◆ Promotion of agro/ farm forestry models outside forest areas
- ◆ Identification of keystone, flagship and umbrella species for biodiversity conservation, and creation of People's Biodiversity Registers
- ◆ Shift from 'JFM' to 'community forest management (CFM)' approach particularly in light of FRA, 2006 and PESA, 1996 act provisions
- ◆ Need of strengthening current revolving fund mechanism
- ◆ Requirement of strong institutional arrangements for focused intersectoral convergence
- ◆ There is need for engaging professional/ expert organisations for livelihood support and financial inclusion
- ◆ Exploring CSR opportunities for securing additional funds for natural resource management and livelihood promotion activities.

The workshop titled 'Sustainable Forest Management with People's Participation and Modernisation of Management' was organised by the West Bengal Forest Department (WBFD), the executing agency, through the West Bengal Forest and Biodiversity Conservation Society implementing the JICA assisted project during 11- January 2017 at Kolkata and Sundarbans.

This 9<sup>th</sup> Workshop basically worked further on the recommendations made during the 8<sup>th</sup> annual national workshop organised by the Sikkim Biodiversity Conservation and Forest Management Project (SBFP) at Gangtok, Sikkim during February 29 and March 1, 2016.

The recommendations were made during the sessions of the 8<sup>th</sup> workshop in four broad themes; a) Sustainable Forest and Biodiversity Management, b) Livelihood Security, c) Institutional Strengthening and Capacity Building, and d) Technology based Monitoring. During, 9<sup>th</sup> workshop, further deliberations took place, and these recommendations were further fine-tuned and made actionable.

## **4.2 Reviews of Past and On-going Similar Projects**

Issues and lessons which can be reflected in the proposed Project:

### Forest Ecosystem Climate Proofing Project (KfW)

- ◆ Sufficient orientation and willingness of community is foremost prior to initiating formation of village level institutions
- ◆ Not only VFDS, but involvement of Gram Panchayats maybe essential after the project for O&M of assets/ infrastructure created under the project

### Swan River Integrated Watershed Management Project (JICA)

- ◆ Full-time dedicated staff should be spared by HPFD and project staff (including on contact) should work in synergy and minimise duplication of interventions as well as responsibilities to get focus on the process and quality service delivery
- ◆ Realistic assessment of available area for treatment is required prior to setting project targets

Mid-Himalayan Watershed Management Project (World Bank)

- ◆ Involvement of Gram Panchayats as partner institution is one of realistic initiatives for ensuring sustainability and building social capital in long run. Furthermore, strengthening support to the Gram Panchayats is useful for generating interest for engagement of Panchayats and community for action.
- ◆ Forest frontline staff to be involved for verification of the works, but the challenge would be to ensure focused time for the project as they are already overloaded with regular departmental works and priority.

Indo-German Eco-development Changar Project (GTZ)

- ◆ Quality and timely planted mixed plantations are most effective to achieve rehabilitation and conservation objectives in a short span of time.
- ◆ Protected plantations within few years enrich biodiversity.
- ◆ Grass production increases substantially after the plantation enclosure and has good economic potential
- ◆ Natural regeneration of various plants (e.g. medicinal herbs and trees, fruit species) enhances the economic value spontaneously.
- ◆ Exit Policy be developed and disseminated at least one year prior to completion of a project so that all stakeholders concerned know well in advance about their roles, rights and responsibilities after the project.

National Social Forestry Project (World Bank/ USAID)

- ◆ Planning process should be bottom-up. Community must be actively involved in planning process to have greater ownership.
- ◆ Commitment from the state government for continued financing support for the project initiatives.

Himachal Pradesh Forest Sector Reform Project (DFID)

- ◆ Community institutions of forest resource users can be empowered to address livelihood needs, particularly through linkages with local government, and other government departments

Sanjhi Van Yojana (SVY) Scheme

- ◆ Thorough understandings and analysis on the dependence of natural resources of targeted beneficiaries for determining interventions.

**D-5 ISSUES AND LESSONS LEARNED FROM FOREST MANAGEMENT IN THE STATE**

Based on the findings as well as reviews of forest management and livelihood status of HP, issues and lessons which can be reflected in the proposed Project have been examined by the Study Team. The overall reviews of the forest management and livelihood status in HP are described in the Table below.

**Table 5.1 Overall Reviews of Forest Management and Livelihood Status in HP**

Issues and Features	Description
<b>1. Application of JFM/PFM approach as well as definition of JFM/PFM areas differ among projects/schemes</b>	<ul style="list-style-type: none"> <li>- JFM/PFM related interventions in HP have been supported by various projects and mixture of village level institutions under different names (VDC, VFDC, VFDS, and JFMC) of similar nature have been established.</li> <li>- Therefore, both the national level JFM guideline and the state level PFM regulation provide the fundamentals of JFM/PFM approaches in HP. However, their applications at field varied from project to project.</li> <li>- In most of the past project/schemes, JFM/ PFM treated areas were recorded or demarcated, but JFM/PFM areas beyond treated areas were not demarcated or recorded.</li> <li>- Definitions of JFM/PFM areas (beyond treated areas), varies among projects/schemes, which ranges from forest areas within revenue village, ward, gram panchayat, or entire ward/ gram panchayat. This may have been the results of different kinds of rights endowed to people in various forest settlement</li> </ul>

Issues and Features	Description
	<p>reports determined in respective princely states (prior to formation of HP).</p> <ul style="list-style-type: none"> <li>- Compared to other states, the treatment (treated) area to each JFM/PFM institution seem to be smaller and not more than 30 ha.</li> <li>- JFM/PFM areas could be scattered and fragmented which may downgrade the efficiency and effectiveness of interventions.</li> </ul>
<p><b>2. Not much strong relationships among poverty, forest dependency, and forest degradation are observed in HP</b></p>	<ul style="list-style-type: none"> <li>- There are high demands for the fuelwoods (especially for heating during winter) and other forest resources. There has been an increase in the demand for fuelwood according to the Forest Development Corporation statistics. But at the same time, many households have other sources of energy for cooking and other household requirement and reduced dependency on fuelwood.</li> <li>- Many communities have varieties of livelihood options (i.e. government;/ private sector work) and access to commercial facilities (bank, etc.). However, Lahaul &amp; Spiti and a part of Kinnaur have limited access to amenities including means of communication. Especially during winter, the life in the areas is generally met with severe challenges as the lifeline gets affected by the snow and freezing temperature.</li> <li>- In HP, though there may be areas/ communities which rely exclusively on forests, there is a tendency that forest dependents or users of forest resources are not always relying to the forest for daily survival.</li> <li>- In the surveyed households, the survey results indicated that the income level of the ST households was the highest compared to other social groups, which was also reflected in the field observation. It was difficult to conclude the clear linkage between the social group and economic marginalisation.</li> <li>- In some part of the state (Kinnaur etc.), ST households could be hiring labourers to collect fuelwoods and other forest resources for their domestic consumptions and other purposes.</li> <li>- In consideration of the above, compared to other states, a vicious cycle of forest degradation by forest dependent communities<sup>7</sup> which is one of the key justifications of JICA forestry sector projects in India appears to be very limited in HP. Rather, necessity of improvements of forest conditions/ health without strong linkages with poverty, forest dependency, and forest degradation seems to be more relevant.</li> </ul>
<p><b>3. Tendency that the JFM/PFM approach and livelihood activities closely related to JFM/PFM institutions are not fully applicable in HP (in comparison to other states)</b></p>	<ul style="list-style-type: none"> <li>- In general, in HP, people and communities surrounding the forest areas already have some kinds of rights and access to forest areas and forest resources. This is more prevalent than in the other states.</li> <li>- Since benefits from the forest are available as their entitlement, JFM/PFM seen in other states will not always give incentives for forest resource management fo people and communities in the forest fringe areas.</li> <li>- In consideration of existing livelihood conditions of many, the kind of investment required to further improve on the livelihood situation could be significant and may not be feasible within the scope of the proposed Project.</li> <li>- In the case of NTFP based livelihoods, though not many are engaged in these days, potential can be seen in improving the post harvest technologies and ensuring sustainable harvesting methods.</li> <li>- The seasonal variations in livelihood vulnerability need to be looked into along with gender issues in grassland/ pasture utilisation.</li> <li>- Lahaul &amp; Spiti with lack of forest and grassland, households need to procure their requirement from outside of the area. This increases further vulnerability of the households as their livelihoods options are limited since the area is remote and less accessible.</li> </ul>
<p><b>4. Quantified data explaining increase of forest degradation is not fully available</b></p>	<ul style="list-style-type: none"> <li>- As a general description, degradation of forest areas and their resources of the state are often raised. However, there is not much of detailed quantified data which indicate the changes in the status of forest degradation.</li> <li>- Rather forest cover is gradually increasing as per data and analysis from FSI data.</li> <li>- On the other hand, there are statistical data for illicit felling, forest fires, encroachment, etc.</li> <li>- HPFD recognises forests having crown density under 70% are eligible for forest improvement. Improvement of moderately dense forest (crown density 40%~70%) to higher crown density is one of priorities. However, forests site specific breakups of crown density within moderately dense forest are not fully available within HPFD.</li> </ul>
<p><b>5. Nearly half of notified forest</b></p>	<ul style="list-style-type: none"> <li>- Notified forest area in HP is 37,033km<sup>2</sup> and this represents 67% of total geographical area of the state.</li> </ul>

<sup>7</sup> poor households having no alternative sources of livelihood other than forest resources and heavily relying on forest and forest resources for daily survival that have been regarded as the ones significantly impacting on the forest resources and thus caused further forest degradation.

Issues and Features	Description
<p>areas in HP are without tree cover. 57% of notified forest area is not demarcated.</p>	<ul style="list-style-type: none"> <li>- 44% of notified forest area (16,376km<sup>2</sup>) is without forest/ tree covers and dominated by the permanent snow or glacier (unculturable forest area).</li> <li>- According to the HP Forest Sector Policy and Strategy 2005, majority of these unculturable forest areas will continue to be managed as glaciers, permanent snow and alpine pastures.</li> <li>- Approximately 57% of notified forest area in the state (21,293km<sup>2</sup>: 38% of total state geographical area and 59% of notified forest area managed by HPFD) is either un-demarcated protection forest or un-classified forest and their boundaries are not demarcated.</li> <li>- Existence of many un-demarcated forests makes it difficult to detect forest offences/ encroachments and increase risks of conflicts and forest offences.</li> </ul>
<p>6. Necessity for further biodiversity conservation and management in the state</p>	<ul style="list-style-type: none"> <li>- The state is rich in fauna and flora.</li> <li>- There are 31 protected areas in HP. Approximately 15% of state's geographical area is under protected area (8,358 km<sup>2</sup>). Size and numbers of protected areas are in mass-scale.</li> <li>- However, some protected areas are isolated.</li> <li>- There are further needs for biodiversity conservation and management outside of protected areas (including human-wildlife conflict measures) .</li> </ul>
<p>7. There were many externally aided projects and centrally sponsored schemes having similar activities</p>	<ul style="list-style-type: none"> <li>- Many externally aided projects adopting JFM/PFM approach have been implemented in HP since 1990s.</li> <li>- Securing sustainability and continuity of these JFM/ PFM have benn the challage in most of the past interventions.</li> <li>- KfW project using the JFM/PFM approach is already implemented in Pangi/Bharmour sub-divisions under Chamba district, which divisions were proposed to be covered under this project.</li> <li>- Two World Bank projects are in-pipeline. Of these, one would mainly deal with treatment of stream bank and rainfed agriculture, whereas the other would mainly deal with improvement of forest areas. Shimla district and Pangi/Bharmour sub-divisions of Chamba district are overlapping with the proposed Project.</li> </ul>
<p>8. Limitations in accessibility and activity period</p>	<ul style="list-style-type: none"> <li>- Due to snow and other climatic factors, majority of proposed project areas (Lahul &amp; Spiti, Kinnaur, Chamba, etc.) have seasonal limitations for undertaking various project activities (including livelihood activities) and access in and out.</li> <li>- Depending on the regions, field activities and travelling would not be feasible during winter (4-6 months in a year).</li> <li>- Remaining months of years are spent for livelihood and income generation activities.</li> <li>- In consideration of the above, time available for the proposed project interventions will be limited and tend to overlap with other existing activities.</li> </ul>
<p>9. Tendency for longer duration required for raising seedlings</p>	<ul style="list-style-type: none"> <li>- Majority of seedlings raised by HPFD require nursing period of two years and above. This is relatively longer period compare to other states in lower areas having nursing period of 3 months to 1 year.</li> <li>- Furthermore, the state promotes "tall plants" which require longer nursing period of 3.5 years and above to secure large seedlings. Most of species require a maximum of 3.5 years but some species such as <i>Fraxinus spp.</i> require around 5 years.</li> <li>- For project implementation, the duration required for seedling raising shall be taken into account for the implementation schedule. Also, this factor may limit total quantities of seedling which can be produced and total areas which can be taken up in the Project.</li> </ul>

Source: JICA Study Team (2017)

## D-6 REVIEW OF DRAFT PROJECT REPORT (DPR)

### 6.1 Overview

The Study Team reviewed the data and relevant information to understand the basis for DPR. Although the availability of such data was limited, the results of DPR review revealed some shortcomings and the need for further confirmation of the data as well as the need to further restructure the project framework and approach in response to the conditions in the proposed project areas.

## 6.2 Project Needs and Rationale

Trends on increase in forest degradation as well as necessities of alternative livelihood options of forest dependent communities to reduce adverse impacts to forest areas /resources were not fully confirmed with sufficient justifications based on the quantified data during the Study. Likewise, in the other JICA forestry loan projects in India, the vicious cycle of forest degradation by poor forest dependent communities was one of fundamental assumptions described in DPR for the proposed Project. However, this assumption was not fully applicable and justifiable in the HP context. In this context, livelihood improvement components/ activities shall instead be designed to ease the seasonal vulnerability of the household economy in the context of sustainable forest resource use and management as a supporting component in the project.

Based on findings as well as analyses conducted during the Study, the modified project needs and rationale were confirmed and presented in **Part II, Chapter 3** of this report.

## 6.3 Project Objectives and Approaches

Overall goal, project objective, outputs, and approaches presented in DPR were in need of further elaboration to be more explicit. During the initial stage of the study narrative summary of the proposed Project was reviewed by HPFD and the Study Team. The latest project objective and approaches are presented in **Part II, Chapter 3** of the Final Report.

## 6.4 Overview of Component-wise Review of Proposed Project by HPFD

Based on the component structure of DPR and the restructured project framework by HPFD and JICA prior to the commencement of the Study, the review was done in the following aspects.

- |   |  |
|---|--|
| 1) Institutional Capacity Building including Orientation/ Sensitisation & General Preparedness (Preparatory Work) | 7) Research, Studies and Documentation     |
| 2) Forestry (Department mode and JFM mode)  | 8) Strengthening of ICT in HPFD            |
| 3) Soil & Moisture Conservation   | 9) Monitoring and Evaluation               |
| 4) Livelihood Activities  | 10) Project Management Unit (PMU)          |
| 5) Wildlife Habitat Improvement   | 11) Office Building for the Project        |
| 6) Environmental Rehabilitation   | 12) Consulting Service                     |
|   | 13) Environmental and Social Consideration |

In general, descriptions of each activity and their work quantities (including region-wise work quantities) were not fully described in DPR.

## D-7 ENVIRONMENTAL AND SOCIAL CONSIDERATION

### 7.1 Environmental and Social Consideration Framework in India

An analysis of ESC framework in India against JICA Guidelines as well as World Bank's safeguard policies was conducted in the Study. Overall, environmental and social safeguard

policies and related legislation in India do not deviate from the requirements of the JICA guidelines. Particularly, “Environment (Protection) Act, 1986 (and Amendment 1991)”, and “EIA Notification 2006 (and Amendments 2007, 2008, 2009, 2011 and 2012)” for environmental consideration and “The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013” for social consideration have been provided the solid legal foundation to avoid or minimise the negative impacts on environment and local communities, and to prevent the occurrence of unacceptable adverse impacts.

Ministry of Environment, Forest and Climate Change (MoEF & CC) is the highest body and central ministry in the country for regulating and ensuring environmental protection and supervision of environmental and forestry policies/programmes for the implementation. The Central Pollution Control Board (CPCB) under MoEF & CC at the union level and the State Pollution Control Boards (SPCB) at the state level together form the regulatory and administrative core of this sector. Department of Environment, Science and Technologies (DEST) is also a focal point in charge of environmental protection and pollution control under different relevant Act and Rules.

## **7.2 Baseline Information for Environmental and Social Consideration**

Prior to commencement of any development projects, whether it requires an EIA or not, it is imperative to understand and identify the baseline levels of environmental and social parameters which might be affected as a result of the proposed Project or its sub-projects or activities. In this regard, social and natural environment as well as environmental pollution baseline data are described in Vol I Chapter 8.

## PART II PROJECT

## D-8 PRELIMINARY SITUATIONAL ANALYSIS OF THE POTENTIAL PROJECT AREA

## 8.1 Forest Cover

Division-wise forest cover based on ISFR2015 for divisions located in the prioritised project districts are summarised in the Table below.

**Table 8.1.1 Division-wised Forest Cover of Divisions Located in the Prioritised Project Districts**

No.	Division	District	Total Area(ha)	Scrub (ha)	Open Forest (ha)	Moderately Dense Forest (ha)	Very Dense Forest (ha)	Total Forest Cover(ha)	Forest Cover%
<b>A) Territorial</b>									
1	BILASPUR	Bilaspur	116,739	14	16,706	17,098	2,363	36,168	31.0%
2	MANDI	Mandi	82,026	83	13,100	12,129	6,383	31,612	38.5%
3	NACHAN	Mandi	61,951	18	8,343	16,167	12,811	37,321	60.2%
4	SUKET	Mandi	92,074	1,173	11,208	10,450	3,003	24,661	26.8%
5	KARSOG	Mandi	60,212	1,569	11,212	12,434	4,128	27,775	46.1%
6	JOGINDERN AGAR	Mandi	65,750	3	6,591	11,940	3,831	22,362	34.0%
7	KULLU	Kullu	115,662	326	16,006	24,800	7,975	48,781	42.2%
8	PARVATI	Kullu	94,456	649	12,805	14,053	11,504	38,362	40.6%
9	BANJAR	Kullu	35,691	164	4,648	7,611	8,953	21,212	59.4%
10	ANNI	Kullu	71,459	484	9,479	12,299	9,158	30,936	43.3%
11	LAHAUL	Lahaul	657,485	971	14,481	3,111	1,466	19,058	2.9%
12	KINNAUR	Kinnaur	569,040	6,869	23,166	22,058	6,498	51,722	9.1%
13	SHIMLA	Shimla	8,980	1,351	11,695	13,188	6,453	31,336	45.4%
14	THEOG	Shimla	67,035	211	6,936	12,023	8,634	27,594	41.2%
15	ROHRU	Shimla	158,907	469	18,235	32,193	17,655	68,083	42.8%
16	CHOPAL	Shimla	81,096	406	9,637	18,989	12,471	41,097	50.7%
17	KOTGARH	Shimla	27,329	16	3,009	5,359	4,632	13,000	47.6%
18	RAMPUR	Shimla	81,942	470	9,289	14,635	15,597	39,521	48.2%
<b>Total of Above</b>			<b>2,507,835.1</b>	<b>15,249.4</b>	<b>206,545.9</b>	<b>260,537.9</b>	<b>143,514.4</b>	<b>610,598.1</b>	<b>24.3%</b>
<b>B) Wildlife</b>									
1	Kullu WL	Kullu	123,066	124	8,290	11,360	10,303	29,953	24.3%
2	GHNP	Kullu	124,517	567	10,576	12,772	14,482	37,830	30.4%
3	Spiti WL	L&S	736,648	1,737	61	-	-	61	0.0%
4	Sarahan WL	Kinnaur	96,265	432	4,336	7,509	7,464	19,309	20.1%
5	Shimla WL	Shimla	5,640	1,737	61	-	-	61	0.0%
<b>Total of Above</b>			<b>1,086,136.0</b>	<b>2,860.4</b>	<b>23,859.9</b>	<b>34,407.2</b>	<b>34,122.1</b>	<b>92,389.2</b>	<b>8.5%</b>
<b>Grand Total</b>			<b>3,593,971.1</b>	<b>18,109.8</b>	<b>230,405.8</b>	<b>294,945.1</b>	<b>177,636.5</b>	<b>702,987.3</b>	<b>19.6%</b>

Note: for Shimla WL division only areas fall into proposed project districts are compiled.

Source: Compiled by JICA Study Team (2017) based on ISFR 2015 and information from HPFD

Divisions where dry alpine pastures are dominant (i.e. the alpine zone) tend to have lower forest cover ratio than other divisions (i.e. the non-alpine zone) due to their higher altitude. The forest cover ratios are extremely low in Spiti wildlife division, Lahaul division, and Kinnaur division, which are 0.0%, 2.9%, and 9.1%, respectively. On the other hand, the forest cover ratio of GHNP division and Bharamour division exceed 30% even though these divisions are located in the alpine zone.

In the non-alpine zone, most of divisions have the forest cover ratio exceeding 30% and except for Suket division which only have 26.8%. Majority of divisions have forest cover ratio ranging from 40% to 60%.



## 8.2 Major Ecosystems

Brief description of the ecosystem (vegetation) type in the divisions concerned are presented in the Table below.

**Table 8.2.1 Description of Ecosystem Types in Project Districts Proposed by HPFD**

Ecosystem/ Vegetation Type	Description
Tropical Moist Deciduous Forest	Only found in Shimla and Theog divisions covering areas of 855 ha, whereas presence of the forest-type group is 2,560 ha in Shimla wildlife division.
Tropical Dry Deciduous Forest	30,111ha visible in 12 territorial divisions (Bilaspur, Suket, Theog, Karsog, Shimla, Chopal, Rampur, Mandi, Kotgarh, Anni, Jogindernagar and Nachan). Bilaspur division has the most cover and almost two-third of the total area (20,300ha) in territorial divisions under this forest-type group. In wildlife divisions, Kullu wildlife division (450ha) has this forest-type group.
Sub-Tropical Pine Forest	This is the second dominating forest-type group and has a total of 71,223 ha (70,310 ha in 18 territorial divisions and 913ha in four wildlife divisions) in the prioritised project district areas. The top six territorial divisions (Karsog, Theog, Bilaspur, Suket, Shimla, Mandi) cover more than 75% of the area.
Himalayan Moist Temperate Forest	This is the most dominating forest-type group and a total of 377,578 ha (339,449 ha in territorial and 38,029 ha in wildlife) is found in all of the prioritised project district areas except in Spiti wildlife division. Nine divisions (Chopal, Jogindernagar, Rohru, Nachan, Kullu, Parvati, Rampur, Kullu wildlife and Mandi) have more than 20,000ha of this forest-type group within their divisions and total area covering around 71% of this forest-type group.
Himalayan Dry Temperate Forest	This is the third dominating forest-type group and a total of 71,057ha (60,298 ha in territorial and 10,759ha in in wildlife divisions) is found in the prioritised project district areas. This forest-type group is found in all of five wildlife divisions and 13 territorial divisions, but not in Bilaspur, Mandi, Nachna, Suket and Theog divisions.
Sub-alpine Forest	This forest-type group has a total of 47,575 ha (41,673 ha in 11 territorial divisions and 5,902ha in four wildlife divisions) in the prioritised project district areas. Top five divisions (Rohru, Kinnaur, Kullu, Parvati and Kullu wildlife) have more than 3,000 ha of this forest-type group within divisions and contribute to about 80% of total area under this forest-type group.
Moist Alpine Forest	This forest-type group has a total of 6,501 ha (5,220 ha in 9 territorial divisions and 1,281ha in four wildlife divisions) is in the prioritised project district areas. Top six divisions are Kullu, Parvati, Kullu wildlife, Rampur, Anni, and Rohru divisions which contribute about 88% of the total area.
Dry Alpine Forest	This forest-type group has a total of 24,408 ha (19,037 ha in 9 territorial divisions and 5,371ha in four wildlife divisions) is in the prioritised project district areas. The three largest divisions (Kinnaur, Kullu, and Spiti wildlife), have more than 2,000 ha and accounts for 80% of this forest type group is found in these districts
Dry Aline Pasture	The dry alpine pasture has a total of 707,708 ha (470,564 ha in 10 territorial divisions and 237,143ha in five wildlife divisions) in the prioritised project district areas. The dry alpine pasture is dominated in three divisions (Kinnaur: 205,065ha, Lahaul: 162,185ha, Spiti wildlife: 115,741ha), which covers about 75% of the area. Four other divisions (GHNP, Saharan wildlife, Rohru, and Kullu wildlife) have the dry alpine pasture exceeding 20,000ha. These nine divisions account for about 95% of the dry alpine pasture found in these districts.

Source: Compiled by JICA Study Team (2017) based on IFSD 2015 and information from HPFD

## 8.3 PFM/JFM

According to the data supplied from the project divisions, 491 JFMCs with the total number of 19,027 members have been formed under FDA between 2000 and 2011, out of which, 197 JFMCs are reported to be active. The average number of members in divisions ranges between 8

and 180, with the total average of 39 members.

Across nine divisions, 275 Gram Panchayats were identified suitable for the PFM mode operation. The total treatable area under PFM mode was estimated to be 4,961 ha. In Kinnaur, substantial area of grass land is available for treatment along with the areas for ANR.

The proposed project intends to work with wards which is the lower unit of Gram Panchayat under PRI. There are for 4,599 wards in the proposed project divisions. Thus, the number of wards to be selected from each project range may need to be limited taking into consideration of the scale of the treatment areas, which in other wards affects the effectiveness of the treatment and has an implication on the project operational cost.

## 8.4 Wildlife and Biodiversity

### Protected Area

Questionnaire survey was conducted with 22 protected areas in seven proposed project districts by HPFD, and ten answers (45.5%) were returned. The current status of respective wildlife divisions such as facilities, human-wildlife conflict, endangered fauna and flora, and ecotourism activities are briefly summarized in **Table 8.4.1**.

**Table 8.4.1 Current Status of Wildlife Divisions of Prioritised Project Districts**

Wildlife Division	Shimla	Sarahan	Spiti
Protected Areas included	SWC Dhali, SWC Chail, Tharoch	Dharanghati, Lippa Asrang, Rakchham Chhitkul, Rupi Bhaba	Chandertal, Kibber, Pin Valley NP
Interpretation Centre	No	No	1 in Kibber
Veterinary Care Centre	No	Sarahan Pheasantry	No
Tranquilization equipment	2 in Tharoch	Yes in division office	1 in division office
Camera traps	4 each in respective PAs	24 in division office, 2~28 in respective PAs	Yes
Audio-Visual equipment	No	8 in division office, 8~17 in respective PAs	No
GPS	5 in total	13 in division office, 1~10 in respective PAs	Yes
4WD vehicle	0	1 in division office	1 in division office
Motor bike	2 in total	3 in division office	No
Bicycle	66 in total	no	No
Human-wildlife conflict	0	Sporadic, black bear, snake	Ibex damages agriculture crops of adjoining villages, crop raiding. Snow leopard sometimes prey on domestic animals
Issues of endangered fauna and flora	0	Tragopan, Musk Deer, Serow	Medicinal plants exploitation, pastures land competition between domestic animals & wildlife, prey spp of snow leopard. Spread of communicable diseases
Existing measures for endangered fauna and flora	0	Tragopan Conservation breeding Programme, Development of anti-poachers, Provision of watch-towers and law training for staff.	Protection by staff, educating the local population. Pasture improvement, moisture improvement, awareness & vaccination with the help of line department.
Habitation and usage of PA by people	0	Debarred, accordingly to notification issued during 2013	In fringe areas for pasture, medicinal plant collection. migratory graziers.
Eco-development	0	Nil	Bunkers, tracking & traditional

Wildlife Division	Shimla	Sarahan	Spiti
work			routes
Eco-tourism	0	Eco – tourism Society of circle level is under formation	Trekking routes to Baralachha & Leh.
No. of nature camps organized in 2016-17	0	10 in total	9 in total
No. of eco-clubs exist	-	-	1 Senior Secondary School each in respective PAs
No. of cases of timber poaching in 2016-17	0	2	-

Source: Compiled by JICA Study Team (2017) based on questionnaire survey by the Team

### Human-Wildlife Conflicts

The tendency of the human-wildlife conflicts is as follows.

- ◆ The human-wildlife conflicts seem to be more prevalent in low to mid elevational districts/divisions in HP which are more populated in comparison to districts/divisions which are in higher elevation with less population density
- ◆ Compared to territorial divisions, there seem to be less human-wildlife conflicts in wildlife divisions which include protected areas. This is because local livelihood and livestock are not expected in the protected areas thus chances of conflicts are much less than those outside protected areas.

The incidences of human wildlife conflicts identified from the Livelihood Survey indicated that the damage was caused by monkeys and mostly on crops. Bears were also identified as a cause of crop damage in the JFM areas and wild boar in Bilaspur and Mandi. Damages to the household properties are reported by one household in Kotgar (non JFM/ parrot) and 2 households in Rampur (non JFM/ rat) and Theog and one grassland users/ semi-nomadic household from Parvati (non JFM/ wild boar). Loss of domestic animals were reported by 8 households of the JFM villages and by 4 households amongst the 59 grassland users/ semi-nomadic households. The compensation was received by one household in Kinnaur for the loss of domestic animals for the amount of INR 16,000. No incidences of human injuries were reported by the surveyed households however, a few households indicated that female adults and female children were affected by the wild life.

## **8.5 Forest Products and Markets**

### Timber and Fuelwood

Timber and fuelwood are the major forest products in the project area. The HP State Forest Development Corporation Limited has been assigned with the responsibility of harvesting and sale of timber and fuel wood as per the directions of HPFD. Since there is a ban on green felling, the Corporation undertakes salvage operations for the dry, diseased, damaged and uprooted trees handed over to the Corporation by HPFD

Sale of fuel wood to non-right holders in the state is managed by the Corporation through 42 timber/fuel wood depots. Since 1992, the Corporation has been supplying fuel wood to HPFD to meet the requirement of local people as well as the government departments. The fuelwood depots in tribal areas are managed by HPFD. During 2010-11 to 2014-15, the Corporation

supplied fuel wood worth 273 million INR<sup>8</sup> to HPFD for meeting the requirements in tribal areas.

### NTFPs

A wide range of NTFPs are available in all 7 proposed project districts by HPFD in Chamba, Lahaul and Spiti, Kullu and Mandi, which are the important districts for production of high altitude medicinal plants. Although the production/ outturn of high altitudinal medicinal plants has significantly declined, there is a potential to regenerate the resource base and enhance the production of these medicinal plants both from the forest and non-forest areas. **Table 8.5.1** presents the important NTFPs from the project area.

**Table 8.5.1 NTFPs Procured and Traded in the Proposed Project Districts**

District	NTFPs currently traded	NTFPs under cultivation	Value addition of NTFPs
Bilaspur	Resin, Katha, Myrabolans, Pine Needles	Myrobolans and aloe vera	HP State Forest Development Corporation runs a resin processing unit in Bilaspur.
Chamba	Pathan Bel, Muskbala, Revandchini, Patlain roots, Bhutkesi, Kapurkachri, Guchhi, Bankakri, Moss Grass, Dhoop, Nagchhatri, Rhododendron flower, Atis/Patis, Birmi, Ban Lahsun, Kadu etc.	Atis, Bankakri, Kadu, Muskbala, Nagchhatri, Kalajeera	
Lahaul & Spiti	Kalajeera, Dhoop, Atis/Patis, Artemisia, Kuth, Kadu, Ban-ajwain, Puskarmool, Seabuckthorn, Bankakri, Guchhi	Kuth, Seabuckthorn, Puskarmool, Atis, Bankakri and Kadu	Seabuckthorn Society has set up a pulp processing unit in Lahaul.
Kinnaur	Neoza, Dhoop and Somlata are the important ones. Small quantities of Juniper, Taxus leaves, kala jeera, Lichens(Chhadila), Kadu, Singli-Mingli are also available.	Atis/ Patis, Bankakri, Kadu, Salampanja	
Kullu	Kadu, patish, ban kakri, guchhi, rakhal, lichens, berberis roots, reetha, kakar singhi, jatamansi	Atis/ patis, bankakri, kadu, kuth, chora, rakhal, belladonna, valeriana, ratanjot, nagchhatri, ban lahsun, seabuckthorn, hath panja	Aromatic oils from cedar wood, tagetes and others. processing of dhoop. herbal medicines from different NTFPs
Mandi	Berberis roots, tejpatta, rhododendron flower, ban haldi, kail cones, kunish cones, cedar rosettes, ritha, green moss grass, lichens, guchhi, resin, pine needles, nirgal etc.	Rakhal, valeriana, kuth, kutki, belladonna, myrabolans, chirayata, aswagandha, aloe vera, safed musli, tulsi, berberis, horse chestnut	Processing of berberis roots in small quantities, aromatic oils from cedar wood, costus, tegetes, bach, valeriana, kapur kachri, juniper etc.
Shimla	Resin, kadu, lichens, kuth, guchhi, khanor, wild pomegranate, Marigold etc.		

Source: JICA Study Team (2017)– compilation of information from interaction with different stakeholders, from Annual Reports, Working Plans of HPFD etc.

### Farm Forestry and Social Forestry

Poplar, willow, khair, bamboo etc. are some of the species planted by the farmers in their own land in some of the project areas. Farm forestry as commercial farming is not a common practice of farmers in the major part of HP. Poplar and willow were traditionally being planted in the cold arid regions of the state – Lahaul & Spiti and Kinnaur to meet the fuel, fodder and small timber requirements. Willows grow near the tree line, where other vegetation does not exist and people in Lahaul consider it to be the life line for meeting the fuel, fodder and small timber needs.

In comparison to farm forestry, orchard development is very common in the project area, especially in Shimla, Kinnaur, Kullu, Mandi, Lahaul & Spiti and Chamba districts. People, in

<sup>8</sup> GoHP (2016). Report of CAG of India on Public Sector Undertakings (Economic Sector) for the year ended 31<sup>st</sup> March 2015.

general, do not want to lock up their land for planting forestry species, which has long gestation period and is not as remunerative as horticulture & off-season vegetables. The average operational holding is less than 1 ha, which is another reason for poor adoption of farm forestry by the people in the project area.

## **8.6 Livelihood Socio Economic Characteristics**

The following information is based on: i) livelihood survey based on household interviews conducted with 400 households, and ii) rapid field assessment using PRA and gender analysis tools undertaken in the selected communities selected from the proposed project districts.

Socio-economic Background: 57.3% of the survey households reported to hold the above poverty line (APL) card while 34.2% hold the below poverty line (BPL) card. Slightly higher proportion of the households are holding BPL status in the graziers/ grassland users' community.

Social Groups: 89.0% of the survey households were Hindus, 5.1% Buddhists and 4.4% Muslims. The general category households constitutes 35.3% and STs accounting for 35.1% of the total sampled households. Amongst the graziers and grassland users, 50% of the households belong to STs.

Demographic Characteristics: The total population of the 400 survey households was 2,130 persons with an average family size of 5.3 persons per family and the same is slightly bigger amongst the graziers/ grassland users as it was recorded as 6.0 persons per household.

Education and Literacy: Amongst the 6 years and above population, 15.4% was non-literate (9.0% of male population and 22.2% of female population). Non-literacy rate was higher among the graziers and grassland users. The number of non-literate women increases among those among those beyond the age of 40 years whereas the same for men tends to increase among the slightly older age groups. 66.4% of above 18 male population and 51.6% of women the women of above 18 in the survey villages attained the education of 8<sup>th</sup> standard and above. Gender wise, slightly lower proportion of women received formal education.

Means of Livelihoods: Livelihood pattern in the surveyed villages can be summed up as agriculture/ horticulture + salary/ wage. All the village households adopt multiple livelihood strategies to earn their living. Many women may be engaged with wage work and income generation activities like handicrafts or handloom.

### Income and Expenditure:

The annual income earned between April 2016 and March 2017 was asked. Out of 400 households, 41 households did not respond on this query. The average annual income of the survey households was estimated to be INR 204,126 with the median of 120,000. The maximum income was INR 2,100,000 and minimum was INR 1,500. The average income level of the territorial divisions was 62.5% higher than that of the graziers/ grassland users. The female headed household earned significantly lower than that of male headed households. In the territorial divisions, 48% less in JFM areas.

The average household expenditure was estimated to be 161,318 INR for territorial divisions and

232,496 INR for the graziers/ grassland users with the median of INR 105,300. Expenditures are high in food, farm inputs, education for children and maintenance of house. Among the graziers/ grassland users, the expenditure on fodder was high in some parts of survey areas.

#### Seasonality of the Livelihood

Across all areas except Bilaspur, winter (November – April) is the most challenging season of the year. Most households prepare for winter by stocking fuelwood, fodder and food. Sometimes rations run out but in such cases, neighbours help each other. They overcome such difficult situation through mutual help. Winter is also the season that most livelihood activities halt.

### **8.7 Forest Uses**

Household Energy: The households in the surveyed villages use multiple sources of household energy including LPG, fuelwood, electricity, solar energy, and dried animal dung. Due to the power cuts during winter and erratic supply and high cost of LPG cylinders, village households still use fuelwood. It was also one of the preferred energy source for cooking and warming the house. In the areas where the electricity was available, induction cookers and electric heaters were occasionally used.

Grazing/ Fodder/ Pasture Management: Commonly owned livestock amongst the survey households included cow, goat, sheep, and ox. Buffalo was also owned mostly amongst the graziers/grassland users with an average holding of 25.3 while about 50% of the respondents in Bilaspur division owned 1.4 buffaloes on an average. Cow was owned by 60% of the total survey households with an average holding of 1.5. The number of goats owned by the households varies between 1-150 and graziers could have as many as 150 goats. The sheep is also owned in a large herd ranging between 2 – 90. The graziers were indeed has 37 sheep on an average. Nearly all the animals were grazed during summer either in the nearby government forest area or in the agriculture field and stall fed during the winter seasons. The average duration of grazing in the forest area including pastures was 7.0 months.

### **8.8 Gender and Community Forest Management**

General: A clear gender division of labour was seen. Women would look after family and production of food crops for the family whereas men would carry out the heavy work in the farm and work outside of home or village to earn cash income. The gender gap in wages was evident. Most women would stay at home and when needed, they take part in MGNREGS and other works near home which wages would not be as high as that is earned by men from outside.

Ownership of Household Assets: Women in all the surveyed villages did not own land except widows. All the land was registered under their spouses' name. Gold jewellerys were considered to be women's property but require the spouse or in-laws consent when in need of encashment.

Forest Resource Use and Management: In almost all the surveyed villages, women were the primary collector of the fuelwood and fodder from the forest area. Grazing was likewise mostly done by women in the surveyed villages. Women were aware of the NTFPs that they collected

and NTFPS to be collected were decided through the discussions with men, which suggests that the men may have the control over the marketable NTFPs while women may not. In the surveyed villages, not much of the forest management activities were undertaken. One of the common activities was firefighting and reporting of the illicit felling to FD. In many places where it was done, it was largely by women as most men are working outside of the village during the day. If men were in the village, they would help. The survey findings also suggested that women were not much aware of JFMC or VFDS whereas Mahila Mandal were well recognised and in some places were engaged in the social forestry and taking charge of watching to prevent illicit felling.

## **PART I    STUDY**



## **Part I: Main Text**

## **CHAPTER 1 INTRODUCTION**

### **1.1 Background of the Study**

The state of Himachal Pradesh (HP) located in the North India at the foot of Himalayas, with a geographical area of 55,673km<sup>2</sup> and population of 6.865 million (2011 Census), of which 5.71% are scheduled tribes (ST) and 25.19% are scheduled castes (SC). In HP, the ratio of the notified (legal) forest area is high since 66.52% of its geographical area is recorded as notified forest area such as reserved forest and protection forest. Furthermore, 22.57% of the notified forest area (15.01% of the state geographical area) is designated as the protected area, such as national park and wildlife sanctuary.

In general, HP mostly consists of mountainous area (elevation 350 – 6,800 m), except for plain areas prevalent in the southern border of the state. Within the state, forest vegetation is characterised by pine dominated coniferous forests, oak dominated broad leaves deciduous forests, and mixed forests. According to the Atlas Forest Type of India 2011, 39 forest types are recorded within the state. Due to its undulating topography, the state possesses various types of ecosystems, mainly forest ecosystems, and ecosystem and biodiversity conservation (including water catchment conservation and rare species protection) is viewed as one of the important issues in HP.

Based on the analysis of 2013 satellite imageries, the forest/ tree cover ratio of the entire state was 27.76% (15,453km<sup>2</sup>), of which 5.79% was very dense forests, 11.46% was moderately dense forests, 9.14% was open forests, and 1.36% was tree covers. HP has formulated the State Forestry Sector Policy in 2005, and set the target state forest/ tree cover ratio of 35.5% (from the actual ratio of 27.1% at that time). However, at the entire state level, there is not much of significant increase in forest/ tree cover.

Since 90% of the state population resides in the rural areas, and rural population tends to be more dependent to forest and other natural resources, there are concerns within the state that there will be further loss of natural resources due to increase in population and adverse impacts to ecosystem including forest degradation/ pasture decrease.

Sustainable forest/ ecosystem management and livelihood improvement of local communities are becoming priority issues in the state. Hence, the Government of India requested Japan International Cooperation Agency (JICA) to support the Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project (the Project) for promoting sustainable forest management and socio-economic development in the forest based ecosystem areas within HP. Based on the request, JICA decided to dispatch a Study Team to undertake the preparatory study of the Project (the Study) to examine the Project's eligibility for a Japanese Yen Loan project.

## **1.2 Objective of the Study**

The objectives of the Study are to undertake a study to collect and analyse information on project backgrounds, objectives, contents, costs, implementation framework, operation and maintenance setups, environmental & social considerations, etc. to fulfil the eligibility requirements of a Japanese Yen Loan Project.

## **1.3 Scope of the Study**

### **1.3.1 Study Areas**

The original study area was entire state excluding the areas which require protected area permits (PAP) and the areas which can only be accessible from PAP areas by vehicle roads. The safety concerns in the PAP areas have been confirmed by JICA in early July and so the PAP areas were also included as the part of the study area as well as areas to be examined for the proposed Project. The Study Team was able to conduct field surveys in the PAP areas by the end of August 2017 after formal procedures within JICA.

The proposed project area to be examined in the Study covers seven districts: namely Shimla, Bilaspur, Kullu, Kinnaur, Mandi, Lahaul & Spiti and Chamba. In case of Chamba district, proposed project areas are sub-divisions of Bharmour and Pangi only.

### **1.3.2 Scope of Work**

The scope of the Study is outlined below:

- 1) Examination of necessity, relevance, and background of the Project
- 2) Review of the target areas, determination of prioritisation of the target areas, selection of the potential areas
- 3) Examination of the scope of the Project
- 4) Examination of consulting services and construction and procurement methods
- 5) Examination of institutional arrangements for implementation, operation, and maintenance of the Project
- 6) Review of environmental and social considerations
- 7) Estimation of project cost including annual fund requirement
- 8) Formulation of an optimum project implementation plan
- 9) Examination of project effects and assessment of potential risks

### 1.3.3 Study Period

The Study was carried out from the middle of May 2017 to the end of February 2018, which is the submission of the final report of the Study. The latest work schedule of the Study is shown below.

- ◆ Preparatory work in Japan (Mid May 2017)
- ◆ Field work in India (June to October, middle of December 2017)
- ◆ Home work in Japan (Intermittently up to February 2018)

## 1.4 Overall Framework of the Study

### 1.4.1 Composition of the Study Team

The Study Team is composed of a total of 9 international experts as listed below.

**Table 1.1.1 Composition of the Preparatory Study Team**

Position	Name
1.Team Leader/ Forest Management 1/ GIS·MIS1	Tomohiro Shibayama
2.Deputy Team Leader/ Forest Management 2/ Community Development/ Livelihood Improvement/ Gender	Michiko Ebato
3.Biodiversity Conservation/ Ecosystem Service	Masakazu Kashio*
	Hiroshi Imae #
4.GIS·MIS2	Shalabh Bharadwaj
5.Soil Water Conservation/ Infrastructure	Hideki Imai
6.Institutional Strengthening/ Capacity Building	Mikiko Tsurui
7. Marketing / Value-chain Analysis	Manoj Pattanaik
8.Economical-Financial Analysis/ Cost Estimate	Sanjay Verma
9.Environmental and Social Consideration/Coordinator	Takuya Nomura

\* assignment in India up to September 2017, # assignment in India from September 2017  
Source: JICA Study Team (2017)

In addition, national experts and one local firm were hired for the Study, especially data collection in the target areas and livelihoods survey at the selected sites, respectively.

### 1.4.2 Counterpart Agency

The counterpart agency of the Study is the Himachal Pradesh Forest Department (HPFD). HPFD will be the implementing agency in the proposed Project and HPFD has supported the Study Team in coordinating with the relevant offices and organisations and collecting data and information.

## **CHAPTER 2 FOREST SECTOR IN INDIA**

### **2.1 Overall Forest Status in India**

India is the seventh largest country in the world with an area of 3,287 million km<sup>2</sup> and different bio-geographical regions. There are 16 different forest type-groups in India as per the classification done by H.G. Champion and S.K. Seth (details described in **Part I, Section 4.3.3**). These forest type-groups are further divided into forest types. The latest situation of forests in India has been reported by “Indian State of Forest Report (ISFR) 2015” by Forest Survey of India (FSI). The forest cover for whole of India has been estimated based on the satellite data from October 2013 to February 2014 and inventory of forest carried by FSI from 2008-14 (**Tables 2.1.1 and 2.1.2**). The ISFR 2015 mentions that forest cover in India has increased by 5,081 km<sup>2</sup> between 2013 and 2015. Very dense forests in the country cover only 2.61 % of the total forest area, whereas, moderately dense forests are around 9.59 % and open forests are 9.14%. The biennial report by FSI for 2015 mentions increase in forest cover from 640,819 km<sup>2</sup> (in 1987) to 701,673 km<sup>2</sup> i.e. 21.34 % of the total geographical area of the country. An increase of 1,306 km<sup>2</sup> was noted and the total tree cover reached 92,572 km<sup>2</sup> which is 2.82% of the total geographical area. Among the north eastern states, a decline in forest cover is seen except in Manipur. Whereas, Mizoram that has the highest forest cover (88.93%). The main reason for this is shifting cultivation in northeastern region of the country. North eastern states constitute only 7.98% of geographical area but constitute one fourth of the forest cover. Madhya Pradesh has the largest forest cover of 77,462 km<sup>2</sup>. Andaman and Nicobar islands added 1,930 km<sup>2</sup>, Uttar Pradesh added 572 km<sup>2</sup> of very dense forest and Tamil Nadu has gained 100 km<sup>2</sup> of forest cover. Mangrove cover has increased in India by 112 km<sup>2</sup> due to conservation efforts in Sunderbans and Bhitarkanika forests.

On the other hand, in India, a loss of around 2,510 km<sup>2</sup> of very dense and dense forests has occurred since 2013. States of Jammu & Kashmir, Uttarakhand, Meghalaya, Kerala, Arunachal Pradesh, Karnataka and Telangana suffered loss in forest cover. Moderately dense forest has the maximum share, open forests follows it, whereas, very dense forests in India are only 2.5% of total geographical area. There is an increase of 110.34 m cum in total growing stock as compared to last assessment report ISFR 2013. Forest cover in the hill districts of the country is 283,015 km<sup>2</sup> (39.99%) of total Geographic area of these districts. These hill districts have recorded an increase of 1,680 km<sup>2</sup>.

The forest cover situation in Himachal Pradesh (HP) are as follows and its details are described in **Part I, Section 4.3.2**: very dense forest 3,224 km<sup>2</sup>; moderately dense forest 6,381 km<sup>2</sup>; open forest 5,091 km<sup>2</sup> and the total forest cover area is 14,696 km<sup>2</sup>.

**Table 2.1.1 Forest Cover of India Class Area and Percent of Geographical Area**

Forest Cover	Area (km <sup>2</sup> )	Percent of Geographical area (%)
a) Very Dense Forest	83,502	2.54
b) Moderately Dense Forest	318,745	9.7
c) Open Forest	295,651	8.99
Total Forest Cover*	697,898	21.23
Scrub	41,383	1.26
Non Forest	2,547,982	77.51
Total Geographic Area	3,287,263	100

\*Includes 4,740 km<sup>2</sup> under mangroves

Source: State of Forest Report, 2015 (FSI)

**Table 2.1.2 Forest Cover Change Matrix for India between ISFR, 2013 and ISFR, 2015**

Forest Cover	Very dense forest	Moderately dense forest	Open Forest	Scrub	Non-Forest	Total ISFR 2013
Very dense Forest	82,473	623	145	4	257	83,502
Moderately Dense Forest	2,897	311,063	2,438	93	2,254	318,745
Open Forest	362	2,580	286,491	596	5,622	295,651
Scrub	15	130	1,496	38,068	1,674	41,383
Non-Forest	157	978	9,825	2,601	2,534,421	2,547,982
Total ISFR 2015	85,904	315,374	300,395	41,362	2,544,228	3,387,263
	2,402	-3,371	4,744	-21	-3,754	

Source: Forest Survey of India (FSI) biennial report (December, 2015)

## 2.2 Central Government Institution Relevant to Forestry Sector

### 2.2.1 The Ministry of Environment, Forests and Climate Change (MoEF&CC)

At the national/ union level, the Ministry of Environment, Forests and Climate Change (MoEF&CC) is the apex body and central ministry that is responsible for planning, promotion, coordination and supervision of the implementation of India's environmental and forestry policies and programmes. 10 regional offices have been established under the MoEF&CC for monitoring and evaluation of on-going forestry development projects and schemes with special emphasis on forest conservation as shown in **Table 2.2.1**.

The regional offices also provide advice to the state and union territory governments on the proposal preparation relating to diversion of forest land for non-forestry purposes under the provisions of the Forest (Conservation) Act, 1980. Overall, these regional offices are under the control of the Secretary and headquarters at the MoEF&CC which is responsible for supervision and coordination of all their activities.

**Table 2.2.1 Regional Offices of MoEF&CC**

No.	Headquarter of the Regional Office	States and UTs under jurisdiction
1	Bangalore	Karnataka, Kerala, Goa and Lakshadweep
2	Bhopal	Dadra & Nagar Haveli, Daman & Diu, Gujarat and Madhya Pradesh
3	Bhubaneswar	Orissa and West Bengal
4	Chennai	Andhra Pradesh, Tamil Nadu, Puducherry and Andaman & Nicobar Islands
5	Chandigarh	Chandigarh, Haryana, Jammu & Kashmir and Punjab
6	Dehradun	Himachal Pradesh and Uttarakhand
7	Lucknow	Delhi, Rajasthan and Uttar Pradesh
8	Nagpur	Chhattisgarh and Maharashtra
9	Ranchi	Bihar and Jharkhand

No.	Headquarter of the Regional Office	States and UTs under jurisdiction
10	Shillong	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura

Source: Prepared by JICA Study Team (2017) based on the website of MoEF&CC

In October 2010, the National Green Tribunal (NGT) was established under the Policy and Law Division of MoEF&CC following the National Green Tribunal Act in 2010. The main purposes are for specialised, speedy, effective and expeditious disposal of cases relating to environmental protection, forest conservation and other natural resources including enforcement of any legal right relating to environment and providing relief and compensation for damages to persons and property.

## 2.2.2 The Ministries of Rural Development, Tribal Affairs, and Social Justice and Empowerment

The Ministries of Rural Development, Tribal Affairs and Social Justice and Empowerment are the concerned institutions to take care of the social considerations in the forestry programmes/projects.

The Ministry of Rural Development is the nodal agency for most of the development and welfare activities in rural areas. It plays a vital role in implementation of schemes for generation of self-employment and wage-employment, extends provisions for housing and minor irrigation assets to the rural poor, and provides social assistance to the destitute and reach-out to the most disadvantaged sections of society. It provides financial assistance for establishment of rural roads, and area development programmes, especially on watershed development programmes. The ministry is bifurcated into the Department of Rural Development and the Department of Land Resources<sup>1</sup>.

The Ministry of Tribal Affairs was established in 1999, after it was dismembered from the Ministry of Social Justice and Empowerment. It was created with the objective of providing concerted approach on the integrated socio-economic development for tribal peoples in a coordinated and planned manner<sup>2</sup>.

The Ministry of Social Justice and Empowerment came into existence in May 1998. It is the nodal agency for the overall policy, planning and coordination of programmes for the development of SCs, socially and educationally backward classes, de-notified tribes, and economically backward classes and the welfare of senior citizens. This ministry constitutes two departments, namely, the Department of Social Justice & Empowerment and the Department of Empowerment of Persons with Disabilities. The Department of Social Justice and Empowerment provides special schemes which are aimed at social, educational and economic empowerment of the groups, except senior citizens, e.g. scholarships, hostels, residential schools, skill training, concession loans and subsidy for self-employment, etc. On the other hand, the Department of

1 [http://rural.nic.in/netrural/rural/sites/downloads/annual-report/Annual\\_Report\\_2013\\_14\\_English.pdf](http://rural.nic.in/netrural/rural/sites/downloads/annual-report/Annual_Report_2013_14_English.pdf) and <http://rural.nic.in/netrural/rural/sites/about-the-ministry.aspx>

2 <http://www.tribal.nic.in/index.aspx>

Empowerment of Persons with Disabilities facilitates empowerment of the persons with disabilities, which includes persons with disability related to sight, hearing, speech, movement, mental retardation, mental illness, multiple disability and any other disabilities.<sup>3</sup>

Major roles and responsibilities as well as relevant laws/policies of the above mentioned major institutions related to forestry sector are described in **Attachment I.2.2.1**.

## **2.3 Forest Research and Extension**

MoEF&CC has established the following autonomous bodies/ agencies in the areas of forestry, ecology, botany, environmental education, ornithology, etc and provides financial supports.

- ◆ The Botanical Survey of India<sup>4</sup>
- ◆ The Zoological Survey of India<sup>5</sup>
- ◆ The Forest Survey of India
- ◆ The Indian Council of Forestry Research and Education;
  - Forest Research Institute Dehradun
  - Tropical Forest Research Institute Jabalpur
  - Arid Forest Research Institute Jodhpur
  - Himalayan Forest Research Institute Shimla
  - Institute of Forest Genetics and Tree Breeding Coimbatore
  - Institute of Forest Productivity Ranchi
  - Rain Forest Research Institute Jorhat
  - Institute of Forest Biodiversity Hyderabad
  - Institute of Wood Science and Technology Bangalore
  - Centre for Social Forestry and Eco-Rehabilitation Allahabad
  - Centre for Forestry Research and Human Resource Development Chhindwara
  - Advanced Research Centre for Bamboo and Rattan (ARCBR) Aizawl
- ◆ Indian Institute of Forest Management
- ◆ Wildlife Institute of India, Dehradun
- ◆ The Gobind Ballabh Pant Institute of Himalayan Environment and Development

## **2.4 Forest Inventory and Monitoring**

### **2.4.1 Bi-annual Forest Cover Mapping**

The Forest Survey of India (FSI), a premier organisation under the MoEF&CC, is responsible for assessment and monitoring of the forest resources of the country and is engaged in forestry related training, research work and extension services. FSI was established in the year 1981, by succeeding a project entitled “Pre-investment Survey of Forest Resources” (PISFR) of Government of India initiated in 1965 with the sponsorship of FAO and UNDP. Since then FSI is doing the country level satellite based assessment of forest cover along with sample field assessment on biennial basis.

Over the years, FSI has refined the methodology and means of data processing due to improvement in data processing techniques, advancement in the technology, and improvement in resolution of the satellite images. The details of India State of Forest Reports (ISFR) published by FSI over the years are elaborated in **Table 2.4.1**.

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<sup>3</sup> <http://socialjustice.nic.in/>

<sup>4</sup> Botanical Survey of India has completed a survey of the floral wealth over about 60 percent of the country

<sup>5</sup> Zoological Survey of India has identified and collected about one million specimens and have surveyed about one third of the country.



**Table 2.4.1 Details of ISFRs Published Over the Years along with Satellite Input and Methodology Used**

Cycle of Assessment	Year	Satellite Data Period	Sensor	Spatial Resolution (meters)	Scale	Minimum Mapping Unit (ha)	Mode of Interpretation/ Methodology of Change Analysis
I	1987	1981-83	LANDSAT-MSS	80	1:1 million	400	Visual
II	1989	1985-87	LANDSAT-TM	30	1:250,000	25	Visual
III	1991	1987-89	LANDSAT-TM	30	1:250,000	25	Visual
IV	1993	1989-91	LANDSAT-TM	30	1:250,000	25	Visual
V	1995	1991-93	IRS-1B-LISSII	36.25	1:250,000	25	Visual & Digital
VI	1997	1993-95	IRS-1B-LISSII	36.25	1:250,000	25	Visual & Digital
VII	1999	1996-98	IRS-1C/1D-LISSIII	23.5	1:250,000	25	Visual & Digital
VIII	2001	2000	IRS-1C/1D-LISSIII	23.5	1:50,000	1	Digital
IX	2003	2002	IRS-1D-LISSIII	23.5	1:50,000	1	Digital
X	2005	2004	IRS-1D-LISSIII	23.5	1:50,000	1	Digital
XI	2009 <sup>6</sup>	2006	IRS-P6-LISSIII	23.5	1:50,000	1	Digital/Change Polygon <sup>7</sup>
XII	2011	2008-09	IRS-P6-LISSIII & IRS-P6 AWiFS	23.5 56.0	1:50,000	1	Digital/Change Polygon
XIII	2013	2010-11	IRS-P6-LISSIII & IRS-Resourcesat2-LISS III	23.5	1:50,000	1	Digital/Change Polygon
XIV	2015	2013-14	IRS P6-LISS-III & IRS-Resourcesat-2 LISS-III	23.5	1:50,000	1	Digital/Change Polygon

Source: India State of Forest Report-2015

## 2.4.2 National Forest Inventory (NFI)

The estimation of annual yield from the forest, based on the field based assessment of growing stock or wood volume, has always been an integral part of Working Plan preparation. In 1965, assessment of growing stock and volume, was started in a much larger scale using aerial photographs for sampling sites. Initially, stock inventory was limited to rich forest areas but subsequently, it was extended to cover even non-forest areas. In 2002, sampling design for growing stock assessment was modified as part National Forest Inventory (NFI) with an objective of assessing national level estimates of growing stock and other parameters, covering both forests as well as tree outside forest (TOF), on biennial basis in sync with the ISFR. The first national level growing stock estimates were published in ISFR 2003.

Recently, as per the FAO and UNFCCC guidelines for implementation of REDD+ strategy, it is recommended that every country should have a National Forest Monitoring System (NFMS) with inbuilt three essential components viz., satellite based land monitoring system, national forest inventories and Green House Gas (GHG) inventory.

Under NFI, FSI has adopted a two-stage sampling design for national forest inventory. Under stage-1, the country is stratified into 14 homogeneous physiographic zones based on the

<sup>6</sup> In ISFR 2009, revised details for SFR2007 is also presented

<sup>7</sup> Change Polygon in the forest cover map of previous cycle using current satellite data.

physiography, climate and vegetation, wherein districts form the sampling unit. In total, a sample size of 10% districts (covers approximately 60 no. of districts) distributed over different physiographic zones, in proportion of their size, are randomly selected for detailed inventory of forest in a cycle of every 2 years. Under stage-2 sampling design, the selected districts are further divided into grids of latitude and longitude using Survey of India (SOI) topographical sheet at 1:50,000 scale, which form the second stage sampling unit, wherein 36 grids of 2<sup>1/2</sup>' x 2<sup>1/2</sup>' and 144 sub-grids of 1<sup>1/4</sup>' x 1<sup>1/4</sup>' are marked as basic sampling frame. In total, around 3,500 geo coded sample plots from 60 districts, covering all 14 physiographic zones, are biennially covered. From each sample plot, the following information is collected:

- Tree Information
- Shrubs and Herbs
- Intensity of regeneration
- Incidence of Fire
- Forest area under different land use
- Injuries to crops
- Grazing
- Presence of weeds and grass
- Soil information
- Humus
- Rockiness
- Bamboo Information
- Plantation Potential
- Biotic Influence

### **2.4.3 Monitoring of Afforestation/ Reforestation**

MoEF&CC has nominated FSI for monitoring of area coverage and species wise survival percentage of plantations/afforestation and assets created under FDAs<sup>8</sup>. Similarly, under Compensatory Afforestation Fund Management and Planning Authority (CAMPA), plantation sites are being surveyed and the geo coded polygons are being uploaded by the State Forest Departments on web based e-Green Watch and FSI has a mandate to check the data quality, accuracy and completeness of the attribute information. FSI analyses the data on google earth and regularly send their reports to the MoEF&CC. Under Green India Mission (GIM), FSI is likely to be assigned the task of monitoring of plantations that would be taken up under the programme.

### **2.4.4 Monitoring of Forest Fires**

As part of monitoring mechanism, FSI has been using Moderate Resolution Imaging Spectroradiometer (MODIS) sensor onboard Aqua and Terra satellites of NASA since 2004. From 2012 onwards, FSI in collaboration with National Remote Sensing Centre (NRSC) has initiated a real time monitoring of forest fires wherein the forest fire alerts from active fire locations are being generated as KML file which is Google compatible format. Fire alerts are automatically sent to the registered users via e-mails and SMS. The Time lag of the information is less than 2 hours from the pass of satellite.

Recently, from Jan 2017 onwards, FSI has also started 'Forest Fire Alerts System 2' for disseminating fire alerts obtained from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor, onboard the Suomi National Polar Orbiting Partnership (SNPP) spacecraft. VIIRS has a better resolution (375 m x 375 m) compared to MODIS (1 km x 1 km). Alerts are disseminated up to beat level for 10 states namely Andhra Pradesh, Bihar, Himachal Pradesh, Jharkhand,

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<sup>8</sup> National Afforestation Programme (NAP) Scheme: At a Glance

Karnataka, Maharashtra, Mizoram, Punjab, Telangana & Tripura and up to range level for Kerala. In case of other states/UT's, alerts are sent up to district level in the absence of forest administrative boundary information from State Forest Departments<sup>9</sup>. In order to receive fire alerts, users can register themselves on the website to receive SMS and e-mail based alerts with geographical coordinates of the fire locations. Registered user also gets a website link to view the location on their browser. As a special feature introduced in the new system, there is a provision given to the user to send back a filled in online feedback form which is accompanied with every fire alert. The system provides lot of flexibility where in registered users can modify their profile along with mobile and email address, area of interest for which fire alerts are required, as well as delete their profile to stop receiving alerts.

#### **2.4.5 Biodiversity Information System**

“National Biodiversity Characterisation at Landscape Level”, a project jointly sponsored by Department of Biotechnology and Department of Space, was implemented to identify and map the potential biodiversity rich areas in India. Under the project, spatial information has been generated at three levels:

- Satellite based primary information (Vegetation Type map, spatial locations of road & village, Fire occurrence);
- Geospatially derived or modeled information (Disturbance Index, Fragmentation, Biological Richness) and
- Geospatially referenced field samples plots.

The above mentioned spatial information on various facets of biodiversity is accessible through a web enabled Biodiversity Information System (BIS) for biodiversity prioritisation, conservation and bio-prospecting and other research studies.

#### **2.4.6 Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance” (OSMEFWC)**

MoEF&CC has developed a web based system for online submission of proposals and monitoring of environmental, forest and wildlife clearances. This initiative is expected to bring in more transparency and accountability in the process of forests, environment and wildlife clearances by providing facility of single window online submission of proposals to various user agencies seeking clearances and monitoring status of the proposals. OSMEFWC in relation to the forest clearance is also described in **Section 8.1.4**.

OSMEFWC is a web based, role based, G2C<sup>10</sup> and G2G<sup>11</sup> workflow application that are developed for online submission and monitoring of the proposals submitted by the user agencies for seeking forests, environment and wildlife clearances. It automates the entire tracking of proposals which includes online submissions of a new proposal, editing/updating the details of

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<sup>9</sup> www.fsi.nic.in

<sup>10</sup> G2C: government to citizen

<sup>11</sup> G2G: government to government

proposals and displays status of the proposals at each stage of the workflow. The system is based on the Web Architecture. It uses IIS as an application server, .Net as a framework and the Structured Query Language (SQL) Server as a database server<sup>12</sup>.

## 2.5 National Level Policies, Laws/Regulations, and Plans relevant to the Proposed Project

Table 2.5.1 to Table 2.5.4 outline the key national level policies, rules, regulations, notifications, policies and guidelines related to forest and wildlife in relation to the project area.

**Table 2.5.1 Policies, Laws/Regulations Related to Forest and Wildlife Relevant to the Project**

Law/Policy	Description	Responsible Ministry/ Agency
a. Indian Forest Act 1927	This Act sought to consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest product, and duty leviable on timber and other forest products.	MoEF&CC State level Environment and Forest departments Implementing Agency
b. The National Forest Policy 1988	The policy was prepared with a national goal to have a minimum of 1/3 of the total land area of the country under forest or tree cover. Whilst in the hills and mountainous regions, to maintain 2/3 of the area under forests or tree cover to prevent erosion and land degradation and to ensure stability of the fragile eco-system. The policy provides for maintenance of environmental stability through preservation, restoration of ecological balance impacted by serious depletion of forests, preserving natural forests with vast variety of flora and fauna, check erosions/ degradations, and to minimise pressure to existing forests.	MoEF&CC, State level Environment and Forest departments
c. Forest Conservation Act 1980 and Amendment 1988	The act provides for conservation of forests and lays emphasis on restriction on de-reservation of forests or use of forest lands for non-forest purposes. It also provides that any reserved forest can be reserved, any forest land may be used for non-forest purposes, any forest land could be assigned by way of lease or otherwise to any private person or to any authority, corporation, agency or any other organisation, any forest land may be cleared of trees, which have grown naturally, for the purpose of reforestation.	MoEF&CC, State level Environment and Forest departments
d. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	The forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in forests for generations, have had a vital and mutually supportive relationship with the forests and they have been dependent on the forests for their livelihoods and existence. However, their rights were rarely recognised by the authorities and due to lack of real ownership of the land, the already marginalised local dwellers suffered. Thus, this Act, commonly known as 'Forests Right Act', seeks to recognise and bestow the forest rights and occupation in forest land among these tribal population groups. Two enabling rules namely, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights.) Rules, 2008 & Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), (Amended) Rules, 2012 have been formed to facilitate implementation of the provisions of the act.	Ministry of Tribal Affairs State Government
e. Wildlife (Protection) Act 1972 and Amendment 1993	This Act was enacted to protect wild animals, birds and plants, and provides for prohibition on hunting any wild animal, prohibition on picking, uprooting, of specified plants, constitution of sanctuaries, national parks and closed areas, prohibition on trade or commerce of wild animals, in trophies, animal articles derived from certain animals, and empowers certain officials to investigate and impose penalties.	MoEF&CC, State Wildlife department

<sup>12</sup> <http://efclearance.nic.in>

Law/Policy	Description	Responsible Ministry/ Agency
	<p>The Act has six schedules which give varying degrees of protection. Schedule I and part II of Schedule II provide absolute protection - offences under these are prescribed the highest penalties. The Species listed in Schedule III and Schedule IV is protected as well, however the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting.</p>	
<p>f. Biological Diversity Act 2002</p>	<p>This is umbrella legislation aimed at preservation and conservation of biological resources and provides a mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. The Act was enacted to meet the obligations under the Convention on Biological Diversity, to which India is a party.</p> <p>The National Biodiversity Authority (NBA) is a statutory autonomous body, established in 2003, with its headquarters in Chennai, under the MoEF&amp;CC was created to implement the provisions under the Act. State Biodiversity Boards have been created in 28 States along-with 31,574 Biological Management Committees (for each local body) across India.</p> <p>Functions include (i) regulation of acts prohibited under the Act, (ii) advise the Government on conservation of biodiversity, (iii) advise the Government on selection of biological heritage sites, (iv) take appropriate steps to oppose grant of intellectual property rights in foreign countries, arising from the use of biological resources or associated traditional knowledge.</p>	<p>National Biodiversity Authority, Chennai State bio-diversity board</p>
<p>g. Joint Forest Management</p>	<p>Joint Forest Management (JFM) is partnership between local communities and State forest department in management of forests. The policies and guidelines of JFM were expressed/enunciated in the Indian National Forest Policy, 1988 and the JFM guidelines (1990) proposed by Government of India. The policy envisages a process of joint management of forests by the state governments (which have nominal responsibility) and the local people, which would share both the responsibility for managing the resource and the benefits that accrue from this management. Subsequently guidelines for Strengthening the Joint Forest Management Programme (February 21<sup>st</sup>, 2000) were made ten years after the initial JFM order, the MoEF issued guidelines on, for strengthening JFM, covering four main aspects.</p> <ul style="list-style-type: none"> <li>- Legal backup to the JFM committees which included: • Registering them under society's registration Act. • An uniform name - JFM Committees • MOU to be signed between state government and JFMCs • All adults eligible to become members</li> <li>- To promote participation of women, certain threshold criteria were proposed for JFMCs • General membership – at least 50% women: • Executive committee – at least 33% women • Quorum for EC, at least 1/3 of women members or 1 member whichever is higher • President/Vice-President/Secretary – at least one post should be held by a women member.</li> <li>- Expansion of JFM beyond degraded forests, Extension of JFM in good forest areas: • Proposed on a pilot basis, to be reviewed and expanded subsequently. • Maximum sharing of revenue at 20%, • Management broadly as per working plan, with JFM mostly for NTFP management • Minimum of 10 years of protection to be eligible for revenue sharing.</li> <li>- Guidance for Micro Plan preparation was provided for both new Work Plan and existing Work Plan areas For new WP (Work Plan) areas: • Include a JFM overlapping working circle with broad provisions for micro plans. • Evolve flexible guidelines for preparation of local need based micro</li> </ul>	<p>MoEF&amp;CC, State Forest Department</p>

Law/Policy	Description	Responsible Ministry/ Agency
	<p>plans • Micro plans prepared by the Forest Officers and JFMCs after detailed PRA exercise • Utilise locally available knowledge and strengthen of the local institutions</p> <ul style="list-style-type: none"> <li>• Cover local consumption, market linkages, environmental function and biodiversity conservation</li> </ul> <p>For existing WP (Work Plan) areas :• Dovetail micro-plans into WP and implement them by special order of the PCCF. • focus on multiple products and NTFP • can cover community lands and other government lands outside notified forest areas</p> <ul style="list-style-type: none"> <li>- Conflict resolution: • may constitute divisional and state level representative forums or working groups including all stakeholders as well as NGOs.</li> <li>- Recognise Self-initiated groups:• identify, recognise, and register community groups as JFM Committees. • recognise prior protection while sharing benefits.</li> <li>- Contribution for Regeneration of Resources: • Reinvest 25% of the share of village community and of the FD in forest. • Transparent mechanisms for computation of income for sharing benefits.</li> <li>- Monitoring and Evaluation: • Concurrent monitoring at Division and State level • Evaluation at interval of 3 years (division) and 5 years (State).</li> </ul> <p>Third set of guidelines: December 24th, 2002 Subsequent guidelines in Dec 2002 emphasised four aspects:</p> <ul style="list-style-type: none"> <li>- Signing of Memorandum of Understanding (MOU), outlining the short term and long term roles and responsibilities, implementation of work programme, pattern of sharing of usufructs and conflict resolution.</li> <li>- Suggesting a Relationship with Panchayats, that lets JFM Committees benefit from the administrative and financial position and organisational capacity, while maintaining the “separate non-political identity of the JFM Committees as ‘guardian of forests’”. Secondly, benefits from NTFP sales should be shared with all members of the Gram Sabha including the JFM committees.</li> <li>- Proposing Capacity building for managing Non-timber Forest Products (NTFPs)</li> <li>- Recognising importance of NTFP management in good forest areas for sustainability and local benefits, propose capacity building for: <ul style="list-style-type: none"> <li>➤ non-destructive harvesting (in accordance with working plans),</li> <li>➤ equity in sharing,</li> <li>➤ institutional reforms</li> <li>➤ strengthening the set-up of NTFP management</li> </ul> </li> </ul>	

Source: Compiled by JICA Study Team (2017) based on relevant acts, rules and information from concerned ministries

**Table 2.5.2 Policies, Laws/Regulations Related to Land, Resettlement and Tribes Relevant to the Project**

Law/Policy	Description	Responsible Ministry/ Agency
a. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	<p>This act provides for a humane and participative, informed and transparent process for land acquisition for the purpose of industrialisation, development of essential infrastructural facilities and urbanisation with the least disturbance to the owners of the land and other affected families.</p> <p>This Act ensures consultation with institutions of local self-government and Gram Sabhas.</p> <p>This act regulates land acquisition and lays down the procedure and rules for granting compensation, disbursement of rehabilitation and resettlement benefits to the affected families. It ensures a just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition and makes adequate provisions for their rehabilitation and resettlement. It ensures cumulative outcome of compulsory acquisition, and that affected persons become partners in development, thereby leading to improvement in their post-acquisition social and economic status.</p>	Department of Land Resources, Ministry of Rural Development Ministry of Tribal Affairs
b. Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006	<p>This act recognises and bestows forest rights and occupation in the forest land to the forest dwelling scheduled tribes and other forest dwellers, who have been living in such forests for generations, but their rights could not be recorded.</p> <p>Thus, the recognised rights include responsibilities and authority for sustainable use and conservation of bio-diversity and maintenance of ecological balance, thus strengthening the conservation regimes of the forests while ensuring livelihood and food security to the forest dwelling communities.</p>	Forest Department Ministry of Tribal Affairs
c. Scheduled Caste and Scheduled Tribes (Prevention of Atrocities) Act 1989	<p>This act aims to prevent the offences of atrocities against the members of the Scheduled Castes and the Scheduled Tribes. The act also provides for special courts for the trial of such offences and for the relief and rehabilitation of the victims of such offences.</p>	Ministry of Social Justice and Empowerment Ministry of Tribal Affairs
d. National Policy on Safety, Health and Environment at Work Place	<p>The Government of India is committed to regulate all economic activities for management of safety and health risks at workplaces and to provide measures to ensure safe and healthy working conditions for every working man and woman in the nation. This policy gives leverage to every ministry or department to work-out their own detailed policy relevant to their working environment as per the guidelines on the National Policy.</p> <p>This policy is devised based on the directive principles and international instruments. The directive principles described in the Constitution are as follows:</p> <ul style="list-style-type: none"> <li>· Securing the health &amp; strength of employees, men and women</li> <li>· Tender age of children are not abused</li> <li>· Citizens are not forced by economic necessity to enter any vocation unsuited to their age or strength</li> <li>· Just &amp; humane conditions of work and maternity relief are provided</li> <li>· Government shall take steps to secure participation of employee in the management</li> </ul>	The Ministry of Labor and Employment

Source: Compiled by JICA Study Team (2017) based on relevant acts, rules and information from concerned ministries

**Table 2.5.3 Policies, Laws/Regulations Related to Environment Protection and EIA Relevant to the Project**

Law/ Policy	Description	Responsible Ministry/ Agency
a. Environment(Protection) Act, 1986 and Amendment 1991	This is an umbrella regulation that concerns all the aspects of environmental safeguards. It provides framework for coordination among the various central and state government authorities for protection and improvement of environment and prevention of hazards to human population, other living creatures and property. It is mandated to prevent environmental pollution in all its forms and to tackle specific environmental problems peculiar to different parts of the country.	MoEF&CC Central and/or State Pollution Control Boards
b. Environment (Protection) Rules 1986 and Amendments	The Environment Protection Rules (i) provides standards for emissions or discharge of environmental pollutants, (ii) imposes prohibitions/ restrictions on the location of industries and on carrying-out processes and operations in different areas, (iii) provides procedure for taking samples and submission of samples for analysis and the format of laboratory report, (iv) providing information to authorities and agencies in certain cases, (v) imposes prohibition and restriction on handling hazardous substances in different areas and (vi) submission of environmental statement. <ul style="list-style-type: none"> <li>- Rules and Notifications framed under the Environment (Protection) Act, 1986:</li> <li>- The Hazardous Waste (Management &amp; Handling) Rules, 1989 amended in 2000</li> <li>- The Manufacture, Use, Import, Export, Storage of Hazardous Microorganism, Genetically Engineered Organisms or Cells Rules, 1989.</li> <li>- The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989, amended in 2000.</li> <li>- The Environment Audit Notification, 1993</li> <li>- The Coastal Regulation Zone Notification, 1991</li> <li>- The Chemical Accidents (Emergency Planning, Preparedness &amp; Response) Rules, 1996</li> <li>- The Biomedical Waste (Management &amp; Handling) Rules, 1998</li> <li>- The Municipal Solid Wastes (Management &amp; Handling) Rules, 2000</li> <li>- Recycled Plastics Manufactures and Usage Rules, 1998 amended in 1999</li> <li>- Notification on Fly ash (14th September 1999)</li> <li>- The Noise Pollution (Regulation and Control Rules, 2000</li> <li>- Ozone Depleting Substance (Regulation) Rules, 2000</li> <li>- Batteries (Management &amp; Handling) Rules, 2001</li> </ul>	MoEF&CC, Central and/or State Pollution Control Boards
c. EIA Notification 2006 and Amendments 2007, 2008, 2009, 2011 and 2012	The Notification imposes certain restrictions and prohibitions, unless prior environment clearance has been accorded (in accordance with the objectives of National Environment Policy as approved by the Union Cabinet on 18th May, 2006), on (i) new projects/ activities, and (ii) expansion or modernisation of existing projects/ activities entailing capacity addition with change in process and or technology, undertaken in any part of India, based on their potential environmental impacts as indicated in the Schedule to the notification. The prior environmental clearance shall be sought and granted from the Central Government or the State or Union Territory Level Environment Impact Assessment Authority (SEIAA), to be constituted by the Central Government in consultation with the State Government or the Union territory Administration concerned under sub-section (3) of section 3 of the Environment (Protection) Act, 1986	MoEF&CC, Expert Appraisal Committees (EAC) at the Centre (MoEF&CC)/ State Expert Appraisal Committees (SEAC) of State Environment Impact Assessment Authority (SEIAA) at the State level
d. The National Green Tribunal	The "National Green Tribunal" was established on 8-Oct-2010 under the National Green Tribunal Act 2010. The main objective	National Green Tribunal (NGT: under MoEF&CC)



Law/ Policy	Description	Responsible Ministry/ Agency
Act 2010	of the Central Government to establish the NGT was to provide a specialised forum for effective and speedy disposal of cases pertaining to environment protection, conservation of forests and for seeking compensation for damages caused to people or property due to violation of environmental laws or conditions specified while granting permissions. The Principal Bench of the NGT has been established in the National Capital – New Delhi, with regional benches in Pune (Western Zone Bench), Bhopal (Central Zone Bench), Chennai (Southern Bench) and Kolkata (Eastern Bench). Each Bench has a specified geographical jurisdiction covering several States in a region.	

Source: Compiled by JICA Study Team (2017) based on relevant acts, rules and information from concerned ministries

**Table 2.5.4 Policies, Laws/Regulations Related to Water, Air and Pollution Relevant to the Project**

Law/ Policy	Description	Responsible Ministry/ Agency
a. Water (Prevention and Control of Pollution) Act 1974 and Amendment 1988	This act provides for prevention and control of water pollution and the maintaining or restoring of wholesomeness of water. For this purpose, it provides for establishment of boards, and confers them with powers and functions for the prevention and control of water pollution.	Central and/or State Pollution Control Boards
b. Water (Prevention and Control of Pollution) Cess Act 1977	This Act provides for levy and collection of tax on water consumed by persons carrying-on certain industries and by local authorities, with a view to augment the resources of the Central and State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act 1974	Central and/or State Pollution Control Boards
c. Water (Prevention and Control of Pollution) Rules, 1975	These Rules are enacted in exercise of the powers conferred by section 63 of the Water (Prevention and Control of Pollution) Act, 1974 The rules provide (i) terms and conditions of service of members, (ii) intervals, time and place of meeting to be held, procedures to be followed, (iii) fees and allowances to be paid to members, etc.	
d. Air (Prevention and Control of Pollution) Act 1981	This act provides for prevention, control and reduction of air pollution. The Act further provides for establishment of Boards, and assigning them with powers and functions towards prevention, control and reduction of air pollution.	Central and/or State Pollution Control Boards

Source: Compiled by JICA Study Team (2017) based on relevant acts, rules and information from concerned ministries

## CHAPTER 3 THE STUDY AREA (THE STATE OF HP)

### 3.1 Overview

The state of HP is a mountainous state situated in the northern part of the country. The state has complex geological structures dissecting its topography with an altitudinal range from 350 to 6,975m above sea level. Two thirds of its geographical area is under forest and other natural ecosystems, and more than 90% population of the state is rural and dependent on forests for some part of their livelihood. Besides supporting the livelihoods of the people, the forests in the state act as catchment for important rivers like Satluj and Indus which provide serve millions of people. The total geographical area of HP is 55,673 km<sup>2</sup>; which is divided into 12 districts and Hamirpur is the smallest district of HP which covers an area of 1,118 km<sup>2</sup> (2.01%) and Lahaul & Spiti has the largest area of 13,835 km<sup>2</sup> (24.85%). The population of the state is 6.86 million (Census, 2011) which constitutes 0.57% of the country's population. Of this, rural population is 89.96% and urban is 10.04%. The overall population density is 123 persons per km<sup>2</sup>.

The HP state is bordered by Jammu & Kashmir in the north, Punjab in the west, Haryana on the south-west and Uttarakhand on the south-east. The eastern border of the state touches the Tibet on the east. The state is located between latitude 30° 22' 40" north to 33 ° 12' 40" north and longitude 75 ° 45' 55" east to 79 ° 04' 20" east.

### 3.2 Administration

The state of HP came into being on 15 April 1948, by integrating 31 hill princely states of the region. The state government of HP is the main governing authority for the 12 districts of the state. The state also has an executive branch headed by the Governor (appointed by the President of India on the advice of Central Government) a judiciary and a legislative branch. The Chief Minister of the state is the head of Government vested with most of the executive powers. State high court has jurisdiction over whole of HP state.

#### 3.2.1 State Administrative Structure

The state is divided into 12 districts. Under the districts, for the purpose of revenue collection, delivery of community development and local governance, three lines of structures are established. However, the base on all the system is the revenue village. The number of these administrative units and their key functions are given in **Table 3.2.1**.

**Table 3.2.1 Outline of the Administrative Units in HP State**

Level/ Particulars	Revenue	Rural Development	Panchayati Raj Institution (PRI)
Division	The state is divided into 3 divisions		
District			
Name	District Collectorate	District Rural Development Agency	Zila Panchayats
No of Units	12	12	12

Level/ Particulars	Revenue	Rural Development	Panchayati Raj Institution (PRI)
Key Functions	<ul style="list-style-type: none"> <li>- Monitoring of rescue operation during various accidents.</li> <li>- To conduct the Lok Sabha, Vidhan Sabha and Panchayati Raj Institutions Elections. Monitoring of Law &amp; Order. Inspection of various offices.</li> <li>- Protocol duties by attending VVIPs and VIPs Monitoring of implementation of various policies and programmers of the Government in letter &amp; spirit.</li> <li>- To conduct various joint inspections.</li> </ul>	<ul style="list-style-type: none"> <li>- To oversee the implementation of different anti-poverty programmes.</li> <li>- To develop the capacity to build synergies among different agencies involved for the most effective results</li> <li>- To develop distinctive capabilities rather than perform tasks that are legitimately in the domain of the PRIs or the line departments</li> </ul>	<ul style="list-style-type: none"> <li>- To maintain District Development fund and utilise for any type of constructive work in District.</li> <li>- To implement the programmes as per directives of the State Government.</li> <li>- To look after safety, health, education, industry and financial aspect of the people living in the district. To render advisory service to their Panchayat Samities/ Approve the budgets, plans of the plans of the Panchayat Samities/ Plan for and prepare proposals for all items of developmental activities.</li> <li>- To supervise the work of different subjects undertaken by Panchayat Samiti in coordination. organise for various meetings of the members and officials, keep up to date records for various programme and documentation with the help of other Departments. It works for the areas where Panchayat Samiti are defunct.</li> </ul>
Intermediate			
Name	Sub-Divisions/ Tehsils/ Sub-Tehsils	Community Development Block	Panchayat Samiti / Gram Panchayat / Panchayat Wards
No of Units	62 Sub-divisions 141 Tehsils/sub-tehsils	78	77
Village			
Name	Revenue Village (Serves as the grass roots unit for all government interventions.)		
No of Units	3,226		

Source: Economics & Statistics Department, Himachal Pradesh

### 3.2.2 Panchayati Raj Institutions (PRI)

Panchayati Raj structure comprises of 12 Zila Parishads (District level PRI), 78 Panchayat Samitis (Block Level Committee) and 3,243 Gram Panchayats on the rural side; and 1 Municipal Corporation, 20 Municipal Councils and 28 Nagar Panchayats on the urban side besides 7 Cantonment Boards. At each level plans for various developmental activities are discussed. The lowest level of line department is placed at the block level; the information on the schemes/programmes is readily available for successful convergence at this level.<sup>1</sup>

**Table 3.2.2 Number of PRIs in the Rural Areas in HP State**

Rural Area in the State	Number of PRIs
District	12
Block	78
Gram Panchayats	3,226
Villages	20,690 (17,882 inhabited villages)

Source: Economics & Statistics Department, Himachal Pradesh

<sup>1</sup> <http://www.thehansindia.com/posts/index/Hans/2015-03-18/Panchayati-Raj-institutions/138074>

### (1) Zila Parishads/District Level PRI

It is the uppermost body of the Panchayati Raj System. In HP, Panchayati Raj system was enacted after the 73<sup>rd</sup> Constitutional Amendment. Member of Zila Parishad are elected directly and chairman and vice chairman are elected by the elected members indirectly. The state government determines the number of elected members at the rate one member 25,000 population. Additional Deputy Commissioner (ADM) has been designated as chief executive officer, whereas district Panchayat officer is the secretary of Zila Parishad.

### (2) Panchayat Samiti /Block Level Committee

It is intermediate body of the three-tier Panchayati Raj system in the state is called Panchayat Samiti. This institution is generally co-terminus with the Development Blocks. Members of Panchayat Samiti are elected directly whereas the chair-persons and vice-chairperson are elected indirectly by the elected members. The number of elected members of Panchayat Samiti is determined by the Govt. at the rate of one member for every 3,500 population or part thereof subject to a minimum of 15 members. There is no separate office of Panchayat Samiti but office of the Block Development Officer (BDO) is functioning as Samiti's office. BDO is designated as executive officer-cum-secretary of the Panchayat Samiti. The member of the Zila Parishad, representing the Ward which comprises whole or part of the Panchayat Samiti area, is also the member of the Panchayat Samiti.<sup>2</sup>

### (3) Gram Panchayat

Gram Panchayats are constituted for a village or group of villages having population ranging from 1,000 to 5,000. In Scheduled and other far flung areas, Gram Panchayats are also constituted for a population of less than 1,000. The number of members of Gram Panchayat is determined on the basis of population which ranges from 5 to 13 excluding Pradhan and Up-Pradhan. Pradhan, Up-Pradhan and members of Gram Panchayats are required to be elected directly by the voters of the Panchayat area. The member of the Panchayat Samiti representing a part or whole of the Gram Sabha area is also the member of the concerned Gram Panchayat(s) and has the right to vote.

### (4) Gram Sabha / Village Council

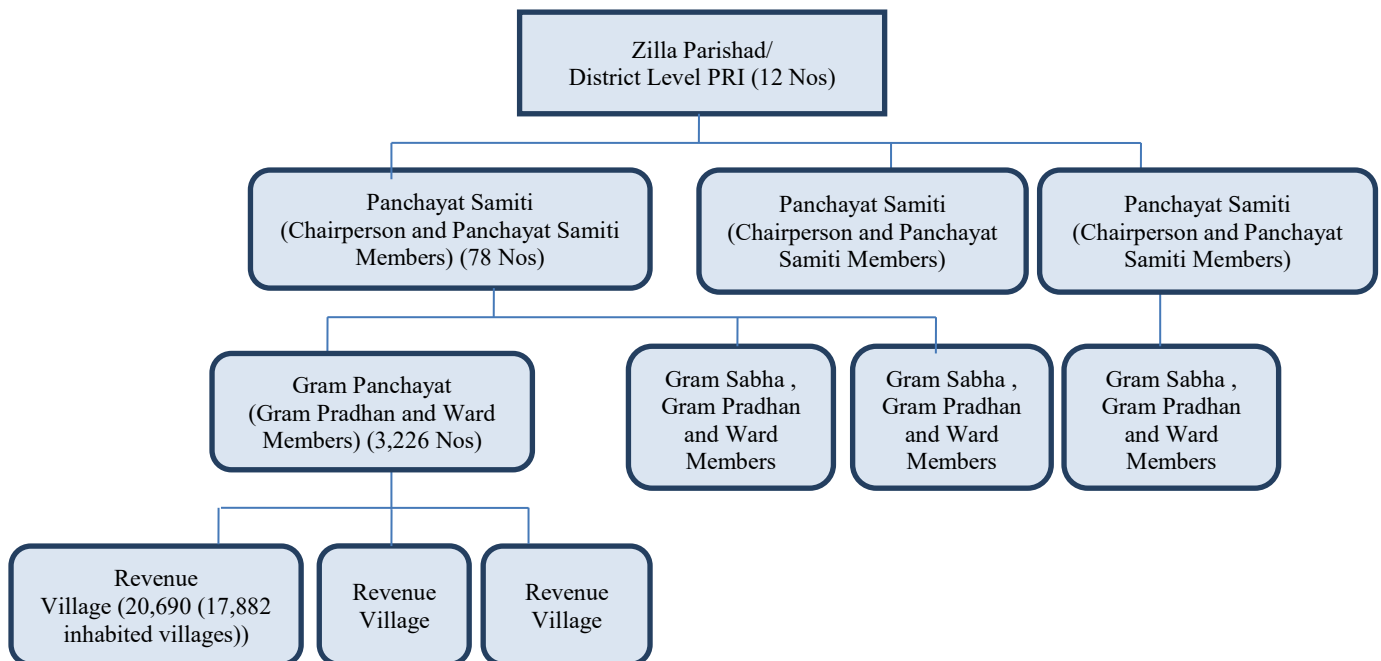
It forms the core of democratic decentralisation needs to be given utmost attention. Gram Sabhas have been empowered to form Vigilance Committee(s) to supervise Gram Panchayats works, schemes and other activities. No member of Gram Panchayat, is eligible to become member of the Vigilance Committee. It has been made mandatory for every Gram Sabha to hold four general meetings every year, besides Special Meetings. These meetings are required to be held on first Sunday of January, April, July and 2<sup>nd</sup> October. The accounts of the Panchayats are to be placed

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[http://www.arthapedia.in/index.php?title=Structure\\_and\\_Major\\_Functions\\_of\\_Panchayati\\_Raj\\_Institutions\\_\(PRIs\)\\_in\\_India](http://www.arthapedia.in/index.php?title=Structure_and_Major_Functions_of_Panchayati_Raj_Institutions_(PRIs)_in_India)

before the Gram Sabha meetings for consideration and approval. In addition to this, Audit Notes and Replies and to select beneficiaries for Poverty Alleviation Programmes is also handed over to Gram Panchayats.<sup>3</sup>



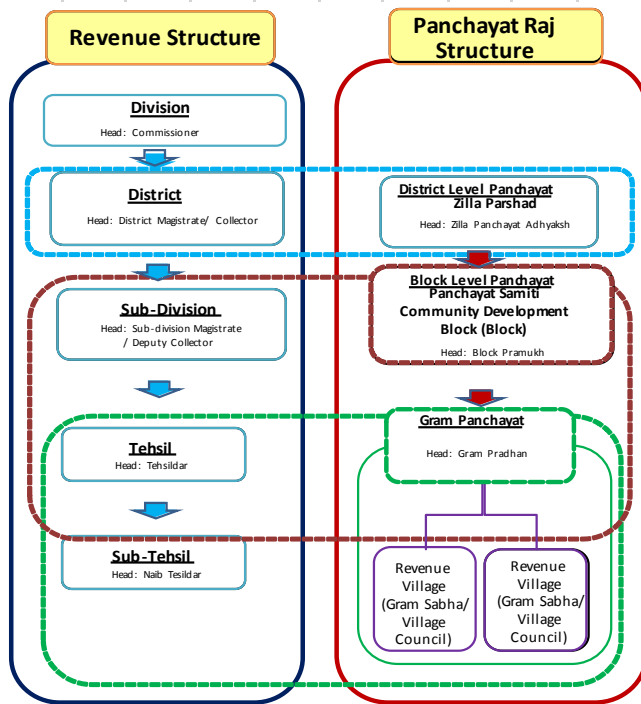
Source: JICA Study Team (2017)

**Figure 3.2.1 Panchayati Raj Institutions in HP State**

HP Panchayati Raj Act has also been amended and under the amended provisions, there shall be constituted an Up-Gram Sabha for each Ward of the Gram Sabha and all members of the Gram Sabha, residing in the area of the Ward shall be the members of Up-Gram Sabha. If such village level functionaries fail to attend the meetings, the Gram Sabha shall report the matter to their controlling officer through the Gram Panchayat. They shall take disciplinary action against such functionaries within one month from the date of receipt of the report and shall intimate the action taken to the Gram Sabha through the Gram Panchayat. In addition to this Gram Sabha will authorise Gram Panchayat to issue utilisation certificate of funds spent on the implementation of the Plans, Projects and Programmes undertaken in the Gram Panchayat areas. Under the Constitution there can be only three tiers of the Panchayat. The Gram Sabha is not a tier of the PR system. It does not have any executive function and operates as a recommending body only. Gram Sabhas hold meetings normally two to four times a year, but can meet as and when necessary. Issues to be discussed in the meetings can be wide ranging but the essential agenda should include: annual action plan and budget, annual accounts and annual report of the GP, selection of beneficiaries for different social service programmes (Indira Awas Yojana (IAY), Pension Schemes etc.), and identification of schemes for preparation of annual plan for the Gram Panchayat.

<sup>3</sup><http://www.thehansindia.com/posts/index/Hans/2015-03-18/Panchayati-Raj-institutions/138074>

(5) Relationship of Revenue and PRI Structures Units in HP



Source: Prepared by Study Team based on information obtained from HP State Government webpage

**Figure 3.2.2 Hierarchies and Relationship of Revenue and PRI Structures Units in HP State**

Hierarchies and relationship between the administrative units of the Revenue Department and PRI are presented in **Figure 3.2.2**. As stated earlier, the revenue structure is established by the revenue department from revenue collection point of view, whereas the PRI structure is established based on PRIs for local autonomy purpose. Boundaries of these two structures do not always correspond each other except for the district level. Normally, statistical surveys, assistance and convergences related to community development are organised at the block level under the Panchayat Raj structure.

**3.2.3 Fiscal Conditions**

The state of HP is one of the special category states, where the state revenue is assisted by the grant from the Central Government. Under this assistance, the cost of 90% of the centrally sponsored scheme will be treated as grant while the remaining 10% will be borne by the state government, which also applies to the externally aided projects. The state of HP has seen considerable economic growth and compound growth of Gross State Domestic Product (GSDP) for the period 2006-07 to 2015-16 has been recorded 15.47%. GSDP in 2015-16 at current prices was 1,105,110 million INR. **Table 3.2.3** gives a brief overview of the financial conditions of the state under different heads viz.; fiscal operations, revenue receipts relative to GSDP, states own resources, tax revenue, non-tax revenue, transfers from Government of India (GoI), Grant in aid from GoI, central tax transfers, capital receipts etc.

**Table 3.2.3** presents HP Government’s fiscal transactions (receipts and disbursements) for the fiscal year 2014-15 and 2015-16. The total revenue receipts for 2015-16 are 234,400 million INR and revenue expenditure is 223,030 million INR and the tax revenue generated during 2015-16 was 66,960 million INR.

**Table 3.2.3 Summary of Fiscal Operations**

(Unit: million INR)

Receipts	2014-15	2015-16	Disbursements	2014-15	2015-16		
	Total	Total		Total	Non Plan	Plan	Total
<b>Section-A: Revenue</b>							
Revenue receipts	178,430	23,440	Revenue expenditure	197,870	188,100	34,930	223,030
Tax revenue	59,400	66,960	General Services	76,040	87,340	540	87,880
Non-tax revenue	20,810	18,370	Social Services	74,510	60,360	1,9440	79,800
Share of Union Taxes/Duties	26,440	36,110	Economic Services	47,230	40,300	1,4940	55,250
Grants from Government of India	7,1780	112,960	Grants-in-aid and Contributions	9	100	--	100
<b>Section-B: Capital and others</b>							
Misc. Capital Receipts	650	--	Capital outlay	24,730	2,960	25,680	28,640
-Recoveries of Loans and Advances	410	260	Loans and advances Disbursed	4,740			4,630
Public Debt receipts	108,770	61,290	Repayment of public Debt	82,600			39,480
Contingency Fund	--	--	Contingency Fund	--			--
Public account receipts	105,750	115,150	Public account disbursements#	88,440			105,770
Opening cash balance	(-) 8,870	(-) 7,390	Closing cash balance	(-) 7,390			2,160
<b>Total</b>	<b>390,990</b>	<b>403,710</b>	<b>Total</b>	<b>390,990</b>			<b>403,710</b>

Source: Annual Administrative Report 2014-15; Panchayati Raj Department, HP, Shimla-171009 (<http://admis.hp.nic.in/himachal/economics/>)

During 2015-16, only 37% of the revenue receipts came from state's own resources comprising taxes and non-taxes, while remaining 63% were contributed by central transfers comprising state's share in central taxes and duties (15%) and grants-in-aid from GoI (48%). The trends in revenue receipts relative to GSDP are presented in **Table 3.2.4**.

**Table 3.2.4 Trends in Revenue Receipts relative to GSDP**

(Unit: million INR)

Item	2011-12	2012-13	2013-14	2014-15	2015-16
Revenue Receipts (RR)	145,430	155,980	157,110	178,430	234,400
Rate of growth of RR (%)	14.41	7.25	0.72	13.57	31.36
State's Own Taxes	41,080	46,260	51,210	59,400	66,960
Rate of growth of Own Taxes (%)	12.76	12.61	10.70	15.99	12.73
State's GSDP	727,200	822,940	925,890	1,011,080	11,051,100
Growth rate of GSDP (%)	--	13.16	12.51	9.20	9.30
R R/GSDP	20.00	18.95	16.97	17.65	21.21
<b>Buoyancy Ratios<sup>3</sup> (%)</b>					
Revenue Buoyancy w.r.t. GSDP	--	0.55	0.06	1.48	3.37
State's Own Taxes Buoyancy w.r.t. GSDP	--	0.96	0.86	1.74	1.37

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of HP, Report No. 4 of the year 2016

The growth rate of revenue receipts consistently decreased from 14.41% in 2011-12 to 0.72% in 2013-14 but it showed a positive trend during previous two years (2014-16). During 2015-16, the revenue receipts increased to 31.36% from 13.57% in 2014-15. This was the impact of 14<sup>th</sup> Finance Commission recommendation of high devolution of central transfers. The growth rate of GSDP has declined from 13.16% in 2012-13 to 9.20% in 2014-15 but marginally increased by 0.1% in 2015-16 over the previous year. The revenue buoyancy with reference to GSDP which decreased from 0.55% to 0.06% during 2012-14 rose to 1.48% in 2014-15 and 3.37% in 2015-16

due to increase in revenue receipts and declining rate of GSDP growth. The state's own tax buoyancy with reference to GSDP showed inter year variation which came down to 1.37% in 2015-16 from 1.74% in 2014-15 due to decrease in own revenue receipts of the state.<sup>4</sup>

Details regarding the state's own resources, tax revenue, non-tax revenue, transfers from Government of India to state, grant in aid, central tax transfers, capital receipts, recoveries of loans and advances, debt receipts from internal sources, loans and advances from GoI and public account receipts are enclosed as **Attachment I.3.2.1**.

### **3.2.4 Governance and Government Initiatives for its Reforms**

Government of HP has made many attempts to reform its governance system. Administrative reforms are found to be the most complex and difficult to be carried out. These are based not only on policy changes but also require intricate administrative and behavioral shifts within the government systems. Administrative reforms also require bureaucratic commitment and acceptance within all levels.

In general, efforts at administrative reforms when supported by middle and lower level hierarchy of administration gives better results, while implementing reforms. Success of administrative reform is not only influenced by but also adjudged by the degree of sustainability of reforms.

The economy of HP is predominantly dependent upon agriculture and in the absence of a strong industrial base; any fluctuations in the agricultural or horticultural production causes some changes in economic growth also. The e-PDS Project was started in the state apart from that the implementation of Solid and Liquid Waste Management in the 477 Gram Panchayats during 2015-16 was another big achievement in the wings. Digitisation of cadastral maps (Musavi) started and has been found to be successful for replication in the remaining districts of the state.

State government has taken a number of initiatives in the field of computerisation, introducing MIS in different sectors, online bookings, reservations for travel and tourism etc. Details of these initiatives are presented in **Attachment I.3.2.2**.

## **3.3 Socio-Economic Conditions**

### **3.3.1 Demography**

#### **(1) Population and Population Density**

The population of HP state has been increasing continuously over the years. However, the growth rate of total population shows a decreasing trend over the last three decades. In 2011, the total population of HP is 6,864,602 out of which 3,481,873 were males (51%) and 3,382,729 (49%) were females. The rural population accounted for nearly 90% of the total population and the growth of urban population over the period of time is also seen as a trend.

The population is rapidly growing in Una, Solan, Sirmour and Kullu of the southern central districts of the state between the range of 14.76% and 16.26% (2001-2011). In Kullu, the decadal

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<sup>4</sup><http://www.cag.gov.in/content/report-no-4-2016-state-finances-himachal-pradesh>



growth of the rural population was reported to be 37.54% between 2001 and 2011. On the other hand, Lahaul&Spiti, located in the higher elevation areas, has indicated negative population growth during the same period at the rate of -5%.

The districts having the highest population density are found in the Southwestern side of the state. The population density was recorded the highest in Hamirpur (407 persons per sq. km) and followed by Una (338 persons sq. km), Bilaspur (328 persons per sq. km) and Solan (300 persons sq. km). On the other hand, the most sparsely populated area is Lahaul&Spiti with 2 persons per sq. km. The district wise population is given in **Attachment I.3.3.1**.

## (2) Sex ratio

The sex ratio in HP is 972 females per 1000 males. The highest sex-ratio is observed in Hamirpur, Kangra and Mandi districts, while the least is in district Kinnaur. Sex ratio at birth for children born in the last five years was 1,151 in urban area and 920 in rural area with the state ratio of 936, which is 17 points higher than the all India sex ratio at birth.

**Table 3.3.1 District-wise Sex Ratio in HP (Census, 2011)<sup>12</sup>**

District	Females Per Thousand Males											
	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001	2011
1. Bilaspur	840	862	874	900	938	948	952	993	1,002	1,002	990	981
2. Chamba	903	897	893	910	874	894	876	945	936	949	959	986
3. Hamirpur		900	930	917	916	936	1,092	1,111	1,149	1,105	1,099	1,095
4. Kangra		900	930	917	916	936	964	1,008	1,016	1,024	1,025	1,012
5. Kinnaur	911	935	922	941	910	1070	969	887	885	856	857	819
6. Kullu		1,009	1,015	1,006	930	941	945	920	918	920	927	942
7. Lahul &Spiti	992	990	993	989	920	933	776	818	767	817	802	903
8. Mandi	908	921	933	917	907	971	994	964	999	1,013	1,012	1,007
9. Shimla	853	881	842	886	867	875	852	869	878	894	896	915
10. Sirmaur	798	822	824	803	818	800	828	835	873	897	901	918
11. Solan/ Mahasu*	725	723	645	724	736	800	879	923	929	909	852	880
12. Una		900	930	917	916	936	978	1,003	1,028	1,006	997	976
HP	884	889	890	897	890	912	938	958	973	976	968	972

\*Prior to reorganisation of districts in 1973 there was Mahasu district.

Source: Census of India, 1991 to 2011. Census of India-2011- HP

## (3) Scheduled Castes (SCs)/ Scheduled Tribes (STs) / Other Backward Class (OBCs)

Scheduled Castes and Scheduled Tribes are recognised by the Constitution of India as the social groups in need of protection of their rights and facilitation for their advancement (further details for SC/ STs are given in the **Part I, Section 8.2.1**). In the state, the Scheduled Caste (SC) and Scheduled Tribe (ST) population accounts for 25.19% and 5.71% respectively of the total population of the state. Bhot, Gaddi, Gujjar, Jad and several other tribal communities are known to reside in the state. Some of the communities are known for their nomadic way of lives. They are seasonal migrants and moving through the pastures along with their livestock depending on the season. The characteristics of each tribal community is given in the **Attachment I.3.3.2**. Gender segregated SC/ ST population is given in **Attachment I.3.3.3**.

The Other Backward Classes (OBCs) is a collective term used by GoI to classify castes which are socially and educationally disadvantaged. As per the Himachal Backward Classes Finance and Development Corporation, a Government of HP undertaking under the aegis of Ministry of Social Justice and Empowerment, established on 31st January 1994, estimates the population of Backward Classes as 927,452. The district-wise population of OBCs are given in **Table 3.3.2**.

**Table 3.3.2 District-wise Distribution of OBC Population in HP State**

No.	Name of District	Population of OBC	
		Population	Percentage
1.	Bilaspur	20,106	2.17%
2.	Chamba	11,853	1.28%
3.	Hamirpur	72,626	7.83%
4.	Kangra	518,897	55.94%
5.	Kinnaur	0	0.00%
6.	Kullu	5,749	0.62%
7.	Lahaul & Spiti	0	0.00%
8.	Mandi	36,046	3.89%
9.	Shimla	20,906	2.25%
10.	Sirmour	63,643	6.86%
11.	Solan	38,477	4.25%
12.	Una	139,239	15.01%
Total		927,452	100%

Source: Compiled by JICA Study Team (2017) based on information from Himachal Backward Classes Finance & Development Corporation (HBCFDC), a Government of Himachal Pradesh Undertaking under the aegis of Ministry of Social Justice and Empowerment, set-up on 31st January, 1994 (<http://admis.hp.nic.in/himachal/hbcfdc/index.htm>)

### 3.3.2 Education and Literacy

Literacy rate in HP is 82.8%, while the male and female literacy rates are 89.5% and 75.9% respectively. Among the rural and urban folk of the state, the literacy rate is 81.9% and 91.1% respectively. Among the SC and ST community the literacy level is 78.9% and 73.6% respectively. The district wise literacy ratio is given in **Table 3.3.3**.

**Table 3.3.3 District-wise Literacy Levels among SC and ST Population**

Population	Literacy rate among SC			Literacy rate among ST		
	Male	Female	Total	Male	Female	Total
1. Bilaspur	88.0	74.2	81.2	84.6	66.0	75.5
2. Chamba	79.7	59.3	69.6	80.3	58.0	69.1
3. Hamirpur	91.9	80.3	85.9	92.6	78.2	85.4
4. Kangra	88.1	74.7	81.4	82.8	65.7	74.1
5. Kinnaur	85.6	69.0	77.3	89.2	71.5	80.0
6. Kullu	83.6	66.1	75.1	90.2	76.0	83.2
7. Lahaul & Spiti	90.0	69.1	80.0	86.9	67.2	76.9
8. Mandi	85.9	69.1	77.5	83.8	68.2	75.9
9. Shimla	85.9	71.4	78.8	79.8	70.8	75.5
10. Sirmour	81.4	67.5	74.7	69.7	48.7	59.7
11. Solan	86.7	72.6	79.9	82.5	63.0	73.1
12. Una	90.8	78.5	84.7	87.8	71.8	80.0
H.P.	86.2	71.5	78.9	83.2	64.2	73.6

Source: Compiled by JICA Study Team (2017) from Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics

The gross enrollment ratio in various educational institutions of the state indicates that the school going age between 6-11 and 11-14 years are 105.6% and 102.8% respectively. No gender difference was found amongst the age group of 6-11 years where as the girls' ratio was higher by 0.3% in the latter age group. Women between the ages of 15 and 49 years old with 10 years or more years of schooling was reported to be 73.7% in urban areas and 57.9% in the rural areas and 59.4% in the state. 14.7% has increased as a state since 2005-2006. These figures are much higher than the figures for all India which indicated 51.5% for urban area and 27.3% in the rural area with the total figure of 35.7%. The dropout rates are very minimal, however, Lahaul & Spiti recorded the highest incidences of primary and middle education dropouts. Gender wise, primary dropout ratio are higher amongst the boys whereas the situation turns reverse when it comes to middle education.

**Table 3.3.4 District-wise Dropout Rates (2015-16)**

(Unit:%)

District	Primary (I-V)			Middle (VI-VIII)		
	Boys	Girls	Total	Boys	Girls	Total
Bilaspur	0.00	0.00	0.00	0.00	1.34	0.13
Chamba	0.23	1.26	0.74	1.06	3.34	2.16
Hamirpur	1.17	2.42	1.76	0.00	0.21	0.00
Kangra	1.26	1.07	1.17	0.96	0.94	0.95
Kinnaur	3.88	2.10	3.01	4.04	5.13	4.61
Kullu	1.23	1.01	1.12	1.38	1.29	1.34
Lahaul & Spiti	14.76	12.75	13.73	4.86	6.97	5.97
Mandi	0.00	0.00	0.00	0.02	0.00	0.00
Shimla	2.29	2.25	2.27	1.10	1.79	1.43
Sirmour	1.29	0.95	1.13	1.87	1.73	1.81
Solan	0.00	0.00	0.00	0.23	0.45	0.33
Una	0.77	2.45	1.55	0.00	1.72	0.00
Total Average	2.24	2.19	2.21	1.29	2.08	1.56

Source: Education Department, H.P., Statistical Abstract of Himachal Pradesh 2015-16. Department of Economics and Statistics.

### 3.3.3 Economic Status

#### (1) Sector wise Gross State Domestic Product

The state has attained constantly high economic growth ratio. In 2007-08, the Gross State Domestic Product (GSDP) was growing at the rate of 8.5% and still maintains the growth rate of 7.7% in 2015-16. With the high growth rate of GSDP, the per capita income at current prices has nearly tripled since 2007-08 and attained 130,067 INR in 2015-16. The main contributor to the state's economy is the secondary sector, specially manufacturing sector which accounts for 21.58% of the GSDP in 2015-16. Forestry & logging sub-sector contributes to 5.55% of the total GSDP.

**Table 3.3.5 Sector-wise Gross State Domestic Product (At Current Prices)**

(Unit: million INR otherwise noted)

Economic Activity / Sector	2013-14 (P)*	%	2014-15 (Q)*	%	2015-16 (A)*	%
1. Agriculture & Animal Husbandry	88,925	11.49	79,920	9.42	86,354	9.29
2. Forestry & Logging	39,129	5.06	48,882	5.76	51,596	5.55
3. Fishing	737	0.10	891	0.11	974	0.10
4. Mining & Quarrying	2,266	0.29	2,440	0.29	2,507	0.27
<b>Total Primary</b>	<b>131,057</b>	<b>16.93</b>	<b>132,132</b>	<b>15.58</b>	<b>141,430</b>	<b>15.21</b>
5. Manufacturing	183,598	23.72	192,431	22.69	200,614	21.58
6. Construction	68,259	8.82	70,930	8.36	74,958	8.06
7. Electricity, Gas, Water Supply, and other utility services	48,162	6.22	54,527	6.43	59,403	6.39
<b>Total Secondary</b>	<b>300,019</b>	<b>38.76</b>	<b>317,888</b>	<b>37.48</b>	<b>334,974</b>	<b>36.03</b>
8. Transport, Storage & Communication	33,407	4.32	41,133	4.85	47,181	5.08
8.1 Railways	141	0.02	155	0.02	163	0.02
8.2 Transport by other means	19,482	2.52	25,913	3.06	30,862	3.32
8.3 Communication & Services related to broadcasting	13,768	1.78	15,048	1.77	16,139	1.74
8.4 Storage	16	0.00	17	0.00	18	0.00
9. Trade, Repair, Hotel and Restaurant	48,024	6.20	55,708	6.57	62,755	6.75
<b>Total: Transport, Communication and Trade, Repair, Hotel &amp; Restaurant</b>	<b>81,430</b>	<b>10.52</b>	<b>96,841</b>	<b>11.42</b>	<b>109,937</b>	<b>11.83</b>
10. Financial Services	36,612	4.73	35,550	4.19	38,039	4.09
11. Real Estate, Ownership of Dwelling & Professional Services	79,490	10.27	92,295	10.88	107,024	11.51
<b>Total Financial Services &amp; Real Estate</b>	<b>112,103</b>	<b>14.48</b>	<b>127,845</b>	<b>15.07</b>	<b>145,063</b>	<b>15.61</b>
12. Public Administration	37,190	4.80	44,911	5.30	50,548	5.44
13. Other Services	74,639	9.64	89,045	10.50	103,259	11.11
<b>Total: Community and Personal Services</b>	<b>111,828</b>	<b>14.45</b>	<b>133,956</b>	<b>15.79</b>	<b>153,807</b>	<b>16.55</b>
Net State Domestic Product	773,998	100.00	848,098	100.00	929,592	100.00
<b>Per Capita Income (INR)</b>	<b>110,209</b>	<b>14.24</b>	<b>119,720</b>	<b>14.12</b>	<b>130,067</b>	<b>13.99</b>

\*(P): Provisional; (Q): Quick; (A): Advanced Analysis

Source: Economics &amp; Statistics Department, HP

## (2) Employment - Workers

The total working population is 2.063 million, which is about 51.85%, while the remaining 48.15% are non-working. Among the working population, about 30% are designated as main workers who are engaged for more than 180 days annually, while the remaining 22% are designated as marginal workers (as these workers are engaged for less than 180 days per year). On the other hand, out of the total working population, cultivators constitute a large majority of the population, amounting to 58% of the total working population. The gender wise work participation ratio is given in **Table 3.3.6**. It shows that the proportion of male main workers are higher than that of female whereas the proportion of female marginal workers are higher than that of male.

**Table 3.3.6 Gender-wise Work Participation Ratio**

District	Main Workers (%)			Marginal Workers (%)			Non-Workers (%)		
	M	F	Total	M	F	Total	M	F	Total
Bilaspur	38.1	15.9	27.1	19.8	34.0	26.8	42.1	50.1	46.1
Chamba	33.4	12.5	23.1	27.4	39.9	33.6	39.2	47.5	43.4
Hamirpur	34.7	21.4	27.7	20.0	30.5	25.5	45.3	48.2	46.8
Kangra	32.7	9.0	20.8	21.1	26.8	23.9	46.2	64.3	55.3
Kinnaur	64.7	44.6	55.6	8.6	14.6	11.3	26.8	40.8	33.1
Kullu	52.8	35.2	44.3	13.2	21.4	17.2	34.0	43.4	38.6
Lahaul-Spiti	52.6	43.1	48.1	12.2	13.9	13.0	35.1	43.0	38.9
Mandi	37.3	19.6	28.4	22.5	35.2	28.9	40.3	45.2	42.7
Shimla	50.6	24.9	38.3	10.3	19.4	14.6	39.2	55.7	47.1
Sirmaur	48.8	23.3	36.6	12.5	20.4	16.3	38.7	56.4	47.1
Solan	51.2	22.6	37.8	10.4	17.5	13.7	38.5	60.0	48.5
Una	40.2	11.1	25.8	13.5	17.6	15.5	46.3	71.4	58.7
Total	41.3	18.4	30.1	17.4	26.4	21.8	41.3	55.2	48.2

Source: Compiled by JICA Study Team (2017) based Census 2011

Agricultural laborers comprise about 5% of the working population. Cultivators and agricultural laborers comprise about 63%. Workers involved in household industries constitute 1.6% of the total workers, while persons engaged as other workers, which includes the tertiary job sector, service providers, self-employed, etc., comprise about 35.5% of the total workers. Gender wise work participation is given in the table below. The table shows that 76.2% of the total women work population is engaged in agriculture whereas 44.4% of the male work population is engaged in the same. On the contrary, the proportion of men engaged in other workers (48.8%) is nearly 3 times higher than the same for women (17.6%).

**Table 3.3.7 Gender-wise Workers by the Type of Work Engaged**

District	Cultivators (%)			Agriculture Labourers (%)			Other Workers (%)		
	M	F	Total	M	F	Total	M	F	Total
Bilaspur	42.4	84.7	61.8	2.5	1.4	2.0	53.5	13.1	35.0
Chamba	54.5	81.5	66.9	3.3	2.9	3.1	40.8	14.0	28.5
Hamirpur	39.6	81.2	60.8	3.4	3.9	3.6	55.2	13.9	34.2
Kangra	30.0	67.0	44.9	8.2	8.1	8.1	59.3	23.0	44.7
Kinnaur	45.5	78.4	58.6	4.7	4.2	4.5	48.1	15.7	35.2
Kullu	65.7	82.6	73.3	4.2	5.1	4.6	29.0	11.4	21.1
Lahaul-Spiti	45.4	74.3	58.2	3.1	2.7	3.0	50.5	22.2	38.0
Mandi	54.5	82.1	67.7	2.7	2.8	2.8	41.2	14.3	28.2
Shimla	48.5	72.1	58.0	5.9	6.3	6.1	43.9	19.5	34.1
Sirmaur	55.7	80.1	65.3	4.0	3.6	3.8	38.4	14.4	28.9
Solan	34.2	70.2	47.3	3.2	3.8	3.4	60.8	24.5	47.6
Una	27.6	61.9	39.4	9.6	8.1	9.1	61.0	28.7	49.9
Total	44.3	76.2	57.9	5.0	4.7	4.9	48.8	17.6	35.5

Source: Compiled by JICA Study Team (2017) based Census 2011

### (3) MGNREGS<sup>5</sup>

Mahatma Gandhi National Rural Employment Generation Scheme (MGNREGS) aims at ensuring 100 days of employment opportunities to households who are in need of employment and willing to take part in manual labour. Under this scheme, the payment will be done through

<sup>5</sup> The data in this section is based on MGNREGS at a glance for Himachal Pradesh. ([http://mnregaweb4.nic.in/netnrega/all\\_lv1\\_details\\_dashboard\\_new.aspx](http://mnregaweb4.nic.in/netnrega/all_lv1_details_dashboard_new.aspx) accessed on 11 Aug 2017)

bank transfer and thus, the beneficiaries will receive the wages in their own bank account. The wages currently paid under MGNREGS is reported to be 175.76 INR per person per day. The average number of work days provided under the scheme is between 52 days to 42 days between FY 2013-14 and FY 2016-17. Women's participation ration around 60% and above. Only about 1% of households have completed the 100 days of employment between FY 2013-14 and FY 2016-17. The number of households holding the job card to take part in the MGNREGS, 1.2 million with 2.3 million workers. Out of which the active workers are less than half of the registered workers accounting for about 1 million workers. SC workers accounts for 26.8% of the active workers and 6.87% for ST. The summary data between FY 2013-14 and FY 2016-17 is given in **Table 3.3.8**.

**Table 3.3.8 Status of MGNREGS in HP State (as of 11<sup>th</sup> August 2017)**

Particular	FY 2016-2017	FY 2015-2016	FY 2014-2015	FY 2013-2014
Persondays Generated so far [In million]	23.7	17.8	19.0	28.2
SC persondays% as of total persondays	27.71	26.92	27.1	28.45
ST persondays% as of total persondays	7.97	8.41	8.26	7.37
Women Persondays out of Total (%)	61.8	63.15	61.03	62.51
Average days of employment provided per Household	44.74	41.97	42.15	52.38
Average Wage rate per day per person(Rs.)	169.28	161.24	153.42	137.46
Total No of HHs completed 100 Days of Wage Employment	11,126	20,390	21,576	55,350
Total Households Worked [In thousand]	529	423	453	539
Total Individuals Worked [In thousand]	691	542	576	681
Differently abled persons worked	1,630	1,210	1,233	1,654

Source: MGNREGS At a Glance. ([http://mnregaweb4.nic.in/netnrega/all\\_lvl\\_details\\_dashboard\\_new.aspx](http://mnregaweb4.nic.in/netnrega/all_lvl_details_dashboard_new.aspx) accessed on 11 Aug 2017)

#### (4) Tourists

HP is blessed with the beautiful landscape of Himalayas and biodiversity and attracts a number of tourists from India and abroad. The number of tourists received in the state in 2015 was 17,531,153<sup>6</sup> which had grown nearly three times since 2002 when the total number of tourist arrival in the state was reported to be 600,000 visitors<sup>7</sup>. The sector contributes 7.0% of the state GDP and the state government places an emphasis in further promoting and developing the sector<sup>8</sup>. The Asian Development Bank has assisted the state for the infrastructure development for the sector<sup>9</sup>. With the participation of the private sector, ropeway facilities are developed. The government also markets destinations in exhibitions held in various parts in India<sup>10</sup>.

The number of tourist arrival in Himachal Pradesh between 2013 – 2015 shows a stable growth of the number of domestic tourists whereas the number of foreign tourist arrival remains almost constant. This may suggest that the better recognition of the destination in the domestic market rather than international one. Although it is premature to assess the future trend with the limited data available with the study team, as the government continues to investment in the sector for

<sup>6</sup> Statistical Abstract of Himachal Pradesh 2015-16. Department of Economics and Statistics, Himachal Pradesh.

<sup>7</sup> The tourist arrival in 2002 was reported in the State Development Report – Himachal Pradesh (2014, p327).

<sup>8</sup> Economic Survey 2016-17. Economics & Statistics Department, Himachal Pradesh.

<sup>9</sup> ibid

<sup>10</sup> ibid

development, a steady growth may be anticipated with the domestic market providing the market conditions remain favourable. The district wise statistics on tourist arrival shows that the highest number of both Indian and foreign visits were received in Shimla (37.96%), followed by Kangra (27.79%) and Kullu (26.96%).

**Table 3.3.9 Tourists Visited in HP State (2013 - 2015)**

District	Indian		Foreigner	
	Persons	%	Persons	%
2013	14,715,586	-	414,249	-
2014	15,924,701	-	389,699	-
<b>District Wise Tourists Visited in HP State (2015)</b>				
Bilaspur	1,368,807	7.99	350	0.09
Chamba	1,122,894	6.56	1,197	0.29
Hamirpur	855,263	4.99	4	0.00
Kangra	2,396,970	14.00	112,843	27.79
Kinnaur	117,216	0.68	2,695	0.66
Kullu	3,314,463	19.35	109,468	26.96
Lahaul-Spiti	86,591	0.51	4,612	1.14
Mandi	1,086,231	6.34	10,478	2.58
Shimla	3,261,152	19.04	154,155	37.96
Sirmaur	1,016,060	5.93	3,377	0.83
Solan	1,072,486	6.26	6,692	1.65
Una	1,426,912	8.33	237	0.06
Total (2015)	17,125,045	100.00	406,108	100.00

Source: Tourism Department, HP. Statistical Abstract of HP 2015-16. Department of Economics and Statistics.

### 3.3.4 Poverty

In HP state, 23.87% of the rural population was reported to be below poverty line (2002-2007)<sup>11</sup>. The highest incidences of poverty are observed in Chamba district (54.15%), followed by Lahaul & Spiti (43.50%). Followed by Shimla (29.07%), Sirmaur (19.44%), Una (16.92%) and Kullu (16.24%) indicated the lowest figures. The block wise BPL ratio estimated by the Study Team is given in the **Attachment I.3.3.4**.

One of the recent report “Scaling the Heights (World Bank, 2015)” states that HP has successfully reduced the incidence of poverty in across various social groups and both in the rural and urban areas. The report has highlighted that the poverty level in the rural areas of HP has declined from 36.8% in 1993 to 8.5% in 2011, which is four-fold declines. The poverty status is better than any other state in the country. The social group wise poverty status is given in **Table 3.3.10**.

**Table 3.3.10 Poverty Head Counts by the Social Group**

Social Groups	Rural		Urban	
	2004-05	2011-12	2004-05	2011-12
STs	35.4	9.5	2.4	4.0
SCs	39.5	16.5	9.2	9.9
OBCs	19.0	2.3	10.8	9.9
Others	18.3	7.0	2.5	1.7
All	25.0	8.5	4.6	4.3

Note: Data refer to poverty headcount – the ratio of the poor population to the total population.  
Source: World Bank (2015). Scaling the Heights. P11

<sup>11</sup> “Survey on Poor Families 2002-2007”. Rural Development Department, Himachal Pradesh.

As per the revised poverty line issued by the Planning Commission, government of India estimated that the poverty line for the rural area of Himachal Pradesh was 827.03 INR per capita per month and 1,178.46 INR per capita per month for urban area for 2009-2010<sup>12</sup>.

### 3.3.5 Gender

#### (1) Policies in India and HP State

Although the state of HP does not have a gender policy/ strategy, India is in the process of finalising the National Policy for Women 2016 (Draft). In this policy, women's economic empowerment and needs to mitigate women's vulnerability induced by the climate change are identified as the issues to be dealt with. The policy highlighted the need for promotion of education, entrepreneurship, and alternative energy. Gender budgeting is yet to be introduced in the state.

#### (2) Gender situation in HP State

In the recent past, along with the economic growth, female literacy, education access to communication, banking services have improved. In comparison to all India average, the proportion of women who have gone through 10 or more years of education in HP is much higher. On the other hand, women's work participation and ownership of a house/ land still significantly lags behind in comparison to rest of India. Within HP state, the work participation of women is higher in the urban area, whereas the proportion of women owning house/ land are slightly higher in the rural areas.

**Table 3.3.11 Gender Status in HP State (2005-06/ 2015-16)**

Particulars	Himachal				All India			
	2015-16		2005-06		2015-16		2005-06	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Population (female) age 6 years and above who ever attended school (%)	89.8	77.9	79.0	73.1	80.6	63.0	68.8	58.3
Sex ratio of the total population (females per 1,000 males)	914.0	1,097.0	1,078.0	1,070.0	956.0	1,009.0	991.0	1,000.0
Sex ratio at birth for children born in the last five years (females per 1,000males)	1,151.0	920.0	936.0	913.0	899.0	927.0	919.0	914.0
Adults (age 15-49)								
Women who are literate	92.6	87.8	88.2	79.5	81.4	61.5	68.4	55.1
Men who are literate	95.0	96.4	96.2	94.0	90.8	82.6	85.7	78.1
Women with 10 or more years of schooling (%)	73.7	57.9	59.4	44.7	51.5	27.3	35.7	22.3
Currently married women who usually participate in household decisions	96.4	90.0	90.8	79.2	85.8	83.0	84.0	76.5
Women who worked in the last 12 months who were paid in cash	27.2	15.5	17.0	10.6	23.2	25.4	24.6	28.6
Women owning a house and/ or land (alone or jointly with others)	9.2	11.6	11.3	na	35.2	40.1	38.4	na
Women having a bank or savings	77.5	67.5	68.8	22.2	61.0	48.5	53.0	15.1

<sup>12</sup> Government of India, Planning Commission (2014). Report of the Expert Group to Review the Methodology for Measurement of Poverty. June 2014.



Particulars	Himachal				All India			
	2015-16		2005-06		2015-16		2005-06	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
account that they themselves use								
Women having mobile phone that they themselves use	85.3	72.3	73.9	na	61.8	36.9	45.9	na

Source: National Family Health Survey-4 2015. Ministry of Health and Family Welfare, Government of India

Representation of women in Panchayati Raj Institution in the state is higher than that of other states of India. On a political front, women Members of Legislative Assembly (MLAs) constitute 4.41% in the present *Vidhan Sabha*. In order to increase women participation in decision making and developmental activities, the state government has raised the reservation for women in the PRIs and Urban Local Bodies (ULBs) from 33% to 50%. As a result of these reservations the results of the Panchayat elections of December 2010 –January 2011 were as under in HP state.

**Table 3.3.12 Representation of Women in Panchayati Raj Institutions (2010-11)**

No.	Representation of women in Panchayati Raj Institutions	%
1	Ward Members	58.33%
2	Members of Panchayat Samitis	51.55%
3	Member of Zila Parishad	51.00%
4	Gram Panchayat Pradhans	50.54%
5	Chairpersons of Panchayat Samitis	54.55%
6	Chairperson of Zila Parishads	50.00%

Source: Department of Panchayat Raj, Government of Himachal Pradesh, Shimla, 2012 <http://www.cok.pratibha-spandan.org/www/files/issue2015/april-june2015/002.pdf> (page visited on 18/07/2017)

The status of women representation as on 24<sup>th</sup> November 2016 recorded 50.11% of the total elected representatives with 1,631 Sarpanches (village heads)<sup>13</sup>.

### (3) Gender Related Interventions by the Government of HP State

The Women and Child Development Department of HP state is trying to create a gender awareness amongst the government officials from various departments. The department also implements various schemes to facilitate women's empowerment. The outline of the schemes is given in **Table 3.3.13**.

**Table 3.3.13 Outline of the Schemes for Women**

No.	Schemes/ Programmes	Financial Source (Central/ State)	Budget for FY 2016-17* (in INR million)	Expenditure FY 2016-17 (in INR million)
Department of Agriculture/ Horticulture				
1	National Mission on Agricultural Extension and Technology (NMAET)	Centre/ State (90:10)	Outlay proposed for 2017-18: INR 25 million	20 (expected)*
2.	Mission for Integrated Development of Horticulture (MIDH) – Horticulture Mission for North East and Himalayan States (HMNEH)	Centre/ State (90:10)	INR 355.6 million	147.9
3	National Food Security Mission (NSFM)	Centre/ State (90:10)	Outlay proposed for 2017-18 – INR 16.5 million NSFM website shows no information for 2016-17**	15.9 (expected)*

<sup>13</sup> <http://www.panchayat.gov.in/documents/10198/384335/Representation%20of%20Women%20in%20PRIs.pdf> (accessed on 18<sup>th</sup> July 2017)

No.	Schemes/ Programmes	Financial Source (Central/ State)	Budget for FY 2016-17* (in INR million)	Expenditure FY 2016-17 (in INR million)
4	National Mission for Sustainable Agriculture (NMSA)	Centre/ State (90:10)	Outlay proposed for 2017-18 – INR 20 million	20 (expected)*
Department of rural Development				
6	National Rural Livelihood Mission (NRLM)	Centre/ State (90:10)	Demand Driven Strategy Approved action plan for 31.5 million	Total 3,280 women SHGs are proposed for assistance by providing credit of 400 million.
7	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	Centre/ State (90:10)	-	Centre - 3067.25 million State - 519.52 million
8	Indira Awas Yojana (IAY) – Pradhan Mantri Awas Yojana: Gramin (PMAY-G) since 2016	Centre/ State (90:10)	Allocation of 492.26 million Centre – 443.453 million State – 49.276 million	-

Source: JICA Study Team (2017) compiled from information provided by Government of Himachal Pradesh

#### (4) Gender in Forestry Sector

As seen in other states in India, women are closely associated with forest. In HP state, many women would collect fodder grasses from the forest areas and feed their cattle, and collect fuelwoods to be used for cooking and warming the houses especially in the winter. The rapid analysis from the field suggested that pine leaves are also collected from the forest mostly by women for beddings of cattle. On the other hand, rapid expansion of LPG and electrification by the government efforts, the requirement for fuelwood is gradually reducing in many parts of the state except poorly connected areas where LPG cylinders are difficult to be transported and during the winter seasons in the snow bound area. Gender roles in NTFPs harvesting, processing and marketing and forest management in the proposed project areas are studied through field visits and findings are reported in **Part II, section 2.7.4**.

#### 3.3.6 Rural Development

The Department of Rural Development (DRD), HP state is the nodal agency for planning and execution of the related activities. Under DRD, 12 District Rural Development Agency (DRDA) and 78 Community Development Blocks are established as the field units below DRDA. After the effectuation of the Panchayat Raj (Extension to Scheduled Areas) Act of 1996, panchayats have also been established in the 5<sup>th</sup> Scheduled areas (whole district of Kinnaur and Lahaul-Spiti, Pangi Tehsil and Bharmour sub-tehsil in district). Rural development interventions are funded by the central government as well as the state government. Major interventions undertaken by DRD are given in **Table 3.3.14**. National rural Livelihood Mission in succession of Swarnjayanti Gram Swarozgar Yojana (SGSY) has also been launched in the state, which details are covered in **Part I, Section 4.11.4**. DRD also implements programmes for watershed management, wasteland management, desert areas and drought prone areas.

**Table 3.3.14 Rural Development Schemes/ Programmes**

Scheme/ Programme		Areas of intervention	Description
Central Government Scheme/ Programme	National Rural Livelihood Mission	Poverty alleviation/ livelihood improvement	Livelihood improvement of the rural households. The detail is found in <b>Part I, Section 4.11.4</b> .
	Deen Dyal Upadhaya-Gramin Kaushal Yojna	Skills development	To provide skills development opportunities for the economically marginalised rural households and youth so that they can access alternative means of livelihoods.
	Pradhan Mantri Awaas Yojana Gramin	Rural Housing	Provide permanent structured house to all houseless households and households living in the houses of the temporary structure by 2022.
	Matri Shakti Bima Yojana	Insurance	Life and medical insurance for all BPL women
	Swachh Bharat Mission	Sanitation	Provides assistance for BPL and APL families to construct latrines at home.
State Government Scheme/ Programme	Maharishi Valmiki Sampooran Swachhata Puruskar	Sanitation	Annual reward to the cleanest Panchayat
	School Sanitation Reward Scheme	School sanitation	Started in 2008-2009. Rewards for the cleanest government primary and middle schools at district and block level.
	Mahila Mandal Protsahan Yojna	Sanitation	6 Mahila Mandal will be selected at the block level and receive the reward for awareness creation on the sanitation.
	Mukhya Mantri Awaas Yojana	Housing	Financial assistance for the BPL families of general category.
	Rajive Awaas Repair Yojana	Housing	Financial assistance for house repair for the general category BPL
	Saansad Adrash Gram Yojana	Integrated development	Improve living standard of all communities
	Mahatma Gandhi National Rural Employment Guarantee Scheme	Rural Employment	Creating work opportunities for rural households. INR 3,585.9 million were utilised and created 16 million work days to the 431,933 households in FY 2016-17.

Source: Economic Survey of Himachal Pradesh 2016-17. Economics & Statistics Department.

The Scheduled Tribes Development Department of HP state prepares plans and implements the developmental activities for STs. The implementation of the interventions targeting tribal areas is based on the Integrated Tribal Development Programme (ITDP) unit, which boundary now coincides with the Block boundaries of DRD. Under the 12<sup>th</sup> Five Year Plan (2012-2017), 20.5 billion INR has been allocated for Tribal Sub Plan for 2012-2017. The recent trend indicates the dispersed tribal population in the non-tribal areas. The approved outlay for the 2016-17 was 4.7 billion INR in total comprising of 2.7 billion INR for the economic services, 1.5 billion INR for social services, 210 million INR for Border Area Development Programme and the rest is for general services (Tribal Sub-Plan 2016-17, Tribal Development Department).

### 3.3.7 Financial Inclusion

#### (1) Overview

According to the Census of India, 89.2% of rural households and 89.2% of the urban households have access to banking services. NABARD State Focus Paper 2015-16 reported that the state has achieved the 100% financial inclusion in 2007 whereas the credit was extended to the limited extent. So far, financial services are made available to the 12,315 villages were covered out of the

20,016<sup>14</sup> unbanked villages (ditto). There are different types of financial service providers available including commercial banks and cooperative banks. In total, 2,150 banks/ societies exist in the state with 1,925 branches. The non-formal groups dealing with credit and savings such as SHGs/ JLGs, Business Correspondents and Business facilitators also play an important role in enhanced outreach of the financial services to the rural areas. The number of SHGs/ JLFs are reported to be 54,510 and Business Correspondents and Business Fascinators are said to be 12,135 persons (ditto).

## (2) Microfinance in HP State

The Self-Help Groups (SHGs), which are small groups of 10 to 20 members, are the dominant channel of microfinance in India (See **Box 1**). In HP state, the SHG movement had spread across the state with a firm base. The movement has been upscaled with support in the human resources and financial products. Under the Microfinance schemes, SHG-Bank Linkage programme has started in 1992. The SHG-bank linkage programme has targeted to reach the poorest sections, which are bypassed by the formal banking system. Nevertheless, the current situation in the state is far from its fruition. As shown in **Table 3.3.15**, as on March 2017, there were total 45,735 SHGs covering 650,000 households (against a total of 1.3 million households), with total savings of 506 million INR (an average of INR 11,000 per group).

**Table 3.3.15 Progress under Microfinance in HP State**

(Unit: thousand INR)

Banks	Saving of SHG with Bank as on March 2017			Cumulative Bank loan outstanding (O/S) as of March 2017		
	No. of SHG	Saving amount	Av. saving/ group	No. of SHG	Loans O/S amount	Av. loan O/S/group
Commercial bank	16,913	163,518	9.67	4,217	376,942	89.39
Regional Bank	9,941	160,000	16.09	7,464	333,000	44.61
Cooperative bank	18,881	182,639	9.67	4,805	394,210	82.04
Total in HP	45,735	506,157	11.07	16,486	1,104,152	66.98

Source: NABARD "Status of Microfinance in India 2016-17"

During 2016-17, only 8.12% of the total SHGs in the state had used bank credit facility, representing only 3,715 borrowing groups. Meanwhile, 36% of SHGs had loans in outstanding during the same time period. Cumulatively, 16,486 SHGs had around INR 67,000 loan outstanding per group, of which 14.72% has been rendered net NPA by Commercial, Regional Rural, and Cooperative banks. While the above statistics highlight the scope of Microfinance (credit) penetration in the state, it also brings to the fore the pressing concerns around the quality of assets, SHG's repaying capacity and willingness toward credit-based interventions. Credit linkages without capacity assistance and commercial avenues to earn more and pay more induce defaulter SHGs, while manpower limitations for the banking sector, strips SHG BLP of its lucrative business proposition, if any.

Furthermore, NABARD also identified some potential factors for the limited extension of

<sup>14</sup> The number of unbanked villages exceeds the inhabited villages in the state, which is 17,882 villages as reported in Census of India 2011.

microfinance in the state. Those included, the high transaction cost due to the low population density, less requirement for micro finance as BPL ration is significantly low in comparison to other states in India, and many options for agriculture credits as agriculture being one of the main economic sector in the state<sup>15</sup>.

Detailed situational analysis on the Microfinance programmes and SHG promotion in the study area is dealt with in **Part I, Section 4.11.4**.

### **Box.1 What is a Self Help Group (SHG)?**

Self Help Groups (SHGs) are a homogenous group of 10-20 individuals who come together for saving and internally helping each other in times of need. SHGs promote small savings among their members. The SHG gives small loans to its members from its common fund. After six months, if the SHG satisfies the bank as per the check list for quality, bank can give loans to the SHG.

#### **【Size of the SHG】**

The ideal size of an SHG is 10 to 20 members. In a bigger group, members cannot actively participate. Also, legally it is required that an informal group should not be of more than 20 people. The group need not be registered.

#### **【Membership】**

From one family, only one person can become a member of an SHG. The group normally consists of either only men or of only women. Mixed groups are generally not preferred. Women's groups are generally found to perform better as they are better in savings and they usually ensure proper use of loans. Members should have the same social and financial background. This makes it easier for the members to interact freely with each other. If members are both from rich as well as poor class, the poor may hardly get an opportunity to express themselves.

#### **【Meetings】**

The group should meet regularly. Ideally, the meetings should be weekly or at least monthly. This helps them to understand each other's difficulties. Membership register, minutes register etc., are to be kept up to date by the group by making the entries regularly.

#### **【Major Functions of an SHG】**

##### **Savings and Thrift**

All SHG members regularly save a small amount. The amount may be small, but savings have to be a regular and continuous habit with all the members. The savings are kept with the bank. This is the common fund in the name of the SHG. "Savings first — Credit later" should be the motto of every SHG member. The members learn financial discipline through savings and internal lending.

##### **Internal lending**

The SHG should use its savings amount for giving loans to members. Purpose, amount, rate of interest, schedule of repayment etc., are to be decided by the group itself. Proper accounts to be kept by the SHG.

##### **Taking bank loan**

The SHG takes loan from the bank and gives it as loan to its members. Normally it happens after the repetition of saving and inter-lending for 6 months. The loan is sanctioned and issued in the name of the group. The amount of loan is set 1 to 4 times of its saving, while the repayment is made in installment based on the repayment schedule drawn by the bank.

##### **Discussing problems**

In every meeting, the SHG discusses and try to find solutions to the problems faced by the members. Individually, the poor people are weak and lack resources to solve their problems. When the group tries to help its members, it becomes easier for them to face the difficulties and come up with solutions.

*Source: Compiled by JICA Study Team (2017) based on the Bankers Institute of Rural Development (BIRD) E-Learning Site (<http://elearning.birdlucknow.in/Books/Self%20Help%20Groups/Book.aspx?bk=5#C4> accessed on August 2017).*

### **(3) Financial Inclusion in HP State**

Financial inclusion is the delivery of financial services and products at an affordable cost to all the section of society and vulnerable or disadvantaged segments in fair and transparent manner.

<sup>15</sup> Based on interaction with NABARD Deputy Director, Himachal Pradesh

GoI constituted Financial Inclusion Fund (FIF) to provide impetus to financial inclusion initiate in the country in 2005. HP state has become a first state that achieved 100% financial inclusion in 2007 although the state is yet to achieve 100% credit inclusion. Other than the low density of population (6.5 million people), introducing the concept of “no-frills account” that requires minimum formalities and amounts to open a bank account attributed to fast achievement of 100% inclusion. **Table 3.3.16** below gives the district-wise reach of bank institutions in the state.

**Table 3.3.16 Reach of Banking Institutions in HP State, as on 31<sup>st</sup> March, 2017**

No.	District	Number of Bank Branches					ATMs	Lead Bank
		Public	Regional	Private	Cooperative	Total		
1	Bilaspur	70	14	3	33	120	112	UCO
2	Chamba	42	38	5	22	107	69	SBI
3	Hamirpur	92	24	6	47	169	161	PNB
4	Kangra	221	51	21	120	413	364	PNB
5	Kinnour	28	3	1	17	49	50	PNB
6	Kullu	70	19	10	30	129	131	PNB
7	Lahaul & Spiti	15	2	0	7	24	16	SBI
8	Mandi	123	54	8	53	238	219	PNB
9	Shimla	201	26	31	74	332	330	UCO
10	Sirmour	86	9	11	32	138	121	UCO
11	Solan	168	12	22	36	238	320	UCO
12	Una	97	11	9	36	153	143	PNB
	H.P.	1213	263	127	507	2110	2027	

Source: State Level Banker's Committee, HP - Agenda Papers for 144 Quarterly Review Meeting – for quarter ended 31<sup>st</sup> March 2017, available at: <http://www.slbcnp.com/slbc%20meeting.html>

On the basis of Reserve Bank of India (RBI), a “road map” for covering all the unbanked villages with population below 2,000, total 18,948 out of 20,060 unbanked village were covered by banks though opening Brick and Mortar branch and Business Correspondents outlets by September 2016.

#### (4) Government Programme on Financial Inclusion

GOI launched a comprehensive financial inclusion campaign called “Pradhan Mantri Jan Dhan Yojana (PMJDY) in August 2014 to cover the excluded section of society throughout the country. In the first phase of this scheme, at least One Basic Saving Deposit Account (OBSDA) opened for each household in the State. As a part of financial inclusion programmes, it was extended to other financial services and products such as insurance and pension by implementation of the government programmes as explained in the **Table 3.3.17** below.

**Table 3.3.17 Financial Inclusion Programmes by Government**

Programme	Service	Condition	Progress in HP to date
Pradhan Mantri Jan Dhan Yojana (PMJDY) (Aug 2014-)	<b>Saving:</b> opening of Basic Saving Bank Deposit Account (BSBDA)	excluded section of the society all the households with at least one	989,817 BSBDA accounts 844,968 BSBDA account holders accessed to “RuPay” debits card* *inbuilt accidental insurance cover of INR. 100,000 (Sep 2016)
Pradhan Mantri Suraksha Bima Yojana (PMSBY) (May 2015 -)	<b>Insurance (accidental death):</b> Renewable one year accidental death cum special ability cover of INR. 20,000	All saving bank account (SBA) holders in the age of 18 to 70 years A premium of INR.12 per year per subscriber.	891,208 subscribers enrolled under this scheme (Sep 2016)

Programme	Service	Condition	Progress in HP to date
Pradhan Mantri Jeevan Jyoto Bima Yojana (PMJJBY) (May 2015 -)	<b>Life Insurance:</b> Renewable one year life insurance of INR. 200,000 covering death due to any reason for. Banks have already enrolled 276,264 subscribers under this scheme	All SBA holders in the age of 18 to 70 years A premium of INR.300 per annum per subscriber	Banks enrolled 276,264 subscribers (Sep 2016)
Atal Pension Yojana (APY)	<b>Pension:</b> 1/ A fixed min. pension (INR 1,000 to 5,000)/month starting at 60 years. 2/ In HP, Banks provide INR 1,000/year for 3 years.	For 1/ Unorganised sector Subscribed for 20 years (enrolment age is between 18 and 40) For 2/ Joined APY in 2015/6/	30,997 subscribers (Sep 2016)

Source: Economic Survey 2016-17, Economics and Statistics Department, Himachal Pradesh

In addition to the above, MGNREGS and Aadhaar, which are not exclusively intended for financial inclusion but as a result, have made significant impacts in advancing financial inclusion in the country.

i) MGNREGS

MGNREGS is a national job guarantee scheme enacted in 2005 and designed to provide legal employment of 100 days of manual labour per financial year specifically to adult members of a registered household. As per the Government mandate, wages were required to be remitted through bank or post office accounts, which required the opening of bank accounts to all the registered adult individuals for MGNREGS. This scheme has been regarded as a major driving force for financial inclusion in rural India.

ii) Aadhaar

Aadhaar (literally means “basis”), the unique identification number is being used as a platform to link increasing number of people into the mainstream banking system. Through the payment systems offered by the National Payment Corporation of India, direct remittance can be made into the beneficiary account linked to his/her aadhaar number. Further, it enables the Direct Benefits Transfers such as transfer of Government subsidies such under MGNREGS, LPG subsidy etc. Through Aadhaar Seeding programme on Core Banking System (CBS), banks organise village level camps for capturing Aadhaar details for beneficiary databases and account linkages. These camps also provide as an opportunity to create awareness amongst the rural population on other financial services offered by the government and other schemes related to credits and insurance.

### 3.3.8 Household Amenities

#### (1) Energies used by Household

As for the majority of households, fuelwood continues to be the main source of energy for cooking. According to the Census 2011 data, diversification of cooking energy sources seems to have been advanced in the districts other than Chamba and Bilaspur. In Kullu, Shimla and Kinnaur, more than 70% of the households use LPG/ PNG. Other energy sources like crop residue, cow dung cake, and kerosene are used by less than 2% of the households in the state.

**Table 3.3.18 Sources of Energy for Cooking**

District	Total No of HH (No.)	Fuelwood (%)	LPG/ PNG (%)	Crop Residue (%)	Cow Dung Cake (%)	Kerosene (%)
Chamba	26,236	84.8	13.6	0.5	0.1	0.9
Kangra	19,935	64.4	34.1	0.4	0.1	0.8
Lahul & Spiti	5,291	57.8	27.5	0.5	13.7	0.4
Kullu	4,720	18.1	77.1	0.1	0	4
Mandi	4,286	70.1	25.2	2.1	0.1	1.8
Hamirpur	1,655	61.3	34.6	1.9	0.5	1.1
Una	2,587	70.9	24.5	3.1	0.2	1
Bilaspur	2,712	80.9	13.4	4.4	0.2	0.4
Solan	6,881	39.7	49.5	2.7	0.1	5.9
Sirmaur	2,886	64	25.6	3.5	0.4	1.8
Shimla	4,018	24.4	65.2	3.1	-	5.8
Kinnaur	10,810	31.2	62.8	3.4	0.1	1.4
Himachal Pradesh	92,017	60.8	34.4	1.5	0.9	1.7

Source: Compiled by JICA Study Team (2017) based on Census 2011 data.

As of 30<sup>th</sup> June 2017, out of 17,882 inhabited villages, only 35 villages remain without electricity and out of the 146,500 rural households, 144,500 have access to electricity<sup>16</sup>. Further, since 2016, the GoI has launched *Pradhan Mantri Ujjwala Yojana* to avail LPG connection to BPL households.

## (2) Sources of Drinking Water

Majority of the households have access to the safe drinking water from the treated water source through tap connection. Mandi district indicated 90.6% of the tap water connection from the treated water sources followed by Kinnaur (88.5%) and Kullu (87.7%). Amongst the districts, Sirmaur district indicated 58.9% which is the lowest accessibility to the tap water connection from the treated water source and 16.4% of the households collect water from the Handpump. There were other water sources like spring, river, covered/ uncovered wells, however, only the very small proportion of households are dependent on such water sources.

**Table 3.3.19 Sources of Drinking Water**

Unit:% otherwise noted.

District	Total No of HH	Tap water from treated source	Tap water from un-treated source	Handpump	Tube well/ Borehole
Chamba	26,236	85.2	10.3	0.2	0
Kangra	19,935	85.6	3.7	3.9	0.8
Lahul & Spiti	5,291	71.4	20.2	5.2	0
Kullu	4,720	87.7	5.4	3.7	0.8
Mandi	4,286	90.6	4	0.7	0.1
Hamirpur	1,655	85.6	5.8	3.4	0.3
Una	2,587	79.3	6.6	8.5	1.5
Bilaspur	2,712	73.7	6.3	4	1.3
Solan	6,881	84	3.3	2	4
Sirmaur	2,886	58.9	6.9	16.4	2.2
Shimla	4,018	85.2	6.3	0.1	0
Kinnaur	10,810	88.5	6.2	0	0.2
Himachal Pradesh	92,017	83.9	7.3	2.5	0.7

Source: Compiled by JICA Study Team (2017) based on Census 2011 data.

<sup>16</sup> Source: <http://www.ddugiy.gov.in/mis/portal/index.jsp> (accessed on 16th July 2017)



### (3) Means of Communication

In the state, 61.5% of the households have mobile phone only and 7.4% of the households have the landline only. Computer/ laptop with or without internet connection is yet to become a common household asset. Only 2.8% of the households own computer/ laptop with internet connection and 5.6% owns one without internet connection. As many of the government transactions are now done through internet, small kiosk, where the internet, computer and typing facilities are available, are found in small towns in the state. Such places will provide the service with a minimal charge.

**Table 3.3.20 Access to Internet/ Mobile Phones**

Unit: % otherwise noted.

District	Total No of HH	Computer/ Laptop with Internet	Computer/ Laptop Without Internet	Landline only	Mobile only	Both%
Chamba	101,972	1.6	3.4	2.3	63.6	6.7
Kangra	336,407	2.4	4.4	8.3	60.4	12.8
Lahul & Spiti	6,695	0.9	2.9	6.8	46.3	21.6
Kullu	95,545	2.7	4.6	2.4	71.3	9.5
Mandi	219,994	2.4	5.0	9.7	54.3	14.2
Hamirpur	105,068	2.4	4.8	16.0	51.3	18.6
Una	109,699	2.2	5.3	7.1	64.0	11.6
Bilaspur	80,453	2.0	5.9	9.5	58.4	15.3
Solan	123,353	4.3	7.5	8.2	62.0	17.9
Sirmaur	97,090	2.3	6.6	5.4	64.3	8.0
Shimla	180,770	5.1	8.3	3.8	69.6	16.0
Kinnaur	19,535	1.8	11.3	4.7	66.0	13.6
Himachal Pradesh	1,476,581	2.8	5.6	7.4	61.5	13.4

Source: Compiled by JICA Study Team (2017) based on Census 2011 data.

### 3.3.9 Major Infrastructure: Electricity, Road Network and Transportation

#### (1) Electricity

The total installed electricity generation capacity in HP is ranging from 467 to 487.6 MW during the last 10 years as indicated in **Table 3.3.21**. In HP, power generation heavily relies on hydropower.

**Table 3.3.21 Installed Power Generation Capacity in HP State**

Year	Hydropower Installed Capacity (MW)	Thermal Power Installed Capacity (MW)	Total Installed Capacity (MW)
2005-06	328.950	0.133	329.083
2006-07	466.950	0.133	467.083
2007-08	466.950	0.133	467.083
2008-09	466.950	0.133	467.083
2009-10	466.950	0.133	467.083
2010-11	466.950	0.133	467.083
2011-12	471.450	0.133	471.583
2012-13	471.450	0.133	471.583
2013-14	477.450	0.133	477.583
2014-15	487.450	0.133	487.583
2015-16	487.450	0.133	487.583

Source: Statistical Yearbook of HP 2015-16; Department of Economics and Statistics

In HP state, nearly all of villages have connection to the electricity grid and electrified (**Table 3.3.22**). Even in villages in Kinnaur, and Lahul & Spiti districts, which are less populated areas, have more than 97.5% electrification rate.

**Table 3.3.22 Number of Villages Electrified in HP State**

Year/District	Total no. of inhabited villages-2011 Census	Number of villages electrified		Percentage of villages electrified
		During the year	Up to the end of the year	
2014-15	17,882	0	1,7827	99.69
2015-16	17,882	9	1,7836	99.74
District- wise:				
1. Bilaspur	953	0	953	100.00
2. Chamba	1,110	0	1,102	99.28
3. Hamirpur	1,671	0	1,671	100.00
4. Kangra	3,617	0	3,616	99.97
5. Kinnaur	241	1	235	97.51
6. Kullu	314	1	311	99.04
7. Lahaul-spiti	280	0	277	98.93
8. Mandi	2,850	2	2,842	99.72
9. Shimla	2,705	5	2,689	99.41
10. Sirmaur	968	0	968	100.00
11. Solan	2,383	0	2,383	100.00
12. Una	790	0	789	99.87

Source: Statistical Abstract of HP 2015-16; Department of Economics and Statistics

Another feature of HP in relation to electricity is that a bulk of electricity are supplied from outside of the state to meet the consumption within the state but at the same time sold outside of the state (**Table 3.3.23**).

**Table 3.3.23 Electricity Supply and Consumption in HP State**

Year	Supply		Consumption		
	Total Generation in State (MU)	Purchased from Outside (MU)	Sold Outside State (MU)	Consumed in State (MU)	Total Consumed /Sold (MU)
2013-14	1,947	8,679	2,000	7,555	9,555
2014-15	2,097	9,981	2,940	7,867	10,806
2015-16	1,573	11,169	3,523	7,951	11,474

Note: MU=million unit

Source: Statistical Yearbook of HP 2015-16; Department of Economics and Statistics

## (2) Roads

Roads are an essential infrastructure of economy. In the absence of any other suitable and viable modes of transportation like railways and waterways, roads play a vital role in boosting the economy of the hilly state like HP Starting almost from a scratch the state Government has constructed 35,356 km of motorable roads inclusive of jeep able and track till December, 2014. The road length was further increased to 35,583 km by the end of 2014-15. By the end of 2015-16 the total road length in the State was increased to 36,049 km. This road length comprised of all types of roads i.e. motorable double lane (2,416 km), motorable single lane (31,953 km), jeepable (284 km) and less than jeepable (1,396 km).<sup>17</sup>

<sup>17</sup>Economic survey of H.P. 2014-15

**Table 3.3.24 District-wise Road Length in HP State**

Unit: km

Year/District	Total Road Length	Motorable double lane	Motorable single lane	Jeepable	Less than Jeep able
2014-15	35,583	2,416	31,499	272	1,396
2015-16	36,049	2,416	31,953	284	1,396
District-wise:					
1. Bilaspur	1,701	128	1,567	0	6
2. Chamba	3,257	114	2,247	251	645
3. Hamirpur	1,893	66	1,827	0	0
4. Kangra	5,951	468	5,478	1	4
5. Kinnaur	1,060	177	641	17	225
6. Kullu	1,907	128	1,747	2	30
7. Lahaul-Spiti	1,256	260	984	2	10
8. Mandi	5,667	191	5,089	7	380
9. Shimla	5,405	339	5,059	2	5
10. Sirmaur	3,062	216	2,795	1	50
11. Solan	2,961	173	2,746	1	41
12. Una	1,929	156	1,773	0	0

Source: Public Works Department, HP, Statistical Abstract of HP 2015-16; Department of Economics and Statistics

Travel and transportation comparisons for various destinations within the state have been made. Travel comparison from Shimla to major locations within HP is described in **Table 3.3.25** and more extensive comparison from Shimla/ Kullu/ Rampur and other destinations within HP is listed in **Attachment I.3.3.5**. The data has been collected from various sources of information. Maps used by tourism department and other online sources have been made use of for distance calculation from one destination to another. Time for travelling from one destination to another was discussed with various transport agencies working in the state. Himachal Pradesh Road Transport Corporation (HRTC) personnel and representatives of taxi union were asked to share information regarding travel time in the hilly regions and time taken during different seasons of the year.

**Table 3.3.25 Travel Comparison from Shimla to Major Destinations in HP State**

Start	Destination	Distance (km)	Transportation Method	Possible Major Routes	Indicative Travel Time (hr)	Accessible Months
Shimla	Kullu	208	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Barmana, Sundernagar, Ner Chowk, Mandi, Bajaura and Bhuntar	6 - 9 hrs	Throughout the year
Shimla	Rampur	129	Car/Bus	Dhalli, Kufri, Theog, Matiana, Narkanda, Keengal, Rampur	4-5 hrs	In winters closed occasionally
Shimla	Kilar (Pangi, Chamba)	495	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Ghumarwani, Bhot, Nadaun Jwalamukhi, Ranital, Nurpur, Dunera, Dalhousie, Surangani, Paddar, Killar	18-21 hrs	March to November when snow melts
Shimla	Brahmaur (Chamba)	400	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Ghumarwani, Bhot, Nadaun Jwalamukhi, Ranital, Nurpur, Makwal, Chowari, Chamba, Dharwala, Lahal, Bharmour	13-16 hrs	March to November when snow melts
Shimla	Bilaspur	86	Car/Bus	Ghanatti, Dhami, Namoli, Ghanahatti, Namhol, Brahmukhar, Nauni	3-5 hrs	Throughout the year
Shimla	Reckong Peo,	244	Car/Bus	Mashobra, Kufri, Theog, Matiana,	10-12 hrs	February to

Start	Destination	Distance (km)	Transportation Method	Possible Major Routes	Indicative Travel Time (hr)	Accessible Months
	Kinnaur			Narkanda, Kotgarh, Rampur Bushair, Sarahan, Sungra, Tapri, Reckong Peo		October end
Shimla	Keylong, Lahul	363	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Barmana, Sundernagar, Ner Chowk, Mandi, Bajaura, Bhuntar, Kullu, Raison, Patlikul, Manali, Vaishist, Marhi, Rohtang, Khoksar, Sissu, Shipting, Tandi, Keylong	12-15 hrs	February to October end
Shimla	Kaja, Spiti	427	Car/Bus	Dhalli, Kufri, Theog, Matiana, Narkanda, Keengal, Rampur, Jhakri, Jeori, Sungra, Tapri, Kalpa, Ribba, Moorang, Spillo, Pooh, Nako, Chango, Sumdhu, Lapcha, Tabo, Siluk, Dhankar, Kaza	15-20 hrs	February to October end

Source: Compiled by JICA Study Team (2017) based on i) interviews with relevant stakeholders for travel time and accessible months, and ii) routes and distance as per the following website:  
<https://www.google.co.in/maps/dir/Rampur+Bushair,+Himachal+Pradesh/Bharmourwww.distancecalculator.globefeed.com/India> (page visited on 15/07/2017)

National Highways (NH) is of 1,234 km in road length and eight in numbers pass through this State. Shahpur is touched with NH-1A. NH-20 connects Pathankot, Nurpur, and Mandi. NH-21 passes through Chandigarh to Manali via Mandi. Ambala and Kaurik is connected through Shimla, Kalka and Wangtoo with NH-22. Mubarakpur, Ambala and Hamirpur are connected by NH-70. NH-21A, starting from Pinjore, Haryana, reaches Swarghat via Nalagarh and then merged to NH-21. Shimla to Kangra through Hamirpur is connected with NH-88. Starting from Ambala, NH-72 goes via Paonta Sahib in Himachal and terminated at Haridwar, Uttarakhand.<sup>18</sup> HP has also a huge network of village roads and highways along with national highways. HRTC, a Government under taking, operates buses network not even to all routes of the state but to other states also. Snowfall, washouts and landslides block the village roads during monsoon and winter seasons and are called seasonal roads. For example, the road from Manali to Leh is almost closed during winter season. Deluxe buses, high-tech. buses, luxury coach buses and ordinary buses are four types of bus services which are being operated by HRTC. Manali and Shimla cities have large bus agencies for private bus services. HP has also got other hired modes of transport. The travelling agencies and car rental services provide taxis, cabs, cars and jeeps to hire at/ from the cities.<sup>19</sup>

### (3) Railway

Railways in HP have a small and limited network due to difficult mountain terrain. Two railway tracks of narrow gauge are functional; one is from Kalka to Shimla which has a length of around 96 kms. This railway line is more than 150 years old with 102 tunnels and 864 bridges. The second narrow gauge line is functional from the Kangra Valley Railway lies in the sub-Himalayan region of Kangra Valley and covers a distance of 164 km from, Punjab to Jogindernagar in HP, India. The Kangra valley railway comes under the Ferozpur division of

<sup>18</sup><https://vahan.hp.nic.in/srsvservices/vahan/gui/jsp/organisationChart.jsp> (page visited on 15/07/2017)

<sup>19</sup><http://www.discoveredindia.com/himachal-pradesh/transportation-in-himachal-pradesh/> (page visited on 15/07/2017)

Northern Railway. The highest point on this line is at Ahju station at an elevation of 1,290 meters (4,230 ft).<sup>20</sup> Nangal Dam in Punjab to Una in Himachal is a broad-gauge line. This line is further being extended with operational track till Churu Takarla. Himachal Express and Jan Shatabdi connect Delhi to Una.

#### (4) Air Flight

HP has three airports, Gaggal airport at Kangra, Jubbarhatti airport at Shimla and Bhuntar airport at Kullu. Severe weather situations during winters create problems during landing/take off. All the three airports are operated in seasons only when weather is clear. Due to short runway length, big aircrafts are not operated in these airports.<sup>21</sup>

A number of helipads are present in the state which is used from time to time. In tribal areas, these helipads are generally used during emergency for evacuation of patients etc.

HP State Disaster Management Authority provides a list of helipads which can be used in case of emergency in the state.

**Table 3.3.26 Number of Helipads in Different Districts of HP State**

No.	District	Number of Helipads
1	Bilaspur	16
2	Chamba	10
3	Hamirpur	11
4	Kangra	14
5	Kinnaur	11
6	Kullu	04
7	Lahaul&Spiti	13
8	Mandi	19
9	Solan	17
10	Una	12
11	Sirmaur	10
12	Shimla	09
Total	HP	146

Source: <http://www.hpsdma.nic.in/ResourceList/Helipads.html> (page visited on 15/07/2017)

### 3.3.10 Security Situations and Areas Required for Protected Area Permit (PAP) and Inner Line Permit

#### (1) Security Situation

As per the National Crime Record Bureau (NCRB), Ministry of Home Affairs, GoI, number of civilians killed/injured due to terrorist/militants, left wing Extremism, bomb explosion, riots, border cross fire, cross fire during police operations during 2015 in the state of HP was nill. The state wise details of the civilians killed/injured due to above mentioned reasons during 2015 are illustrated in **Attachment I.3.3.6**.

The distribution of other crimes in HP state for 2014-15 and 2015-16 is summarised in **Table 3.3.27**.

<sup>20</sup>[https://en.wikipedia.org/wiki/Kangra\\_Valley\\_Railway](https://en.wikipedia.org/wiki/Kangra_Valley_Railway) (page visited on 15/07/2017)

<sup>21</sup><http://www.hpsdma.nic.in/ResourceList/Helipads/Others.html> (page visited on 15/07/2017)

<http://www.hpsdma.nic.in/ResourceList/Helipads/HelipadCoordinates.pdf> (page visited on 15/07/2017)

**Table 3.3.27 Crimes in HP State (2014-15 and 2015-16)**

Crimes	2014-15	2015-16
1. Offences against State& public		
(a) Reported	506	413
(b) Convicted	20	14
2. Murder:		
(a) Reported	134	104
(b) Convicted	22	21
3. Other serious offences:		
(a) Reported	3,410	3,006
(b) Convicted	183	203
4. Dacoity:		
(a) Reported	2	2
(b) Convicted	0	1
5. Cattle theft:		
(a) Reported	22	12
(b) Convicted	4	1
6. Property theft		
(a) Reported	1,562	1,398
(b) Convicted	96	100
7. Ordinary theft		
(a) Reported	587	511
(b) Convicted	49	35
8. House trespass:		
(a) Reported	808	709
(b) Convicted	36	48

Source: Statistical Abstract of HP 2015-16; Department of Economics and Statistics

## (2) Protected Area Permit (PAP)/ Inner Line Permit

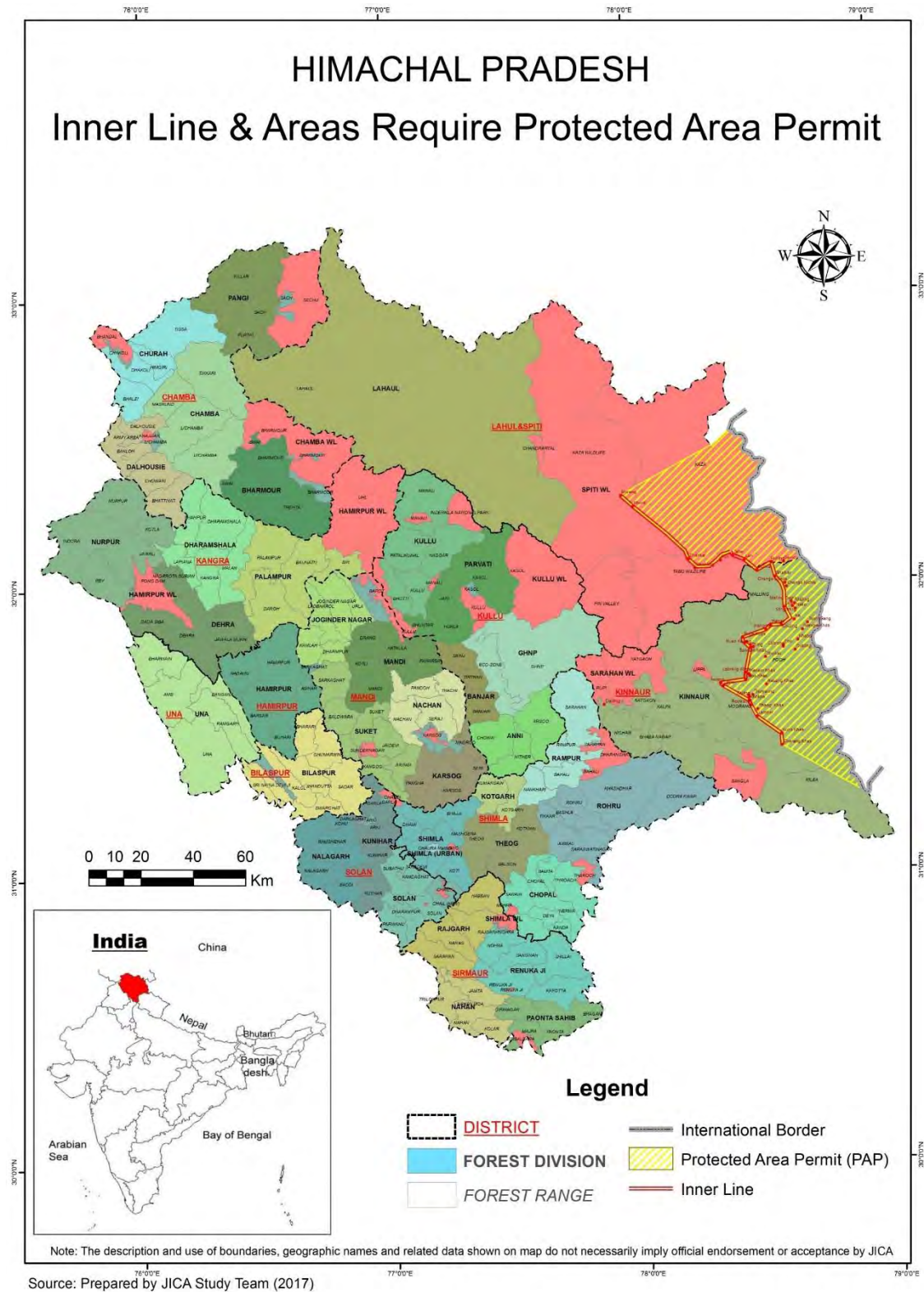
Protected area means any border areas falling beyond the “inner line” towards the international border. Under the Foreigners (Protected Areas) Order, 1958, part of HP falling between the ‘inner line’ and the international border of the state has been declared as a ‘Protected Area’. No foreigner shall enter into or remain in any protected areas except under and in accordance with the permit issued by the central government or any official authorised by the central government. Foreigners intending to visit protected areas as tourists in group consisting of four or more foreigners, duly sponsored by the recognised travel agencies in India and having a pre-drawn itinerary, can be allowed to visit the places listed in **Table 3.3.28** for 30 days after obtaining a Protected Area Permit from the HP state government.

**Table 3.3.28 List of Areas in HP State where PAP is Mandatory Required**

District	Block/Sub-division	Place Names			
Kinnaur	Pooh Block	1- Sumra	13- Dabbling	25- Labrang Khas	36- Thangi
		2- Shalkhar	14- Pooh	26- Ropa	37- Lamber
		3- Chango	15- Labrang	27- Rush Kulang	38- Cherang
		4- Nako	16- Namgia	28- Nasang	39- Kunu/Kuno
		5- Malling	17- Khab	29- Spilloo	40- Lippa/Lapo
		6- Malling Dogri	18- Tashi Gang	30- Morang	41- Asrang
		7- Yang Thang	19- Dubling	31- Gramang	
		8- Kaa	20- Shayaso	32- Thuwaring	
		9- Leo	21- Sunam	33- Khopa/ Khokpa	
		10- Hango	22- Giabong	34- Shilling	
		11- Chuling	23- Taling	35- Roowang	
		12- Hangmat	24- Kanam		
Lahaul & Spiti	Spiti Sub Division	1- Dhankar	4- Tabo	7- Gue	
		2- Shichling	5- Hurling	8- Samdo	
		3- Poh	6- Gue	9- Korik/Kaurik	

Source: Compiled by JICA Study Team (2017) based on Revised Chapter 17-Restricted and Protected Areas Special Permits, Visa Manual

The indicative PAP areas in HP is presented in **Figure 3.3.1**. Also, conditions and procedures for obtaining PAP are described in **Attachment I.3.3.7**.



**Figure 3.3.1 Protected Area Permit (PAP) Areas in HP State**

### 3.4 Natural Conditions

#### 3.4.1 Zoning

Various zoning classifications relevant to HP exist. Hereunder described the major zoning classifications recognised by HPFD.

##### (1) Bio-Geographic Regions

Bio-geographic classification of India was done by Rodgers and Panwar (1988)<sup>22</sup>, using various factors such as altitude, moisture, soil, topography, rainfall, etc. It was further revised and 10 biogeographic zones (regions) and 26 biogeographic provinces were identified<sup>23</sup>. According to HPFD, bio-geographic zones were often used as a basis for planning wildlife protected areas in India. **Table 3.4.1** describes 10 bio-geographic zones and 26 bio-geographic provinces in India.

**Table 3.4.1 Bio-geographic Zones and Provinces**

Bio-geographic Zones (Regions)	Bio-geographic Provinces
Trans Himalaya	<b>1A: Himalaya- Ladakh Mountains</b> 1B: Himalaya-Tibetan Plateau
Himalaya	<b>2A: Himalaya- North West Himalaya</b> <b>2B: Himalaya- West Himalaya</b> 2C: Himalaya- Central Himalaya 2D: Himalaya- East Himalaya
Indian Desert	3A: Desert-Thar 3B: Desert-Katchchh
Semi-Arid	<b>4A: Semi-arid – Punjab Plains (Shivalik)</b> 4B: Semi-Arid- Gujarat Rajputana
Western Ghats	5A: Western Ghats- Malabar Plains 5B: Western Ghats- Western Ghats Mountains
Deccan Plateau	6A: Deccan Peninsular-Central Highlands 6B: Deccan Peninsular- Chotta Nagpur 6C: Deccan Peninsular- Eastern Highland 6D: Deccan Peninsular- Central Plateau 6E: Deccan Peninsular- Deccan South
Gangetic Plains	7A: Gangetic Plain- Upper Gangetic Plains 7B: Gangetic Plain- Lower Gangetic Plains
Coasts	8A: Coasts-West Coast 8B: Coasts- East Coast 8C: Coasts-Lakshadweep
North-East	9A: North-East- East- Brahmaputra Valley 9B: North-East-North East Hills
Islands	10A: Islands-Andaman 10B: Islands-Nicobar

Source: Compiled by JICA Study Team (2017), based on information from HPFD, and W.A.Rodgers, H.S.Panwar and V.B.Mathur 2002

In HP, four of the 26 bio-geographic provinces are represented. These four zones are:

- ◆ Zone 1: The Trans-Himalaya: The area of Lahaul & Spiti district
- ◆ Zone 2A: The North-west Himalaya: The area on north of the Satluj River. It is characterised by a more ‘Mediterranean’ climate

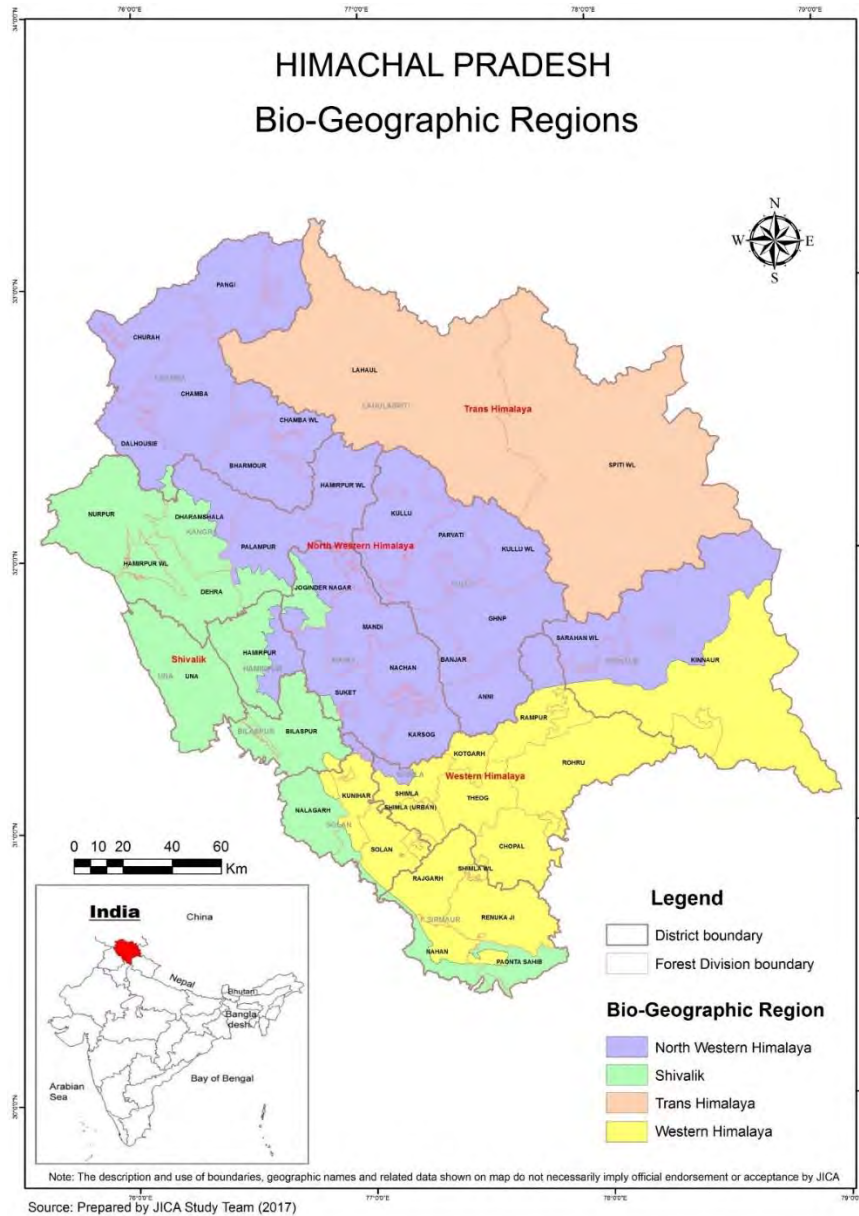
<sup>22</sup> Rodgers and Panwar (1988) Planning a Wildlife Protected Area Network in India. 2 vol. Project FO: IND/82/003, FAO, Dehradun, 339, 267.

<sup>23</sup> W.A.Rodgers, H.S.Panwar and V.B.Mathur: Wildlife Protected Area Network in India: A review, Wildlife Institute of India, Dehradun, 2002



- ◆ Zone 2B: The Western Himalaya: The area south of the Sutlej River. It is dry in general, and has harsh winters.
- ◆ Zone 4A: Shivalik (Semi-arid – Punjab Plains): South-western part of HP with lower elevation and is a semi-arid zone that is characterised by the hot dry foothills.

The distribution of these bio-geographic zones in HP is illustrated in **Figure 3.4.1**.



**Figure 3.4.1 Bio-geographic Regions in HP State**

(2) Elevational Zoning

According to HPFD, HP state has been divided into four elevational zones based on altitudes associated with different forest types with trees, shrubs and herbs species. The four zones are as follows.

- i. Sub-tropical zone: comprising low hills up to 1,000 m.
- ii. Sub-tropical zone: covering mid hills 1,000 - 1,500 m.
- iii. Temperate Wet zone: representing high hills 1,500 - 3,000 m.
- iv. Temperate dry zone: representing high hills above 3,000 m (alpine pasture zone).

The details of these four zones are described hereunder.

- i. Sub-tropical low hills zone; up to 1,000 m

This zone is mainly dominated by tropical mixed deciduous forest and thorn scrub in the foothills and fallow lands. The native tree species found are: *Acacia catechu*, *Embelica officinalis*, *Dalbergia sissoo*, *Terminalia chebula*, *Cassia fistula*, *Anogeissus latifolia*, *Zizyphus jujube*. The most common shrubs found are *Euphorbia royaleana*, *Adhotada vasica*, *Vitex negundu* and *Woodfordia fruticosa*.

- ii. Sub-tropical mid hills zone 1,000-1,500 m

The sub-tropical zone is characterised by the presence of sub-tropical pine forests and also known as Himalayan scrub. The upper Himalayan pine forests bears and almost pure *Pinus roxburghii*. The other species found in the mixture are *Quercus incana*, *Lannea sp.*, *Lyonia ovalifolia*, *Rhododendron arboretum*, *Indigofera sp.*, *Myrsine sp.*, *Rubus sp.*

Himalayan scrub: These areas are characterised by dry and shallow soil with intensive influence of biotic factors. The species met with are *Diospyros melanoxylon*, *Embelica officinalis*, *Carrissa sp.*, *Dodonea viscosa*, *Acacia catechu*, *Anogeissus sp.*, *Lannea sp.*, *Cassia fistula*.

- iii. Temperate wet high hills zone between 1,500-3,000 m

The main conifers tree species met with are *Pinus wallichiana*, *Cedrus deodara*, *Picea smithiana*, *Abies pindrow* and broad-leaved trees found are three oaks species namely: *Quercus incana*, *Q. semecarpifolia*, *Q. dilate* associated with *Aesculus indica*, *Acer caesium*, *Prunus padus*, *Populus cilata*, *Corylus colurna*, *Ulmus wallichiana*, *Juglans regia*, *Pyrus lanata*, *Betula alnoides*, *Fraxinus sp.*, *Carpinus sp.* In this zone, typical of western Himalayan forests, the three common oaks provide a simple and convenient basis for sub-division into altitude zones.

- iv. Temperate dry high hills zone; above 3,000 m

The main grass species found in the sub alpine pastures are *Agropyron longeristatum*, *A. semicostatum*, *Bracypodium sylvaticum*, *Oryzopsis*, *Phleum*, *Poa sp.* alpine pastures (meadows) are composed mostly of mesophytic herbs with very little grass such as *Primula*, *Anemone*, *Fritillaria*, *Iris*, *Gentiana spp.* And are at higher altitudes to stony desert with herbs such as *Sedum crassipes*, *Primula mimutissima*, *Saxifraga imbricate*, *Potentilla fruticosa*, *Draba gracillima*, *Kobrisia duhtei*. Dwarf shrub species *Juniperus wallichiana*, *J.communis* and *Caragana sp.*

### (3) Zoning to be Applied in the Study for Reformulation of the Proposed Project

Since existing zoning classifications are originally developed for different purposes, there is no single zoning classification which fully covers all aspects of natural conditions as well as forest management which fits to the purpose of the Study. In consideration of this, the following zoning classifications to be given an emphasis on the Study for further project area prioritisation and activities formulation.

- ◆ Bio-geographic region
- ◆ Dry Alpine Zone/ Non-Alpine Zone classification based on Forest Type-Group (**Part I, Section 4.3.3**) and Grassland/ Pasture distribution (**Part I, Section 4.5.3**) based on IIRS vegetation and land use map 2012

These classifications were highlighted in the Study, since i) classifications themselves and their sources of information are familiar with HPFD and ii) polygon data are available or possible to process and can be utilised for further project area prioritisation.

#### 3.4.2 Land Use

##### (1) Land Use Classification and Land Use Pattern

The HP State Land Use Board was constituted in December 1974 and renamed as the HP State Land Use and Waste Land Development Board in 1989. It is headed by the Chief Minister. The Board is, inter-alia, required to assess the land resources and the uses to which these resources can be put and to review the existing land use in the state and to explore options for optimisation of the lands uses.

The total geographical area of the state by the Surveyor General of India is 5,567,300 ha or 55,673 km<sup>2</sup> in comparison to this geographical area, the totally cadastral surveyed area in the state comes to 4,576,000 ha, and is called 'Reporting Area'. This means that 991,300 ha area is yet to be surveyed and categorised under the un-demarcated protected forest, thus do not appear in the revenue records. Major part of Kullu and Kinnaur districts fall under the falls in this category. **Table 3.4.2** gives break-up of the reporting area of nine land use classifications.

**Table 3.4.2 Land Use Classification in HP State (2010-11)**

No.	Land Use Type	Area in 1,000 Ha	% of Total Reporting Area
1	Forests	1,126	24.6%
2	Barren and Unculturable land	779	17.0%
3	Land put to non-agricultural uses	353	7.7%
4	Permanent pastures and other grazing lands	1,508	33.0%
5	Culturable wastelands	124	2.7%
6	Lands under miscellaneous tree crops and groves	65	1.4%
7	Current fallow lands	57	1.2%
8	Other fallow lands	21	0.5%
9	Net area sown	543	11.9%
<b>Total reporting area by village papers (1 to 9)</b>		<b>4,576</b>	<b>100.0%</b>

Source: Land Use Statistics, Ministry of Agriculture, GoI, 2012-13 (Taken from Statistical Abstract of HP2015)

The district-wise land use pattern of the above data is described in **Table 3.4.3**.

**Table 3.4.3 District-wise Land Use Pattern (2010-11)**

(Unit: Ha)

District	Forests	Barren and Unculturable land	Land put to non-agricultural uses	Permanent pastures and other grazing lands	Culturable wastelands	Lands under miscellaneous tree crops and groves	Current fallow lands	Other fallow lands	Net area sown	Total Area
Bilaspur	14,013	4,437	15,845	39,583	6,061	151	1,535	964	29,187	111,776
Chamba	272,008	4,748	15,380	348,869	6,871	225	1,942	733	41,643	692,419
Hamirpur	18,232	13,854	13,257	11,511	11,199	1	5,335	1,540	35,295	110,224
Kangra	232,520	14,848	77,669	87,865	28,204	8,274	11,456	1,097	115,748	577,681
Kinnaur	38,590	132,444	117,878	322,043	3,254	101	1,513	83	8,310	624,216
Kullu	2,520	3,207	7,931	3,911	1,300	3,804	2,604	462	38,485	64,224
Lahul & Spiti	137,376	541,314	16,857	211,474	568	111	108	2	3,396	911,206
Mandi	175,289	8,590	16,567	96,250	4,505	352	6,558	1,062	88,775	397,948
Shimla	149,692	11,521	19,867	235,206	13,078	8,898	16,089	5,091	65,944	525,386
Sirmaur	48,682	8,520	10,548	59,583	11,481	35,790	4,666	5,183	40,307	224,760
Solan	20,271	10,903	13,293	77,695	14,980	553	2,586	2,896	37,746	180,923
Una	16,549	24,139	27,575	13,532	22,620	6,645	3,105	2,181	38,529	154,875
<b>Total</b>	<b>1,125,742</b>	<b>778,525</b>	<b>352,667</b>	<b>1,507,522</b>	<b>124,121</b>	<b>64,905</b>	<b>57,497</b>	<b>21,294</b>	<b>543,365</b>	<b>4,575,638</b>

Source: Compiled by JICA Study Team (2017) from the Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics

The brief descriptions of the nine land use classifications are provided hereunder.

i. Forests

All forested area on lands classed or administered as forests, covered by any legal enactment dealing with forests, whether state owned or private and whether wooded or maintained as potential forest land, comes under the category of “forests”.

ii. Barren and Unculturable Land

This category of land use classification includes all barren and uncultivable lands mountains, deserts, etc., which cannot be brought under cultivation except at an exorbitant cost. These lands can lie in isolated blocks or may lie within cultivable holdings.

iii. Land put to Non-agricultural Uses

This category of land use classification includes all lands which are put to uses other than agricultural such as lands occupied by buildings, roads, railways, rivers and canal, etc.

iv. Permanent Pastures and Other Grazing Lands

This includes all grazing lands whether they are permanent pastures or not. The village common grazing lands are also included under this classification. The land under this category forms the large chunk of the reporting area.

v. Culturable Waste Lands

This comprises of all lands not available for cultivation whether taken up for cultivation or abandoned after a few years for one reason or the other. Such lands may either fallow or covered with shrubs or jungles, which are not put to any use. They may be assessed or un-assessed and may lie in isolated blocks or within cultivated holdings. Land once cultivated but not cultivated for five years or more in succession shall be included under this head.

vi. Lands under Miscellaneous Tree Crops and Groves

This includes all such lands which are not included in the net area sown but it is put to some agricultural uses.

vii. Current fallow Lands & Other Fallow Lands

This includes all lands which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year.

viii. Net Area Sown

This represents the net area sown under crops counting area sown more than once only once in the same year.

The land use pattern has been continuously changing ever since man started settled living. The state of HP has also witnessed changes in its land use. Large manmade reservoirs are now part of the HP scenery, as a result of dams constructed across major rivers. Furthermore, expansion of cities and towns, construction of roads, electric transmission lines and development of necessary infrastructure, etc., have contributed to change in land use of HP. **Attachment I.3.4.1** reflects the land-use pattern for the entire state and districts, and also shifts in land use pattern over a period of approximately 35 years, between 1964 and 2000.

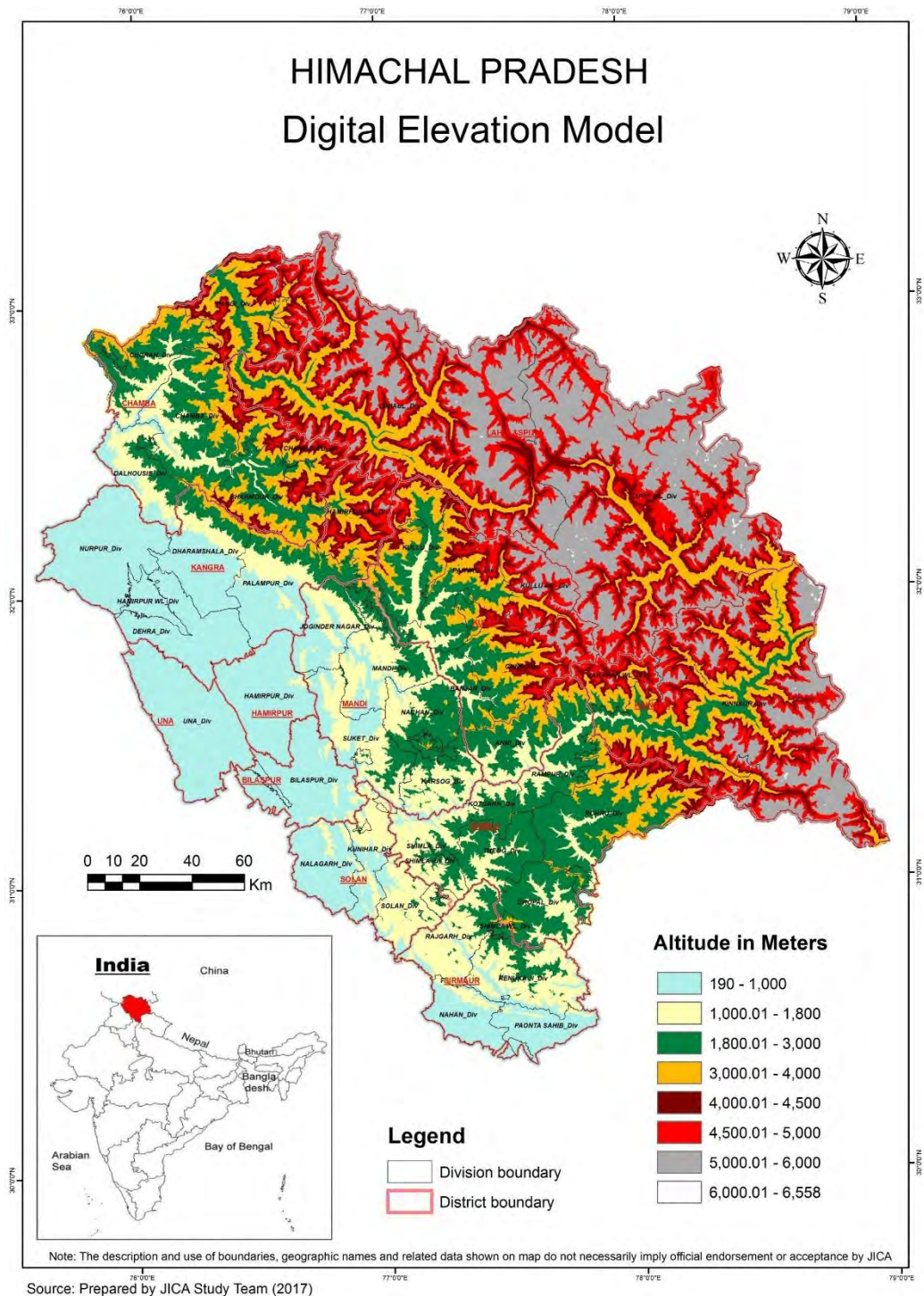
## (2) Land Holdings

Although the data on overall land holdings status in the state were not available, state-wise land holdings according to Agricultural Census (2011-2012) are summarised in **Attachment I.3.4.2**.

### 3.4.3 Topography and Soil

#### (1) Topography

The prominent topographic features of HP comprise of lofty mountain ranges and deeply dissected valleys carved-out in slopes of various descriptions. The elevation varies from 320 m in Una district, to 6,975 m at Leo Pargil Peak in Kinnaur district. HP is endowed with a network of perennial rivers, which have fed by glaciers, and the prominent rivers include rivers Satluj, Beas, Ravi, Chenab, Spiti, Parbati, Pabbar, Tons and Giri. The elevational map of HP state along with elevations is depicted in **Figure 3.4.2**.



**Figure 3.4.2 Elevations in HP State**

**(2) Soil**

In general, soils vary according to aspect, slope and climatic conditions. Normally, the soils in HP are generally thin, except in the valleys. Soils of HP could be generally divided into brown soils and sub-montane/ podzol soils. The brown soils are mostly found in the Shiwalik and regions not exceeding 3,000m, which areas cover 42.16% of the state's area. The higher area with soil horizons are characterised by podsollic or sub-montane type, which covers 46.07% of the state.

The glacial and eternal snow types of soils cover an area of 11.77%, which are not fully developed as they are found in the snow-covered areas. Based on their development and physico-chemical properties, the soils of the state can be broadly divided into nine groups as shown below:<sup>24</sup>

- ◆ Alluvial soils
- ◆ Brown hill soils
- ◆ Non-calcic brown soils
- ◆ Brown forest soils
- ◆ Grey wooded or brown podzolic Soils
- ◆ Grey brown podzolic soils
- ◆ Planosolic soils
- ◆ Humus and Iron podzols
- ◆ Alpine humus mountain skeletal soils

Descriptions of these soil types are presented in **Attachment I.3.4.3**.

#### **3.4.4 Geology**

The geology of HP reflects being dated ranging in age from Precambrian to Recent. Owing to its complex tectonic and geological structures reflects a complicated topography with intricate mosaic of mountains ranges, hills and valleys. The complicated geology of the region can be categorised into the following four broad zones based on physio-geographic regions<sup>25</sup>: i) Outer Himalaya (Shivalik), ii) Lesser (Lower) Himalaya, iii) Greater (Higher) Himalaya and iv) Tethys Himalayan zone. The geological features of these four zones are described in **Attachment I.3.4.4**.

#### **3.4.5 River System and Catchments**

Good rainfall during the monsoon and winter season has endowed the state with abundance of water resources, which includes glaciers, perennial streams, natural lakes and manmade reservoirs, innumerable water springs and sub-soil water. HP serves as a major source of water for Indus and Ganga river system. All rivers of HP are fed by snow and rainfall and have adequate water all year round.

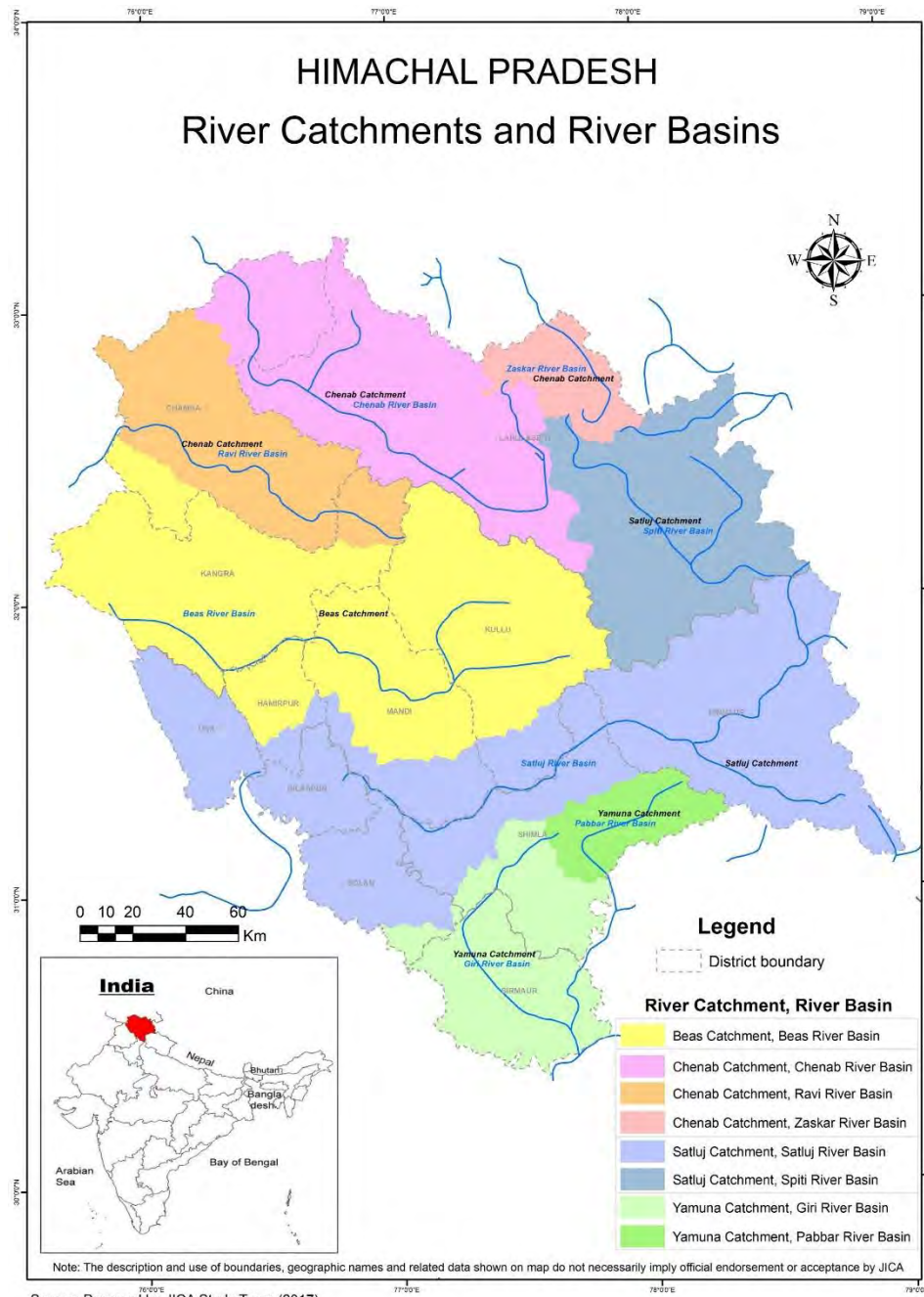
Various classifications of river catchments and river basins are available for different purposes. Thus accordingly, the Study Team adopted the classification based on river catchments and basins data/information provided by the GIS cell of HPFD. The classification is described in **Table 3.4.4** and distribution of classified river catchments and river basins are described in **Figure 3.4.3**. The Study Team also attempted to confirm the status of soil erosion and soil

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<sup>24</sup> Singh K, Singh JP, Bhandari AR (1996) Numerical classification of some soils from upper transect of Satluj river catchment in Himachal Pradesh. *J Indian Soc Soil Sci* 44:122–130, Verma SD (1979) Characteristics and genesis of soils of Himachal Pradesh. Ph.D. thesis, HPKV, Palampur, Census of India (2011c) Census handbook of Himachal Pradesh, Government of India

<sup>25</sup> Jreat M (2006) Geography of Himachal Pradesh. Indus Publishing Co, New Delhi  
Government of Himachal Pradesh (2011) Economic survey 2010–11. Himachal Pradesh Finance Department, Shimla

flowing into the river catchments/ basins and water reserving dam, but the data was not available in the state.



**Figure 3.4.3 River Catchments and River Basins in HP State**

**Table 3.4.4 River Catchments and River Basin in HP State**

River Catchment	River Basin
Satluj	- Satluj - Spiti
Beas	- Beas
Chenab	- Chenab - Ravi - Zaskar (Zanskar)
Yamuna	- Giri - Pabbar

Source: Prepared by JICA Study Team (2017) based on information from HPFD



The brief descriptions of these river catchments and river basins are provided here under<sup>26</sup>.

### (1) Satluj River Catchment

#### i. The Satluj

The Satluj rises from the Kailash mountain as Longcchen Khabab river in Tibet. It enters HP at Shipki (6,608 metres) through Kinnaur district and flows through Shimla, Kullu, Solan, Mandi and Bilaspur districts. It flows is about 320 km in HP with tributaries such as the Spiti, Baspa, Soldang, Nogli Khaid, and the Soan. It leaves HP to enter the plains of Punjab at Bhakhra. Its total catchment area in HP is approximately 20,000 km<sup>2</sup> and drains into the Indus in Pakistan.

#### ii. The Spiti

Spiti River originates from Kunzum rangethe Tegpo and Kabzian streams and Pin valley area drains into Spiti river system. The river attains peak discharge in the late summer due to glacier melting. After flowing through Spiti valley, the Spiti river meets Satluj at Namgia in Kinnaur district traversing a length of about 150 km.

### (2) Beas River Catchment

The Rohtang pass, at 4,350 meters the north of Manali, Kullu district is the source of the Beas. On the west of this pass lies the source of the Beas also known as Beas Rishi. To the south of this source lies another source known as Beas Kund. Both these mountain streams meet at Palachan village, 10 km north of Manali to form the Beas. The Beas runs through districts of Kullu, Mandi, Hamirpur and Kangra within HP. Main tributaries are the Parbati, Awa, and the Banner. Northern and Eastern tributaries of the Beas are perennial and snow fed, while the Southern ones are seasonal. Its flow is maximum during monsoon months. At Pandoh, in Mandi district, the waters of the Beas have been diverted through a tunnel to join the Satluj. It flows for 256 km in HP.

### (3) Chenab River in Catchment

#### i. The Chenab

The Chenab (or Chandra Bhaga) is formed after the two streams the Chandra and the Bhaga merge with each other. The Chandra and Bhaga rise on the opposite sides of the Baralacha pass in the Lahul & Spiti district at an elevation of 4,891 metres and meet at Tandi at an elevation of 2,286 metres to form the river Chenab. The Chandra initially flowing southeast for about 88 km and joins the Bhaga at Tandi, after traversing a total length of 125 km. The course of Bhaga up to the confluence is 80 km having a steep slope. It flows in HP for 122 km with about 7,500 km<sup>2</sup> catchment area within the state. It is the largest river of HP in terms of volume of waters.

#### ii. The Ravi

The Ravi originates in the Chamba district following a north-westerly course. It turns south-west, near Dalhousie and then cuts a gorge in the Dhauladhar range entering Punjab near Madhopur.

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<sup>26</sup> Based on information from Jreat M (2006) Geography of Himachal Pradesh. Indus Publishing Co, New Delhi, <https://www.himachalworld.com/himachal-geography/himachal-river-system.html> (page visited on 12/072017)

The Bhadal, the Siul the Baira and the Tant Gari are the major tributes of the Ravi. The river length is about 158 km in HP and has a catchment area of about 5,500 km<sup>2</sup>.

iii. The Zaskar (Zanskar)

The Zanskar river is formed by two major tributaries, the Stot and the Lugnek. The former originates from Pansi pass and glaciers in Jammu and Kashmir (J&K) state. The Lugnek drains the catchment adjacent to HP. Both tributaries join at Padam (Zanaskar Tehsil), Kargil district, Jammu and Kashmir state to constitute Zanaskar river which further joins the Indus.

The Lugnek is formed by the Kargyag and the Trasp. The Karaya has its source near the Shingo La (5,091 m) located at the border of HP and J&K.

#### (4) Yamuna Catchment

The Yamuna enters HP at Khadar Majri in Sirmaur district. The Yamuna is the Eastern-most river of HP. Its major tributaries are the Pabbar, Giri (Giri Ganga), Ton and the Markanda. Its total catchment area in HP is 5,870 km<sup>2</sup>. It leaves the state near Tajewala and enters into Haryana state.

i. The Pabbar

The Pabbar rises from near Chandra Nahan Lake near the Chansal peak in Rohru tehsil of Shimla district. It joins the Tons at the base of the Chakrata massif near the border of Uttar Pradesh and HP and which in turn drains into the Yamuna. The main stream is fed by the Chandra Nahan glacier and springs originating from underground waters.

ii. The Giri

The Giri rises from near Kubar peak just above Jubbal town in Shimla district, and drains a part of south-eastern HP and joins Yamuna upstream of Paonta below Makkampur.

#### (5) Lakes and Other Water Bodies

Apart from rivers, HP state is also endowed with a number of lakes and small water bodies in various part of the state. Most of them have religious significance and revered by the local population. Such water bodies include: (i) Surya Taal in Lahaul Valley, (ii) Chandra Taal in the Spiti Valley, (iii) Revalsar Lake in Manali, (iv) Chander Nahan in Rohru in Shimla district, (v) Bhrigu Lake in Kullu, (vi) Manimahesh Lake in Bharmour in Chamba, (vii) Mahakali Lake in Chamba, (viii) Prasahr Lake in Manali, (ix) Macchial Lake in Joginder Nagar, and (x) Dhankar Lake.

#### (6) Population of Each River Basin

The population distribution in eight major river basins is shown in **Table 3.4.5**. The Census 2011 data were calculated as per the river basin boundaries on GIS database.

**Table 3.4.5 Population Distribution in Eight Major River Basins in HP State**

No.	River Basin	Population-2011	Ratio (%)
1	Satluj	2,386,275	34.76
2	Spiti	12,457	0.18
3	Beas	3,034,729	44.21
4	Chenab	37,248	0.54

No.	River Basin	Population-2011	Ratio (%)
5	Ravi	398,907	5.81
6	Zaskar	0	0.00
7	Pabber	157,672	2.30
8	Giri	837,314	12.20
Total		6,864,602	100.00

Source: Compiled by JICA Study Team (2017) from the GIS database.

### (7) Annual Discharge of Major Rivers

The major rivers in HP flow down to some areas of HP or neighboring regions and flow into Pakistan finally. The annual discharges of these major rivers are observed at many stations and the data are managed strictly. The JICA Study Team took much effort to obtain the data from the Central Water Commission(CWC), the Bhakra Beas Management Board (BBMB), and the National Hydroelectric Power Corporation (NHPC) with the support of HPFD. JICA Study Team sent official letters through HPFD to three organisations, but data was not provided due to access restrictions.

### 3.4.6 Climatic Conditions

The distribution of rainfall and temperatures in HP varies considerably due to its topography and varying altitudes. The climate varies from semi-tropical to semi-arctic depending on the altitude of the region. In the lower altitudes, the state experiences four seasons i.e. summer (March to June), Monsoon (July to September), Post Monsoon (October to November) and winter (December to February). The areas of the great Himalaya and Trans Himalayas which fall into districts of Lahaul& Spiti, Kinnaur and Pangi valley of the district Chamba remains cold throughout the year and most of the year covered with snow.

#### (1) Temperature

##### i. Current Status

The temperature of HP is highly dependent on altitude and there are variations in the state. Mean annual temperature is higher in western parts of the state and it decreases gradually toward north and eastern parts, as the altitude increases. The maximum and minimum temperature recorded at various stations in HP is show in **Table 3.4.6**. In general, the highest temperature is recorded during May and June in most of locations, whereas the lowest of temperature is recorded in January and February.

**Table 3.4.6 Max and Min Temperature in Selected Stations/ Centres in HP (2015-16)**

Centre/ Months	°C	Jan	Feb	Mar	Apr'	May	Jun	Jul	Aug	Sep'	Oct	Nov	Dec
Saloni	Max	21.5	22.5	27	29.5	34	35	34	31.5	32.5	27.5	23.5	17
	Min	-9	-8.5	-8	2.5	7	10.5	13.5	12	6.5	7	4	-3
Dharamshala	Max	16.6	21.8	27.8	30.2	33.4	33.4	30.6	29.6	29.6	27.6	21.8	19.2
	Min	2.8	3	6.2	9.2	15.2	16	15	15	15	14	8.2	4.6
Kalpa	Max	10	12	23.4	21.8	24.4	25.8	27.4	25.8	26	22.6	19.4	17.8
	Min	-10.6	-11	-10.8	-2.6	2.6	5.4	10	10.6	6.4	1.4	-1	-6
Bhuntar	Max	20.5	24.4	31.5	31	36.1	36	35.1	34.4	34.6	32.9	28	24.3
	Min	-0.6	0.6	2.1	6.8	8.6	12	16	15.2	11.4	7	2.4	-1.5
Keylong	Max	9.4	10.5	13.4	16.9	24.9	28.6	31	29.1	24.6	21.3	14.5	11.3

Centre/ Months	°C	Jan	Feb	Mar	Apr'	May	Jun	Jul	Aug	Sep'	Oct	Nov	Dec
Sunder Nagar	Min	-15.9	-15.1	-12.7	-1.2	1.4	4.1	9.6	7.9	4.3	-1.9	-3.9	-6.7
	Max	21.5	28.2	32	32.6	38.3	38.3	35.8	33.3	34.4	32.7	28.4	25
	Min	0.2	1.7	2.4	9	12	15.3	20.1	19.3	14.1	8.9	3.5	-0.9
Shimla	Max	18.5	20.5	24.1	26.9	29.3	29.1	25.3	25.4	25.7	25.4	22	20
	Min	-2	0.7	0.8	6.4	10.6	12.5	14.6	13.9	12	5.3	4.3	-0.8
Nahan	Max	20.3	25.1	28.7	31.8	37.4	36.8	31.1	29.8	32.2	31.2	25.2	24.7
	Min	1.7	8.5	8.4	12.7	16.2	17.3	17.4	18.4	17.1	11.6	12.4	5.2
Nauni	Max	22.5	27	28.5	31	34.7	34.7	31.7	30.5	31.4	29.6	26	25
	Min	-0.5	1.5	2.3	8.4	11	14.5	17.4	17.2	12.4	6.7	5	-0.8
Una	Max	23.7	27.5	35.8	39.2	43.6	42.2	37.8	36.4	37.4	35.2	29.8	26.3
	Min	-1.2	1	3	9.6	11	16	16	12	12.3	7	2.8	-3.3
Manali	Max	15.2	18.8	24.6	24	26.8	27.8	32.6	26.6	25.8	23	18.8	17.4
	Min	-6.6	-3.4	-3	1.4	4.4	5.6	9.6	9.2	6	2.2	-0.6	-5

Source: Compiled by JICA Study Team (2017) from the Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics

## ii. Long-Term Trend

It is observed that the temperature increased at a lower rate till 1930, and moderate rate during the decade of 1961-1970. Warming rate become higher during the period from 1991-2002 compared to the earlier periods and the gross rise in mean temperature during 1980-2002 was about 2.2°C. Both the maximum as well as minimum temperatures are increasing with the maximum increasing much more rapidly. **Table 3.4.7** indicate clear increase trends observed in winter temperature in HP state and across north west Himalayan region.

**Table 3.4.7 Winter Air Temperature Trend**

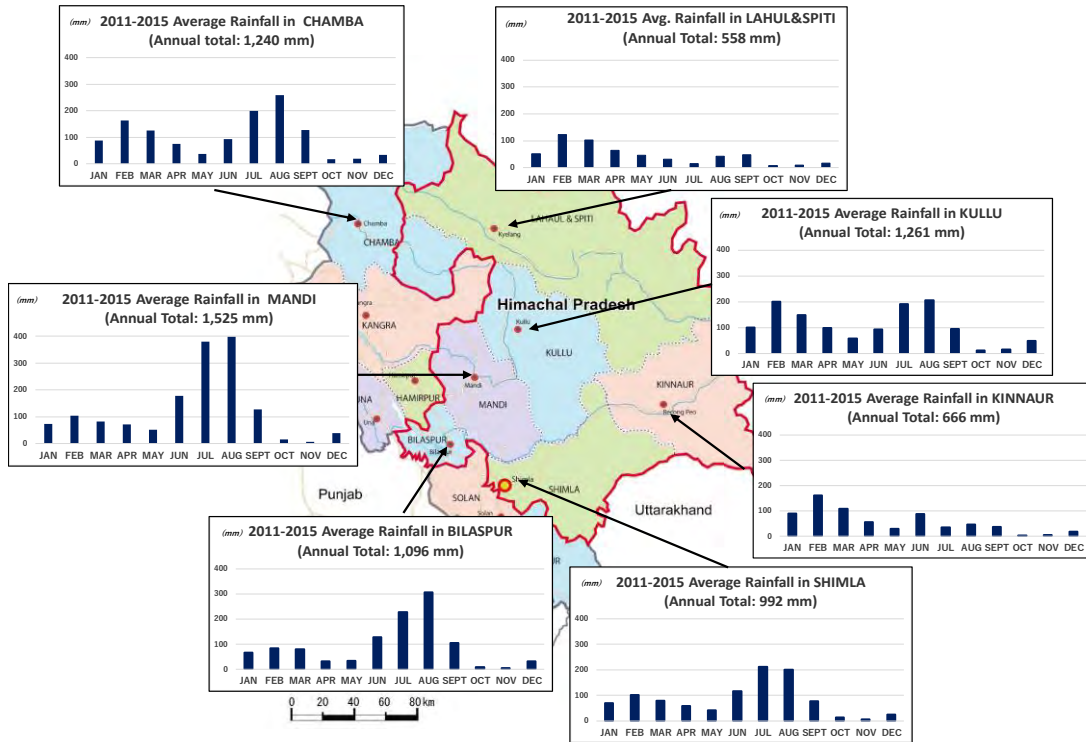
Observation Station (Period)	Mean Max (°C)	Mean Min (°C)	Average Winter (°C)	
Shimla	(1901-2002)	2.6	1.00	1.800
	(1991-2000)	1.83	0.14	0.898
	(2001-2007)	3.42	0.74	2.800
Solang	(1991-2000)	0.99	- 0.08	0.45
	(2001-2007)	2.84	- 1.12	1.98
North west Himalaya (1901-2002)	1.7	1.7	1.7	

Source: JICA Study Team (2017) based on State Strategy & Action Plan on Climate Change Himachal Pradesh (2012), Department of Environment, Science and Technology

## (2) Rainfall

### i. Current Status

Most of the rainfall originates from the southwestern monsoon, starting in June and stretching up to September. There are places in HP, where the average annual rainfall is around 2,600 mm (Dharamsala, Palampur etc.), while at some other places the rainfall is less than 100 mm (cold desert areas of Lahaul and Spiti). As a general trend, the rainfall declines from west to east and from south to north. About 70% of the rainfall is received between July and September. The precipitation during winter months is in the form of snow, which is received at altitudes above around 1,800 m. The rainfall trend of major locations within HP is shown in **Figure 3.4.4**.



Source: Prepared by JICA Study Team (2017) based on Customised Rainfall Information System (CRIS), India Meteorological Department)

**Figure 3.4.4 Rainfall Trend of Major Locations within HP State**

ii. Long-Term Trend

Based upon rainfall data of 37 stations in HP state for the period 1951-2005, it is found that annual rainfall and rainy days are showing significantly decreasing trends by -4.58 mm/year and -0.13 days/year respectively. Seasonal rainfall is showing significantly decreasing trend in monsoon (-3.68 mm/year) and post monsoon (-0.98 mm/year) while increasing trend in summer (+0.51 mm/year) and decreasing trend in winter (-0.34 mm/year). The above information is summarised in **Table 3.4.8**. The daily rainfall is showing significantly decreasing trends in the southern parts of HP state which is agriculturally an important area.

**Table 3.4.8 Rainfall Trend in HP State (1951-2005)**

Months/ Season	Rainfall				Rainy days			
	Mean (mm)	SD (mm)	CV (%)	Trend (mm/year)	Mean (days)	SD (days)	CV (%)	Trend (days/year)
January	77.1	40.52	53	-0.61*	4.4	2.05	46	-0.04*
February	76.0	45.03	59	+0.36	4.4	2.05	46	+0.02
March	78.0	44.87	58	+0.08	4.9	2.16	44	No trend
April	43.6	26.5	61	+0.24	3.4	1.64	49	No trend
May	53.3	34.11	64	+0.21	3.9	1.69	43	+0.02
June	115.6	47.09	41	+0.39	6.1	1.74	28	+0.02
July	345.1	95.68	28	-1.83*	13.3	2.66	20	-0.04*
August	329.9	85.48	26	-1.49*	13.1	2.45	19	-0.04*
September	150.4	77.17	51	-0.74	6.8	2.63	38	-0.02
October	38.5	60.76	158	-0.90*	1.9	1.78	94	-0.03*
November	14.1	17.04	121	-0.07	0.9	0.92	97	No trend
December	33.5	31.41	94	-0.19	1.9	1.32	68	-0.01
Annual	1353.4	234.26	17	-4.58*	65.1	7.88	12	-0.13*

Months/ Season	Rainfall				Rainy days			
	Mean (mm)	SD (mm)	CV (%)	Trend (mm/year)	Mean (days)	SD (days)	CV (%)	Trend (days/year)
Winter	186.2	77.35	42	-0.34	10.8	3.23	30	No trend
Summer	174.8	73.57	42	+0.51	12.2	3.68	30	+0.02
Monsoon	940.7	197.99	21	<b>-3.68*</b>	39.4	5.99	15	<b>-0.09*</b>
Post Monsoon	52.4	61.32	117	<b>-0.98*</b>	2.8	2.01	71	<b>-0.03*</b>

Note: SD: Standard Deviation, CV: Coefficient of Variation,

\*Trend values significant at 95% level are shown in bold and marked

Source: Compiled by JICA Study Team from Seasonal and annual rainfall trends in Himachal Pradesh during 1951-2005 (2015), India Meteorological Department

### (3) Retreating Glaciers

Glaciers are one of the most important sources of water which influences run-off into river system in HP state, such as the Satluj, Chenab, Ravi, and Beas. However, the Himalayan glaciers have seen a gradual retreat since 1850 and whose rate accelerated over the last 30 years due to the average increase in temperature in the Himalayan region by 1°C (double the average global warming on the land surface)<sup>27</sup>

The rate of glacial loss in the Himalayas has accelerated from around 9±4 Gt/year in 1975-85 to 20±4 Gt/year in 2000-2010. According to Space Application Centre, over 449 km<sup>2</sup> of glacier area in HP state has disappeared between 1962-2001. The overall reduction in glacier area was 21% and it shrunk from 2,077 km<sup>2</sup> in 1962 to 1,628 km<sup>2</sup> in 2001. **Table 3.4.9** indicate the basin-wise loss of glacier area in HP state between 1962-2004.

**Table 3.4.9 Basin-wise Loss of Glacier Area in HP State (1962-2004)**

Name of Basin	Glacier area (km <sup>2</sup> )			Volume (km <sup>3</sup> )		
	1962	2004	Loss (%)	1962	2004	Loss (%)
Chenab	1,411	1,110	21	157	105	33
Parbati	488	379	22	58	43	26
Baspa	173	140	19	19	14	23
Total	2,077	1,628	21	235	162	31

Source: Kulkarni, AV, 2007

### (4) Climate Change Impact on Vegetation in HP State

The major ecological and environmental changes associated with climate change include species range shifts, tree line migration, community composition change, invasion of exotics and changes in phenology. The change observed in phenology of the trees, such as flowering, fruiting, and germination may be the major short-term response to the climate change. Some of the climate change impact on vegetation in HP state are confirmed as listed up below;

- ◆ There is a study to assess the impact of climate change on the tree species in the Himalayas from 1999-2006. During the period, the average temperature increased by 3.7°C and rainfall declined from 1,214 mm in 1999 to 970 mm in 2006. The study results revealed that the growth period of 11 trees species have prolonged by 31 to 46 days and leaf emergence got advanced by 5 to 40 days (Thakur, R. S et al. 2008). The

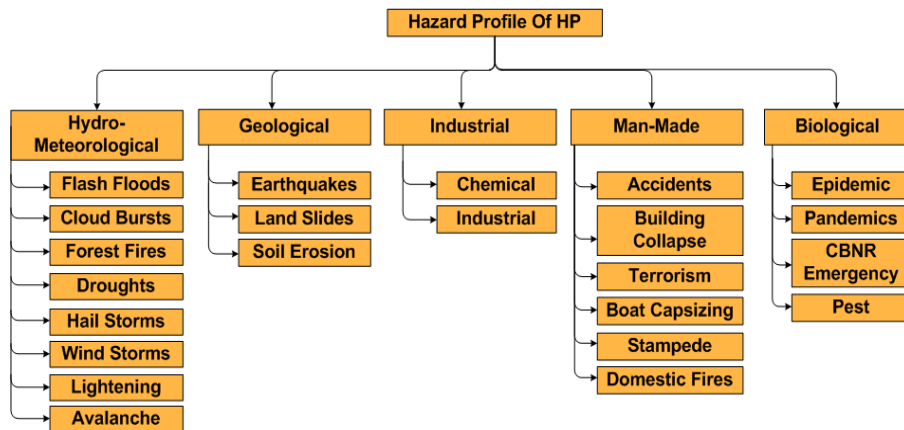
<sup>27</sup> Based on information from Kulkarni, A.V. and Karyakarte, Y. 2014. Observed changes in Himalayan glaciers. Current Science, Vol. 106, No. 2, 25

most visible change in phenology was observed in the flowering of *Rhododendron*. *Rhododendron* has now observed to be flowering about 15 days earlier and that the flowers appear to be smaller than they were 15–20 years ago. (Kaushik, G, M.A. Khalid, 2011; Thadani, R et al 2015).

- ◆ Regeneration of sal (*S. robusta*) forest is being affected due to the increase of uncertainty of monsoon commencement. The seeds are ready to germinate by mid-June, but the seeds will die if monsoon has not started timely as sal seeds are viable only for couple of weeks. (Upgupta, S. 2015; Chawla, A. et al 2012)
- ◆ Forest in Kashmir significantly increase in drying and the morbidity of kail (*Pinus wallichiana*). This drying out of the tree is normally caused by a fungal disease, white pine blister rust (*Cronartium ribicola*) which affects only kail. This new outbreak of morbidity is due to new fungus *Lophodermium macchi sokolski* and *Berube* which has been identified for the first time in Asia (Farooq, A et al 2011). Increase in moisture/humidity and milder winter due to climate change has resulted in a favorable climate condition for the disease to spread. This could easily spread to Himachal as the state is contiguous to Kashmir.
- ◆ It has been confirmed the early succession chir pine (*Pinus roxburghii*) is replacing late succession banj oak (*Quercus leucotrichophora*) although it should be the reverse under natural succession. Most of seed production in oak forest occurs in the months of January, February and March however, persistent low snowfall and low rainfall is resulting in low water supply for seed germination during these seasons which cause the conversion (Lodhiyal, N., Lodhiyal, L.S. 2003). This loss of oak tree cover has resulted in an increase in soil erosion leading to fall in soil moisture and decrease the biodiversity as chir pine forest is a mono dominant forest (Nautiyal, Ankush, 2015).
- ◆ The average upward shift of all crops shows the following pattern: average of 19 m per 10 years in the south slope and 14 m per 10 years for the north slope in the Himalayas (Parmesan et al. 1999). *Rhododendrons* and other woody species have already started their upward shift towards alpine meadows (Singh and Thadani, 2011) and brown oak or *Q. semecarpifolia*, which is a major forest oak tree above 2,400 m in HP state, are replaced by such species (Shrestha U. B. et al 2009). An increase in 1°C temperature is expected to reduce brown oak forest area by around 40% (Sharma, Singh, 2004).

### 3.4.7 Natural Disasters

HP state is prone to various hazards both natural and manmade. Main hazards consist of earthquakes, landslides, flash floods, snow storms and avalanches, droughts, dam failures, fires – domestic and wild, accidents – road, rail, air, stampedes, boat capsizing, biological, industrial and hazardous chemicals etc. The hazard profile for HP is presented in the **Figure 3.4.5**



Source: <http://hpsdma.nic.in/ProfileOfState/HazardProfile.html> (page visited on 12/072017)

**Figure 3.4.5 Diagrammatic Representation of Hazard Profile of HP State**

Some of the major disasters is mentioned below<sup>28</sup>:

### (1) Earthquake Hazards

From seismicity point of view, HP which forms a part of North West Himalayas is very sensitive. During the last century, the state has been shaken by a number of micro as well as macro earthquakes. A number of damaging earthquakes has struck the state and the adjoining parts of Punjab, Uttarakhand and Jammu and Kashmir. The areas falling in districts of Chamba, Kangra, Mandi, Kullu, Hamirpur Bilaspur are very sensitive as they fall in Very High Damage Risk Zone i. e. Zone V, whereas the rest of the areas falls in High Damage Risk Zone.

### (2) Landslides Hazards

The hills and mountains of HP are liable to suffer landslides during monsoons and also in high intensity earthquakes. The vulnerability of the geologically young and not so stable steep slopes in various Himalayan ranges, has been increasing at a rapid rate in the recent decade due to inappropriate human activity like deforestation, road cutting, terracing and changes in agriculture crops requiring more intense watering, etc.

Delineation of landslide-prone areas requires a large data set. Various forms of landslides are slumps; debris or rock slides, debris falls or rock falls. Various factors influence the landslides: steepness of slopes, saturation by heavy rains or melting snow and ice, rocks vibrations, excess load from embankments, fills and waste dumps, changes in water content, frost effect, weathering of rocks, effect of ground water, and change in vegetal cover.

### (3) Avalanche Hazards

The higher hills comprising the districts of Kinnaur, Lahaul & Spiti, Chamba, and Kullu are particularly vulnerable to the hazards of avalanches. And the destruction caused as a result of

<sup>28</sup> Govt of Himachal Pradesh (2012) Himachal Pradesh State Disaster Management Plan. Disaster Management Cell, Department of Revenue  
<http://www.ndma.gov.in/en/himachal-pradesh-sdma-office#>



avalanches in the past in HP is confined to the higher reaches of the state only (though not widespread).

#### (4) Flood Hazards

Due to the diverse topography of the area, the flood problem in the state is largely isolated in nature. High monsoon rains in the area of the Shiwalik and lower and mid Himalayan ranges cause extensive floods during rainy seasons. In the upper reaches of the Beas and Satuj valley the main problems are flash floods and bank erosion because of the steep slopes of rivers and high river flows due to heavy rains. Often the flash caused due to cloudbursts, glacial lake outbursts and temporary blockade of the river channels have been also observed. As a result of breaches in embankments and damage to various utilities such as irrigation/flood control schemes and houses are also observed. The rivers of importance from flood damage angle are, River Satluj and its tributaries- Spiti, Sangle khad, Ali khad, Gambhar khad, Sir khad, and Swan river. River Beas and tributaries-Uhl and Suketi khads. River Ravi and its tributaries-Siul; River Yamuna and its tributaries like Pabbar, Giri and Bata.

#### (5) Forest Fire Incidents

Described in **Part I, Section 4.5.7** of this report.

#### (6) Record of Natural Disasters

Major natural disasters in HP were recorded in the State Disaster Management Plan 2012, prepared by the Disaster Management Committee of HP. Tables below summarise major natural disasters described in the plan.

**Table 3.4.10 Major Past Earthquakes in HP State**

Date	Locations affected	Magnitude / Intensity	Damage
4 April 1905	Kangra	Magnitude 8.0	Approx. 19,800 people died in Kangra district.
28 February 1906	Shimla	Magnitude 6.5	26 people died, 45 severely injured
19 January 1975	Kinnaur	Magnitude 6.8	60 people died, 2000 dwellings housing devastated
26 April 1986	Dharamshala	Magnitude 5.5	6 people died, Extensive damage to buildings
April 1994	Chamba	Magnitude 4.5	Area at risk was Chamba town
24 March 1995	Chamba	Magnitude 4.9	Fearsome shaking, more than 70 percent houses faced cracks
July 1997	Sunder Nagar	Magnitude 5.0	Some part of Sunder Nagar affected

Source: Prepared by JICA Study Team (2017) based on Himachal Pradesh State Disaster Management Plan 2012

**Table 3.4.11 Major Past Landslides in HP State**

Location/ Highway	Year of Occurrence		Damage to Highway
	First	Last	
NH-22	1988	1995	During the flood, of 1988, 1993 and 1995, 250, 350 and 475 m of the road was washed away.
NH-22 km 292-293	1988	1995	During the flood of 1988, 1993 and 1995, 200, 500 and 300 m of the road was washed away.
NH-22 km 307	1988	1995	During the flood of 1988, 1993 and 1995, 100, 150 and 600 m of the road was washed away.

Source: Prepared by JICA Study Team (2017) based on Himachal Pradesh State Disaster Management Plan 2012

**Table 3.4.12 Major Landslides due to Flash Floods**

Name of Landslide	Year	Description
Jhakari	1993	Road (NH-22) stretch of about 1/2 km was completely damaged and slide debris blocked the river Sutlej. Traffic restored after two months.

Source: Prepared by JICA Study Team (2017) based on Himachal Pradesh State Disaster Management Plan 2012

**Table 3.4.13 Major Past Flash Floods in HP State**

Year	Location	Damage
July 2000	Satluj River, Kullu, Mandi, Kinnaur, Rampur	140 people dead, 400 shifted, 12,400 km <sup>2</sup> affected
August 2001	Chamba	16 people dead, 3,010 km <sup>2</sup> affected
July 2003	Gadsa valley – Kullu	35 people dead
August 2004	Satluj river, Kinnaur, Shimla, Kullu, Bilaspur	3,500 people and 56 villages evacuated
June 2005	Parchu lake, Kinnaur, Rampur	5 bridges damaged, 50 houses submerged

Source: Prepared by JICA Study Team (2017) based on Himachal Pradesh State Disaster Management Plan 2012

**Table 3.4.14 Major Past Avalanches in HP State**

Date	Location	Damage
March 1978	Lahaul and Spiti	30 people dead
March 1979	Lahaul and Spiti	237 people dead
1988	Shimla	Lahaul-Spiti, Kinnaur and Solan districts blocked
March 1991	HP state affected	Road blockage for 40 days
September 1995	HP state affected	Flood caused by melting of snow brought by avalanche
September 2001	HP state affected	Devastated flood caused huge amount of damage

Source: Prepared by JICA Study Team (2017) based on Himachal Pradesh State Disaster Management Plan 2012

### 3.5 Development Planning

India set itself on the path of planned development from 1950 onwards when Planning Commission was established and 1<sup>st</sup> Five-Year Plan (1951 – 56) was put in action. Since then 12 Five-Year Plans, last being 2012-17, have been implemented. Each five-year plan sets plan outlays for various sectors putting emphasis on one or the other sectors.

#### 3.5.1 12th Five-Year Plan (2012-17)

12<sup>th</sup> Five-Year Plan was implemented between 2012–2017 under the objective of “Faster, More Inclusive and Sustainable Development” through creation of employment irrespective of social groups and the participation and empowerment of people the government intended to achieve economic growth. For this purpose, with its financial outlay of INR 228 billion, social sector and transportation and communication were identified as a priority sector by allocating the budget of 33.66% and 20.66% respectively. Agriculture and allied sector was allotted of 12.75% and followed by energy sector (12.31%).

#### 3.5.2 Beyond 12th Five-Year Plan

##### (1) Three-Year Action Agenda (2017-18 to 2019-20)

Beyond the 12th Five-Year Plan, the GOI has changed its planning process and strategy for development. It envisages achieving the Sustainable Development Goals (SDG) of the United Nations as envisioned and resolved by the UN General Assembly in 2015.

The National Institution for Transforming India (NITI Aayog) has taken over the role of Planning Commission and is the institution for streamlining India’s national development plan.

i) Review of 12<sup>th</sup> Five-Year Plan

Post the replacement of old Planning Commission by NITI Aayog, as a transitive step an appraisal process of last Five-Year Plan of 2012-17 was commissioned during the latter’s first governing council meeting in February 2015. The document evaluates and summarises the expiring plan’s performance during the first four-years of its implementation, i.e. 2012-13 to 2015-16. It examines the broad coverage of physical and financial achievements made during the said period with detailed assessment on the following thematic areas:

- ◆ **Economic** assessment of aggregated targets and **macro-economic** factors against the backdrop of policy decisions and outcomes taken during the current government regime
- ◆ **Governance** assessment with exploratory discussion on measures to improve efficiency of public expenditure by supporting local institutions and integrating a gender perspective into the development process while improving public service delivery
- ◆ **Education and Skill, and Human Resource Development** assessment on existing schemes covering skill, vocational education, labour market scenarios, health and women and child development. The analysis unearths reasons for declining labour force participation especially for female populace in rural areas linking it to structural transformation of rural economies and lack of women oriented work in the vicinity of hometowns and other circumstantial social factors.
- ◆ **Physical Infrastructure** assessment highlights the role of new and renewable energy sources in facilitating rural transformation by access to off-grid renewable power and seising untapped potential of mini grids. Nevertheless, it underlines inefficiencies in local distribution network and economic of scale as hindering factors.
- ◆ **Environmental Sustainability** interventions under the 12th Five-year plan are assessed with the economic growth juxtaposed with inter-generational equity. The assessment covers an array of schemes under Land, Water, Mineral Resources, and, Environment, Forest, and Wildlife.

**Table 3.5.1 Summary of the Review of 12<sup>th</sup> Five-Year Plan by NITI Aayog**

Area of Evaluation	Key Findings
Initiatives under Environment, Forest, and Wildlife	Core Indicators: Increase in Green Cover; Augment Renewable Energy Capacity; Reduction in GDP emission intensity  Envisioned Programmes: Central and State level inter-ministerial standing committee and working groups Amendments to Environment (Protection) Act, 1986 with proposal to upwardly revise penalties Online Single-Window system to improve environmental, forest, and wildlife clearance mechanisms National information grid for biodiversity, ecology, and environment data Autonomous agency for NTFP sector with branches in all States/UTs Institutional mechanism for efficient utilisation of proposed Compensatory Afforestation Fund Bill
Recommendations	National and State Environment and Forestry Councils to monitor environmental impact of development projects

Area of Evaluation	Key Findings
	National Environment Restoration Fund from voluntary contributions, user fees for access to specified natural resources, and penalties levied from environmental violations. Strengthening of Participatory Forest Management with capacity building measures. Upgrading socio-economic status of village-level JFMC for sustainable forest resource extraction especially NTFP

Source: Appraisal Document of 12<sup>th</sup> Five-Year Plan 2012-17, NITI Aayog

- ◆ **Rural Transformation** examination of strategies aimed to improve rural economy and quality of life through multi-sectoral approach of supporting non-farm employment, rural tourism, ICT, entrepreneurship, financial inclusion. It purports the pressing need for de-risking agriculture sector and making it more remunerative.

**Table 3.5.2 Scheme Specific Recommendation based on the 12<sup>th</sup> Five-Year Plan Review**

Schemes	Recommendations
MGNREGA	Focus on productive work with asset creations and sustainable agriculture and allied activities. Expand coverage of vulnerable household with special Schedule of Rates for activities on land and homesteads owned by SC/STs, marginal farmers, Forest Rights Act and IAY beneficiaries. Address the growing gap between projected labour availability and actual work demand
NRLM	Ambitious targets unlikely to be achieved based on current status Address issues on transition from SGSY; Mission architecture, human resource availability, social capital.

Source: Source: Appraisal Document of 12<sup>th</sup> five-year Plan 2012-17, NITI Aayog

ii) Three Year Action Agenda (2017 – 18 to 2019 – 20)

The Three-Year Action Agenda is a stepping-stone toward a holistic development path replacing the traditional Five-Year Plan policy under the erstwhile Planning Commission’s substitution with NITI Aayog. The fast paced Action Agenda is a part of the three-phased policy implementation approach involving a Seven-Year Strategy and 15-Year Vision document. It sets an ambitious policy implementation process spanning across sectors of Indian economy viz. agriculture, manufacturing, industry, and services by examining the positive externalities of India’s economic growth story. It proposes a series of contextual strategies aimed to evaluate the economic transformation (revenue vs. capital expenditure linked to functional classifications of priority sectors), rural transformation, and regional strategies through key growth enablers namely Infrastructural Development, Digital Connectivity, Public-Private Partnerships, Energy, Science & Technology, and a collaborative Innovation Ecosystem. While, the Action Agenda is a strong proponent of skill based interventions to meet sector specific objectives such as Doubling Farmers’ Income by 2022; Job Creation to address Underemployment; and meeting the needs of the Social Sector, it offers compelling proposals to address pressing concerns around Rural Transformation, Regional Development (North East Region, Northern Himalayas, Coastal Areas, and Desert and Drought Prone regions), and Sustainability. The following is a tabular representation of the agendas’ recommended interventions specific to Northern Himalayan Region (J&K, Uttarakhand, and Himachal Pradesh), Rural Development, and Sustainability.

**Table 3.5.3 Regional Strategies for Northern Himalayans States (Jammu & Kshimir, Himachal Pradesh and Uttarakhand)**

Particulars	Outline
States Characteristics	Harsh Weather, Poor Connectivity, Low Land Availability, Inaccessible Terrain
	High Per Capita Income - HP: INR 54,494; National Avg: INR 39,904
	Infrastructure - HP: 2.53 km of highway length per 100 sq km; National Avg: 2.42 km
Key Focus	Balanced Regional Development Agenda to facilitate delivery of public services
Education and Skill Development	Centre of Excellence to support knowledge upgrade and climate change sensitisation
	Courses on Mountain Hospitality, Tourism, Sustainable Economic Development, Mountain specific Planning Administration, Engineering, and Social Sciences
Alternative Industry	Comparative Advantage in promising sectors - Animal Husbandry, Fruits & Timber, Floriculture
Regulations	State Level Plan for development projects' by products such as construction waste, excavated earth
	Approval for infrastructural projects entailing forestland diversion from 5 ha to 10 ha
<b>Rural Development</b>	
Challenges	Job creation, access to skill, education, health facilities, water, and sanitation, local governance, financial inclusion
Strategies	Reorientation of social subsidies to increase beneficiaries' economic agency and independence
	Improved delivery mechanisms for better social outcomes - Direct Benefit Transfer VS Open-ended Schemes
Digital Connectivity	Digital India Campaign
	Enabling Infrastructure for Connectivity in Rural and Remote Areas
	Affordable devices and data plans; uninterrupted electricity and mobile network
Energy	PM Ujjwala Yojana
	Access to clean, reliable, and affordable energy
	Eliminate Black Carbon by 2022 through LPG Distribution and Uptake, Biomass Palletising Unit, Forced Draft Efficient Biomass Chullas, modest subsidies
	Revised Solar irrigation pump distribution target with credit support from NABARD
	Strengthen residential off-grid capacity with a remunerative net-metering policy
Advance Small Hydro Power target of 5,000 MW by 2022 to 2019-20	
<b>Sustainability</b>	
Environment and Forest	Generally Accepted Standards to measure impact and effectiveness of programmes
	Open-Source application and back-end database for local forest managers to document activities
	Remove restrictions on regulation for private lands for felling, transport, and sale of trees to promote tree crop cultivation, long-term investments in community managed forests and JFM, and exotic monoculture
	Incorporation of mitigation measures for liner projects at all stages of planning, construction, and maintenance
	Invasive species control

Source: Three Year Action Agenda (2017-18 to 2019-20), NITI Aayog

## (2) Forest Sector Plan

HPFD envisions SDG as a vision document and among the above 17 SDG, goal No. 15 emphasises on protection, restoration and promotion of sustainable use of terrestrial ecosystems, sustainable management of forests, combat desertification, and halt and reverses land degradation and halt biodiversity loss. Preserving diverse forms of life on land requires targeted efforts to protect, restore and promote the conservation and sustainable use of terrestrial and other ecosystems. Main focus of SDG No. 15 is listed below:

- ◆ Managing forests sustainably, restoring degraded lands and successfully combating desertification, reducing degraded natural habitats and ending biodiversity loss.
- ◆ Halting biodiversity loss as many wildlife species are sliding towards extinction.
- ◆ Soil & water conservation
- ◆ Control on poaching and the trafficking of wildlife.
- ◆ Control on smuggling of wild flora
- ◆ Conservation and management of wetlands
- ◆ Conservation of wildlife habitats

In order to achieve the SDG No. 15, 9 targets have been identified. All the targets have been elaborated in **Table 3.5.4**.

**Table 3.5.4 Targets and Indicators Identified to Achieve SDG 15**

Targets	Tentative Indicators
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry lands, in line with obligations under international agreements.	15.1.1 Forest area as a percentage of total land area.
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.	15.2.1 Forest cover under sustainable forest management. 15.2.2 Net permanent forest loss.
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.	15.3.1 Percentage of land that is degraded over total land area.
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.	15.4.1 Coverage by protected areas of important sites for mountain biodiversity. 15.4.2 Mountain Green Cover Index.
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index.
15.6 Promote fair and equitable sharing of the benefits arising from the utilisation of genetic resources and promote appropriate access to such resources, as internationally agreed.	15.6.1 Number of permits or their equivalents made available to the Access and Benefit-sharing Clearing-House established under the Nagoya Protocol on Access and Benefit-sharing and number of standard material transfer agreements, as communicated to the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture.
15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products.	15.7.1 Red List Index for species in trade. 15.7.2 Proportion of detected trade in wildlife and wildlife products that is illegal.
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species.	15.8.1 Adoption of national legislation relevant to the prevention or control of invasive alien species.
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.	15.9.1 Number of national development plans and processes integrating biodiversity and ecosystem

Targets	Tentative Indicators
	services values.
15.9a Mobilise and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems.	15.a.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems.
15.9b Mobilise significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to advance such management, including for conservation and reforestation.	15.b.1 Forestry official development assistance and forestry foreign direct investment.
15.9c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities.	15.c.1 Proportion of detected trade in wildlife and wildlife products that are illegal.

Source: Compiled by JICA Study Team (2017) based on HP Planning Department Website

## CHAPTER 4 FORESTS AND FOREST AREAS IN HIMACHAL PRADESH

### 4.1 Forest Laws and Policies

#### 4.1.1 Legal Regime

The state government of HP has developed policies in forest sector, aligning with the following legal basis directed from GoI and by making important amendments to the previous policies of the state;

- ◆ The Indian Forest Act, 1927
- ◆ The Wildlife Protection Act, 1972
- ◆ Forest Conservation Act, 1980
- ◆ Indian Penal Code, 1860
- ◆ Code of Criminal Procedure, 1973
- ◆ Forest Right Act, 2006

Further detail legal framework for Indian forest sector is summarised in **Attachment I.4.1.1**.

#### 4.1.2 Forest Policy

The state government has developed the Forest Sector Policy and Strategy in year 2005 aligning with GoI policy guidelines and by making important amendments to the previous Himachal Pradesh Forest Policy of 1980. The endeavour of the Forest Sector Policy is to achieve the vision of the Himachal Pradesh Government which aims to harmonise the relations between people and environment.

The Himachal Pradesh Forest Sector Policy and Strategy (2005) has been developed through a dynamic and consultative process where an extensive evidence gathering process has followed primary and secondary sources of data were referred to and a range of stakeholders consultations including the forest department, research institutions, local communities, representatives of PRI, NGO and CBO as well as people's representative. The HP Forest Sector Policy and Strategy 2005 were developed in accordance with the new conceptual framework at national level on forestry management such as participatory forest management as an alternative approach to forest management and is premised on collaboration, decentralisation and democratisation and as a result the forest sector as a whole has become more holistic – recognising multiple use, multiple stakeholders and multiple values.

The HP Forest Sector Policy and Strategy 2005 suggests some specific policy measures with strategies. The essentials of the new policy measures are given in **Table 4.1.1**.

**Table 4.1.1 Main Policy Measures in HP Forest Sector Policy and Strategy 2005**

Category	Main Points/Descriptions
Forest Management	<ul style="list-style-type: none"> <li>- <b>A new classification of forests</b> needs of conservation/ production, aesthetic value of forests and most importantly, the livelihood needs of the communities have been recognised.</li> <li>- While the state government is committed to bringing more area under forest and tree cover, it pragmatically recognises the <b>uniqueness of HP as a hill state and considering the uncultivable, barren land, snow covered peaks -which cannot sustain forests</b>, and has set a target of 35.5% of the total geographical area under forest and tree cover.</li> </ul>



Category	Main Points/Descriptions
	<ul style="list-style-type: none"> <li>- <b>Systematic planning and implementation of afforestation and equally important rehabilitation programme</b> in degraded and open forests and available non-forest lands have been envisaged.</li> <li>- Realising the increasing human and cattle population and increasing demands and commercial needs the <b>rights and concessions in forest areas have to be reviewed in a participatory manner</b> and significantly the right holders will have the responsibility to identify themselves with protection, development and management of forests to ensure the continuity and sustainability of such rights and concessions.</li> <li>- Watershed management is an integral approach for sustainable forest management so that the synergies of concerned departmental and non-governmental organisations need to be promoted through a nodal agency.</li> <li>- The existing forest management systems needs to be reexamined in light of <b>significant shift from tree centric to multiple use base and people centric approach to forestry</b>. Consequently, forest harvesting needs to be based on scientific principles and approved working plans.</li> <li>- <b>Demarcation and settlement</b> still awaits urgent attention of the state which has resulted in maximum encroachment and illegal occupation on forest land. Thus the survey, settlement and demarcation of un-demarcated and unsettled notified forests will be taken up on high priority.</li> <li>- <b>Forest fires, invasive weeds and stray cattle problems</b> have become serious threats to forest and forest based resources and thus measures to control them will be taken up on an urgent basis.</li> <li>- The role of information technology, research and development, a comprehensive HRD strategy and <b>robust monitoring and evaluation systems</b> are the other focus areas.</li> </ul>
Livelihoods/ Industries	<ul style="list-style-type: none"> <li>- It is envisaged that the government will develop <b>incentives to encourage forest based industries</b> and procure raw material for such industries from sources other than government forests.</li> <li>- It is proposed that <b>nature based tourism including wilderness tourism</b> will be promoted in consonance with the ecotourism policy of the state.</li> <li>- It is further recognised that <b>the farming systems needs to be interfaced with forestry</b> to ensure long term viability of rural livelihoods of rural communities and sustainable forests.</li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>- As regards to biodiversity and wildlife management the thrust of new legislations such as the Biodiversity Act, 2002 and the new amendments in the Wildlife Act will be followed where <b>linkage of biodiversity conservation to livelihoods, traditional knowledge systems, equitable benefit sharing and recognising the unique role of women</b> will be the guiding principles.</li> </ul>
NTFP	<ul style="list-style-type: none"> <li>- A special focus on <b>medicinal and aromatic plants</b> as a part of non-wood forest product management in public and private lands would be placed for livelihood security.</li> <li>- A special focus of the policy is the cold desert areas of the state where <b>native medicinal and aromatic plants and cooperative micro enterprises</b> will be promoted.</li> </ul>
Institutional Arrangement	<ul style="list-style-type: none"> <li>- The policy re-emphasises the need for integrating the forest sector into the larger land use planning process.</li> <li>- The requisite institutional support to implement the new forest sector policy has also been outlined. A key feature of the support is the <b>strengthening and re-constitution of an independent, autonomous and multi-sectoral Centre for Policy and Planning</b>.</li> <li>- A good policy is one which is supported by <b>enabling legal instruments</b>. The policy also delineates specific legal and administrative measures and changes that are required to support the new forest sector policy. It also includes the efforts to promote <b>cross-sectoral collaborative mechanism</b> and converges extra sectoral policy influences.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on HP Forest Sector Policy and Strategy (2005)

#### 4.1.3 Major State Level Laws and Policies related to Forest Management and Forest Products

Major state laws and policies related to forest management and forest products are summarised in **Table 4.1.2**.

**Table 4.1.2 Major State Level Laws and Policies related to Forest Management and Forest Products**

Law/ Policy	Description
Himachal Pradesh Forest Produce Transit (Land Routes) Rules, 2013 and Amendment Rules, 2014, 2017	<p>No person is allowed to transport forest product, other than fuelwood, khairwood, bamboo, charcoal, medicinal plants, grass, other plants including bark, leaves, flowers, fruits, cones and seeds. In case any person which to transport such produce by land routes, s/he shall have it registered and obtain a transit pass at the office of Divisional Forest Officer.</p> <p>The Amendments include modifications to Schedule-I wherein forest product obtained from specified species growing on private land would be exempted from the requirement of Transit Pass, while in Schedule-II a list of forest product and their respective permit fee is elucidated.</p> <p>Any person felling tree either for domestic, agricultural, commercial or public purposes shall plant 3</p>

Law/ Policy	Description
	trees in lieu of 1 tree felled.
Himachal Pradesh Forest (Timber Distribution to the Right Holders) Rules, 2013 and Amendments 2015 and 2016	Timber shall be granted to the right holders who have their recorded rights in the concerned Forest Settlement Reports for grant of Timber for construction, repair and additional or alteration of residential house, cow shed for domestic use. The Rules also specified the quantity, periodicity, rates and procedure for grant of trees. (Details covered in <b>Section 4.12</b> )
PFM Regulations Regulating the Grant in-Aid to the village Forest Development Societies 2002	<p>The purpose of Grant-in-aid is for the furtherance of objectives of PFM and its implementation through the Societies.</p> <p>The assistance in the shape of Grant-in-Aid would be meant for expenditure on plantation &amp; pasture improvement, soil &amp; water conservation, income generation activities, maintenance, fencing, protection etc., subject to the availability of funds, and based on such norms and for such other purposes, as may be decided by the Govt. from time to time.</p> <p>All Grant-in-aid disbursed will be funded by transparent norms, framed in advance, to govern not merely the unit of cost of different activities, but to also specify maximum costing for amounts for different activities and individual Societies would be entitled to.</p>
Himachal Pradesh Participatory Forest Management Regulations 2001	<p>These Rules apply to Government forests and such Government lands including the common land; that will be selected jointly for participatory forest management by the Society and the Forest Department.</p> <p>Village Forest Development Society will be formed for a Gram Panchayat Ward, and registered under section 3 of the Societies' Registration Act, 1860. (Act No. 21 of 1860).</p> <p>Society shall be entitled to (a) collect the yield such as fallen twigs, branches, loppings, grass, fruits, flowers, seeds, leaf fodder and non-timber forest products free of cost; (b.) sell proceeds of all intermediate harvest, subject to protection of forest and plantations; (c.) organise and promote vocational activities related to forest product and land; and other activities such as promotion of self-help groups which may provide direct benefits, including micro-lending to women; (d.) recorded rights over the forest shall not be affected by these benefits; (g.) after 20 years from the date of agreement and, based on the principles of sustained forest management, 75 percent of the net sale proceeds from the selected area shall be put into the account of Society and the remaining 25 percent of the net sale proceeds shall go to the concerned Gram Panchayat; and (h.) to utilise at least 40 percent of the net sale proceeds on forest regeneration activities including soil and water conservation.</p>
The Himachal Pradesh Forest Fire Rules, 1999	<p>The HP Fire Rules Prohibits the following:</p> <p>(1) within one hundred meters from a forest without the permission of Divisional Forest Officer, or his authorised representative; (2) Any person lighting a fire even beyond on hundred meter from the boundary of a forest shall take precautions, by clearing a fire path, not less than 10 meters in width between such place and such boundary, of by employing watchers or otherwise, to prevent the fire from spreading.</p> <p>The Rules also regulate camping activities not to endanger the forest or any building, shed and property at the camping place.</p>
Transit Rule Notifications	<p>With the powers conferred under sub section (2) of section 2 of the Indian Forest Act, 1927, the Governor, Himachal Pradesh appoints Pradhans of the Gram Panchayats in Himachal Pradesh as Forest Officer to carry out the purpose of rule 11 of the Himachal Pradesh Forest Produce Transit (Land Routes) Rules, 1978 for the issuance of pass for transport of minor forest product collected from the forests in the concerned paychayats under to the conditions that the provisions of the Himachal Pradesh Forest Produce Transit (Land Routes).</p> <p>That the Pradhans of the concerned panchayats shall issue pass for the item/species to this Notification as per export fee after verifying that the species are not banned for export and that the species are extracted from the prescribed area in the approved extraction cycle and that the extraction has been done in a sustainable manner and has not caused any ecological or environmental damage</p>
State Compensatory Afforestation Fund Management and Planning Authority (CAMPA)	<p>In compliance to the instructions contained in Ministry of Environment and Forests, Government of India's letter No.1-58/09-MoS(I/c)-E&amp;F dated 15th July 2009, the Governor of Himachal Pradesh reconstituted "State Compensatory Afforestation Fund Management and Planning Authority (CAMPA) as an instrument to accelerate activities for compensatory afforestation, forest resource management preservation of natural forests, management of wildlife, infrastructure development in the sector and allied works.</p> <p>State CAMPA would provide an integrated framework for utilising multiple sources of funding and activities relating to protection and management of forests and wildlife.</p> <p>Its prime task would be regenerating natural forests and building up the institution engaged in this work. The State Forest Department would be modernised to protect and regenerate the forests and wildlife habitat.</p>
HP Forest FRA Rules,	The Gram Sabhas shall be convened by the Gram Panchayat and in its first meeting it shall elect

Law/ Policy	Description
2008	from amongst its members, a committee of not less than ten but not exceeding fifteen persons as members of the Forest Rights Committees, wherein at least one-third members shall be the Scheduled Tribes and not less than one-third of such members shall be women. In case there are no Scheduled Tribes, at least one-third of such members shall be women. The Forest Rights Committee shall decide on a chairperson and a secretary and intimate it to the Sub-Divisional Level Committee.
Himachal Pradesh Forest (Sale Of Timber) Act, 1968 The Himachal Pradesh Forest (Sale Of Timber) Rules, 1960	Any person wish to establish or maintain a depot shall register the same in the office of the Forest Division. Every person registering a depot shall be and remain responsible for the observance of all rules which may from time to time be notified by the Himachal Pradesh Government under section 3 of the Himachal Pradesh Forest (Sale of Timber) Act, 1968, The Divisional Forest Officer, with the approval of the Conservator, may exempt by order in writing any timber dealer from the operation of such rules as he may consider necessary.
Himachal Pradesh Resin and Resin Products (Regulation of Trade) Act, 1981	An Act in the interest of the general public for the carrying on by the State of the trade of purchase and distribution of resin, and for the regulations of manufacture and preparation of various articles based on resin.
The Himachal Pradesh Land Preservation Act, 1978	An Act to provide for the better preservation and protection of certain portions of the territories of Himachal Pradesh Whenever it appears to the State Government that it is desirable to provide for the conservation of sub-soil water or the prevention of erosion in any area subject to erosion or likely to become subjected to erosion, the State Government may, by notification published in the Official Gazette, make a direction accordingly
Himachal Pradesh Private Forest Act and Rules 1969	An Act is to provide for the conservation of Private Forests. The State Government may, by notification and such conditions as may be imposed by the Forest Officer concerned, prohibit the cutting, felling, grid ling, lopping, burning, stripping off the bark or leaves or otherwise damaging any tree or counterfeiting or defacing marks on trees or timber in such private forest. Demarcation of private forests: every private forest shall be demarcated in accordance with the revenue records, and shall erect boundary pillars at the expense of the Government.

Source: Compiled by JICA Study Team (2017) based on information indicated below:  
<http://hpforest.nic.in/pages/display/NjVzZDRiNHhkZmE=-actsrules>, <http://desthp.nic.in/notifications.html>,  
<http://hppcb.gov.in/>

#### 4.1.4 Major State Level Laws and Policies related to Wildlife and Biodiversity

Major state level laws and policies related to wildlife and biodiversity under wildlife department are described in **Table 4.1.3**.

**Table 4.1.3 Major State Level Laws and Policies related to Wildlife and Biodiversity**

Law/ Policy	Description
The Wildlife Protection Act, 1972	Subject related to wildlife and its conservation in India draws strength from Article 48-A of 'Directive Principles of State Policy under the Constitution of India, which states that "the state shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country". The Constitution vide Article 51-A (g), specifying fundamental duties of the citizens of India, states that "it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures. The primary law governing matters related to wildlife in the country is the Wildlife (Protection) Act, 1972. The state of Himachal Pradesh has adopted this Act and its subsequent amendments as the prime legislation to manage and guide wildlife related matters in the state (Source: <a href="http://hpforest.nic.in/pages/display/NHNkZmFohjRmNjVz-wildlife-legislation">http://hpforest.nic.in/pages/display/NHNkZmFohjRmNjVz-wildlife-legislation</a> )
Letter No. Fts (B)-(7)-16/85-II dated 26th October, 1998:- Loss caused by the wild animals to the Personal properties of the public- relief thereof.	The main purpose of this letter is to grant relief to the public on account of losses caused by the wild animals, especially by monkeys as indicated on Section-11(1) (a) and (b) of Chapter-III of the wildlife (Protection) Act, 1972. It reads that "... chief Wildlife Warden or the authorised officer is fully empowered to issue the permit to hunt animals which cause damage to human life or public property (including standing crops or any land)".

Source: Compiled by JICA Study Team (2017) based on information indicated below:  
<http://hpforest.nic.in/pages/display/NjVzZDRiNHhkZmE=-actsrules>, <http://desthp.nic.in/notifications.html>,  
<http://hppcb.gov.in/>

#### 4.1.5 Major State Level Laws and Regulations related to Felling of Trees

The felling of trees over private, forest, non-forest lands is governed under the various acts and rules formulated by the Government from time to time. It has been observed that there is a lack of clarity amongst the field functionaries of HPFD regarding provisions with respect to the felling of trees. Various acts and rules governing felling of trees are summarised in the **Table 4.1.4**.

**Table 4.1.4 State Level Laws and Regulations related to Felling of Trees**

No.	Name of the Act/Rule/ Order from GoHP	Purpose of Felling	Particulars of Authority for Granting Permission	Remarks
<b>A. Private land Not Classified as 'Forest'</b>				
1	HP Land Preservation Act, 1978 & GoHP Order No. FFE-B-A(3)-4/99 dated 10.09.2002	Bonafide domestic and agriculture use	No permission is required up to 5 trees in one financial year in case of broad leaf species including Chir and Ban/Oak and up to 3 trees in case of coniferous species: up to 10 trees with the written permission of the range officer and more than 10 trees with the written permission of DFO concerned.	Where private land adjoins Govt. land demarcation of land is necessary
2	HP Land Preservation Act, 1978 & GoHP Order No. FFE-B-A(3)-4/99 dated 10.09.2002 & Order No. FFE-B-A(3)-4/99-loose Dated 11-11-2013	Felling of trees (except Ban/Oak trees) for sale purpose i.e. under 10 years felling programme	Up to 50 trees DFO concerned, Up to 100 trees –CF/CCF concerned Circle, Up to 200 trees PCCF, HP. Above 200 trees – Govt of HP.	Felling will be done through HPSFDCL. In case of nationalised species.
3	HP Land Preservation Act, 1978 & GoHP Order No. FFE-B-A(3)-4/99 dated 29-04-2003 & Order No. FFE-B-F(1)1/2010-11-Dated 03-02-2011 & Order No. FFE-B-A(3)4/1999-1 dated 16-10-2014	Felling of exempted species which requires no permission	Albizia, poplar, bahunia, eucalyptus, mulberry, siris and bamboo japanese shahtoot. In case of bamboo, three years felling programme are approved by DFO.	Where private land adjoins Govt. land demarcation of land is necessary
<b>B. Private land Classified as Forests e.g. Bani, Ban &amp; Jungle, Jungle Jhari etc.</b>				
1	Forest Conservation Act, 1980	The case shall be required to be processed under forest conservation Act. 1980. Felling in this category will be granted by DFO after processing the case under F.C. Act 1980 and getting its approval.		
<b>C. Government land not Classified as Forest I.e. Non-Forest land Including Land Owned By Other Departments Including Acquired width of PWD/NHAI</b>				
1.	GoHP Letter No. FFE-(B)F(13)53/2006-1 dated 20-08-2011	Felling of trees (except Ban/oak) from non-forest land in rural areas for developmental activities which is not forming compact wooded block of above 5 ha, and land is not classified as Van, Bani, and jungle etc. in Revenue Record.	Chief conservator of forests/Conservator of forests of concerned circle will grant felling permission.	DFO Concerned shall inspect these trees and after obtaining approval from CCF/CF the felling will be done through HPSFDCL
2	GoHP letter No. Fts(F) 13-38/84 dated 11-02-1986	Felling of Ban/Oak trees	There is complete ban on felling of Ban/Oak trees. In case felling is necessary for developmental purposes such as construction of Roads, Hydro Projects, Irrigation lines and construction of hospitals, Schools, Universities etc. same will be accorded by Government.	
<b>D. Government land Classified as Forests.</b>				
1	Forest Conservation	Felling of trees from	After seeking approval of diversion	Felling of

No.	Name of the Act/Rule/Order from GoHP	Purpose of Felling	Particulars of Authority for Granting Permission	Remarks
	Act, 1980 & GoHP letter No. FFE-B-A(3)-3/2015 dated 08-07-2015	diverted forest land where final approval has been granted by Govt. of India u/s 2 of FCA 1980	proposal by State /Govt. of India, Permission of felling over diverted forest land as per GoI sanction is given by DFO concerned. (Full Powers)	trees will be done through HPSFDCL
2	The Schedule tribes and other traditional forest Dwellers (Recognition of forest Rights) Act, 2006; GoHP letter No. FFE-B-A(4)-1/2015 dated 17-02-2016 and MoEF, GoI letter No. 11-09/1998-FC(Pt.) dated 08-11-2016	The provisions of sub-section (2) of section 3 are applicable which provide for diversion of forest land for certain facilities managed by the Govt.	Felling permission to be given by DFO only when the number of felling trees does not exceed 75 trees per hectare and satisfy the following conditions; The forest land to be diverted for the purposes mentioned below is less than one hectare in each case: and The clearance of such developmental projects shall be subject to the conditions that the same is recommended by the Gram Sabha. - School - Dispensary and Hospitals - Anganwadis - Fair Price shop - Electric and Telecommunication lines - Tanks and other minor water bodies - Drinking water supply and water pipelining - Water or Rain water harvesting structures - Minor irrigation canals - Non-conventional source of energy - Skill up-gradation or vocational training centres - Roads - Community centres - Community toilets	-do-
E. Urban areas				
1	Municipal Corporation Act, 1994 GoHP letter No. FFE-B-F(13)53/2006-1 dated 20.08.2011.	Felling of trees which are either causing danger to life and property or mandate requirement for developmental activities in Municipal corporation Shimla area	Permission to be granted by cabinete sub-committee headed by the Hon'ble Forest Minister on recommendations of Tree authority constituted under the Chairmanship of Mayor of Corporation, Deputy Commissioner concerned will grant felling permission in the limits of Municipal/NAC areas except Municipal Corporation Shimla	Felling of trees will be done by HPSFDCL

Source: Compiled by JICA Study Team (2017) based on Order of the state government of HP (No. FFE-B-A(3)-4/99-I dated 15-Mar-2017)

#### 4.1.6 Laws and Policies on Scheduled Castes and Scheduled Tribes

The “Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006” recognises and bestows forest rights and occupation in the forest land to the STs and other traditional forest dwellers (OTFDs), who have been living in the forests for generations. The Act provides a framework to record their rights and the nature of evidence required for such a recognition in respect of forest land. The Act confers on the forest dwelling ST and OTFDs with the responsibility and authority for sustainable use, conservation of biodiversity and maintenance of ecological balance, strengthening the conservation regime, and ensuring livelihood and food security.

Article 366 (25) of the Indian constitution refers to STs as those communities who are scheduled in accordance with Article 342 of the Constitution. According to Article 342 of the Constitution,

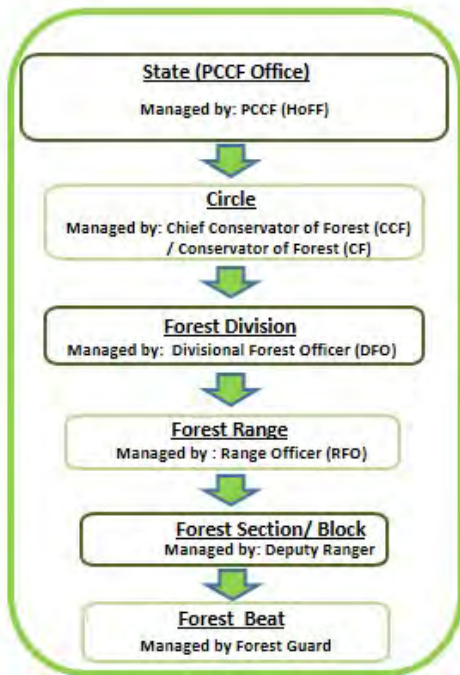
STs are the tribes or tribal communities or part of or groups within these tribes and tribal communities which have been declared as such by the President through a public notification. Classification of a tribe would depend on the status of that tribe in the respective state. Further the Fifth and Sixth Schedule of the constitution provides special provision for tribals in the selected regions of the country.

- ◆ *Fifth Schedule of Constitution (Article 244)*: Provides for the administration and control of Scheduled Areas and Scheduled Tribes. Article 244 (1) and Article 244 (2) of the Constitution of India enables the government to enact separate laws for governance and administration of the tribal areas.
- ◆ *73rd Amendment of Constitution, 1992*: Enables participation of Panchayat level institutions in decision-making and supporting in the preparation and implementation of development schemes.
- ◆ *Panchayats (Extension to Scheduled Areas) Act, 1996*: The Provisions of the Panchayat (Extension to Scheduled Areas) Act (PESA), lays down a process to be followed for acquisition of land in Schedule Fifth areas. The Act under the subsection (1) of section 4 provides for mandatory consultation with the Gram Sabhas, even if single person is affected by the proposed Project.
- ◆ *The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006*: The act recognises and vests the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who has been residing in such forests for generations but whose rights could not be recorded. The act provides a framework for recording forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land.
- ◆ *The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013*: Fair compensation for acquisition of movable assets; Resettlement and economic rehabilitation of displaced population due to involuntary land acquisition.

## **4.2 Forest Administration**

### **4.2.1 Institutional Setup of HPFD**

HPFD operates through wing/ offices and autonomous bodies within the umbrella of the HP State Government. HPFD is headed by the Principal Chief Conservator of Forest (Head of Forest Force: PCCF (HoFF) and comprised of the forest (territorial) wing, wildlife wing and direction (functional) offices. The Himachal Pradesh State Forest Development Corporation Limited (HPSFCDL) acts as the commercial wing of the Department and discharges the function of disposing various forest products like timber, bamboo, resin, NTFPs, etc.



Source: Prepared by JICA Study Team (2017) based on information from HPFD

**Figure 4.2.1 Administrative Hierarchy of Forest Administrative Units in HPFD**

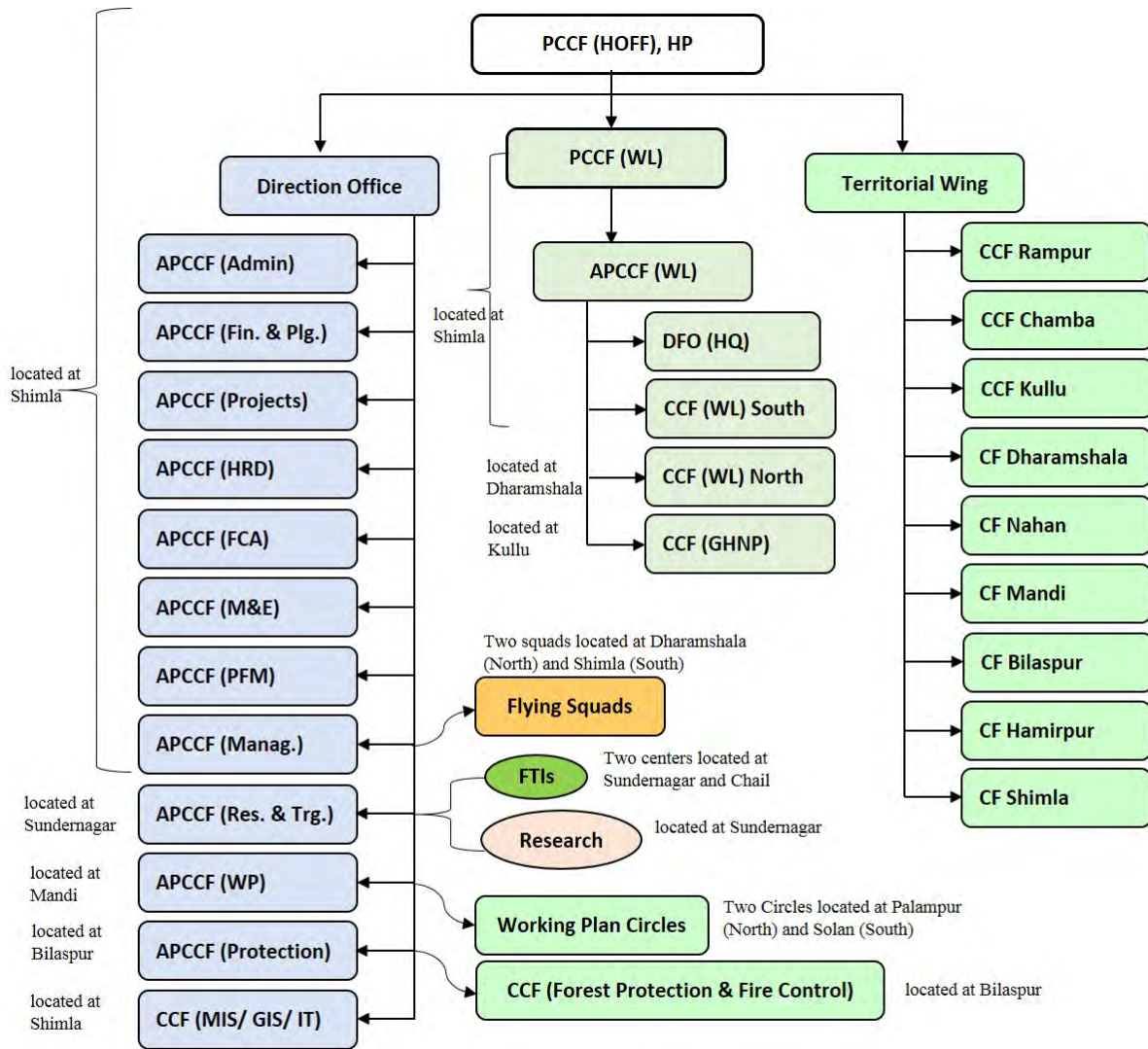
The state has 9 forest circles and 37 territorial forest divisions<sup>1</sup> under the PCCF(HoFF), and 3 forest circles and 7 wildlife divisions with under the PCCF (Wildlife) cum the chief wildlife warden. The forest administrative units under divisions are further divided into “ranges”, “sections/blocks” and then to “beats”. Each level of forest administrative units is managed by different ranks of HPFD officers as described in **Figure 4.2.1**.

In total, 44 divisions (37 territorial divisions and 7 wildlife divisions), 197 ranges (167 territorial ranges and 30 wildlife ranges), 560 blocks (493 territorial blocks and 67 wildlife blocks) and 2,033 beats (1,840 Territorial Beats and 193 Wildlife Beats) exist within HPFD as of July 2017.

Boundaries of forest administrative units are set normally based on areas and locations of notified forest areas. Therefore, these boundaries do not always match with those of general administrative units of HP state. For instance, district boundaries and forest division boundaries do not correspond each other.

The overall administrative structure of HPFD is described in **Figure 4.2.2**.

<sup>1</sup> This consist of 36 territorial divisions which prepare the working plan (section 4.10.1 of this report), and Shimla Urban division which currently does not prepare the working plan. The Shimla Urban Division is also influenced by HP Municipal Cooperation Act 1995 and its status as the division under HPFD or under the municipal cooperation changes from time to time depending on changes in policy of state government administration.



**Abbreviations:**

Admin - Administration; Fin.&Plg.- Finance & Planning; HRD - Human Resource Development; FCA - Forest Conservation Act; M&E - Monitoring & Evaluation; PFM - Participatory Forest Management; Manag.- Management; Res.&Trg. - Research & Training; WP - Working Plan; MIS - Management Information System; GIS - Geographical Information System; IT - Information Technology; HQ - Headquarters; GHNP- Great Himalayas National Park; FTI - Forest Training Institute

*Note: Actual positions and designations are not always the same as what indicated at the above.*

*Source: HP Forest Department; Created by: JICA Study Team, June 2017*

**Figure 4.2.2 HPFD Overall Administrative Structure**

In addition to the offices indicated above, HPFD has other functional offices in operation, like APCCF (Ecotourism & Publicity), APCCF (CAT Plan) at Shimla, etc.

**4.2.2 Human Resources of HPFD**

The HP Forest Department human resource have been sanctioned as per the requirement and priorities of the state. Currently, around 17% positions are vacant in IFS cadre and around 16% positions are vacant in State Forest Service. Position-wise staff strength is depicted in the **Table 4.2.1**.



**Table 4.2.1 Status of Officers and Supporting Staff of HPFD as of January 31, 2017**

No.	Name of Category	Sanctioned Strength	In Position	Vacant	Remarks
<b>A Forest Officers</b>					
1	IFS	114	95	19	Requisition has been submitted to Administrative Department (AD) of HP state government
2	HPFS	160	135	25	Out of 25 vacancies, 10 posts go to direct quota for which requisition has been submitted to Himachal Pradesh Public Service Commission (HPPSC) through AD to fill-up 8 (duly sanctioned) posts through direct recruitment
<b>Other Officers</b>					
1	District Attorney	1	1	0	
2	Deputy Controller (F&A)	1	1	0	
3	Section Officer (F&A)	2	2	0	
4	XEN (Forests)	2	2	0	XEN- Executive Engineer
5	Registrar	3	1	2	The matter is under process at the level of AD.
<b>B Front Line staff</b>					
1	Range Forest Officer (RFO)	296	132	102	Out of 164 vacancies 102 vacancies goes to direct recruitment quota. Out of which process to recruit 50 RFOs is underway. Remaining posts of direct recruits will be filled up in a phased manner.
2	Deputy Ranger	801	783	18	All The CCF/CFs have been requested to convene the Departmental Promotion Committee (DPC) meetings and the results of the meeting are sent to this office for further action.
3	Forest Guards	2581	2407	174	Requisition to fillup-174 vacancies (likely- vacancies up to 31.12.2017) have been submitted to AD for favour of Govt. sanction.
<b>C Ministerial staff</b>					
1	Superintendent Grade-I	23	21	2	The matter is under process at the level of AD.
2	Superintendent Grade-II	127	127	0	
3	Senior Assistant	219	214	5	
4	Clerks	445	238	207	
<b>D Personal staff</b>					
1	Private Secretary	1	1	0	
2	Personal Assistant (PA)	10	10	0	
3	Sr. Scale Stenographers	13	12	1	
4	Drivers	83	76	7	
<b>E Other supporting staff</b>					
1	Forest Map Officer	1	1	0	
2	Assistant Engineer	5	5	0	
3	Veterinary Doctor	1	8	(+7)	Addl. 7 posts of Vet. Doctors have been filled up on secondment basis
4	Forest Statistician	1	1	0	
5	Surveyor	5	1	4	
6	Junior Draftsman (JDM)	11	7	4	
7	Draftsman (DM)	9	4	5	
8	Head Draftsman (HDM)	13	12	1	
9	Patwari	16	8	8	A government official who keeps records regarding the ownership of land
10	Kanungo	25	17	8	Senior position to Patwari
11	Naib Tehsildar	8	5	3	Executive Magistrate of a Tehsil
<b>F Class-IV staff</b>					
1	Peon	419	414	5	
2	Chowkidar	250	269	(+)19	Watchman
3	Mali	158	215	(+)57	Gardner

Source: JICA Study Team (2017) based on the information from HPFD

The frontline staff forms the backbone of the forest operations. **Table 4.2.2 and 4.2.3** provides the sanctioned strength and the likely vacancies by position and years.

**Table 4.2.2 Functional Offices under HPFD**

Sanctioned strength	RFO	Deputy Ranger	Forest Guards
Number of staff	296	801	2,581

Source: JICA Study Team (2017) based on the information from HPFD

Likely vacancies that may occur in HPFD during the next five years due to retirements or promotions to the higher rank are tabulated as under:

**Table 4.2.3 Number of Vacant Positions under HPFD by Year**

Year	Available against sanctioned strength			% of vacant position		
	RFO	Deputy Ranger	Forest Guards	RFO	Deputy Ranger	Forest Guards
2015	91	22	54			
2016	99	47	74			
2017	108	46	90	36%	6%	3%
2018	112	14	55	38%	2%	2%
2019	122	11	71	41%	1%	3%
2020	129	5	79	44%	1%	3%

Source: JICA Study Team (2017) based on the information from HPFD

The recruitment for the position of forest guards is under way. As per the available information in Year 2017, the number of vacancies of the level of ranger would be 36% that would further increase to 44% by year 2020. However, at the level of deputy ranger, the vacancy in year 2017 would be 6% that would further get reduced to 1% by 2020. Similarly, at forest guard level the vacancy in year 2017 is around 3% that would more or less continue at same level till 2020.

### 4.2.3 Training Mechanism of HPFD Staff

A need to train the frontline staff particularly, particularly lower subordinate staff i.e. below range officers within the state itself was felt. This led to the inauguration of the lower subordinate training school at Junga in the year 1949. The Forest Training School was finally shifted to Chail on 15th April 1968 and has been functioning since then. Later, Forestry Training Centre, Sundernagar was established in September 1993 for training front line staff (FLS) of HPFD in forestry and related disciplines.

The two training institutes conduct both regular courses as well as short-term specialised courses. Some of the regular courses are:

- ◆ Course for newly recruited range forest officers, sponsored by DFE Dehradun, Government of India (18 months)
- ◆ In-Service training of forest guards (5 ½ months)
- ◆ Induction courses for newly recruited forest guards (45 days)
- ◆ Orientation course for newly recruited forest guards (3 weeks)
- ◆ Core forestry course newly recruited forest guards (9 weeks)
- ◆ Advance course newly recruited forest guards (6 weeks)

Some of the short-term specialised/ customised courses that are conducted by the FTI's are: a) training of trainers, b) zoo management, c) gender sensitisation, d) micro-planning, e) forest accounts, f) wildlife census, g) forest fire prevention, h) management and conservation of NTFP/medicinal herbs, i) watershed management, j) participatory resource management techniques, k) formation and management of SHGs, l) nature awareness training camps, m) computer training for ministerial staff, and r) orientation courses for HPFS and RFOs etc.

FTI can design & conduct customised and tailor-made courses as per the study needs of the concerned agencies. FTI comprises of experienced faculty members. Director, deputy directors, assistant directors and physical training instructor to provide trainings. To make training more effective, experts within and outside the department are regularly invited to deliver special lectures. FTI is well equipped with infrastructure, equipment and facilities.

#### 4.2.4 Budget of HPFD

The practice of classifying expenditure budget as Plan and Non-Plan in the budget documents was introduced from the 1<sup>st</sup> Five-Year Plan in 1951. With the government moving away from the system of five-year plans from the coming financial year i.e. 2017-18, the distinction between Plan and Non-Plan is soon going to be a thing of the past. With the unveiling of Union Budget for FY 2017-18, all expenditure from now will be reported together.

Plan expenditure has included spending incurred on programmes and schemes of the government detailed under the prevailing Five-Year Plan: it included all kinds of expenditure on schemes, whether on Recurring, or Revenue or Capital heads. Whereas Non-Plan expenditure are referred to outlays on routine functioning of the government like Interest payments, subsidies, salary and pension payments (for regular cadre staff across sectors), police, defence, expenditure on maintenance of assets or infrastructure across sectors. The budget provisions and expenditures of HPFD from financial year 2011-12 till 2016-17 are given in **Table 4.2.4**.

**Table 4.2.4 Forestry Sector Budgets**

Financial Year	Budget*	Expenditure*		Total Expenditure	Expenditure%	
		Plan	Non-Plan		Plan	Non-Plan
2011-12	5,856.8	1,535.5	4321.3	5,856.8	26%	74%
2012-13	3,910.7	2,358.8	1551.9	3,910.7	60%	40%
2013-14	4,399.1	1,828.0	2571.1	4,399.1	42%	58%
2014-15	4,495.0	1,747.8	2747.2	4,495.0	39%	61%
2015-16	4,305.8	1,680.5	2625.3	4,305.8	39%	61%
2016-17**	4,023.6	1,296.1	2,727.5	4,023.6	32%	68%
Total	26,991.0	10,446.7	16,544.3	26,991.0	39%	61%

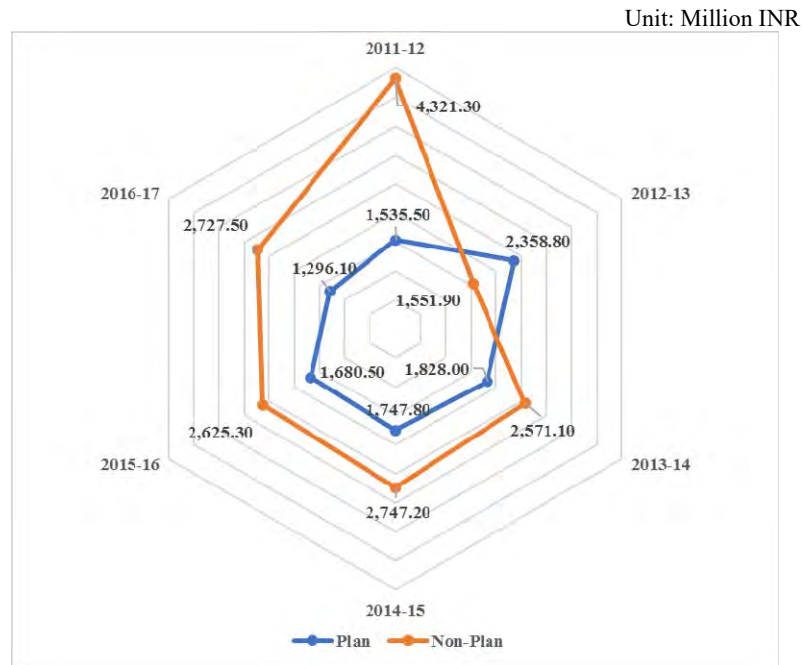
\* Amount in INR million

\*\*<http://admis.hp.nic.in/budget/Aspx/Anonymous/BudQry.aspx> accessed on June 29, 2017

Source: HP Forest Department;

As depicted from the **Figure 4.2.3** the plan expenditure has exceeded non-plan expenditure in year 2012-13, else the non-plan has always been exceeding over the plan expenditures. Thus, taking lessons from the past, the new system introduced for budget allocation and reporting will be a step to achieve an important objective of development planning that may perhaps address the disparities faced by backward regions and disadvantaged sections through channelling additional

public resources for them and achieving balanced development. Decentralised planning is the most important strategy in planning for socio-economic development. Thus, strengthening of District Planning Committees, that are constitutionally mandated to prepare development plans, is urgently required. These important objectives need to be integrated into the budgeting process in the new budgetary classification.



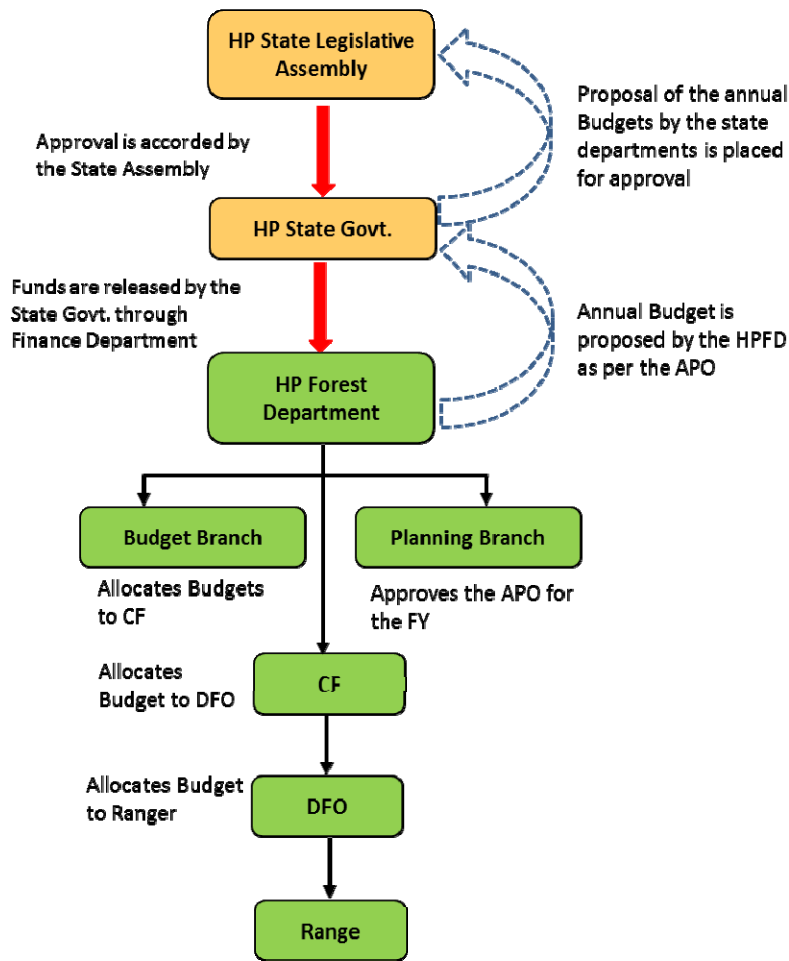
Source: JICA Study Team (2017) based on HPFD

**Figure 4.2.3 Web Diagram of HPFD Expenditure Over Six Financial Years**

#### 4.2.5 Financial Procedure of HPFD

As a regular departmental functioning within the state government, funds are provided to HPFD by way of state budgetary provisions, and government treasury system is followed for payments of defined expenditure account heads. Such system, though robust, usually require longer time to complete financial transactions. Also, the unused funds are surrendered by respective cost centres at the close of the financial year i.e. March 31 every year, and fresh allotment of budget is made for next financial year.

As per the State Financial Rules 2009, heads of the departments shall arrange monthly accounts from his subordinate officers, and return the forms to the treasury or bank after the prescription in order to claim the expenses. And the document shall be compared with the credit statements furnished by the Accountant General to check that the reported amounts have been duly accounted for.



Source: HP Forest Department; Created by: JICA Study Team, June 2017

**Figure 4.2.4 Fund Flow of HPFD from the State Government**

As per Rules, the Accountant General shall send a monthly statement showing the expenditure vis-à-vis the budget provision under the various heads of accounts, in the prescribed proforma, to heads of the departments responsible for overall control of expenditure, against grant of the department as a whole. The figures so communicated by the Accountant General shall be compared by heads of the departments with those consolidated in the prescribed form and differences, if any, shall be taken up by heads of the departments with the Accountant General for reconciliation. Head of the department shall furnish a quarterly certificate to the Accountant General certifying the

correctness of the figures for the quarter by the 15th of the following month after the end of quarters April-June, July-September, October-December and January-March.

Figure 4.2.4 depicts the flow of funds from the state government to the lowest level of operation of HPFD.

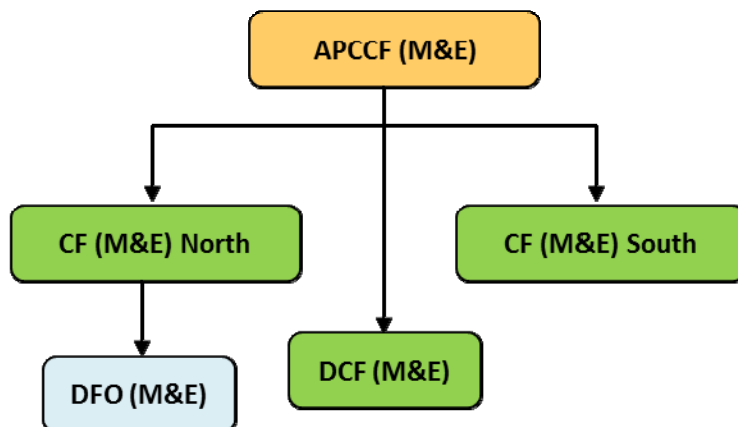
#### 4.2.6 Monitoring and Evaluation in HPFD

The mandate of the Monitoring and Evaluation (M&E) established within HPFD is as follows:

- ◆ M&E of all developmental works (under all state and centrally sponsored schemes including CAMPA)
- ◆ Ensuring mandatory field inspections by field functionaries and compilation of such reports
- ◆ Providing plantation evaluation data to Statistical Cell of HPFD for compilation of Plantation Brochure.

For carrying out monitoring and evaluation exercise, the state has been divided into two circle North and South. The North circle has jurisdiction over Bilaspur, Chamba, Dharamsala and

Hamirpur territorial circles while the jurisdiction of South circle is spread over Kullu, Mandi, Nahan, Rampur and Shimla territorial circles. Please refer to **Figure 4.2.5** for HPFD M&E structure.



Source: JICA Study Team (2017) based on information from HPFD

**Figure 4.2.5 HPFD Monitoring & Evaluation Structure**

#### 4.2.7 GIS/MIS Expertise of HPFD

##### (1) GIS

###### i. Manpower:

IT Lab of HPFD is headed by CCF MIS/GIS/IT and supported by one DFO ranked officer and a forester. Presently, there are nine technical staff members (three Sr. Scientific professionals and six GIS operators) working in GIS section on contractual basis from the National Institute of Electronics & Information Technology (NIELT)<sup>2</sup>.

At field level, young staffs of HPFD are mostly trained in handling GPS instrument for collecting/recording of point coordinates and are having very basic level of understanding of creating Google Earth based kml files. Technical knowledge of utilising capabilities of GIS is yet to reach division/range/beat levels. Summary of the GIS data layers availability with HPFD and their present status as of July 2017 is given in **Table 4.2.5**.

**Table 4.2.5 GIS Data Layers Availability and Present Status**

No.	GIS Data Layer	Stage	Present Status
1.	Division wise Forest Compartment boundaries (RF/PF/UPF)	Completed	Digitisation completed for 23 divisions
		In Progress	Work in Progress for 10 divisions
		Not Started	Input boundary maps for four divisions not received from DFOs
2.	Forest Circle, Division, Range, Block, Beat boundaries	Completed	Digitisation completed for circle/ division/ range/ block/ beat boundaries
3	Protected Areas	Completed	Digitisation completed covering boundary of five National Parks, two Conservation Reserves, 26 Wild Life Sanctuaries
4	Biodiversity Richness, Vegetation Type	Available	Data procured from Indian Institute of Remote Sensing (IIRS) for year 2012

<sup>2</sup> Autonomous Scientific Society under Min. of Electronics & IT (MoE&IT), Government of India

No.	GIS Data Layer	Stage	Present Status
5	Forest Cover	Available	Data procured from Forest Survey of India (FSI) for India State of Forest Report (ISFR) Yr 2003, 2009, 2013, 2015
6	Forest Type	Available	Data procured from Forest Survey of India (FSI) from 2012
7	Watershed boundaries	Available	Mini Watershed boundaries available
8	Drainage network	Available	Covering up to first order streams available
9	Fire Risk	Available	Fire Risk map derived from GIS analysis available
10	District Boundary	Available	Digitised boundary file available
11	Other Data layers (Monkey Hotspots, Decadal Change in forest cover)	Available	Maps prepared using field data and GIS analysis

Source: Compiled by JICA Study Team (2017) based on information from HPFD

## ii. WebGIS

HPFD, in collaboration with the National Remote Sensing Agency (NRSC), has also developed web enabled application based on Geo Platform of Bhuvan, mainly for data layer visualisation.

## iii. Mobile App

Under USAID assisted Forest PLUS project, mobile application has been developed to enable field level collection of data for preparation of working plans as per the National Working Plan Code 2014. As of July 2017, the developed mobile app is in the testing phase.

## (2) MIS

HPFD has developed number of web-enabled Information Systems as part of enabling IT based forest management to support in decision making and monitoring. All Forest Management Information Systems (FMISs) are hosted on the server of the Department of Information Technology (DIT), HP state government. The details of the key web MIS systems developed are given in **Table 4.2.6**.

**Table 4.2.6 Key Web Enabled FMIS Systems Developed by HPFD**

No.	Forest MIS systems	Technology	Features	Present Status
1	Integrated Forest Management System (IFMS)	-Dot Net framework -Sql Server	-Annual Plan -Cash Book -Budget -Stock accounting -M&E System	Operational and in use
2	Forest Industries Management System	-Dot Net framework -Sql Server	-Database and location details of all forest based industries (Saw mill, Cedarwood oil, Fuelwood, furniture shop, timber sale depot, Katha bhattis, Rosin & turpentine etc.) -Central Database with License details of Industries (owner details, Estb date, Last renewal and license validity etc.)	Operational and in use
3	Forest Offence Management System	-PHP -Sql Server	-Database pertaining to all forest and wildlife related offences	Operational and in use
4	Forest Litigation Monitoring System	-Dot Net framework -Sql Server	-Tracking of ongoing court cases -Search cases, decided & pending, case hearing	App Developed, security audit ongoing
5	Vehicle Management System	-Dot Net framework -Sql Server	-Monitoring vehicles -Central database of HPFD Vehicles from purchase to condemnation -Online constitution of condemnation board	Operational and in use

No.	Forest MIS systems	Technology	Features	Present Status
			-Generation of condemnation orders	
6	Online Tree Felling Permission	-Dot Net framework -Sql Server	-Web enabled online tree felling permission from Private land/ Non-forest Govt. land/ Land diverted under FCA	Operational and in use
7	Online Transit Permission	-Dot Net framework -Sql Server	-Issuance of online transit permits for transportation of timber/forest product.	Operational and in use
8	Ecotourism Management System	-Dot Net framework -Sql Server	-Web enabled ecotourism related information	Under Development

Source: Compiled by JICA Study Team (2017) based on information from HPFD

Most of the web applications are simple to operate with a user-friendly interface and do not require any sort of training. For ease of users, manuals/instruction guidelines are also developed. Although for IFMS, which is a very detailed forest management system, HPFD has conducted several rounds of trainings to train HPFD staff from different administrative levels, including the field level staff members, in operating IFMS.

### (3) IT Infrastructure

The compiled details of the IT Infrastructure available with various administrative units of HPFD are given in **Table 4.2.7**. Certain numbers of desktop computers, printers are supplied to circle/division level offices, and also certain numbers of GPS handsets are also supplied to division level office and below. Most of divisional offices which the information was available had internet connections in their offices (except for two divisions out of 22 divisions), whereas it was rare case for range level and below, since only three divisions had internet connections.

**Table 4.2.7 IT Infrastructure in Major Offices in HPFD**

No	Name of Circle & Division	Hardware (No.)							Software (No.)		Internet Connectivity (No.)					Power Backup		IT Trained Manpower
		Computers	Printer	Laptop	Server	Projector	Scanner	GPS	GIS	MIS <sup>3</sup>	Circle/ Div Office (Yes/Np)	Broadband (BB)/ Wi-Fi	Range	Block	Beat	Generator/ Inverter	UPS	
HQ, Shimla																		
1	HQ	138	11		1	0	0		1	0	Y	FTTH				-	1	3
Shimla Forest Circle, Shimla																		
1	Shimla circle	9	10		0	0	0		0	-	Y	FTTH				-	-	-
2	Shimla div.	15	17		0	0	0	20	0	-	Y		0	0	0		15	-
3	Theog div.	10	9		0	0	0	7	0	-	Y	WiFi= 1	0	0	0		6	-
4	Chopal div.	16	16		0	0	0	7	0	-	Y	WiFi= 1	0	0	0	2	16	-
5	Rohru div.	18	18		0	0	0	10	0	-	Y	B.band=1	0	0	0	1	17	-
6	Urban div.	7	10		0	0	0	5	0	-	Y	FTTH	0	0	0	-		-
Bilaspur forest circle, Bilaspur																		
1	Bilaspur circle	15	13	2	0	1	3	2	0	-	Y	WiFi= 1	-	-	-	2	15	0
2	Bilaspur div.	18	17		0	0	0	20	0	-	Y	WiFi= 1	7	0	0		18	1
3	Kunihar div.	14	12		0	0	0	18	0	-	Y	WiFi= 3	5	0	0	2	7	5

<sup>3</sup> All FMISs are web enabled and can be accessed from anywhere through WAN.



No	Name of Circle & Division	Hardware (No.)							Software (No.)		Internet Connectivity (No.)					Power Backup		IT Trained Manpower
		Computers	Printer	Laptop	Server	Projector	Scanner	GPS	GIS	MIS <sup>3</sup>	Circle/Div Office (Yes/Np)	Broadband (BB)/Wi-Fi	Range	Block	Beat	Generator/Inverter	UPS	
4	Nalagarh div.	14	14		0	0	0	20	0	-	Y	WiFi= 1	0	0	0	1	5	0
Mandi forest circle, Mandi																		
1	Mandi circle	15	9	1	0	0	0	0	0	-	Y	B.band=2	-	-	-	1	7	0
2	J/Nagar div.	13	14	0	0	0	0	33	0	-	Y	WiFi= 1	0	0	0	0	13	0
3	Suket div.	15	14	0	0	0	0	27	0	-	Y	B.band=1	0	0	0	0	15	0
4	Mandi div.	17	17	2	0	0	0	39	0	-	Y	WiFi= 1	0	0	0	0	17	0
5	Nachan div.	16	13	2	0	0	0	14	0	-	Y	B.band=1	0	0	0	0	9	0
6	Karsog div.	13	11	0	0	0	0	20	0	-	Y	B.band=1	0	0	0	0	11	0
Kullu forest circle, Kullu																		
1	Kullu circle	10	9	0	0	0	0	0	0	-	Y	B.band=1	-	-	-	2	8	0
2	Kullu div.	13	9	1	0	0	0	16	0	-	Y	B.band=1	2	0	0	1	13	0
3	Seraj div.	10	9	1	0	0	0	9	0	-	Y	B.band=1	0	0	0	0	9	0
4	Parvati div.	15	11	1	0	0	0	21	0	-	Y	B.band=1	0	0	0	4	11	0
5	Lahaul div.	11	11	1	0	0	0	5	0	-	Y	B.band=1	0	0	0	1	5	0
Rampur forest circle, Rampur																		
1	Rampur circle	14	0		0	0	0	1	0	-	Y	B.band=1				0	14	0
2	Rampur div.	15	0	0	0	0	0	16	0	-	Y	B.band=1	0	0	0	1	15	0
3	Kotgarh div.	8	0	0	0	0	0	16	0	-	Y	B.band=1	0	0	0	0	8	0
4	Kinnaur div.	15	0	0	0	0	0	16	0	-	Y	B.band=1	0	0	0	1	15	0
Bharmour & Pangi forest division of Chamba forest circle, Chamba.																		
1	Bharmour div.	11	11		0			23	0	-	Y	WiFi =1	0	0	0	1	10	0
2	Pangi div.	7	7	1	0			12	0	-	0		0	0	0		4	0

Source: Compiled by JICA Study Team (2017) based on information from HPFD

In order to strengthen the communication infrastructure of the forest ranges, recently on 24 March 2017, PCCF has passed an order based on the decision taken under the chairmanship of the Additional Chief Secretary (Forests) to allow all range forest officers to arrange for internet connection in their range offices with a ceiling of 1,000 INR per month as well as to outsource services for data entry for three months in their range office. The expenditure incurred would be charged from the state CAMPA.<sup>4</sup>

#### 4.2.8 Relevant Organisations of HPFD

The HP State Forest Development Corporation Limited (HPSFDCL), an undertaking and captials of the HP state government, came into existence on 25 March 1974. HPSFDCL is headed by a chairman, who is also Forest Minister, vice chairman and a managing director who is the head of execution. HPSFDCL deals mainly with marketing of timber, fuel wood, pulpwood, bamboo, khair and resin. From resin, rosin and turpentine oil and other subsidiary products like phenyl, varnish, black Japan, etc are produced.

<sup>4</sup> Endst No:Ft.CCF (HRD)/2017(E-I)

HPSFDCL works under the following objectives:

- ◆ To carry out the extraction of timber and resin, along scientific lines, adopting suitable modern techniques
- ◆ To eliminate the contractor's agency in respect of works of timber extraction and resin tapping
- ◆ To prevent illicit felling of trees, illicit tapping of resin and other malpractices
- ◆ To manage the forests on commercial lines through recycling of funds for works, and also by raising funds from financial institutions as per requirement,

HPSFDCL has necessary expertise in the following fields:

- ◆ Timber Operations: The Corporation has a long-varied experience in timber harvesting and extraction/conversion operations, its carriage and subsequent sale both for govt. and private timber
- ◆ Resin Tapping: The entire government resin tapping work is being done by the Corporation, through modern techniques (Rill method as of now)
- ◆ Resin Processing: The two rosin and turpentine factories, located at Bilaspur and Nahan operational since four decades, have both skilled and unskilled workers to undertake resin processing & other diversification activities.

### 4.3 Present Condition of Forests

#### 4.3.1 Forest Area Classification

In HP, the ratio of the legal forest area is high, and 66.52% of its geographical area is recorded as the notified forest area such as the reserved forest and the protection forest. Furthermore, 22.57% of the notified forest area (15.01% of the state geographical area having with high biodiversity significance) is designated as the protected area such as the national park and the wildlife sanctuary. The Indian Forest Act 1927 has provided only for the following legal classes of forests: i) Reserved Forests; ii) Protected Forests; iii) Village Forest; and, iv) Private Forests. However, in HP, there are other classes of forests legally recognised which classes find no mention in the Indian Forest Act, 1927 as applicable to this state. The descriptions of notified forest areas indicated in **Table 4.3.1** are presented in **Attachment I.4.3.1**.

**Table 4.3.1 Status of Notified Forest Area in HP State**

No	Class of Forest	Area (Km <sup>2</sup> )	%
(a)	Forests Area Managed by Forest Department		
1	Reserved Forest	1,897.86	5.12%
2	Protected Forest		
2-1	Demarcated	11,911.80	32.17%
2-2	Un-Demarcated	21,197.97	57.24%
2-3	Strip Forests	13.12	0.04%
3	Un-Classed Forests	886.34	2.39%
	Total (a)	35,913.90	96.98%
(b)	Private Forest Areas Managed by Forest Department		
1	Area under Section 38 of the India Forest Act (IFA)	108.67	0.29%
2	Area Managed under Land Preservation Act (LPA)	260.02	0.70%

No	Class of Forest	Area (Km <sup>2</sup> )	%
3	Area under HP Private. Forest Act	0.80	0.00%
	Total of (b)	369.49	1.00%
(c)	Private Forest Areas Not Managed by Forest Department		
1	Municipal Forests	10.37	0.03%
2	Cantonment Forests	13.86	0.04%
3	Shamalat & Mustarqua Forests	169.97	0.46%
4	Other Forests (Private Individuals)	555.38	1.50%
	Total of (c)	749.58	2.02%
	Grand Total a + b + c	37,032.97	100.00%

Source: Annual Administrative Report, HPFD (2011-12), Department of Economics & Statistics HP; Statistical Outline of HP 2012-13[page 103].

Nearly 97% of notified forest area in HP is directly managed by HPFD. Out of which, the un-demarcated protected forest is dominant in HP taking approximately 57% of the notified forest area.

The un-demarcated public forest is protected forest which is notified as forest areas, but not demarcated nor recorded in the revenue records as protected forests. The largest un-demarcated protected forests are in Lahul & Spiti district. (9,666 km<sup>2</sup>), followed by Kinnaur district (4,788 km<sup>2</sup>), Shimla district (2,161 km<sup>2</sup>), Kangra district (1,636 km<sup>2</sup>), and Kullu district (1,582 km<sup>2</sup>).

Inside the protected forest, all rights are allowed unless specifically banned. According to the Indian Forest Act, in the protected forest, rules for usages and management of forests can be determined under section 32, or, reserving of trees for public/ protection usages can be notified under section 30. This is applicable for both the demarcated protected forest and the un-demarcated protected forest since both are legally protected forest and comes under the same force of the law. When un-demarcated protected forests are demarcated, boundary information will be entered into the Revenue Records

#### 4.3.2 Forest Cover

The forest cover of HP based on the interpretation of satellite data of October 2013 to February 2014 as per the India State of Forest Report (ISFR) 2015 is 14,696km<sup>2</sup> which is 26.40% of the state's geographical area. In terms of forest canopy density classes, the state has 3,224 km<sup>2</sup> (5.79%) very dense forest, 6,381 km<sup>2</sup> (11.46%) moderately dense forest and 5,074 km<sup>2</sup> (9.14%) under open forest. Around 623 km<sup>2</sup> is area under 'Trees outside forests' and the forest/tree cover of HP sums up to 27.76%.

The forest cover data of HP between 2003 and 2015 as per ISFR by FSI is given in **Table 4.3.2**. At the state level or district level, forest cover of HP tends to be in an increase and shows stable forest conditions for dense forests. The change in the forest cover between 2009 and 2015 shows increase of the open forest cover by 30 km<sup>2</sup> and which seems to be the result of improvement in vegetations of scrubs and non-forest areas through plantation and other forest management activities. A significant change in the very dense forest category was reported in ISFR 2009. This is due to the improvement in satellite imagery analysis, which took place in 2007.

**Table 4.3.2 Density Classification and Changes in Forest Cover in HP based on ISFR 2003 – 2015**

Density Class	2003 ISFR (2002data)		2005 ISFR (2004data)		2009 ISFR (2006/07data)		2011 ISFR (2009data)		2013 ISFR (2011data)		2015 ISFR (2013 data)		Area Changes between 2015 and 2009ISFR
	Area (Km2)	%	Area (Km2)	%	Area (Km2)	%	Area (Km2)	%	Area (Km2)	%	Area (Km2)	%	
Very Dense Forest (Canopy density: >70%)	1,093	1.96	1,097	1.97	3,224	5.79	3,224	5.79	3,224	5.79	3,224	5.79	0
Moderately Dense Forest (Canopy density: 40 - 70%)	7,883	14.16	7,831	14.07	6,383	11.47	6,381	11.46	6,381	11.46	6,381	11.46	-2
Open Forest (Canopy density: 10 - 40%)	5,377	9.66	5,441	9.77	5,061	9.09	5,074	9.11	5,078	9.12	5,091	9.14	30
Total Forest Cover	<b>14,353</b>	25.78	14,369	25.81	14,668	26.35	14,679	26.37	14,683	26.37	14,696	26.40	28
Scrub (Canopy density: <10%)			383		327		328		298		301		-26
Tree Cover (Patches of trees < 1ha)	491	0.88	709	1.27	638	1.15	623	1.12	697	1.25	757	1.36	119
No Forest Area (Including Tree Cover Area)	41,320		40,921		40,678		40,666		40,692		40,676		-2

Source: Compiled by JICA Study Team (2017) based on respective India State of Forest Reports

The ISFR 2015 describes altitudinal distributions of forest cover within HP (Table 4.3.3). Forest covers in HP dominate in areas at the elevation ranging from 1,000 m to 3,000 m.

**Table 4.3.3 Altitudinal Distribution of Forest Cover in HP**

Altitude Zone	Very Dense Forest (Km <sup>2</sup> )	Moderately Dense Forest (Km <sup>2</sup> )	Open Forest (Km <sup>2</sup> )	Total (Km <sup>2</sup> )
0-500 m	13	417	296	726
500-1,000 m	238	1,645	1,182	3,065
1,000-2,000 m	727	1,639	1,606	3,972
2,000-3,000 m	1,827	1,977	1,243	5,047
3,000-4,000 m	419	700	740	1,859
>4,000 m	0	3	24	27
<b>Total</b>	<b>3,224</b>	<b>6,381</b>	<b>5,091</b>	<b>14,696</b>

Source: India State of Forest Report 2015

The ISFR 2015 also describes patch size distributions of forest cover within HP (Table 4.3.4). More than 95% of forest cover patches are in sizes ranging from 1 ha to 100ha.

**Table 4.3.4 Patch Size Distribution of Forest Cover in HP State**

Patch Size Range in (Km <sup>2</sup> )	No. of Patches	Distribution of Patches by Area Size (%)	Area (Km <sup>2</sup> )	Area Distribution by the Area Size (%)
>=0.01, <=1.0	18,041	96.52	1,390	9.46
>1.0, <=10	551	2.95	1,459	9.93
>10, <=100	84	0.45	2,843	19.35
>100, <=500	9	0.05	2,133	14.51
>500, <=1,000	4	0.02	3,013	20.5
>1,000, <=5,000	3	0.02	3,858	26.25
Total	18,692	100.00	14,696	100.00

Source: India State of Forest Report 2015

The forest cover<sup>5</sup> information in ISFR does not fully coincide with the notified forest area boundaries due to lack of availability of digitised forest boundary data in most of the states. From ISFR 2013, attempts were made to estimate forest cover areas within and outside of the notified forest areas referring to “green wash areas<sup>6</sup>” indicated in topographic maps. According to ISFR 2015, the forest cover within green wash area is 8,748 km<sup>2</sup> and forest cover outside green wash area is 5,948 km<sup>2</sup> in HP (Table 4.3.5). As per the ISFR 2015, the area of the state under forest cover has increased by 13 km<sup>2</sup> under forest cover outside green wash area.

HP forest cover within and outside green wash area is indicated in Table 4.3.5.

**Table 4.3.5 Forest Cover 2015, Within and Outside on Green Wash Area in HP (km<sup>2</sup>)**

Density Class	Forest Cover within Green Wash (Km <sup>2</sup> )	Change within Green Wash (Km <sup>2</sup> )	Forest Cover Outside Green Wash (Km <sup>2</sup> )	Change Outside Green Wash(Km <sup>2</sup> )
Very Dense Forest	2,644	0	580	0
Moderately Dense Forest	3,776	0	2,605	0
Open Forest	2,328	0	2,763	13
Total	8,748	0	5,948	13

Source: ISFR, 2015

### 4.3.3 Forest Type

In India, H.G. Champion first identified 116 forest types in 1936. It was simplified by experts, and finally revised by H.G. Champion and S.K. Seth in 1968 (Champion, H.G., and Seth, S.K., 1968). They consist of five main forest classes and 16 forest type-groups as shown in Table 4.3.6. In addition, they were further divided into 221 forest (more correctly ‘vegetation’) types and sub-types based on location specific climate factors and vegetation formations which reflect edaphic and floristic conditions.

**Table 4.3.6 Main Forest Classes and Forest Type-Groups in India**

Main Forest Classes	Moist Tropical Forest	Dry Tropical Forest	Montane Sub-tropical Forest	Montane Temperate Forest	Alpine Forest
16 Forest Type-Groups	1. Tropical wet evergreen forest	5. Tropical dry evergreen forest	8. Sub-tropical broad-leaved hill forest	11. Montane wet temperate forest	14. Sub-alpine forest
	2. Tropical semi-evergreen forest	6. Tropical dry deciduous forest	9. Sub-tropical pine forest	12. Himalayan wet/moist temperate forest	15. Moist alpine scrub
	3. Tropical moist deciduous forest	7. Tropical thorny and scrub forest	10. Sub-tropical dry evergreen forest	13. Himalayan dry temperate forest	16. Dry alpine scrub
	4. Littoral and swampy forest				

Source: Champion H.G. and S.K. Seth (1986): A Revised Survey of Forest Types of India.

These types were classified based on the original vegetation observed at that time with the temperature and precipitation patterns. This physiognomic classification of vegetation has been widely used because of a common understanding, vegetation is the best possible indicator of environmental conditions. Therefore, they can well represent the characteristics of ecosystems.

<sup>5</sup> Forest Cover: Areas having a tree canopy density of 10% and above, and having more than 1 ha and above. (ISFR 2015)

<sup>6</sup> The green wash area describes notified forest areas and other forest areas in the topographic maps

In HP, eight forest type-groups exist, which are described in **Table 4.3.7**, and the major ecosystems of HP are represented by these eight vegetation types. The distribution map of these eight forest-type groups is presented in **Attachment I.4.3.2**.

**Table 4.3.7 Forest Type-Groups and Forest Types in HP State**

No	Major Forest Group	Classification Code	Forest Type
1	Tropical Moist Deciduous Forest	3C/ C2a	Moist Shiwalik Sal Forest
		3C/C2b	Moist Bhabar Sal Forest
2	Tropical Dry Deciduous Forests	5B/C1a	Dry Shiwalik Sal Forest
		5B/C2	Northern Dry Mixed Deciduous forest
		5B/C2/DS1	Dry Deciduous Scrub
		5B/E9	Dry Bamboo Brakes
3	Subtropical Pine Forests	9C1	Himalayan Subtropical Pine Forests
		9DS1	Himalayan Subtropical Scrub
		9DS2	Subtropical Euphorbia scrub
4	Himalayan Moist Temperate Forests	12/C1a	Lower Western Himalayan Ban Oak Forests
		12/C1b	Lower Western Himalayan Mohru Oak Forests
		12/C1c	Lower Western Himalayan moist Deodar Forests
		12/C1d	Lower western Himalayan moist temperate deciduous forests
		12/C1e	Lower Himalayan moist temperate deciduous forests
		12/C2a	Upper western Himalayan Kharsu Oak forests
		12/C2b	West Himalayan upper oak/Fir Forests
		12/DS1	Montane bamboo brakes
5	Himalayan Dry Temperate Forests	13/C1	Dry broad leaved coniferous forest (Q.ilex-P.gerardiana)
		13/C2a	Dry temperate coniferous – Neoza pine forests
		13/C2b	Dry Temperate coniferous –dry deodar forests
		13/C4	West Himalayan high-level dry blue pine forest
		13/C5	West Himalayan dry Juniper forest
6	Sub-alpine Forest	14/C1a	West Himalayan sub-alpine Fir forest
		14/C1b	West Himalayan sub-alpine Birch/Fir forest
		14/DS1	Sub-alpine pastures
7	Moist Alpine Scrub	15/C1	Birch/Rhododendron scrub forest
		15/C2	Deciduous alpine scrub
		15/E1	Dwarf Rhododendron scrub
		15/C3	Alpine pastures
8	Dry Alpine Scrub	16/C1	Dry Alpine scrub
		16/E1	Dwarf Juniper Scrub

Source: Champion H.G. and S.K. Seth (1986): A Revised Survey of Forest Types of India.

With the socio-economic human development activities in the past few decades, most original vegetation has been disturbed and replaced with various kinds of substitutional vegetation and land uses (e.g. rice paddy, fruit orchards, secondary forests, forest plantations, pastoral grassland, etc.). This change has usually taken places in lower altitude areas first and moving to higher areas. Although the large extent of ecosystems has been kept the original characters, accumulative effects of human activities on the natural ecosystems have been altering the compositions and structure of such ecosystems.

#### 4.3.4 Culturable and Non- Culturable Forest Areas

According to DPR of the proposed Project and the Forest Statistics 2013, nearly half of the notified forest area is regarded as unculturable which meant establishing forest/tree covers are difficult due to natural conditions such as forest limit, permanent snow, glacier, rocky areas. Culturable forest areas regarded as area which can potentially sustain forest/ tree covers as well as grasslands/ pastures. The area information provided in the Forest Statistics 2013 is as follows:

- ◆ Notified Forest Area (Legal): 37,033km<sup>2</sup> (66.52% of total geographical area)
- ◆ Area under Permanent Snow: 16,376 km<sup>2</sup> (29.40% of total geographical area)
- ◆ Culturable Forest Area: 20,657 km<sup>2</sup> (37.10% of total geographical area)

The HP Forest Sector Policy and Strategy 2005 provides an indication of the culturable and non-culturable forest areas in respect to possibilities for sustaining forest/tree covers as shown in **Table 4.3.8**. The policy and strategy 2005 targets 35.5% forest/ tree cover to be attained by culturable forest areas (30.5%) and culturable areas outside of forest areas (5.0%). The remaining notified forest areas (36.0%) are intended to be maintained as alpine pastures, permanent snow /glacier areas, and river/ water bodies areas.

**Table 4.3.8 Culturable & Non-Culturable Forest Areas and Potential Forest/ Tree Cover Areas in Forest Sector Policy and Strategy 2005**

No.	Details	Area (km <sup>2</sup> )	Percentage (%)*
1	Total Geographical Area	55,673	100.0
2	Notified Forest Area (Legal)	37,033	66.5
2a	Forest Area above 4,000 m altitude is uncultivable and cannot sustain tree crops	19,020	34.2
2b	Forest Area below 4,000 m altitude and which cannot sustain tree crops (streams)	1,000	1.8
3a	Notified Forest Area that can sustain tree crops	17,013	30.5
3b	Area under Horticulture that can sustain tree crops	2,230	4.0
3c	Land under Miscellaneous tree crops that can sustain tree crops	568	1.0
4	Total area supporting or can support forest cover and tree cover	19,811	35.5
5	ISFR 2015 Forest Cover and Tree Cover	15,453	27.8 (27.76)

Note: \* Percentages for 3a to 3c are based on HP Forest Sector Policy and Strategy 2005  
Source: HP Forest Sector Policy and Strategy 2005

#### 4.3.5 Land Conversion from Forest to Non-Forest Uses

##### (1) Diversion under Forest Conservation Act

Since the enactment of the Forest Conservation Act 1980 (FCA 1980), 12,109.7 ha of the forest land has been diverted for different development projects and other non-forestry purposes, till January 2016 (**Table 4.3.9**). The largest area was diverted for hydropower projects (35.97%), followed by transmission lines (24.36%). Road construction is third largest sector demanding diversion of forest lands (19.27%)

For the diversion of the forest land, the application needs to be submitted to the state forest department. If after field scrutiny, following the prescribed procedure, the state government

agrees to proposed diversion, a recommendation is made to the MoEF&CC for prior approval under FCA 1980. If such approval is given by MOEF&CC, the state government orders for diversion for specified non-forestry use subject to certain conditions. Details of the procedure are described in **Part I, Chapter 8** of this report.

**Table 4.3.9 Forest Land Diversion for Non- Forestry Purpose till Jan 2016**

No.	Category	Number of Cases	Diverted (Ha)	%Age of total Diverted Area
1	Hydropower	232	4,353.7757	35.95
2	Road	796	2,333.0319	19.27
3	Irrigation	32	80.5037	0.66
4	Dispensary/Hospital	14	2.3442	0.02
5	Drinking Water	27	8.1401	0.07
6	Mining	47	829.2771	6.85
7	School	19	9.1861	0.08
8	Railway	5	14.9002	0.12
9	Defence	9	861.7719	7.12
10	Transmission Line	133	2,949.6094	24.36
11	Others*	418	617.4265	5.10
12	Wind	1	34.2867	0.28
13	Solar	1	6.46	0.05
14	Rehabilitation	2	8.94	0.07
<b>TOTAL</b>	<b>ALL CASES</b>	<b>1,736</b>	<b>12,109.6536</b>	<b>100</b>

Source: HPFD Internal Report

\* Public Interest Buildings, Helipad, Panchayat Ghar (Office) etc

## (2) Diversion under Forest Rights Act (2006)

The act recognises and vests the forest rights and occupation to the forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who primarily resided in and have depended on the forest or forest land for bonafide livelihood needs for generations, at least three generations prior to 13 December 2005. The rights are restricted to the area under actual occupation and all cases have not exceeded an area of four hectares per households.

As of 20 June 2017, 246.04 Ha of forest land has been diverted under Section 3 (2) of the Forest Right Act in HP as indicated in **Table 4.3.10**.

**Table 4.3.10 Diversion Approved under FRA 2006 as of 20 June 2017**

No.	Category	No. of Cases	Forest Area Diverted in ha
1	Transmission Line/ Sub Station/ Communication Centre/ Telecom.line	6	0.32
2	Education	62	19.62
3	Road	348	199.41
4	Irrigation & Drinking Water Scheme	29	9.09
5	Health	33	4.56
6	Animal Health	6	0.54
7	Other	79	12.49
<b>Total</b>		<b>563</b>	<b>246.03</b>

Source: HPFD Internal Report



## 4.4 Wildlife and Biodiversity

### 4.4.1 Biodiversity Profile of HP State

#### (1) Vegetation/ Forests Resources/ Fauna

The forests of HP are abundant in vascular flora. Out of the total 45,000 species of plants found in the country, about 3,295 species (7.32%) have been reported in the state. Among these, over 95% species are native to the state and unique to the Western Himalayan flora, while the remaining 5% (150 species) are exotic which were introduced in the last 150 years.

**Table 4.4.1** indicates dominant tree species of major forest type groups classified by the Champion and Seth (**Part I, Section 4.3.3**) found in HP.

**Table 4.4.1 Forest Type Groups with Dominant Tree Species in HP State**

Forest Types	Important Tree Species
Tropical Dry Deciduous	<i>Shorea robusta, Acacia catechu, Anogeissus latifolia, Boswellia serrata, Lanea coromandelica, Aegle marmelos, Mallotus philipinensis.</i>
Tropical Thorn	<i>Prosopis spicigera, Salvadora spp., Acacia spp., Azadirachta indica etc.</i>
Sub-Tropical Pine	<i>Pinus roxburghii, Cedrus deodara, Pinus wallichiana, Quercus incana, Lyonia ovalifolia, Pyrus pashia, Crataegus crenulata, Rhododendron arboreum</i>
Subtropical Dry Evergreen	<i>Olea cuspidata, Pinus roxburghii.</i>
Himalayan Moist Temperate	<i>Quercus incana, Cedrus deodara, Pinus wallichiana, Pinus roxburghii, Rhododendron arboreum, Lyonia ovalifolia, Litsia umbrosa, Quercus dilatata, Q. semicarpifolia, Picea smithiana, Abies pindrow</i>
Sub-Alpine and Alpine	<i>Abies spectabilis, Pinus wallichiana, Picea smithiana, Rhododendron companulatum, Taxus baccata.</i>

Source: Compiled by JICA Study Team (2017) based on information from State of Environment Report Himachal Pradesh; Department of Environment, Science & Technology

**Attachment I.4.4.1** depicts the diversity of flora/ vegetation/ botanical resources available in HP state.

#### (2) Fauna

Like forest resources, HP is bestowed with a repository of fauna. Out of the 77,450 species of animals, the state is home to 5,721 species, amounting to 7.4% of the Indian fauna. Among the fauna found in HP, invertebrates constitute 88.4% (5,055 species) and vertebrates 11.6% (666 species: 77 mammals, 447 birds, 44 reptiles, 17 amphibians, and 81 fishes) of the total found in HP<sup>7</sup>. Recent study by Sharma and Sidhu (2016)<sup>8</sup> indicates that among the vertebrates, 112 mammal species, 55 reptile species, 16 amphibian species, and 81 fish species are found in HP.

Major mammal species include ibex, serow, blue sheep, Himalayan tahr, musk deer, goral, barking deer, black bear and yak. Amongst carnivorous species snow leopard, Himalayan weasel, yellow throated marlin, wolf and common leopard are also found in the state.

HP state also has the distinction of being home to unique fauna having aesthetic, cultural, commercial and genetic values; birds such as the Himalayan monal, koklas, and tragopan

<sup>7</sup> State of Environment Report 2013 Himachal Pradesh; Department of Environment, Science & Technology

<sup>8</sup> I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", Biological Forum-A International journal 8(1):1-26 (2016)

pheasants, red billed blue magpie, paradise flycatcher, Himalayan snow cock and an array of butterflies add great aesthetic value.

**Attachment I.4.4.2** depicts the distribution of fauna in the biomes that are available in the state, lists of the protected, endangered and vulnerable fauna in HP, and mammal species/ reptile species/ /amphibian species/ fish species found within the state.

Several programmes for protection and recovery of endangered species are implemented in the state<sup>9</sup>. These include in-situ programmes such as Project Snow Leopard and Vulture Conservation, and ex-situ conservation breeding such as Western Tragopan Conservation Programme and Cheer Pheasant Conservation.

## 4.4.2 Protected Areas

### (1) Protected Areas

As of April 2017, there are five national parks, 26 wildlife sanctuaries and three conservation reserves exist. The total area under the protected area network is 8,358.48 km<sup>2</sup> which is around 15% of the total forest area of the state. Felling of trees for any purpose in all these areas is prohibited. There is also total ban on hunting in the entire state. A summary of these legally defined protected areas is given in **Table 4.4.2**.

**Table 4.4.2 Legal Definitions of Protected Area (PA)**

PA Category	Description	Management System	Land use and Resource Use Implications
National Park (NP)	The state government can recognise an area by reason of its ecological, floral, faunal, or geomorphological importance and declare as National Park under section 35 or section 38 or sub section (3) of section 66 of Wildlife Protection Act (1972). Purpose is to protect, propagate or develop wildlife therein or its environment.	Government. Managed by Forest Department in accordance with a site-specific Management Plan for a period of 10 years	Land use alterations not possible. No extractable resource use rights are allowed. However, tourism can be allowed in some predefined zones.
Wildlife Sanctuary (WLS)	The state government can recognise any area (including Reserve Forests) by reason of its ecological, floral, faunal, or geomorphological importance and declare as Sanctuary under the provisions of Chapter IV of WLP (1972) or a deemed sanctuary under sub-section (4) of section 66. Purpose is to protect, propagate or develop wildlife therein or its environment.	Government. Managed by Forest Department in accordance with a site-specific management Plan for a period of 10 years	Land use alterations not possible. Resource use rights need to be defined and settled for different groups of people (like NTFP collection, livestock grazing, fishing, agriculture etc.). Tourism can be allowed in some predefined zones.
Conservation Reserve (CR)	The state government may, after having consultations with the local communities, declare any area owned by the Government, particularly the areas adjacent to National Parks and Sanctuaries and those areas which link one protected area with another, as a conservation reserve to protect flora and fauna and their habitat under Section 36-A of Wildlife Protection (Amendment) Act 2003	Co-management. Decision making powers rest equally with local communities and Forest Department	Land use alterations not possible. Effectively no existing resource use rights gets curtailed. However, management plan can prescribe for sustainable use of some resources. Tourism can be allowed.

Source: Compiled by JICA Study Team (2017) based on relevant Acts

<sup>9</sup> <http://hpforest.nic.in/pages/show/YTU2c2RhiHU2NTRzZA==--conservation-projects>

A brief description of existing protected areas within HP is provided in **Table 4.4.3**. Locations of national parks and wildlife sanctuaries are indicated in **Attachment I.4.4.3**.

**Table 4.4.3 Protected Areas in HP State**

No.	PA Name	Type	Year	Area (km <sup>2</sup> )	District	Wildlife Division	Remarks
1	Great Himalayan National Park*	NP	1994	905.4	Kullu	GHNP	
2	Pin Valley	NP	1987	675	Lahaul & Spiti	Spiti WL	
3	Khirganga	NP	2010	705	Kullu	Parvati	
4	Indekilla	NP	2010	94.00	Kullu	Kullu WL	
5	Simbalbara	NP	2010	27.88	Sirmour	Shimla WL	
6	Bandli	WLS	1974	32.11	Mandi	Kullu WL	
7	Chail	WLS	1976	16.00	Solan	Shimla WL	
8	Chandertal	WLS	2007	38.56	Lahaul & Spiti	Spiti WL	
9	Churdhar	WLS	1985	55.52	Sirmour	Shimla WL	
10	Daranghati	WLS	1974	171.5	Shimla	Sarahan WL	
11	Dhauladhar	WLS	1994	982.86	Kangra	Hamirpur WL	
12	Gangul Siyabehi	WLS	1974	108.4	Chamba	Chamba WL	
13	Kias	WLS	1997	12.61	Kullu	Kullu WL	
14	Kalatop-Khajjar	WLS	1989	17.17	Chamba	Chamba WL	
15	Kannawer	WLS	1984	107.29	Kullu	Kullu WL	
16	Khokhan	WLS	1984	14.94	Kullu	Kullu WL	
17	Kibber	WLS	1992	2,220.12	Lahaul & Spiti	Spiti WL	
18	Kugti	WLS	1974	405.49	Chamba	Chamba WL	
19	Lippa Asrang	WLS	2001	31.00	Kinnaur	Sarahan WL	
20	Majathal	WLS	1974	30.86	Solan	Shimla WL	
21	Manali	WLS	1984	29	Kullu	Kullu WL	
22	Nagru	WLS	1974	132.37	Mandi	Kullu WL	
23	Pong Dam Lake	WLS	1998	207.59	Kangra	Hamirpur WL	
24	Rakchham Chitkul	WLS	1989	304	Kinnuar	Sarahan WL	
25	Renukaji	WLS	1987	3.87	Sirmour	Shimla WL	
26	Rupi Bhaba	WLS	2001	503	Kinnaur	Sarahan WL	
27	Sech Taun Nalla	WLS	1974	390.29	Chamba	Chamba WL	
28	Shimla Water Catchment	WLS	1982	10	Shimla	Shimla WL	
29	Shikari Devi	WLS	1962	29.94	Mandi	Kullu WL	
30	Talra	WLS	1974	46.48	Shimla	Shimla WL	
31	Tundah	WLS	1975	64	Chamba	Chamba WL	
32	Shilli	CR	1974	1.49	Solan	Shimla WL	
33	Naina Devi	CR	1974	17.01	Bilaspur	Shimla WL	Recently de-notified
34	Darlaghat	CR	1991	0.67	Solan	Shimla WL	

Note: NP: National Park, WLS: Wildlife Sanctuary, CR: Conservation Reserve \*Includes Sainj WLS and Tirthan WLS  
Source: HPFD

Other than the above, another category of “Community Reserve” is constituted and governed under the provision of the Wildlife (Protection) Act, 1972. Community Reserve “can be declared by the state government in any private or community land, not comprised within a National Park, Sanctuary or a Conservation Reserve, where an individual or a community has volunteered to conserve wildlife and its habitat. Community Reserves are declared for the purpose of protecting fauna, flora and traditional or cultural conservation values and practices. The rights of people

living inside a Community Reserve are not affected”<sup>10</sup>. Nine Community Reserves have been established in the whole nation as of July 2017, but none in the state<sup>11</sup>.

There are other categories of protected areas not provided in the Wildlife (Protection) Act, such as Key Biodiversity Areas (based on IUCN’s “Global Standard for the Identification of Key Biodiversity Areas”, but no legal basis in India; **Section 4.4.4**), World Heritage Site (based on the “Convention Concerning the Protection of the World's Cultural and Natural Heritage” and domestic legal basis is unclear; **Section 4.4.5**) and Biodiversity Heritage Site (based on Biological Diversity Act 2002; **Section 4.4.8**), details of which are explained in the respective sections.

## (2) Management Plans

The wildlife management plan is a site-specific plan of a protected area which outlines background information on particular species and provide long-term recommendations on various aspects of species management, (e.g. Snow Leopard project<sup>12</sup>, Cheer Pheasant conservation breeding<sup>13</sup>), habitat management, education and outreach efforts, and damage management (e.g. management of human pressure such as cattle grazing and garbage dumping in protected areas<sup>4</sup>). Some protected areas have comprehensive data on wildlife census, while others prepare data limited to specific species. Current approval status of management plans for protected areas in the state is described in **Table 4.4.4**. As of July 2017, only one-fifth of national parks and one-fourth of wildlife sanctuaries have approved management plans. Details of management plan status for protected areas are provided in **Attachment I.4.4.4**.

**Table 4.4.4 Management Plan Status of Protected Areas in HP State (July 2017)**

Type \ Status	Approved	Expired /Under Preparation	Final Approval Awaited	Not Prepared/ Status Not Clear	Total
National Park	1	2	0	2	5
Wildlife Sanctuary	6	14	6	0	26
Conservation Reserve	0	3	0	0	3

Source: Compiled by JICA Study Team based on information from HPFD

### 4.4.3 Himalayan Biodiversity Hotspot

#### (1) Overview

A biodiversity hotspot is a bio-geographic area that has a significant reservoir of biodiversity but subsequently threatened by destruction. The term was proposed in 1988 and quickly adopted by Conservation International. In order to qualify as a biodiversity hotspot, an area must have the following two conditions<sup>14</sup>: (i) it must have at least 1,500 vascular plants as endemics — which is to say, it must have a high percentage of plant life found nowhere else on the planet; and (ii) it must have 30% or less of its original natural vegetation, which means threatened. The Himalayan

<sup>10</sup> <http://www.moef.nic.in/downloads/public-information/protected-area-network.pdf>

<sup>11</sup> [http://wiienviis.nic.in/Database/bhs\\_8650.aspx](http://wiienviis.nic.in/Database/bhs_8650.aspx)

<sup>12</sup> Management Plan for the Upper Spiti Landscape including the Kibber Wildlife Sanctuary; HPFD

<sup>13</sup> Management Plan of Chail Wildlife Sanctuary Himachal Pradesh (2011-12 to 2020-21); HPFD

<sup>14</sup> <http://www.conservation.org/How/Pages/Hotspots.aspx>

Biodiversity Hotspot is one of such biodiversity hotspots and the HP state fall within the hotspot.

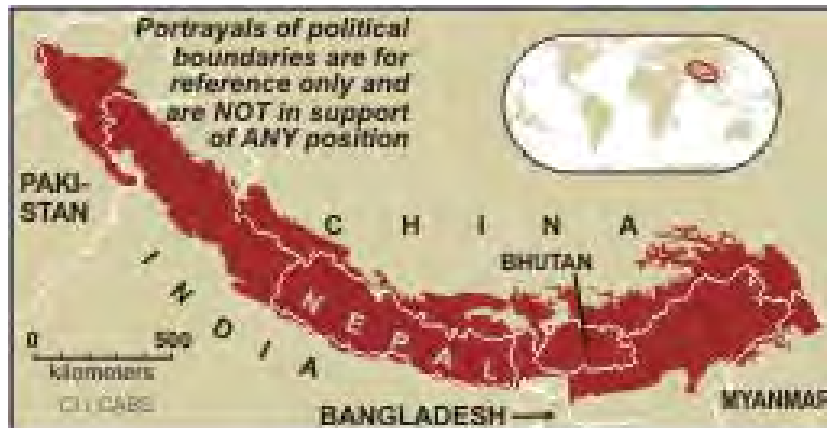
**Table 4.4.5** describes key indications of the Himalayan biodiversity hotspot.

**Table 4.4.5 Indications of Himalayan Biodiversity Hotspot**

Item	Quantity
Hotspot Original Extent (km <sup>2</sup> )	741,706
Hotspot Vegetation Remaining (km <sup>2</sup> )	185,427
Endemic Plant Species (no.)	3,160
Endemic Threatened Birds (no.)	8
Endemic Threatened Mammals (no.)	4
Endemic Threatened Amphibians (no.)	4
Extinct Species (no.)	0
Human Population Density (people/km <sup>2</sup> )	123
Area Protected (km <sup>2</sup> )	112,578
Area Protected (km <sup>2</sup> ) in categories I – IV	77,739

Source: Critical Ecosystem Partnership Fund: <http://www.cepf.net/resources/hotspots/Asia-Pacific/Pages/Himalaya.aspx>

Himalayas are comparatively a new mountain range spreading for over 3,000 km from Northern Pakistan to Nepal, Bhutan and north-eastern states of India. The Himalayas cover close to 750,000 km<sup>2</sup> and has been divided into two regions viz. Eastern Himalayas (covering Nepal, Bhutan, north-eastern Indian States of Western Bengal, Sikkim, Assam and Arunachal Pradesh and southeast Tibet) and Western Himalayas (covering Garhwal, Kumaon, Himachal Pradesh, Northern Kashmir and Northern Pakistan regions). This is one of the highest mountain range in the world with a very high biodiversity.<sup>15</sup> **Figure 4.4.1** shows a range of Himalayan Biodiversity Hotspot.



Source: quoted from "Biodiversity Hotspots in India"  
 (<http://bslenvis.nic.in/files/Biodiversity%20Hotspots%20in%20India.pdf>)

**Figure 4.4.1 A Map of Himalayan Biodiversity Hotspot**

The geological, climatic and abrupt altitudinal variations along with topographic complexity results in a diversity of ecosystems within a small distance (like, alluvial grasslands and subtropical broadleaf forests in the foothills to temperate broadleaf forests in the mid hills, mixed conifers in high hills and alpine meadows above the forest limit). The species diversity and endemism of the Himalayan biodiversity hotspot is presented in **Table 4.4.6**.

<sup>15</sup> bslenvis.nic.in (Biodiversity hotspots in India)

**Table 4.4.6 Species Diversity and Endemism of Himalayan Biodiversity Hotspot**

Taxonomic Group	Species (A)	Endemic Species (B)	Endemism (%) (=B/A)
Plants	10,000	3,160	31.6
Mammals	300	12	4.0
Birds	977	15	1.5
Reptiles	176	48	27.3
Amphibians	105	42	40.0
Freshwater Fishes	269	33	12.3

Source: Critical Ecosystem Partnership Fund: <http://www.cepf.net/resources/hotspots/Asia-Pacific/Pages/Himalaya.aspx>

## (2) Issues Related to Biodiversity Hotspots

There are multiple issues related to the protection and conservation of biodiversity hotspots. Most of these issues have emerged due to the increase in population and usages/consumptions of various forest resources. Fuel wood extraction and grazing/over-grazing by livestock is a common practice for the communities living in the vicinity of forests. Similarly, in the restricted areas, anthropogenic activities like green felling, poaching, medicinal plant collection, forest fires, diverting the land for developmental activities (i.e. dams, road construction), chemical usage/highly toxic insecticide/ fungicides/ pesticides/ weedicides etc in agriculture and horticulture etc are banned as such activities are considered to lead to contribute to the degradation of conservation areas and subsequently a loss in the overall biodiversity of the region.

These challenging threats require novel interventions and strategies to combat exploitation of biodiversity. Conservation interventions need to be introduced to the public. Sharing the knowledge why biodiversity is important for human well being will prove helpful. If diverse communities are taught how biodiversity benefits human well being it could prove a powerful motivation for preserving the earth's biodiversity.<sup>16</sup>

### 4.4.4 Key Biodiversity Areas in HP State

Key Biodiversity Areas (KBAs) are regarded as sites that contribute significantly to the global persistence of biodiversity and suggested to be identified based on IUCN's "Global Standard for the Identification of Key Biodiversity Areas (IUCN 2016)<sup>17</sup>". In India, 531 KBA sites are identified by various organisations but these have no legal basis.<sup>18</sup> Out of the 531 KBA sites in India, 28 sites are present in HP, which is 5<sup>th</sup> in the numbers of KBAs and 9<sup>th</sup> in the area size among 36 states and union territories in India. **Attachment I.4.4.5** provides lists of KBAs in HP and state-wise numbers and area size of KBAs. KBAs are seen as "umbrella" designations, which include globally important sites for different taxa and realms, such as follows:

- ◆ Important Bird and Biodiversity Areas (IBAs)
- ◆ Alliance for Zero Extinction (AZE) sites

<sup>16</sup> [https://labs.eemb.ucsb.edu/young/hillary/PDF/Kilpatrick\\_et\\_al\\_2017\\_phil\\_trans.pdf](https://labs.eemb.ucsb.edu/young/hillary/PDF/Kilpatrick_et_al_2017_phil_trans.pdf) (26/08/2017)

<sup>17</sup> [https://portals.iucn.org/union/sites/union/files/doc/a\\_global\\_standard\\_for\\_the\\_identification\\_of\\_key\\_biodiversity\\_areas\\_final\\_web.pdf](https://portals.iucn.org/union/sites/union/files/doc/a_global_standard_for_the_identification_of_key_biodiversity_areas_final_web.pdf)

<sup>18</sup> [http://www.wiienviis.nic.in/Database/Key\\_Biodiversity\\_Areas\\_8647.aspx](http://www.wiienviis.nic.in/Database/Key_Biodiversity_Areas_8647.aspx) 26/08/2017

- ◆ Important Sites for Freshwater Biodiversity
- ◆ KBAs identified through the Critical Ecosystem Partnership Fund (CEPF) hotspot profiling process

The IBA programme aims to identify, monitor and protect a global network of IBAs for conservation of the world's birds and associated biodiversity. As of July 2017, there are total of 467 IBAs and 96 potential IBAs identified in India, and out of which 25 IBAs and 5 potential IBAs are located in HP<sup>19</sup>. **Attachment I.4.4.5** also provides lists of IBAs and potential IBAs existing in HP.

Under AZE, there are 17 sites identified in India and one site in HP<sup>20</sup>. The Chamba valley located in the Chamba district is identified as AZE and its conservation importance is endangered species dark eyed Himalayan langur (*Semnopithecus ajax*).

#### 4.4.5 Other Important Biodiversity Areas in HP State

##### (1) Wetlands

Although there is no separate provision for specific legal instruments for wetland conservation, the legal framework for conservation and management is provided by Forest (Conservation) Act 1980, the Wildlife (Protection) Act 1972, the Air (Prevention and Control of Pollution) Act 1974, the Water Cess Act 1977, and the umbrella provision of Environment (Protection) Act 1986. There are 92 wetlands in the state, out of which seven are manmade and 85 are natural<sup>21</sup>. Loss of vegetation, water pollution and excessive development are a few factors damaging the wetlands in the state. Among wetlands existing in the state, there are three sites under the Ramsar Convention, whereas the National Wetlands Conservation and Management Programme has five locations identified in the state (**Table 4.4.7**). On-going interventions in these wetlands include habitat improvement, tourism management, engendering awareness, catchment area treatment and eco-development activities upstream such as soil conservation activities and development of water conservation structures<sup>22,23</sup>.

**Table 4.4.7 Wetlands Identified under National Wetlands Conservation and Management Programme**

No.	Name of Site	District	Year of Declaration	Area (km <sup>2</sup> )	Ramsar Site(Yes/No)
1	Renuka Wetland	Sirmaur	08/11/2005	38.56	Yes
2	Pond Dam Lake	Kangra	19/08/2002	307.29	Yes
3	Chandratal Wetland	Lahaul & Spiti	08/11/2001	20.00	Yes
4	Rewalsar	Mandi	2004	N.A	No
5	Khajjiar	Chamba	2006	N.A	No

Source: [www.moef.nic.in/report/0607/Annex-06.pdf](http://www.moef.nic.in/report/0607/Annex-06.pdf) & [http://envfor.nic.in/divisions/csurv/WWD\\_Booklet.pdf](http://envfor.nic.in/divisions/csurv/WWD_Booklet.pdf)

<sup>19</sup> [http://wiienviis.nic.in/database/IBA\\_8463.aspx](http://wiienviis.nic.in/database/IBA_8463.aspx)

<sup>20</sup> <http://www.zeroextinction.org/sitedata.cfm?siteid=10727>

<sup>21</sup> [http://desthp.nic.in/publications/05\\_Guideline\\_Natural\\_Resource.pdf](http://desthp.nic.in/publications/05_Guideline_Natural_Resource.pdf)

<sup>22</sup> Conservation of Wetlands in India: A Profile (Approach and Guidelines); Ministry of Environment & Forests

<sup>23</sup> Management Plan of Chail Wildlife Sanctuary Himachal Pradesh (2011-12 to 2020-21); HPFD

## (2) World Heritage Site

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Sites are place that is notified as of special natural and/ or cultural significances.

As of July 2016, there are seven natural world heritage sites, 27 cultural world heritage sites, and one mixed natural world heritage sites in India. The Great Himalayan National Park is the only world heritage site in HP and notified in 2014 (**Table 4.4.8**).

**Table 4.4.8 UNESCO Natural World Heritage Site in HP State**

No.	Name of WH Site	District	Year of Notification	Area (km <sup>2</sup> )
1	Great Himalayan National Park	Kullu	2014	905.4

Source: ENVIS Centre on Wildlife & Protected Areas, [http://wiienvis.nic.in/Database/br\\_8227.aspx](http://wiienvis.nic.in/Database/br_8227.aspx)

## (3) Biosphere Reserve

Biosphere Reserves (BRs) are sites recognised under UNESCO's Man and the Biosphere (MAB) Programme to promote sustainable development based on local community efforts and sound science. Although national parks and wildlife sanctuaries can be incorporated as a part of BRs, BRs put their emphasis on sustainability and conservation of overall biodiversity and landscape including local people's sustainable livelihood<sup>24</sup>. Thus, BRs are managed through zonation to establish a network of biologically important and socially acceptable core landscape units, and a different set of activities are taking place. A few examples include; snow leopard conservation and development of roads and channels in Kibber WLS<sup>25</sup>, and snow leopard protection, constructions of water harvesting structures, and habitat improvement in Pin Valley National Park. As of December 2014, there are 18 notified BRs in India. The Cold Desert Biosphere Reserve is a BR in the state and notified in 2009 (**Table 4.4.9**).

**Table 4.4.9 Biosphere Reserves in HP State**

No.	Name	District	Date of Notification	Area (km <sup>2</sup> )	Location
1	Cold Desert	Lahaul & Spiti	28.08.2009	7,770	Pin Valley national park and surroundings; Chandratat and Sarchu & Kibber wildlife sanctuaries

Source: ENVIS Centre on Wildlife & Protected Areas, [http://wiienvis.nic.in/Database/br\\_8225.aspx](http://wiienvis.nic.in/Database/br_8225.aspx)

### 4.4.6 Human-Wildlife Conflict

In relation to the human-wildlife conflicts within the state, HPFD is recording numbers and types of cases as well as amount of compensation paid. Human-wildlife conflicts often include wildlife attack on human beings, livestock damage and crop raiding, however crop raiding is rarely reported. Through interviews to FD officers in the field and some local people, it was found that application process for compensation is lengthy and complicated, and local people apply for compensation only for the big damage, such as damage to human/livestock. Reporting crop damage seemed too small to use their time and efforts, and statistics is therefore not available.

**Table 4.4.10** summarises state level human-wildlife conflicts for the last five years (2012-13 to

<sup>24</sup> Protection, Development, Maintenance and Research in Biosphere Reserves in India; Ministry of Environment and Forests

<sup>25</sup> Management Plan for the Upper Spiti Landscape including the Kibber Wildlife Sanctuary; HPFD



2016-17). In these five years, annual averages of 3.8 human death cases, 282 injury cases and 2.47 million INR compensation paid for human casualties. In the same period, annual averages of animal/ cattle losses were 325 cases with 1,020 deaths with 1.48 million INR compensation paid. **Table 4.4.11** indicates types of animals which caused the conflicts during 2012-13 to 2016-17. Monkeys, bears and leopards are major causes of damages in the state, and the human death was recorded by bear and leopard attacks.

**Table 4.4.10 Human-Wildlife Conflicts in HP State (2012-13 to 2016-17)**

Year	Person Died		Injury				Permanent Incapacitation		Animal /Cattle Loss			Grand Total Amount Paid (INR)
	No.	Amount Paid (INR)	Simple Injury	Grievous	Total No.	Amount Paid (INR)	Permanent Incapacitation	Amount Paid (INR)	No. of Cattle Died	No. of Cases	Amount Paid (INR)	
2012-13	2	200,000	428	27	455	2,636,082	-	200,000	1,737	537	1,260,843	4,096,925
2013-14	5	500,000	538	42	580	3,581,769	1	-	932	324	713,369	4,895,138
2014-15	3	400,000	79	14	93	978,494	-	100,000	735	230	1,409,945	2,788,439
2015-16	5	650,000	187	12	199	1,319,807	1	-	844	282	1,775,825	3,845,632
2016-17	4	500,000	65	19	84	1,589,590	-	-	854	256	2,220,600	4,310,190
<b>Grand Total</b>	<b>19</b>	<b>2,250,000</b>	<b>1,297</b>	<b>114</b>	<b>1,411</b>	<b>10,105,742</b>	<b>2</b>	<b>300,000</b>	<b>5,102</b>	<b>1,629</b>	<b>7,380,582</b>	<b>19,936,324</b>

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Table 4.4.11 Wildlife Attacks on Humans in HP State (2012-13 to 2016-17)**

Type	Grievous Injury	Death Cases	Simple	Permanent Incapacitation	Total	Compensation Paid (INR)
Leopard Attacks	19	9	81	1	110	2,192,915
Bear Attacks	56	10	45	-	111	4,484,935
Monkey Attacks	19	-	1,115	-	1,134	4,654,642
Wild Boar Attacks	17	-	41	1	59	1,000,722
Fox Attacks	-	-	8	-	8	40,000
Jackle Attacks	-	-	1	-	1	5,000
Langoor Attacks	2	-	3	-	5	81,000
Sambhar Attacks	-	-	1	-	1	6,614
<b>Grand Total</b>	<b>113</b>	<b>19</b>	<b>1,295</b>	<b>2</b>	<b>1,429</b>	<b>12,465,828</b>

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Table 4.4.12** indicates division-wise human-wildlife conflicts in 2016-17.

From division-wise data of 2016-17, the following trends can be inferred for the human-wildlife conflicts in the state.

- ◆ The human-wildlife conflicts seem to be more prevalent in low to mid elevational districts/divisions in the state where more populated in comparison to districts/divisions which are in higher elevation with less population density
- ◆ Compare to territorial divisions, there seem to be less human-wildlife conflicts in wildlife divisions which include protected areas. This is because local livelihood and livestock are not expected in the protected areas thus chances of conflicts are much less than those outside protected areas.

The latest compensation amount as of July 2017, and paid by HPFD against human-wildlife conflicts is described in **Attachment I.4.4.6**.

Several countermeasures have been implemented in conflict-prone areas<sup>26</sup>. Local communities try to chase away wildlife from their crop fields with loud voices, using dogs and firecrackers, and/or

<sup>26</sup> This information is obtained from interviews to some field-level HPFD officers and local communities.

smoking the area with wood sticks and cow dungs, which are not always effective. Fences and walls seemed to be useless in narrow terrace fields. Keeping sheep inside the forest over night with dogs is one of the preventive measures against possible leopard attacks. Permission to kill monkeys as vermin was granted to local communities in some areas, which was never put into practice. Local communities are unanimous in their unwillingness to kill any animals in spite of the damage caused.

HPFD recognises the need of precautionary measures against damage by wildlife, which has already been addressed by various wildlife organisations such as Wildlife Institute of India (WII)<sup>27</sup>. Ministry of Environment and Forests also issued “Guidelines for Human-Leopard Conflict Management”<sup>28</sup> in 2011. Management Plan for Rupi Bhaba Wildlife Sanctuary suggested that these guidelines should be fully utilised by the public with awareness raising and professional organisations should be approached to study the mechanism of damage by wildlife<sup>19</sup>.

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<sup>27</sup> Management Plan Rupi Bhaba Wildlife Sanctuary, Himachal Pradesh 2010-2015, HPFD

<sup>28</sup> <http://www.moef.nic.in/downloads/public-information/guidelines-human-leopard-conflict-management.pdf>

**Table 4.4.12 Division-wise Human-Wildlife Conflicts in 2016-17**

Name of Division	Human Loss		Human Injury				Cattle/ Animal Loss			Grand Total Amount Paid
	Death cases	Amount Paid (INR)	Simple Injury	Amount Paid (INR)	Grievous Injury	Amount Paid (INR)	No. of Cases	No. of Animal Killed	Amount Paid (INR)	
<b>Shimla Circle</b>										
Shimla	-	-	9	15,713	2	150,000	24	27	154,000	319,713
Rohru	1	100,000	1	10,000	1	75,000	3	5	14,400	199,400
Chopal	-	-	-	-	2	125,000	11	68	170,000	295,000
Theog	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>1</b>	<b>100,000</b>	<b>10</b>	<b>25,713</b>	<b>5</b>	<b>350,000</b>	<b>38</b>	<b>100</b>	<b>338,400</b>	<b>814,113</b>
<b>Bilaspur Circle</b>										
Bilaspur	-	-	-	-	-	-	-	-	-	-
Kunihar	-	-	1	1,631	-	-	-	-	-	1,631
Nalagarh	-	-	-	-	-	-	-	-	-	-
<b>Total</b>			<b>1</b>	<b>1,631</b>						<b>1,631</b>
<b>Rampur Circle</b>										
Rampur	2	250,000	4	12,634	3	225,000	40	78	302,500	790,134
Anni	-	-	-	-	-	-	-	-	-	-
Kinnour	1	150,000	-	-	1	75,000	15	157	284,500	509,500
Kotgarh	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>3</b>	<b>400,000</b>	<b>4</b>	<b>12,634</b>	<b>4</b>	<b>300,000</b>	<b>55</b>	<b>235</b>	<b>587,000</b>	<b>1,299,634</b>
<b>Mandi Circle</b>										
Mandi	-	-	8	14,167	-	-	3	3	18,000	32,167
Suket	-	-	24	44,012	-	-	10	23	34,000	78,012
J/Nagar	-	-	3	20,844	2	150,000	11	11	79,000	249,844
Karsog	-	-	1	1,645	-	-	5	45	80,500	82,145
Nachan	-	-	1	668	-	-	22	107	215,000	215,668
<b>Total</b>			<b>37</b>	<b>81,336</b>	<b>2</b>	<b>150,000</b>	<b>51</b>	<b>189</b>	<b>426,500</b>	<b>657,836</b>
<b>Dharamshala Circle</b>										
D/Shala	-	-	-	-	-	-	-	-	-	-
Nurpur	-	-	-	-	-	-	7	55	75,500	75,500
Palampur	-	-	-	-	-	-	-	-	-	-
<b>Total</b>							<b>7</b>	<b>55</b>	<b>75,500</b>	<b>75,500</b>
<b>Chamba Circle</b>										
Chamba	-	-	-	-	7	525,000	7	26	56,500	581,500
Bharmaur	-	-	-	-	-	-	-	-	-	-
Pangi	-	-	-	-	-	-	-	-	-	-
Churah	-	-	-	-	-	-	-	-	-	-
Dalhausie	-	-	-	-	-	-	-	-	-	-
<b>Total</b>					<b>7</b>	<b>525,000</b>	<b>7</b>	<b>26</b>	<b>56,500</b>	<b>581,500</b>
<b>Kullu Circle</b>										
Kullu	-	-	-	-	-	-	-	-	-	-
Parvati	-	-	1	1,818	-	-	-	-	-	1,818
Seraj	-	-	-	-	-	-	-	-	-	-
Lahaul	-	-	-	-	-	-	-	-	-	-
<b>Total</b>			<b>1</b>	<b>1,818</b>						<b>1,818</b>
<b>Nahan Circle</b>										
Nahan	-	-	-	-	-	-	32	63	253,200	253,200
Rajgarh	-	-	-	-	-	-	10	23	65,000	65,000
Renuka	-	-	3	21,614	-	-	13	45	115,000	136,614
Solan	-	-	-	-	-	-	10	20	60,500	60,500
Poanta	-	-	2	3,345	-	-	1	1	1,500	4,845
<b>Total</b>			<b>5</b>	<b>24,959</b>			<b>66</b>	<b>152</b>	<b>495,200</b>	<b>520,159</b>
<b>Hamirpur Circle</b>										
Dehra	-	-	-	-	-	-	7	8	37,000	37,000
Una	-	-	1	31,013	-	-	-	-	-	31,013
Hamirpur	-	-	6	10,486	-	-	15	68	116,000	126,486
<b>Total</b>			<b>7</b>	<b>41,499</b>			<b>22</b>	<b>76</b>	<b>153,000</b>	<b>194,499</b>
<b>Wildlife Circle Shimla</b>										
Shimla	-	-	-	-	-	-	1	1	6,000	6,000
Sarahan	-	-	-	-	-	-	-	-	-	-
Spiti	-	-	-	-	-	-	-	-	-	-
<b>Total</b>							<b>1</b>	<b>1</b>	<b>6,000</b>	<b>6,000</b>
<b>Wildlife Circle Dharamshala</b>										
Chamba	-	-	-	-	-	-	-	-	-	-
Hamirpur	-	-	-	-	-	-	-	-	-	-
<b>Total</b>										
<b>National Park Shamshi</b>										
Shamshi	-	-	-	-	1	75,000	9	20	82,500	157,500
Kullu	-	-	-	-	-	-	-	-	-	-
<b>Total</b>					<b>1</b>	<b>75,000</b>	<b>9</b>	<b>20</b>	<b>82,500</b>	<b>157,500</b>
<b>Total of Above</b>	<b>4</b>	<b>500,000</b>	<b>65</b>	<b>189,590</b>	<b>19</b>	<b>1,400,000</b>	<b>256</b>	<b>854</b>	<b>2,220,600</b>	<b>4,310,190</b>

Source: Compiled by JICA Study Team (2017) based on information from HPFD

#### 4.4.7 Invasive/Exotic Species

##### (1) Introduction

According to HPFD, invasion of the Himachal's landscape by exotic plant species over the past 20 years has become a cause of serious concern from the ecological, biodiversity, socio-economic and health point of view. The following four exotic species need priority attention in this aspect.

- ◆ *Lantana camara* L. (lantana, fulnu-buti, panch-phulli, ujrhu)
- ◆ *Parthenium hysterophorus* L. (carrot weed, gajar ghas, chatak chandni)
- ◆ *Ageratum conyzoides* L. (goat weed, neel-phulnu)
- ◆ *Eupatorium adenophorum* Sp. (crofton weed)

Brief descriptions of these species are described in **Attachment I.4.4.7**.

Other than four exotic species above, *Robinia pseudoacacia*, which is a notorious invasive species to cause serious threats to biodiversity in Japan, was observed in tree nurseries in the state. Eucalyptus was found everywhere in the state, which was not planted but naturally grown probably due to seeds accidentally mixed in the soil. These species may become a problem in the future and need attention.

##### (2) Extent of Infestation and Consequences of Spread:

In the state, around 3,791 km<sup>2</sup> of area under forest cover (about 25.8% of total forest cover) lies in the lower elevation (below 1,000 m). According to HPFD, nearly 60% out of this is infested with lantana in varying extent. Infestation is rapidly spreading and has been noticed in elevations up to 1,500 m. The districts of Kangra, Bilaspur, Hamirpur, Solan, Sirmour, Chamba and Mandi have been heavily infested, while Shimla has been marginally affected. HPFD had carried out a reconnaissance survey to map the infestation in various divisions and circles during January-March 2011. The summary of the result of the survey is described in **Table 4.4.13**. According to this reconnaissance survey, approximately 1,563 km<sup>2</sup> forest land is infested with lantana. Apart from this 20 km<sup>2</sup> road side and 250 km<sup>2</sup> barren land (culturable waste and fallow lands) are also infested by lantana. Lantana infestation has rendered forests degraded, highly prone to fire and regraded to cause loss of biodiversity in infested areas. Grasslands and pastures have been infested by lantana in large tracts of the state. Livelihoods of migratory graziers has been threatened, due to take over of their winter grazing grounds by lantana.

**Table 4.4.13 Circle-wise Exotic Weed Infestation in Forest Lands (January-March 2011)**

Unit: Ha

Circle	Lantana	Ageratum	Parthenium	Eupatorium	Total
Nahan	21,456.99	4,302.51	4,260.73	595.87	30,616.10
Bilaspur	55,941.55	0.00	0.00	0.00	55,941.55
Mandi	7,900.00	2,360.00			10,260.00
Hamirpur	12,680.00	0.00	0.00	0.00	12,680.00
Dharamshala	47,403.00	12,810.00			60,213.00
Shimla	4,060.89	0.00	1,100.00	0.00	5,160.89
Rampur	0.00	0.00	0.00	0.00	0.00
Chamba	4,631.77	132.91	68.50	85.40	4,918.58

Circle	Lantana	Ageratum	Parthenium	Eupatorium	Total
Kullu	575.70	0.00	284.30	137.25	997.25
WL (S)	475.06	683.98	611.44	190.50	1,960.98
WL (N)	1,160.00	54.00	0.00	1,239.00	2,453.00
WL (GHNP)	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>156,284.96</b>	<b>20,343.40</b>	<b>6,324.97</b>	<b>2,248.02</b>	<b>185,201.35</b>

Source: HPFD Internal Documents

Among the invasive species prevalent in the state, lantana is one of the most influential species and details of lanta infestation is presented in **Attachment I.4.4.8**.

### (3) Causes of Infestation

There are many factors responsible for infestation of invasive exotic species, some of the main reasons recognised by HPFD are listed in **Table 4.4.14**.

**Table 4.4.14 Possible Causes for Infestation of Invasive Species**

Cause	Description
Cutting of lands for roads and projects:	Developmental efforts projects like road construction have led to exposure of fresh soil to lantana and other weeds.
Muck dumping:	Muck dumping of debris of road construction, buildings etc have invited the lantana coloniser.
Uncontrolled grazing:	In the past two decades, HP had a cattle population twice that of humans and uncontrolled grazing led to problems of regeneration of forests, suppression of grass and other flora allowing lantana to spread.
Innate biological traits of weeds:	Weeds have unusually strong genetic makeup, allowing them to colonise, suppress competing flora and develop adaptive behaviour, which enhances sustainability in face of several threats
Effects of climate change	Over the years, the effects of climate change, like rise in temperature, dryness have resulted in conditions that are ideal for spread of weeds.
Fires etc.	Lantan infestation is closely linked with fires. Areas infested with lantana are prone to high intensity of fire, which results in severe damage to trees. Fires also soften the seed coat of Lantana and thus after fire, there is profuse germination of lantana seedlings. After fire, due to strong genetic makeup, lantana sprouts, while the re-growth of endemic flora is thwarted.

Source: Compiled by JICA Study Team (2017) based on information from HPFD

### (4) Past Efforts at Management of Invasive Species in the State by HPFD

Some efforts at management and control of these invasive species such as mechanical/ cultural and chemical methods have been made. Limited efforts at use of lantana for making low cost furniture, coal brickets and compost have also been made in the past.

However, these management efforts, mainly mechanical removal of the exotic species, have been too few and too far spread to create any significant impact. Moreover, these efforts were largely taken up as one-time intervention at weed removal and were not focused on rehabilitation of the treated area. Most of the past efforts have not yielded desired result due to lack of focus on long term follow up system.

Chemical methods (involving mainly application of glyphosate) to control lantana/ *Parthenium* were abandoned after initial trials due to concerns about their adverse environmental implications. Using of removed lantana for furniture, bricket or composting has not found favour

with the local communities. The required efforts seem not commensurate with outputs and utilities to be obtained.

Strategy and methodologies adopted by HPFD for management of the invasive species are described in **Attachment I.4.4.9**.

#### (5) Past Efforts at Management of Invasive Species in the State by Other Organisations

The Himachal Pradesh Agriculture University has been working to develop successful models of managing exotic weeds. It has also been, around Palampur, spearheading Parthenium eradication campaigns in association with educational institutions and civil society organisations. However, these campaigns have been too limited to create large scale impact.

Major learning from the past efforts at eradication of invasive alien plant species is that such efforts need to be integrated with rehabilitation of treated areas and should be of long- term duration for effective results.

### **4.4.8 Biodiversity Conservation and Eco-development**

#### (1) Introduction

HP state is bestowed with distinctive floral and faunal biodiversity having aesthetic, cultural, commercial and genetic values. The Great Himalayan National Park was inscribed into the UNESCO World Heritage list during the session of the 38th World Heritage Committee in Doha, the State of Qatar, on 23rd June 2014.

The Biological Diversity Act, 2002 has been enacted for preservation of biological diversity in India, and provides mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. The Act was enacted to meet the obligations under Convention on Biological Diversity (CBD), to which India is a party. After India signed CBD in 1992, the National Biodiversity Authority (NBA) was established in year 2003 as a statutory autonomous body under the MOEF&CC to implement the provisions under the Biological Diversity Act, 2002. To further support the NBA, State Biodiversity Board (SBB) is established in each of the states.

Aligning with the powers and functions spelt out in Article 243 of the Indian Constitution, Section 41(1) of the Biological Diversity Act, 2002 says – “Every local body shall constitute a Biodiversity Management Committee (BMC) within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganism and chronicling of knowledge relating to biological diversity.” Devolving powers and function, the Section 41(2) empowers of the BMCs to act as sole authority for taking decisions on use of biological resources and knowledge associated with these resources occurring within their jurisdiction, whereas Section 41(3) provides authority to BMCs to levy charges by way of collection fee.

HP state government first constituted the SBB vide notification no. STE-A (3)-1/2004 dated 14.02.2005, and later reconstituted the SBB vide notification no. STE-A (3)-1/2004 dated 12.05.2008 under the Chairmanship of the Chief Secretary, to the HP state government for implementation of the Biological Diversity Act, 2002 in the state.

SBB is an autonomous structure created under Societies Registration Act, and its executive committee is reconstituted every three years. The tenure of the current board headed by Additional Chief Secretary would expire in August 2017. SBB had its first meeting in year 2006, and the second meeting could happen in year 2016, only after a decade. SBB has five key functions and responsibilities as described in **Table 4.4.15**.

**Table 4.4.15 Key Functions and Responsibilities with SBB**

<b>Functions</b>	<b>Brief description</b>
<b>Formation of Biodiversity Management Committees (BMCs)</b>	Local bodies constitute BMC in accordance with Section 41, within their area of jurisdiction for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and micro-organisms and chronicling of knowledge relating to biological diversity. BMC is to maintain a Register giving information about the details of the availability and knowledge of local biological resources, their use or any traditional knowledge, access to biological and traditional knowledge granted, details of the collection of fee imposed and details of the benefits derived and the mode of their sharing.
<b>Creation of People's Biodiversity Registers (PBRs)</b>	People's Biodiversity Registers (PBR) document folk knowledge of status, uses, history, ongoing changes and forces driving changes in biodiversity resources, gainers and losers in these processes and people's perceptions of how these resources should be managed. The documents bring together important locality specific information on biodiversity resources and ecological processes affecting them.
<b>Ensuring Access and Benefit sharing</b>	The concept of Access and Benefit Sharing (ABS) was introduced for the first time in the Convention on Biological Diversity (CBD) negotiations in 1992. It is its third goal. It is essential for the welfare of the current generation and future generations to allow everyone access to these resources while ensuring the conservation and sustainable use of biological diversity.
<b>Conserving Threatened Species</b>	Threatened species are any species (including animals, plants, fungi, etc.) which are vulnerable to endangerment in the near future. Species that are threatened are sometimes characterised by the population dynamics measure of critical depensation, a mathematical measure of biomass related to population growth rate. As per Section 38 of the Biological Diversity Act, MoEF&CC, GoI in consultation with the Govt. of HP, has notified eight species of plants and ten species of animals which are on the verge of extinction in the Gazette notification dated 17th March, 2009.
<b>Maintaining Biodiversity Heritage Sites</b>	Biodiversity Heritage Sites are rich biodiversity areas and are important components of local ecosystems which are being conserved and managed by the society. The Sites are like existing sacred groves, wetlands and traditional crops areas in general which can be declared and notified as Biodiversity Heritage Sites. As per provision under Section 37(1) of 'Biological Diversity Act, 2002', The State Government may, from time to time in consultation with the local bodies, notify in the Official Gazette, areas of biodiversity importance as Biodiversity Heritage Sites under Biological Diversity Act.

Source: Compiled by JICA Study Team, (2017) based on SBB website

## (2) Status and Key Achievements

In HP, permanent structure for SBB (HPSBB) has been under preparation. Currently, it's functioning with concurrent positions with relevant and diverse departments such as Forests, Industry, and Environment, Science and Technology, which enables dynamic and cross-cutting

approaches. SBB is also supported by the state, NBA and UNEP-GEF project. HPSBB is receiving one million INR per year from NBA for supporting the operations.

HPSBB has started functioning in desired manner, only since 2016 onwards under the current leadership. Recently, a proposal has been moved to the state government to support a permanent structure with some 12 sanctioned positions for HPSBB, as it has been done in the neighboring state of Uttarakhand. The website of HPSBB is also being revamped and made more interactive and user-friendly. Standard forms and applications have been designed, and have been made available through the website.

HPSBB has been approaching to Gram Panchayats (GPs) to sensitise them and build capacities to constitute BMCs. Four districts namely Chamba, Kullu, Shimla and Sirmour were prioritised, and two more districts, Kinnaur and Lahaul & Spiti were followed to focus their efforts for BMC development. First round of awareness generation and sensitisation targeted the prioritised four districts, and total of 1,089 GPs were covered, and 184 BMCs have been constituted.

SBB extended their efforts to identify some potential areas for Biodiversity Heritage Site (BHS). No site has been declared as BHS yet, however SBB identified some 15 sites for future recognition as BHS, including sacred groves/ forests and forests protected through traditional forest protection system called Rakha system.

Major status and key achievements of SBB in the state in relation to the functions provided in **Attachment I.4.4.10**.

### (3) Linkage with the State Policy and HPFD

The Himachal Pradesh Forest Sector Policy & Strategy, 2005 clearly states in its preamble that biodiversity conservation, multi-stakeholder approaches, livelihood security, gender and equity concerns are central to sustainable development and forest management.

Vision statement in the State Forest Policy mentions the “HPFD aims to be a committed organisation of excellence in forestry, serving communities and the nation for harmony between people, environment, conservation and development. Working in partnerships, we manage and protect the unique Himalayan biodiversity for the future. Creative and dynamic, we aspire to the best forestry service.’

The Policy also emphasises on the involvement of local communities and PRI in the management of forest resources in the state.

Since HPSBB does not have its own field implementation structure, field level implementation relies on the regular structure of HPFD. To support and enable BMC functioning, recently a notification has been issued by the state government (FFE-A(B) 19-2/2017 No.54060609 dated August 8, 2017) regarding nomination of Secretary of BMC, Nodal Officer and Advisory Members.



#### **4.4.9 Eco-tourism**

##### **(1) Introduction**

Traditionally HP has been known as a summer destination. The Department of Tourism & Civil Aviation has taken special efforts to break the seasonality factor and has developed diversified tourism products to attract tourists in other seasons. The aim of department is at promoting sustainable tourism and encouraging private sector to develop tourism related infrastructure in the state without disturbing the existing ecology and environment. Aligning with the overall aim of tourism, ecotourism is also being promoted in HP.

Ecotourism works towards conservation of nature and biodiversity, and culture as well. HP being one of the top tourist destinations in the country, promotion of ecotourism helps to educate and sensitise general tourists on valuable nature, and thus can lead to conserve it.

Realising the importance and role the ecotourism can play for nature conservation and livelihoods, the first policy on ecotourism was brought by the state in year 2001. This policy has evolved over time by way of learning from experiences, feedbacks on implementation difficulties and operational gaps. To make it more realistic and actionable to support promotion of ecotourism involving private sector as well, the policy had gone through three revisions (2005, 2016 and 2017).

The revised ecotourism policy 2017 aims at bringing the wilderness and virgin ecosystem of the state closer to tourists and nature lovers, while ensuring adequate safeguards and systems for the protection and conservation of the natural resources.

##### **(2) Ecotourism Society**

To carry forward the ecotourism policy prescription to ground, the Himachal Pradesh Ecotourism Society (HPECOSOC) was created within HPFD, and registered as autonomous society registered vide no.422 dated 30 June 2006. The CCF (Ecotourism and Publicity) in HPFD is ex-officio CEO of the society. The main aim of the society is to promote “community based ecotourism” (CBET) which intended for ecologically sustainable, financially viable, culturally acceptable, and beneficial to the village communities. Further, HPECOSOC is also responsible to evolve strategies for the development and the efficient use of the forest rest houses, forest inspection huts and other relevant infrastructure (camping sites, film shooting grounds, etc.) which could help in promoting CBET in localities.

HPECOSOC works in partnerships with the civil society (local communities, NGOs, academic institutions and private enterprises/businesses) and the state (HPFD, the Tourism Department and other related departments). The involvement of local communities in the ecotourism will support livelihood needs and consequently create their direct stake in conservation of local culture, ecology and environment.

### (3) Status and Key Achievements

As of July 2017, HPECOSOC has promoted six sites under Private Public Partnership (PPP) models as indicated in **Table 4.4.16**.

**Table 4.4.16 Ecotourism Sites Promoted by HPECOSOC**

Name of Sites	Date of Initiation	Date of Renewal for Next 5 years	Current Rent per Annum (INR)
Moti Kuna Hill, Sanawar (Solan)	27.01.2009	27.01.2014	375,000
Chewa, Near Barog (Solan)	10.02.2009	10.02.2014	375,000
Barog Camping Site, Barog (Solan)	27.01.2009	27.01.2014	425,000
Shoghi Camping Site, Shimla (on NH-22 (Shimla))	27.01.2009	27.01.2014	425,000
Ala Forest Rest House, Dalhousie (Chamba)	27.01.2009	27.01.2014	425,000
Sonu Bungalow Camping Site, near Tata devi on NH-22 (Shimla)	N/A	N/A	425,000

Source: Compiled by JICA Study Team (2017) based on information from HPECOSOC/ HPFD

There are many nature trails and trekking routes that falls under the jurisdiction of HPFD. HPECOSOC coordinates with HPFD to conduct these trekking tours (**Attachment 4.4.11**). In addition to these, there are some 50 listed trekking routes coordinated and facilitated through HPECOSOC, which are also utilised for ecotourism purposes.

HPFD maintains forest rest houses (274) as well as inspection huts (173) for utilisation during regular forest administration and management. HPECOSOC is directly managing some 50 forest rest houses while remaining are being utilised by HPFD under regular functions.

HPECOSOC is undertaking regular training and capacity building initiatives. In 2016, HPECOSOC had organised training events for Panchayat representatives, travel agents, and NGOs/ CBOs. On July 7 2017, HPECOSOC had also organised a seminar on ecotourism titled - "Improving rural economy by strengthening livelihood options and employment generation through ecotourism". It was shared in the seminar that due to promotion of ecotourism in the Great Himalayan National Park (GHNP) in Kullu, the footfall of tourists, especially foreigners, is gradually increasing as efforts are on to bring direct benefit to the people residing in the 13 panchayats in the vicinity of GHNP. It was further shared that ecotourism development activities have been accelerating in recent years and over 130 potential sites were identified in the whole states, but there are still hurdles in allotting and running them at the ground level operation. The Ecotourism Wing of HPFD is planning to run 10 sites on its own, and operation system for the other sites are still under discussion.

Recently, HPECOSOC has worked out strategy and proposal for developing three eco-circuits each having distinctive objectives viz., a) moisture and water conservation eco-circuit, b) biodiversity conservation eco-circuit, and c) nature trail eco-circuit. These circuits indicate themes for trekking tours, and some 50 listed trekking routes of HPECOSOC are categorised under these eco-circuits.

In addition, the society also trains nature guides to support ecotourism requirements as well as to create employment opportunities for local youths.

#### (4) Linkage with the State Policy and HPFD

HPECOSOC covers the entire state, and will work with the ecotourism societies created at division/ circle level to facilitate PPP initiatives at identified locations. Under the Ecotourism Policy (2017), the societies are created at the circle level which is headed by CF/ CCF, and DFO (HQ) of circle is member secretary and a member of Governing Body (GB). GB of circle level society is also represented by Deputy Commissioner, Zilla Panchayat, Gram Panchayat/ Nagar Panchayat, district tourism officer, forest development corporation and NGOs/ CBOs. Earlier, this society was created at the divisional level. However, as per the 2017 policy existing divisional level societies will be merged into respective circle level societies (CLSs) in due course of time. GB of the CLS is responsible for approving the annual budgets and action plan. The CLSs can meet once in a quarter to review, monitor and evaluate the implementation of various activities of all Ecotourism projects in the circle. The CLS also has a supervision committee headed by DFO created for each of the divisions falling in a circle. The proposals for new ecotourism sites are prepared and sent by CLS to HPECOSOC.

#### **4.4.10 Ecosystem Services**

HP state has a policy on Payment for Ecosystem Services (PES) with a recognition that the ecosystem services provide benefits to people in the form of goods and services. The policy defines an “ecosystem” as “a dynamic complex of plant, animal, and microorganism communities and the non-living environment, interacting as a functional unit”. The benefits deriving from the ecosystem services (ES) are grouped into four: “provisioning services (i.e. food and water)”, “regulating services (i.e. flood and disease control)”, “cultural services (i.e. spiritual, recreational and cultural benefits)” and “supporting services (i.e. nutrient cycling)”, which are essential to human lives. The HP state government recognises a decline in these services and the rejuvenation and sustained benefits of ES assumes “a voluntary, conditional agreement between at least one ‘seller’ and one ‘buyer’ over a well-defined environmental service or a land use presumed to produce that service”<sup>29</sup>. This means that the users of the services would agree on the provision of the services (through protection/ management/ conservation of natural resources) and the users of the services make payment for the service providers. The policy document also refers to the Himachal Pradesh Forest Sector Policy and Strategy 2005, and states that the ecosystem management approach shall include the incentive based mechanisms for watershed services, fire management, invasive weed control, tree plantation and promotion of sustainable forestry and sustainable livelihoods. These policies provide the basis for the Project to adopt integrated approach to ecosystem management with the people’s participation.

Since the formulation of the HP Policy on PES, some initiatives were attempted in the state both by the government and non-governmental sectors. Three case studies based on the literatures are

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<sup>29</sup> Badola, Rucchi. et. al. (n.d.). Payment for Ecosystem Services for Balancing Conservation and Development in the Rangelands of the Indian Himalayan Region. (p. 180). In *Highland Altitude Rangelands and Their Interfaces in the Hindu Kush Himalayas* (2013).

presented below as case studies on PES in HP. The case studies suggest that 1) PES is a multi stakeholder initiative, 2) PES can be designed at different levels and 3) PES can be formalised or kept informal. However, as Badola (2013) suggests that the economic valuation of the services would be essential to design the process.

(1) Case Study of HP State: PES Implementation in Kuhan Village, Kangra District<sup>30</sup>

In a small village in HP state, a successful case of PES was executed between a downstream and upstream village. The objective was to preserve a small dam in the downstream village. The villagers decided to pay the upstream village for the ecosystem services deriving from water which would stop unsustainable practice of overgrazing which was causing soil erosion and the accumulation of silt in the small dam in their village.

Kuhan is a small village in the hills of Kangra district in the state. It receives high annual rainfall and yet faces water shortages due to lack of proper storage facilities. In 2003, the villagers constructed a check dam on a small creek called Gullanah Khad. This was made possible by pooled resources and some help from a watershed development project of the HP government. This made irrigation possible during the non-rainfall months and crop production increased by six times as it became possible to grow vegetables and fruits for cash.

However, by 2005 the reservoir had silted up and its capacity to irrigate the village agricultural land was reduced by half. The villagers correctly diagnosed the problem that most of the silt came from the grazing land of Ooch village, located up side on the nullah. Both villages discussed matters related to saving the dam and reached a formal agreement. Ooch village banned grazing for eight years on its four-hectare common land and planted saplings of fruit, fodder bearing trees as well as bamboo and elephant grass. In exchange, Kuhan paid for the cost of tree samplings, they even agreed to sell irrigation water to Ooch village as and when required. The silt load in the Gullanah khad creek reduced considerable and the Kuhan villagers regained the capacity to store water and grow more crops.

(2) Case Studies - PES Models for Shimla, HP State: World Wildlife Fund-2008<sup>31</sup>

The PES models developed for Shimla is based on recreational services and water supply services provided by forest ecosystems. Shimla is popular tourist destination and the vision document for Shimla aims to increase high-end tourist inflow in the city from 60,000 in 2006 to 2,460,000 in 2021, with a corresponding increase in the average duration of stay from 1.35 days to 3.5 days. The PES model for recreational services proposes that the hotels and tour operators who are the main stakeholders make a conservation payment to the Shimla Municipal Corporation (SMC). The payments made and received by SMC will be invested in effective

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<sup>30</sup> Source: This section is based on an article by Singh, Suprya. Payment for Ecosystem Services (PES) in India from the Bottom -Up. Centre for Science and Environment (CSE), India. (<http://www.cseceec.net/case-studies/payment-for-ecosystem-services-pes-in-india-from-the-bottom-up/>). Accessed on 22 Aug 2017)

<sup>31</sup> Source: This section is based on Scoping Payments for Forest Environmental Services in India. (Manoharan, T.R.). (<http://lib.icimod.org/record/9473/files/5448.pdf>). Accessed on 22 Aug 2017).

management of the forest environment, with the ultimate objective of ensuring a sustained flow of more satisfied and high-end tourists. The model recognises that the PES will work only if the additional revenue generated through increased tourist inflow is more than or equal to the conservation “tax” or “user fee” paid to the sellers of the service.

The PES model for water supply services in Shimla is based on the assumption that the availability of quality water is a function of land use and land management practices in the nearby catchment forest area of the water sources for Shimla. SMC proposes to rectify the water problems by 2021 to achieve self-sufficiency in availability of safe drinking water for all. SMC has adopted an integrated approach which includes measures to manage demand and supply of water, tariff revisions to curb demand, and rain water harvesting.

### **(3) Himachal Pradesh Forest Ecosystem Services (HP-FES) Project**

The project is a technical cooperation project commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), GIZ India and HPFD. The project aims to enable HPFD to introduce/ institutionalise the ecosystem approach in the forest management systems of HP and the projection duration is four years from April 2016 to April 2020. The project focuses on the capacity development in relation to the ecosystem service approaches. Furthermore, the project includes micro planning and implementation in 12 selected pilot villages to introduce ecosystem services approach, and two pilot villages to introduce PES for promoting local stewardship in the forest management. The pilot villages are selected in forest divisions of Shimla, Rampur, Kullu, Karsong, Renukaji, Solan, Dehra, Kunihiar, Palampur and Dalhousie. Findings and lessons to be evolved from these pilot villages are expected to serve as the model approach and can be further replicated in HP for enhancing ecosystem services and PES at the community level.

#### **4.4.11 On-going Schemes/Projects Related to Biodiversity Conservation and Wildlife Management**

According to HPFD, the following activities are being carried out in HP for biodiversity conservation and wildlife management.

- ◆ Protect, develop and scientifically manage the wildlife in the protected areas
- ◆ Protect the wildlife and its habitat in areas outside the protected areas
- ◆ Carry out integrated eco-development work in the vicinity of protected areas to reduce the biotic pressure in protected areas
- ◆ Carry out the conservation breeding and rehabilitation of endangered species
- ◆ Create nature awareness among local people in general and youth in particular and also to involve NGOs
- ◆ Carry out field research regarding wildlife
- ◆ Maintain existing zoological parks in HP
- ◆ Propagate Eco-Tourism.

**Table 4.4.17** describes expenditure for biodiversity conservation and wildlife schemes spent by HPFD during 2014-15 to 2016-17. On an average, about 92 million INR/year was spent for the wildlife schemes during these three years.

**Table 4.4.17 Expenditure Under Wildlife Schemes**

(Million INR)

No.	Name of Scheme	2014-15	2015-16	2016-17
1	a) State Schemes (Non-Tribal)- All	39.95	42.50	67.82
	b) Tribal Sub-Plan	4.29	5.80	6.40
2	Central Sector Schemes	32.69	41.25	20.26
3	Cold Desert Biosphere Reserve (CDBR)	8.04	0.0	6.91
4	Total	84.97	89.55	101.39

Source: HPFD Internal Document

Major ongoing wildlife related schemes are listed hereunder and their brief descriptions are described in **Attachment I.4.4.12**.

1) State Sector Scheme

- i) Wildlife Preservation
- ii) Development of Himalayan Zoological Park
- iii) Improvement and Development of Wildlife Sanctuaries

2) Central Sector Scheme

- i) Assistance for Development of National Parks and Sanctuaries (Re-named as Integrated Development of Wildlife Habitats)
- ii) Development of Pin Valley National Park
- iii) Cold Desert Biosphere Reserve (CDBR)
- iv) Conservation Projects
  - a) Cheer Pheasant Conservation Breeding Project
  - b) Conservation Breeding Centre for Monal (CBC) at Manali
  - c) In-situ Vulture Conservation

## 4.5 Forest Management and Forestry

### 4.5.1 Forest Management System

(1) Working Plans

Working Plan has been the main instrument of forest planning in India for scientific management of forests. It is a document for evaluating the status of forests and biodiversity resources of a forest division, assessing the impact of past management practices and deciding about suitable management interventions for future. Periodical up-dating and revision of working plan is essential to keep pace with the trends emerging out of forest–people interface and to address national and international obligations. However, with the intervention of the Honourable Supreme Court of India in 1996, it was clarified that all working plans were to be approved by the Central Government. In response to the decision, MoEF&CC adopted a uniform code as known as The National Working Plan Code which provides guidelines for preparation of working

plans for the management of forests under the prescriptions of a working plan/scheme to standardise the procedure.

The prescriptions depicted in the National Working Plan Code provides framework to design site specific working plans for co-existence of development with nature through simultaneous implementation of the Indian Forest Act, 1927, the Wildlife (Protection) Act, 1972, the Forest Conservation Act, 1980, the Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA), the Biological Diversity Act, 2002, and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006; and to meet the requirements of the objectives of the National Forest Policy and other international conventions/agreements.

In the state, as of April 2017, 35 working plans are under implementation (total territorial divisions which require working plans are 36, but Nahan and Ponat Sahib divisions have a combined working plan) in HP (Table 4.5.1). 23 divisions have approved working plans. One working plan is under consideration of the MoEF&CC and 11 working plans (Lahaul, Mandi, Jogindernagar, Churah, Rohru, Parvati, Ani, Chamba, Renuka ji, Kinnaur, Solan) are expired and are under revision. The total area managed under different working plans is 27,827.51 km<sup>2</sup> (except for protected areas covered by the respective management plans), of which the reserved forest is 1,662.51 km<sup>2</sup> (5.97%), the demarcated protected forest is 9,947.96 km<sup>2</sup> (35.74%), the un-demarcated protected forest is 14,823.88 km<sup>2</sup> (53.26%), and others are 1,399.19 km<sup>2</sup> (5.03%).

**Table 4.5.1 Status of Working Plans in HP State (April 2017)**

No.	Name of working Plan	In the Proposed Project District	Period	Status
<b>A Approved working plan</b>				
1	Chopal	Yes	2003-04 to 2017-18	Approved
2	Suket	Yes	2003-04 to 2017-18	Approved
3	Bharmour	Yes	2004-05 to 2018-19	Approved
4	Pangi	Yes	2002-03 to 2021-22	Approved
5	Dharamshala	No	2012-13 to 2021-22	Approved
6	Nurpur	No	2012-13 to 2021-22	Approved
7	Dehra	No	2012-13 to 2021-22	Approved
8	Palampur	No	2010-11 to 2025-26	Approved
9	Shimla	Yes	2011-12 to 2025-26	Approved
10	Karsog	Yes	2012-13 to 2026-27	Approved
11	Una	No	2012-13 to 2026-27	Approved
12	Kotgarh	Yes	2012-13 to 2026-27	Approved
13	Kunihar	No	2012-13 to 2026-27	Approved
14	Bilaspur	Yes	2012-13 to 2026-27	Approved
15	Nalagarh	No	2012-13 to 2026-27	Approved
16	Banjar(Seraj)	Yes	2013-14 to 2027-28	Approved
17	Rajgarh	No	2013-14 to 2027-28	Approved
18	Dalhousie	No	2013-14 to 2027-28	Approved
19	Kullu	Yes	2013-14 to 2027-28	Approved
20	Rampur	Yes	2014-15 to 2028-29	Approved
21	Hamirpur	No	2016-17 to 2028-29	Approved
22	Theog	Yes	2016-17 to 2028-29	Approved
23	Nahan/ Paonta	No	1998-99 to 2012-13 extension granted up to 31.03.2018	Approved
<b>B Draft working Plans Submitted to MOEF&amp; CC</b>				
1	Nachan	Yes	-	Approval awaited from GoI
<b>C Working Plans Submitted to MOEF&amp; CC</b>				
1	Lahul	Yes	1993-94 to 2006-07	Expired, extension upto March16
2	Mandi	Yes	1999-2k to 2013-14 extension	Approved extension upto

No.	Name of working Plan	In the Proposed Project District	Period	Status
			granted up to 31.03.2016	March16
3	Jogindernagar	Yes	1999-2k to 2013-14 extension granted up to 31.03.2016	Approved extension upto March16
4	Churah	No	1993-94 to 2007-08	Expired, under preparation
5	Rohru	Yes	1994-95 to 2008-09	Expired, under preparation
6	Parvati	Yes	1994-95 to 2009-10	Expired, under preparation
7	Ani	Yes	1996-97 to 2011-12 Extension granted up to 31.03.2015	Expired, extension upto March, 2015
8	Chamba	No	1998-99 to 2012-13 Extension granted up to 31.03.2015	Expired, extension upto March, 2015
9	Renukaji	No	199-2k to 2013-14 Extension granted up to 31.03.2015	Expired, extension upto March, 2017 under correspondence with Gol
10	Kinnaur	Yes	199-2k to 2014-15	Expired, under preparation
11	Solan	No	2002-03 to 2016-17	Expired on 31.03.2017, submitted to Gol for approval

Source: HPFD

## (2) Working Circles

Under working plans, specific management practices are prescribed for specific forests areas. Each of such areas identified by different forest management practices is called as “working circle”. The working circle is one of forest management/ treatment units and different from the forest administrative unit indicated in **Figure 4.5.1**. Forest areas in forest divisions is allocated to different working circles compartment-wise, and each working circle is management under a particular silvicultural and/or management treatments. Working circles are divided into “main (or non-overlapping) circle” and “overlapping circle”. The former is prescribed with certain treatments to single forest areas, whereas the latter covers areas of more than one main working circle for which a common treatment is applicable. According to HP Forest Statistics, there are a total of 22 working circles having specific management objectives and prescriptions to achieve these objectives. Out of these, 13 working circles are main working circles and the remaining nine are overlapping working circles. The types of these 22 working circles are presented in **Table 4.5.2**, and division-wise area as well as growing stocks of working circles are summarised in **Attachment I.4.5.1**. Major working circles are chir (1,258.85km<sup>2</sup>); deodar/deodar & kail (1228.70 km<sup>2</sup>); fir/fir & spruce (971.98 km<sup>2</sup>); oak (289.56 km<sup>2</sup>). The total growing stock has been calculated to be 138.30 million m<sup>3</sup> in all the working plans put together.

**Table 4.5.2 Types of Working Circle in HP State as of 2013**

Type	Working Circle Name
Main Working Circle	- Chir
	- Deodar
	- Deodar & Kail
	- Oak
	- Fir
	- Fir & Spruce
	- Bamboo
	- Improvement
Overlapping Working Circle	- Selection
	- Coppice
	- Eucalyptus
	- Sal
	- Neoza
	- Khair
	- Protection
	- Plantation
- Rehabilitation	
- Soil cum Biodiversity Conservation	
- Broad Leaved (B/L)	



Type	Working Circle Name
	- Afforestation
	- Grazing
	- Biosphere Conservation

Source: Compiled by JICA Study Team (2017) based on HP Forest Statistics 2013 and Working Plans

Though the latest total number of working circles in HP are not clear at the time of the preparation of this report, new types of overlapping working circles such as wildlife management, NTFP, JFM, SWC, are described in some of the new working plans prepared after 2012. Descriptions of major working circles are summarised in **Attachment I.4.5.2**.

#### 4.5.2 Forest Management of Natural Forests and Artificial Forests

##### (1) Natural Forest Management

According to HPFD, up to 1980s, natural (high) forests<sup>32</sup> were managed largely for timber extraction for developmental needs. Mainly, deodar, chir, kail, fir, and spruce were exploited for timber and khair for katha. They were managed under Punjab shelterwood<sup>33</sup> or other shelterwood system and at rotation age (age at which forest attain economically exploitable diameter) in all the coniferous species is 120–150 years. Regeneration could not keep pace with the felling resulting in reduction in very dense and medium density forests. Besides there are other number of factors for forest degradation like illicit felling, encroachment, fires, diversion of forest lands, etc.

##### (2) Artificial regeneration (afforestation/reforestation)

To improve the forest density and forest cover in shorter time periods, artificial regeneration (afforestation/reforestation) has been carried out. Plants of appropriate species are raised in nurseries of HPFD from three months to three years (depending upon the species) and then transplanted in plantation sites at determined spacing and with fencing protection. Regular maintenance (weeding, cleaning etc.) are done for three - five years after planting to improve growth and survival of planted seedlings.

Afforestation areas established in HP between 1950 and 2011 is described in **Table 4.5.3**. Large scale afforestation efforts have been done in HP since 1950s under various schemes (state and centrals) and externally aided projects, and the total area afforested up to 2011-12 is approximately 1.08 million ha, which is equivalent to nearly 20% of the total geographical area of HP. There has been a declining trend in annual achievements over years from approximately between 24,000 ha to 32,800 ha in 1980s and 1990s to approximately 17,000 ha up to early 2011-12. In the recent years (2015-16 and onward) the annual achievement has further declined gradually and around 11,000 ha per year is coming under afforestation as indicated in **Table 4.5.4**.

<sup>32</sup> “High forest” is a type of forest which regenerated from seeds and/or seedlings, and normally develop high/ close forest canopy. On the other hand, “low forest” is a type of forest originated from vegetative regeneration, such as coppice forest (The Dictionary of Forestry, Society of American Foresters)

<sup>33</sup> A type of regeneration method which certain number of trees are maintained as shelterwood to serve as shade to enhance the regeneration.

**Table 4.5.3 Amount Invested in Forestry and Afforestation Area in HP State under Plan Budget**

Plan Period		Plan Expenditure State Sector (Million INR)	Area Afforested (Ha)	Average Annual Afforestation (Ha)	Cumulative Afforestation (Ha)
1	First Five Year Plan (1950-56)	18	5,294	1,059	5,294
2	Second Five Year Plan (1956-61)	78	17,926	3,585	23,220
3	Third Five Year Plan (1961-66)	438	40,187	8,037	63,407
4	Annual Plans (1966-69)	310	27,321	9,107	90,728
5	Fourth Five Year Plan (1969-74)	929	73,349	14,670	164,077
6	Fifth Five Year Plan (1974-78)	1,308	73,599	14,720	237,676
7	Annual Plans (1978-79 & 1979-80)	1,095	44,897	22,449	282,573
8	Sixth Five Year Plan (1980-85)	4,698	120,399	24,080	402,972
9	Seventh Five Year Plan (1985-90)	10,883	163,826	32,765	566,798
10	Annual Plans (1990-91 & 1991-92)	6,475	58,945	29,473	625,743
11	Eighth Five Year Plan (1992-97)	23,420	142,732	28,546	768,472
12	Ninth Five Year Plan (1997-2002)	39,659	131,850	26,370	900,325
13	Tenth Five Year Plan (2002-07)	38,456	86,341	17,268	986,666
14	Eleventh Five Year Plan (2007-12)	59,508	88,661	17,732	1,075,327

Source: Compiled by JICA Study Team (2017) based on Himachal Forest Statistics 2013

District-wise artificial regeneration achievement of HP including projects and centrally sponsored schemes (CSSs) between 2011-12 to 2016-17 is summarised in **Table 4.5.4**. In the past six years (2011-2016) the total area brought under plantation is 94,008 ha and total number of seedlings planted was 569.88 million. During this period, Chamba district had total afforestation area of 18,500 ha and achieving more than 2,000 ha per year, followed by Kangra, Kullu, Mandi, and Simla districts having constant afforestation area of 1,000 ha or more per year. On the other hand, Kinnaur and Lahul & Spiti districts tend to have afforestation area less than 500 ha per year and total afforestation areas during this period do not exceed 2,500 ha.

**Table 4.5.4 District-wise Planation Achievements by State Plan including Projects and Centrally Sponsored Schemes**

District Name	2011-12 Area (ha)	2012-13 Area (ha)	2013-14 Area (ha)	2014-15 Area (ha)	2015-16 Area (ha)	2016-17 Area (ha)	Total (ha)	206-17 Seedling Planted (million)
Afforestation (Notified Forest Areas and Public Lands)								
Bilaspur	940	597	689	1,152	649	207	<b>4,234</b>	0.2
Chamba	3,692	3,882	2,979	3,597	2,427	2,002	<b>18,579</b>	2.38
Kangra	2,273	1,615	1,509	1,463	1,673	1,622	<b>10,155</b>	0.17
Kullu	1,451	1,400	1,628	2,201	1,564	1,520	<b>9,764</b>	1.38
Mandi	1,969	2,916	1,580	2,517	1,687	1,126	<b>11,795</b>	1.81
Sirmaur	1,864	870	1,150	1,050	954	568	<b>6,456</b>	1.24
Solan	819	994	1,494	1,148	1,181	810	<b>6,446</b>	0.45
Shimla	1,662	920	2,369	1,364	1,035	1,237	<b>8,587</b>	1.19
Hamirpur	831	332	407	449	267	207	<b>2,493</b>	0.82
Lahul & Spiti	408	482	371	634	208	71	<b>2,174</b>	0.15
Kinnaur	265	276	373	412	154	412	<b>1,892</b>	0.58
Una	2,569	3,371	2,850	1,442	931	271	<b>11,434</b>	0.26
Total of Above	<b>18,743</b>	<b>17,655</b>	<b>17,399</b>	<b>17,429</b>	<b>12,730</b>	<b>10,052</b>	<b>94,008</b>	10.69
Total of Forest Area*	<b>13,296</b>	<b>14,689</b>	<b>12,995</b>	<b>12,693</b>	<b>11,794</b>	-	-	-
	70.9%	83.2%	74.7%	72.8%	92.6%	-	-	-

Note: \*Based on respective Plantation Brochures

Source: Compiled by JICA Study Team (2017) based on Information from HPFD

### (3) Labour Procurements

Working plans describe labour supply conditions in relation to forestry operations implemented by HPFD or harvesting/extractions conducted by HPSFDCL. Reviewing available working plans, adequate local labour is generally available. However, most of forest divisions tend to face scarcity of labours during monsoon planting seasons (July to August), which overlap with other activities such as agriculture. During such period, higher wage tends to be offered especially by private employers and thus, forest divisions tend to rely on outside labours such as Gorkha labours from Nepal and labours outside of respective divisions. According to working plans, HPSFDCL has more tendency to rely on outside labours and also engage labourers from outside of states such as Uttar Pradesh, Jammu & Kashmir. Labour supply status of major forest divisions as per respective working plans are presented in **Attachment I.4.5.3**.

## **4.5.3 Grasslands and Pastures Management**

### (1) Grassland and Pasture Areas in HP State

Various classifications and estimated areas of grasslands/pastures are available for different purposes. Thus, the Study Team adopted the following classification to understand grassland/pasture distribution in HP.

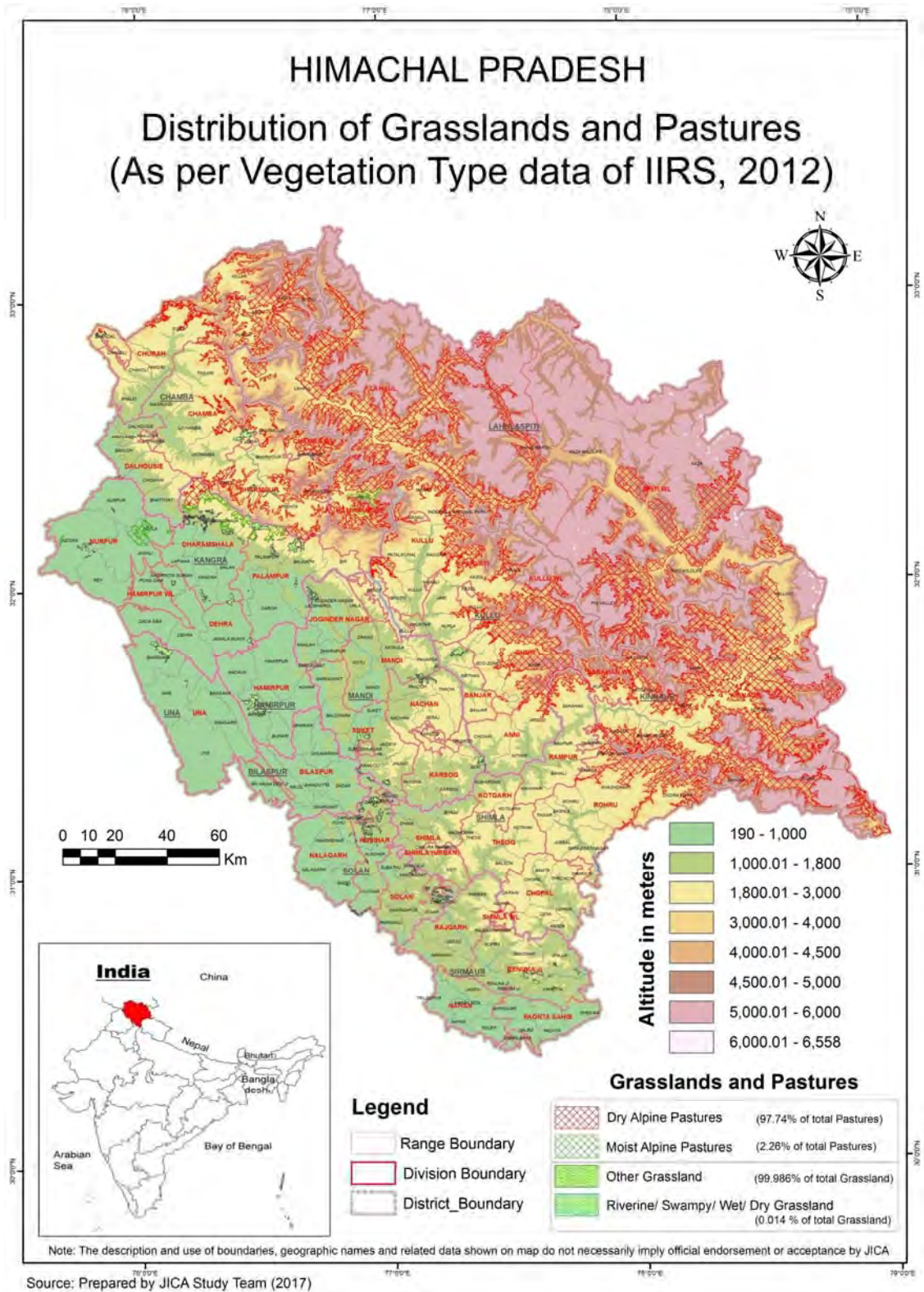
- i. Vegetation and Land Use Type Map (as part of ‘Biodiversity Characterisation at Landscape Level: National Assessment 2012’, Indian Institute of Remote Sensing (IIRS) for biological richness analysis)

Based on the data of the vegetation and land use type map 2012, grasslands/ pastures were re-categorised as “Dry Alpine Pastures”, “Moist Alpine Pastures”, “Other Grasslands”, “Riverine/ Wet/ Dry/ Swampy Grass Land”. Definitions of these grasslands/ pastures are presented in **Attachment I.4.5.4**. Forest circle-wise grassland and pastures areas was calculated and presented in **Table 4.5.5** and a distribution of these grasslands/ pastures in HP is illustrated in **Figure 4.5.1**. Majority of grasslands/pastures existing in HP is categorised as the “dry alpine pasture” having the total area of approximately 750,000 ha which are more prevalent at elevation between 3,000 m and 4,500 m. The dry alpine pastures are dominated in forest circles of Rampur (covering Kinnaur district, and part of Shimla and Kullu districts) and Kullu (covering Kullu district and Lahul sub-division of Lahul & Spiti districts) having around 200,000 ha. Followed by forest circles of Shimla Wildlife South (part of Shimla Kinnaur, and Lahul & Spiti districts), Great Himalayan National Park (Kullu districts), Spiti Wildlife (Spiti sub division of Lahul & Spiti district), and Chamaba (Chamaba district), which have dry alpine pastures areas ranging from 80,000 ha to 55,000 ha within respective circles.

**Table 4.5.5 Circle-wise Pasture/ Grassland Distribution in HP State based on Vegetation and Land Use Type Map 2012**

Circle	Total Area (ha)	Dry Alpine Pastures (ha)	Moist Alpine Pastures (ha)	Other Grassland (ha)	Riverine/ Wet/Dry/ Swampy Grass Land (ha)	Total Pasture/ Grassland (ha)	Percentage of Pasture / Grassland
BILASPUR	243,691.8	-	-	3,944.8	-	3,944.8	1.6%
CHAMBA	519,261.5	55,631.0	18.2	1,540.2	0.1	57,189.5	11.0%
DHARAMSHALA	366,866.0	6,069.7	13,072.8	6,949.4	-	26,091.9	7.1%
HAMIRPUR	362,729.6	-	-	4,849.9	-	4,849.9	1.3%
KULLU	903,294.8	188,550.2	2.7	926.1	0.1	189,479.1	21.0%
MANDI	380,531.3	-	-	3,880.3	-	3,880.3	1.0%
NAHAN	340,082.3	70.1	-	2,894.3	0.1	2,964.6	0.9%
RAMPUR	749,769.5	213,936.2	1.0	130.5	-	214,067.7	28.6%
SHIMLA	377,850.4	26,098.6	1.7	10.5	2.2	26,113.1	6.9%
DHARAMSHALA WL NORTH	240,843.6	47,878.6	4,292.5	1,228.0	1.2	53,400.3	22.2%
GHNP	247,583.3	68,651.8	-	0.2	-	68,652.1	27.7%
SHIMLA WL SOUTH	410,812.2	81,502.9	-	211.5	-	81,714.4	19.9%
SPITI WL	440,773.5	62,373.2	0.2	-	-	62,373.4	14.2%
Total	5,584,089.8	750,762.3	17,389.2	26,565.8	3.7	794,721.0	14.2%

Source: Compiled by JICA Study Team (2017) based on Vegetation and Land Use Type Map 2012, Indian Institute of Remote Sensing (IIRS)



**Figure 4.5.1 Grasslands and Pastures Distributions in HP State**

Another area based information available for grasslands/ pastures of HP state is land use classification based on land record as indicated in **Table 4.5.6**. About 1.5 million ha of the permanent grassland and grazing land is recorded in HP.

**Table 4.5.6 District-wise Statistical Data of Pasture**

District	Total Land as Per Records (Ha)	Permanent Grassland and Grazing Land (Ha)	Percentage of Grass Land and Grazing Land
BILASPUR	111,776	38,384	34.34%
CHAMBA	625,645	336,911	53.85%
HAMIRPUR	98,832	9,777	9.89%
KANGRA	577,671	89,434	15.48%
KINNAUR	624,216	321,884	51.57%
KULLU	64,224	3,911	6.09%
LAHUL&SPITI	911,195	211,448	23.21%
MANDI	400,426	95,097	23.75%
SHIMLA	525,326	237,957	45.30%
SIRMAUR	224,759	59,412	26.43%
SOLAN	180,923	77,695	42.94%
UNA	154,857	13,163	8.50%
Total	4,499,850	1,495,073	33.22%

Note: Total Reporting Area does not much with the Area (4,576,00ha) in Table 4.4.2, due to compilation differences.

Source: Compiled by JICA Study Team (2017) based on District Economic and Statistics Abstract 2014-15

For reference purpose, **Attachment I.4.5.5** describes other grassland/ pasture classifications relevant to HP.

## (2) Biomass Productivity

The above-ground biomass in these grasslands varies from 1,000 kg/ha to 10,000 kg/ha for warm temperate grassland and 400–5,000 kg/ha for high altitude grasslands<sup>34</sup>. It has been estimated that due to increase in the cover of unpalatable species the herbage production in the Himalayan grasslands has decreased by 20–50% in terms of quantity and 10–15% in terms of quality compared with their potential. Total biomass available from mid Himalayan grasslands is 1.0-2.0 t/ha (dry matter). However, Bimal Misri<sup>35</sup> reported at Palampur during 1997-98 on a well-protected grassland that have the potential to provide herbage under frequent cuttings, if they are protected from grazing. Under monthly cutting regimes biomass up to 79.53 t/ha (green) and 15.98 t/ha (dry) was obtained during 1997-1998. Unlike the tropical grasslands, the temperate and alpine grasslands exhibit a strong seasonality. While the growing season in the temperate region generally begins in April, the sub-alpine and alpine grasslands start sprouting in June to July. Thus, the biomass production in these grasslands is lower than in tropical grasslands due to the shorter growing season.

## (3) Livestock and Pastures

Livestock rearing is one of the major occupations in India that provides manure, draught power for agriculture and local transportation and forms important source of food and cash income to millions of households spread across various parts of the country. Significance of the livestock sector can be appreciated from the fact that it contributes about 8.5 - 9% to the country's GDP<sup>36</sup>.

<sup>34</sup> G.S. Rawat, "Temperate and Alpine Grasslands of the Himalaya: Ecology and Conservation", Parks Vol.8 No.3 October 1998, p. 27-36.

<sup>35</sup> *Regeneration Potential of Mid-hill Himalayan Grasslands of Himachal Pradesh* Bimal Misri, Sindhu Sareen (Indian Forester: Vol130, Issue 11, Nov2004)

<sup>36</sup> Sub group report on Fodder & Pasture Management., Planning Commission, 2011

The sector assumes still higher significance as it forms the most critical means of supporting the earning capacity of landless pastoralists and those of marginal and small farmers, especially those living in drought-prone, hilly, tribal and such other areas where crop production, dependent mainly upon vagaries of nature, is not certain. Closer scrutiny of the sector, however, reveals that the contribution to the GDP by livestock sector is far too low for such a large size of livestock population. This low productivity of the sector is as much attributable to underfeeding of the livestock as it is attributable to the poor livestock breeds. In absolute terms, the country is, by 2020, facing an estimated shortage of 728 million tons of green fodder and 157 million tons of dry fodder. Obviously, this low forage availability impacts the productivity.

The study<sup>37</sup> by the Indian Grass & Fodder Research Institute (IGFRI) revealed that the overall grazing pressure in HP was 3.17 ACU (Adult Cattle Unit) on per ha of grasslands. This pressure was found highest in low hills (6-15 ACU/ha), moderate in mid hills (2-6 ACU/ha) and lowest in high hills (0.01 – 1.50 ACU/ha). At present the classified grasslands (permanent pasture) in the state are in a position to cater for only limited forage requirements (12-14%) of the livestock. This calls for urgent attention towards such natural resources in the state and appropriate interventions for the improvement.

#### (4) Patterns of Livestock Rearing<sup>38</sup>

Three systems of livestock rearing are prevalent in HP, which are sedentary, semi-migratory and migratory systems. Sedentary systems of livestock rearing are followed in Zone I (subtropical low hills under of Kangra, Hamirpur, Una Bilaspur, Mandi and Sirmour districts) and Zone II (mid hills located of Chamba, Kangra, Hamirpur, Mandi, Bilaspur, Shimla, Kullu, Kinnaur and Sirmour districts). Animals are stall fed, however grazing in community lands and private lands is the mainstay of the system. Semi-migratory system of livestock rearing is prevalent in zone III (high hills ranging from 1,500 m to 3,250 m and temperate wet climate areas of Chamba, Kangra, Kullu, Mandi, Shimla, Solan, Sirmour and Kinnaur districts) and Zone IV (temperate dry and covers north and north-eastern part of Chamba and Kullu districts, high hills and valley of Lahul-Spiti, Kinnaur and Shimla districts). This is practiced by the farmers who have their permanent residences and cropland in the foothills, as well as other subsidiary occupations. In summer, they take their livestock to sub-alpine and alpine pastures, where they stay from March-October. Right of usage of pasture is passed through the generations in a family, although property right remains with the state. Some of the villages hire a grazeier for grazing their animals on community basis. *Gaddi* and *Gujjar* tribes of the state follow migratory system of livestock rearing. This is a year-round system of migration. Transhumant/migratory system is a response to the ecological demands and mutual adjustments between herding to insure against specific seasonal risks and enhance preparedness against general uncertainty at different elevations.

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<sup>37</sup> Grasslands of Himachal Pradesh, J P Singh et. al, IGFRI, Jhansi (2009)

<sup>38</sup> Fodder Resource Development in North-Western Himalaya, IGFRI, Jhansi (2007)

## (5) Issues of Grasslands and Pasturelands

### i. Pastoralism

Most of the grasslands in the lower temperate belt of western and central Himalaya are grazed by livestock throughout the year. In the state, 2,149,259 cattles, 716,016 buffalos, 804,871 sheeps, 1,119,491 goats and other livestock are reported to be reared<sup>39</sup>. In the earlier estimates, the Himalayan region supports nearly 12 million sheep and goats, 10 million cattle, 3–4 million buffaloes, 400,000 horses and donkeys, and up to 350,000 pigs<sup>40</sup>. Since the lower altitude grazing lands are limited in area and the livestock population in these areas far exceeds the carrying capacity, the practice of summer migration to the higher altitude alpine meadows has become necessary to sustain the number of livestock. It has been observed that agro-pastoralists in the western and central Himalaya generally keep more cattle than they really need because of easy access to free grazing areas and their inability to dispose or cull the population due to religious sentiments<sup>41</sup>. Uncontrolled grazing on the steeper slopes reduces water holding capacity and compaction reduces the permeability of the soil. Continuous grazing also creates channels or paths on hill slopes which remove huge quantities of soil during rains. Despite the fact that domestic animals are an integral part of agro-pastoral ecosystems and that grazing-based animal husbandry is the mainstay of the economy in many parts of the Himalaya, no studies and policy guidelines are available for optimal use of grazing resources. Plantation of agroforestry trees and round the year production of fodder would be the best option for the agro-pastoralists, but excessive use of resources for horticulture (orchards) and heavy use of pesticides to promote fruit production may, as practiced in the states of HP, and Jammu and Kashmir (J&K) , have severe ecological consequences and loss of biodiversity in the long run.

### ii. Collection of Medicinal Herbs

Alpine meadows, besides being popular summer grazing grounds for a large number of migratory livestock, harbour numerous medicinal herbs which are extracted in large quantity by many local communities for their own consumption, as well as for sale. Over-exploitation of some of the herbs from high altitude areas has caused serious concern amongst conservationists. Most of the medicinal plants growing in the alpine meadows have tuberous or rhizomatous roots. Digging of fragile alpine soil for such medicinal herbs and subsequent trampling and grazing by livestock spreads weeds and causes soil erosion. In the western Himalayan meadows, exploitation pressure is particularly high on *Dactylorhiza hatagirea*, *Picrorhizakurrooa*, *Jurinea macrocephala* and *Aconitum heterophyllum*. Presently, there are only a few protected areas in the western Himalaya where extraction of medicinal herbs is prohibited.

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<sup>39</sup> Livestock Census 2012, Department of Animal Husbandry, Government of Himachal Pradesh

<sup>40</sup> G.S. Rawat, "Temperate and Alpine Grasslands of the Himalaya: Ecology and Conservation", Parks Vol.8 No.3 October 1998, p. 27-36.

<sup>41</sup> G.S. Rawat, "Temperate and Alpine Grasslands of the Himalaya: Ecology and Conservation", Parks Vol.8 No.3 October 1998, p. 27-36.



iii. Collection of Fuelwood

Livestock grazing and extraction of woody plants by the pastoral communities go together. Consumption of firewood is very high around tree line and sub-alpine zones of the greater Himalaya and thickly populated areas of trans-Himalaya. There are clear indications that the natural tree line in many parts of the Himalaya has lowered considerably as a result of regular camping and removal of woody vegetation. Selective removal of highly preferred species such as *Juniperus macropoda* and *J. communis* can also lead to local extinction of such species. Extraction of fuel wood, particularly from the low productive areas of trans-Himalaya, is one of the burning issues in the conservation of steppe communities. In the absence of larger trees and shrubs local people dig out the low shrubs and under shrubs in large quantities in order to warm their houses and cook during long and severe winters.

The consequences of degradation of the pastures include –

- ◆ Low productivity – in the form of reduced availability of forage and medicinal herbs
- ◆ Loss of biodiversity – more species entering Red List
- ◆ Soil erosion – due to sheet erosion from denuded slopes leading to siltation of water bodies downstream
- ◆ Effect on moisture regulation – due to more run off, less percolation.

(6) Ongoing Scheme: Development of Pasture and Grazing Lands by HPFD

This is an ongoing plan scheme related to grasslands/ pastures since the 2<sup>nd</sup> Five-Year Plan. In HP, cattle, sheep and goat mainly depend upon the pastures in the higher reaches. Under this scheme the high-altitude pastures as well as grazing lands adjoining villages are taken care of by introducing better grasses and raising fodder trees. Besides, these steps are also taken to prevent soil erosion. In view of the experience of its implementation in the past, the scheme has been divided into two parts covering two separate eco-systems occurring at different altitudes in HP;

i. Development of Pastures

Alpine pastures are situated between tree line and snow line above around 3,000 m (9,000 feet) and extend till around 4,000 m (12,000 feet). These ecosystems serve as a grazing ground to flocks of migratory graziers during the summer months. The productivity of these lands has decreased in view of increased pressure due to excessive grazing. Thus, the primary objective of management intervention on these lands is ecological rehabilitation for increased productivity. This would be accomplished through removal of unwanted weeds, sowing of local grass seeds in patches of size 2m x 1m (400-500 per ha), improvement of moisture regime through Moisture Retention Interventions (MRI) and resorting to rotational grazing. Such measures would help in boosting growth of grasses and assist in ecological amelioration of alpine pastures. A norm of 15,000 INR per ha is suggested for undertaking these activities. These activities would be done through graziers or local people of the area. The improvement of such lands would improve productivity of milk and other products based on cattle and other animals. This improvement

would be assessed after a period of three years and subsequently on continuous basis after this interval.

ii. Development of Grazing Lands

Grazing lands are open areas without vegetation of herbs, shrubs and trees and occur in the foothills or mid-hills. These are used as grazing grounds by local people for their livestock during summer months as per concession granted to them various forest settlements. The objective of management of such areas is conservation and development of grass resource for increased productivity leading to enhanced yield of milk and other products related to cattle and other animals dependent on these lands. These areas are usually located in the vicinity of habitation and are vulnerable to degradation due to heavy biotic pressure caused by intense grazing. Hence, such lands need to be fenced before any activity for increasing productivity is initiated in such lands. Tufts of native grass species will be raised in trenches of size 2m x 1m (400-500 No per ha) along the contours coupled with soil and water conservation measures (MRI) to improve the water regime. If edaphic factors permit, 100-200 plants per ha of native fodder species be also planted to augment fodder production. A norm of 30,000 INR per ha is recommended for this treatment. According to HPFD, a general methodology for grassland /pasture improvement is as follows:

- ◆ Remove weeds (manually), revisit for two-three months to remove any new sprouts of weeds (lantana/ ageratum/ eupatorium)
- ◆ Do seeding of appropriate grass seeds, to ensure higher success (germination in many grass seeds is low), transplant nursery sown slips at 40. 40 cm or 60. 60 cm interval in lines
- ◆ Protection and weeding/ howing for at least two years
- ◆ Planting of fast growing grasses like Lemon Grass (*Cymbopogon citratus*) and other fodder species along the trench berms. Planting of such grasses would help in further improving the moisture regime of the area.

Apart from the on-going schemes and activities, major potential interventions for grasslands/ pastures improvements, proposed by the planning commission and other institutions are presented in **Attachment I.4.5.6**.

#### 4.5.4 Cold Desert/Permanent Snow Area Management

(1) Cold Desert <sup>42</sup>

The cold desert landscape of India is situated in the Himalayas and stretches from Ladakh (in the Jammu and Kashmir state: J&K) in the north to Kinnaur district of HP in the south. Administratively, Leh and Kargil districts of J&K state, Spiti region of the Lahaul and Spiti district and a part of Kinnaur district in HP are situated in the cold desert landscape.

The region constitutes a cold desert biome with harsh climatic conditions, which can be attributed to two factors. One is its location on the leeward side of the Himalayas, which makes it a rain-

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<sup>42</sup> UNESCO - Cold Desert (<http://whc.unesco.org/en/tentativelists/6055/>)

shadow zone inaccessible to the annual south-eastern monsoon winds that sweep the rest of the country, thus creating desert conditions with low levels of precipitation. Second is its very high elevation (ranging from 3,000 – 5,000 m) that adds to the coldness in its environment. A cibsuderavke seasonal variation is seen in the climatic conditions, ranging from short and dry summers (maximum temperature reaching up to 36°C during the day) to long, windy and cold winters (minimum temperature of -32°C at night). Blizzards, snowstorms and avalanches are common. The soil is not very fertile and the climatic conditions allow very short growing seasons making it a bare landscape. Water resources are minimal and comprise glacier-fed streams.

Within this one geographic unit lie many settlements, scattered across the landscape at locations that provide marginally improved conditions for habitation, nestled within valleys protected from harsh winds and located near rivulets. The settlements are small, isolated, sparsely populated. The inhabitants are largely dependent on agriculture, wild resources such as Droh, Gandam (*Triticumaestivum*), Neh, Jau (*Hordeum himalayense*) and medicinal plants for their livelihood. About 118 species of the medicinal and aromatic plants are known from the valley.

Cold Desert biome with harsh climatic conditions, displays an extremely fragile ecosystem that shows a complex relationship of the climatic and geomorphological processes, and exhibits very less but highly endemic diversity. Many rare and special varieties of flora and fauna are found here so much so that many national parks and wildlife reserves have been declared. As stated in **Part I, Section 4.4.5**, the area has been notified as the Cold Desert Biosphere in 2009. Also, as stated in **Part I, Section 4.4.11**, the centrally sponsored scheme “Cold Desert Biosphere Reserve (CDBR)” is implemented by HPFD in the area. Not only the biodiversity conservation, but other various activities such as cultivation of medicinal plants, afforestation, ecotourism, land stabilisation, etc. are carried out in the area by CDBR scheme as well as by the other central and state government agencies to support the sustenance of people and ecosystem of the region.

## (2) Permanent Snow Area

According to HPFD, there are no management interventions in the permanent snow area except that any human activity or frequent visit is to be avoided including vehicular movement.

### **4.5.5 Forest Management Related Infrastructure**

#### (1) Type of Infrastructure

The major types of forest management related infrastructure maintained by HPFD are below: i) forest road/ foot path, ii) buildings (office, resident, rest house, inspection huts, and other buildings), iii) boundary and chak pillars, iv) nursery, and v) soil and moisture (water) conservation. The available information as of August 2017 on these infrastructures are shown below.

(2) Forest Road and Foot Path

Data on forest roads and bridle paths between 2008-09 to 2015-16 is shown in **Table 4.5.7** and **Table 4.5.8**. The length of motorable road is shorter than the length of bridle path, because majority of the forest areas in HP are located in mountain slopes which are generally steep and the motorable road construction is difficult.

**Table 4.5.7 Motorable Forest Road in HP State**

(Unit: km)

Circle	As on 31-3-2016			Increasing Length (2009 to 2016)			Average Increasing Length per year		
	1)	2)	Total	1)	2)	Total	1)	2)	Total
Bilaspur	2.2	120.2	122.4	1.9	7.2	9.1	0.3	1.0	1.3
Chamba	3.1	230.2	233.3	-	52.1	52.1	-	7.4	7.4
Dharamshala	2.6	350.2	352.8	0.1	13.1	13.2	0.0	1.9	1.9
Hamirpur	1.3	169.7	171.0	0.1	10.5	10.6	0.0	1.5	1.5
Kullu	2.8	116.4	119.2	-	7.8	7.8	-	1.1	1.1
Mandi	0.3	350.0	350.3	0.1	18.5	18.6	0.0	2.6	2.7
Nahan	1.7	192.6	194.3	-	2.6	2.6	-	0.4	0.4
Rampur	3.0	129.1	132.1	-	15.8	15.8	-	2.3	2.3
Shimla	0.8	433.5	434.3	-	8.6	8.6	-	1.2	1.2
WL D/Shala	0.0	3.8	3.8	-	-	-	-	-	-
WL Shimla	4.9	54.8	59.7	-	-	-	-	-	-
G.H.N.P. Shamshi	0.0	77.6	77.6	-	-	-	-	-	-
FTI Chail	1.8	0.0	1.8	-	-	-	-	-	-
XEN Forests	1.1	0.0	1.1	-	-	-	-	-	-
Grand Total H.P.	25.7	2,228.1	2,253.8	2.2	136.2	138.4	0.3	19.4	19.8
Average	1.8	159.2	161.0	0.6	15.1	15.4	0.1	2.2	2.2

Note: 1) Metalled, 2) un-metalled

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Table 4.5.8 Bridle Path in HP State**

(Unit: km)

Circle	As on 31-3-2016			Increasing Length (2009 to 2016)			Average Increasing Length per year		
	1)	2)	Total	1)	2)	Total	1)	2)	Total
Bilaspur	3.2	173.0	176.2	2.3	17.4	19.7	0.3	2.5	2.8
Chamba	0.2	2,102.7	2,102.9	0.0	205.8	205.8	-	29.4	29.4
Dharamshala	0.6	260.4	261.0	0.0	8.1	8.1	-	1.2	1.2
Hamirpur	0.0	95.9	95.9	0.0	0.0	0.0	-	-	-
Kullu	0.6	376.4	377.0	0.6	1.3	1.9	0.1	0.2	0.3
Mandi	0.0	545.2	545.2	0.0	45.3	45.3	-	6.5	6.5
Nahan	0.0	32.8	32.8	0.0	0.0	0.0	-	-	-
Rampur	0.0	255.7	255.7	0.0	16.3	16.3	-	2.3	2.3
Shimla	0.0	1,422.2	1,422.2	0.0	133.8	133.8	-	19.1	19.1
WL D/Shala	0.0	68.9	68.9	0.0	0.0	0.0	-	-	-
WL Shimla	2.0	424.8	426.8	2.0	9.3	11.3	0.3	1.3	1.6
G.H.N.P. Shamshi	11.2	637.0	648.2	0.0	36.4	36.4	-	5.2	5.2
FTI Chail	0.5	0.2	0.7	0.0	0.0	0.0	-	-	-
XEN Forests	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Grand Total H.P.	18.3	6,395.2	6,413.5	4.9	473.7	478.6	0.7	67.7	68.4
Average	1.3	456.8	458.1	0.4	33.8	34.2	0.2	7.5	7.6

Note: 1) Metalled, 2) un-metalled

Source: Compiled by JICA Study Team (2017) based on information from HPFD

### (3) Building (Forest Rest House, Inspection Hut)

The current number of forest rest house in HP is 274 and the number of inspection houses is 173. The total number of these is 447 (**Table 4.5.9**). These infrastructures are originally intended for utilisation during regular forest administration and management. Furthermore, these buildings are used for recreation activities related to forest areas such as, pristine beauty and rich biodiversity, nature, trails, wildlife, natural springs, and also education on flora & fauna, culture and heritages of the state. The most of forest rest houses and inspection houses are maintained by HPFD but around 50 forest rest houses which are more used for recreational activities are managed by HPECOSOC.

**Table 4.5.9 Number of Forest Rest House and Inspection Hut**

(Unit: nos.)

Circle	Forest Rest House	Inspection Hut	Staying Facilities (combined)
Bilaspur	24	6	30
Chamba	52	30	82
Dharamshala	15	17	32
Hamirpur	15	15	30
Kullu	23	9	32
Mandi	46	21	67
Nahan	15	15	30
Rampur	20	15	35
Shimla	33	23	56
<b>Subtotal (Territorial)</b>	<b>243</b>	<b>151</b>	<b>394</b>
Dharamshala WL	9	7	16
Shimla WL	10	10	20
GHNP	9	5	14
<b>Subtotal (Wildlife)</b>	<b>28</b>	<b>22</b>	<b>50</b>
FTI	2	0	2
XEN (Forests)	1	0	1
<b>Subtotal (Other forests)</b>	<b>3</b>	<b>0</b>	<b>3</b>
<b>Ground Total</b>	<b>274</b>	<b>173</b>	<b>447</b>

Source: Compiled by JICA Study Team (2017) based on information from HPFD

### (4) Building (Office, Resident, and Other Buildings)

The number of office and residence which are used for forestry and administration activities for HPFD in 2012 is shown in **Table 4.5.10**.

**Table 4.5.10 Number of Buildings**

Building	Number of Building (Nos)
PPCCF Office	1
CCF Office	6
CCF Residence	2
CF Office	10
CF Residence	9
DFO. /Dir. Office	56
DFO Residence	44
ACF Residence	37
RO. Office-cum-Residence	135
RO. Office	106

Building	Number of Building (Nos)
RO Residence	106
BO Quarter	444
Type-V Quarter	4
Type-IV Quarter	18
Type-III Quarter	59
Type-II Quarter	231
Type-I Quarter	201
Forest Guard Hut	1622
Forest Rest House	256
Inspection Hut	179
Range Rest Room	70
Chowkidar Quarter	67
Mali Hut	90
Store/Godown	128
Chek Post	45
Recreation Hall/Hall	15
Seed Store	101
Motor Garrage	58
Out Houses	41
Other Buildings	544
Total	4,685

Source: Compiled by JICA Study Team (2017) based on information from HP Forest Statistics 2013

#### (5) Boundary and Chak Pillar

The number of forest boundary and chak pillars established as of 2012 in HP is shown in **Table 4.10.11**.

**Table 4.5.11 Number of Boundary and Chak Pillars**

(Unit: nos.)

Circle	Boundary Pillars (No)	Chak Pillars (No)	Total (No)
Bilaspur	12,640	2,008	14,648
Chamba	99,001	22,836	121,837
Dharamshala	16,313	4,463	20,776
Hamirpur	6,614	3,031	9,645
Kullu	13,231	0	13,231
Mandi	73,167	12,346	85,513
Nahan	33,471	3,751	37,222
Rampur	8,544	14,202	22,746
Shimla	18,977	7,083	26,060
WL (S) Shimla	2,043	624	2,667
WL (N) Dharamshala	5,207	1,747	6,954
GHNP, Kullu	6,290	909	7,199
Total	295,498	73,000	368,498

Source: Compiled by JICA Study Team (2017) based on information from HP Forest Statistics 2013

Though the latest data of boundary pillars are not fully available, the increase in numbers of boundary pillars seems to be limited. Approximately 55% forest area does not have proper demarcation and has not been surveyed or demarcated. Yet the progress of survey/demarcation is

rather slow (Table 4.5.12). According to HPFD, despite best efforts, only 50% of un-demarcated forests could be demarcated in around 40 years.

**Table 4.5.12 Status of Survey and Demarcation of Un-demarcated Forest (2010 & 2016)**

District	Area of Un-demarcated Forest (Ha)	Area Surveyed/Demarcated (Ha)			Remaining Un-demarcated Forest (Ha)
		As of 31 /12/2010	As of 31 /12/2016	Increase	
Kangra	222,889	91,767	91,767	0	131,122
Una	42,747	-	-	0	42,747
Bilaspur	30,895	21,035	21,035	0	9,860
Hamirpur	12,464	114	114	0	12,350
Sirmaur	172,299	74,862	74,862	0	97,437
Solan	74,173	19,275	20,282	1,007	53,891
Kullu	126,062	9,343	9,688	345	116,374
Lahul-Spiti	566,976	116,961	116,961	0	450,015
Shimla	226,216	97,604	108,646	11,042	117,570
Kinnaur	77,072	23,727	77,072	53,345	0
Mandi	83,528	83,528	83,528	0	0
Chamba	427,437	427,437	427,437	0	0
Total	2,063,758	965,653	1,031,392	65,739	1,032,366

Source: Compiled by JICA Study Team (2017) based on information from HPFD

#### (6) Nursery

The statistical data of nurseries within the state managed by HPFD was not fully available. According to HPFD, in general each forest range has at least one permanent nursery which size and seedling production capacity differ from nursery to nursery. Nursery information, especially of divisions proposed for the Project is presented in **Part II, Section 2.3.2** of this report..

#### 4.5.6 Soil and Water Conservation

The soil water or moisture conservation works managed by HPFD or part of forestry operations are hereby called as “Soil and Water Conservation (SWC)” in this report.

HPFD prepared a manual, “Manual on Soil and Water Conservation with Focus on Watershed Management 2012”, based on the activities and experiences or some models adopted in other states.

In accordance with the manual, the SWC works in HP are broadly classified into three categories; i) soil and water conservation measures, ii) measures Landslide control measures, and iii) Landslip control measures. General SWC measures are described and introduced in the category i) In Japan, the “landslide” explained in the manual is generally known as “slope failure” and the “landslip” explained in the manual is generally known as “landslide”. The measures mentioned in categories ii) and iii) are one of SWC measures in a broad sense but will be required in some specific situations only.

##### i) Soil and water conservation measures

There are two sub-categories; (1) bio-engineering measure and (2) mechanical measures. Bio engineering measures can be further classified into; i) measures using wood or live bush for the structure, and ii) measures which will function after some vegetation grows. Mechanical

measures include check dam, drop, silt detention structure and retaining wall. Dray stone, gabion (or dry stone with crate wire), masonry and concrete are used for these structures.

ii) Landslide control measures

The landslides are classified into two types; (1) landslide triggered by weak geology, and (2) landslide triggered by road construction. Due to vulnerable geological conditions and steep topographic conditions, there are high risk of landslide in HP. And also, the road construction has high risk of causing landslides. The different measures are required in response to the respective situations.

iii) Landslip control measures

The specific measures are used for landslip control, which focus on surface and ground water control, as this type of work has high possibility to move the land/soil block significantly.

The measures indicated above are reviewed based on the aspects of i) effectiveness, and ii) possibility based on the results of reviewing the manual and site observations of the SWC works implemented by HPFD. Most of the measures are considered to be effective but some of them would not. Some conditions such as, soft soil for digging, experience of HPFD offices are limiting factors for implementation. Based on the review of those measures, recommendations by the JICA Study Team were prepared and summarised in **Table 4.5.13**. Details of the review and recommendations for each SWC measure are presented in **Attachment I.4.5.7**.

**Table 4.5.13 Recommended SWC Measures by the JICA Study Team**

Category		SWC Measures	Recommendation
i) Soil and water conservation measures	(1) Bio-engineering measures	(a) Bamboo crib wall (slope)	-
		(b) Brush layer/Hedge bush Layer (slope)	-
		(c) Fascines (slope)	-
		(d) Vegetative barriers on contour-line (slope)	-
		(e) Contour wattling [live hedge, which is composed with trench, banking, planting on banking] (slope)	++
		(f) Vegetated Palisade Wall (small stream or gully)	+
		(g) Live check dam (small stream)	+
		(h) Brush wood check dam (small stream)	+
	(2) Mechanical measures	(a) Dry stone check dam	++
		(b) Gabion check dam	++
		(c) Gabion structure with ferro-cement impervious barrier	-
		(d) Permanent structures for gully stabilisation	-
		(e) Masonry drop structure	+
		(f) Masonry drop structure with apron	+
ii) Landslide control measures	(1) Land slide triggered by weak geology	Combination of (a) Retaining wall, (b) Series of staggered retaining walls on the slope, (c) Geo-jute, (d) Log crib, (e) Gunny bag	+
	(2) Land slide triggered by road construction	Cobination of (a) Water diversion, (b) Retaining wall at base and all sections on road cut, (c) Channelising flow through waterway, (d) Planting bushes and grasses along waterway, (f) Cross drainage works along roads	-
iii) Landslip control measures		Combination of (a) Diversion ditch, (b) Main drainage, (c) Sub-drainage, (d) Lateral drain, (e) Vertical stand pipe, (f) Retaining wall	-

Source: Compiled by JICA Study Team (2017) based on information from HPFD



#### 4.5.7 Forest Damages and Encroachment

Major threats to forests and forest areas in HP arises from forest fires, encroachments, illicit felling; and invasive exotic species. The invasive exotic species is described in **Part I, Section 4.4.7**.

##### (1) Forest Fires

The forests of HP predominantly comprise of species such as chir, deodar, kail, fir, spruce, oak, khair, bamboo and other broad-leaved species. Out of these species, chir is highly prone to forest fires especially in summer season.

Causes of forest fires can be divided into two broad categories: environmental and anthropogenic causes. Environmental causes are largely related to climatic conditions such as temperature, wind, lightning, level of moisture and duration of dry spells. Anthropogenic related causes result from human activity as well as methods of forest management. These can be intentional or unintentional such as the following:

- ◆ glaziers and gatherers of various forest products starting small fires to obtain good grazing grass
- ◆ pine needles, a major cause of forest fires in HP
- ◆ the use of fires by villagers to ward off wild animals
- ◆ fires lit intentionally by people living around forests for encouraging fresh grass growth
- ◆ fires started accidentally by careless visitors to forests who discard cigarette butts.

Forest fire cases occurred in HP between 2004-05 to 2017-18 are summarised in **Table 4.5.14**. Since there are yearly fluctuations for number of forest fire cases as well as areas of fire occurrence, it is difficult to generalise trends of forest fires. However, in peak years, roughly more than 20,000 ha of forest areas had been damaged and nearly 2,000 cases of forest fires occurred in the state.

**Table 4.5.14 The Year-wise Detail of Forest Fire in HP State (2004-05 to 2017-18)**

Abstract of Forest Fire Cases							
Financial Year	No. of Fire cases	Kind of Area Affected by Fire (in ha)				Total Area (in ha)	Estimated Loss (in Rs)
		Natural	Plantation	Regenerated	Other		
2004-05	391					6,002.00	3,639,254
2005-06	476					8,014.70	4,431,362
2006-07	132					1,426.00	1,087,537
2007-08	580	3104.81	1997.72	455	2253.8	7,810.83	8,663,340
2008-09	572	2768.9	2015.74	68.1	1733.4	6,586.12	6,005,064
2009-10	1906	13602	4054	1896.34	5297	24,849.52	25,522,928
2010-11	870	4308.9	1446.15	0	2082.6	7,837.63	9,769,363
2011-12	168	1199	207.4	0	351.8	1,758.15	4,307,878
2012-13	1798	8025.4	4946	0	7802.6	20,773.97	27,682,589
2013-14	397	1258.4	687.34	0	1291.8	3,237.52	5,231,011
2014-15	725	3058.3	1167.73	0	2500.5	6,726.49	11,326,522
2015-16	672	2914.8	1105.05	0	1730.2	5,749.95	13,477,730
2016-17	1832	9046.10	3863.75	0	6625.91	19,535.76	35,067,790
2017-18 (13-6-2017)	634	2008.32	728.38	0	1574.25	4,308.95	5,313,591

Source: HPFD Internal Report

According to HPFD, the following kinds of measures are for control and prevention of forest fires in HP

- ◆ HPFD has identified forest fire sensitive beats, which have been categorised as high (339), medium (667) and low (1,020) sensitivity, based on past incidences and other factors. Also prepared the fire risk zonation map (**Figure 4.5.2**)
- ◆ The calendar of activities to be followed for prevention of forest fires
  - Establishment of Control Room and Mobile/ Wireless communication Duty order for staff (15 – 31 March)
  - Deployment of mobile firefighting units in the sensitive areas (15 March – 7 April)
  - Meeting by senior officers with staff on fire prevention (15 March – 7 April)
- ◆ Detailed instructions regarding forest fire prevention are brought into force
- ◆ Chir forests are highly susceptible to fires and need special attention. Besides implementing prevention measures as prescribed in the Working plans like clearing of the fires lines, control burning, etc.

In addition to preventive measures, the following combative measures are imposed by HPFD.

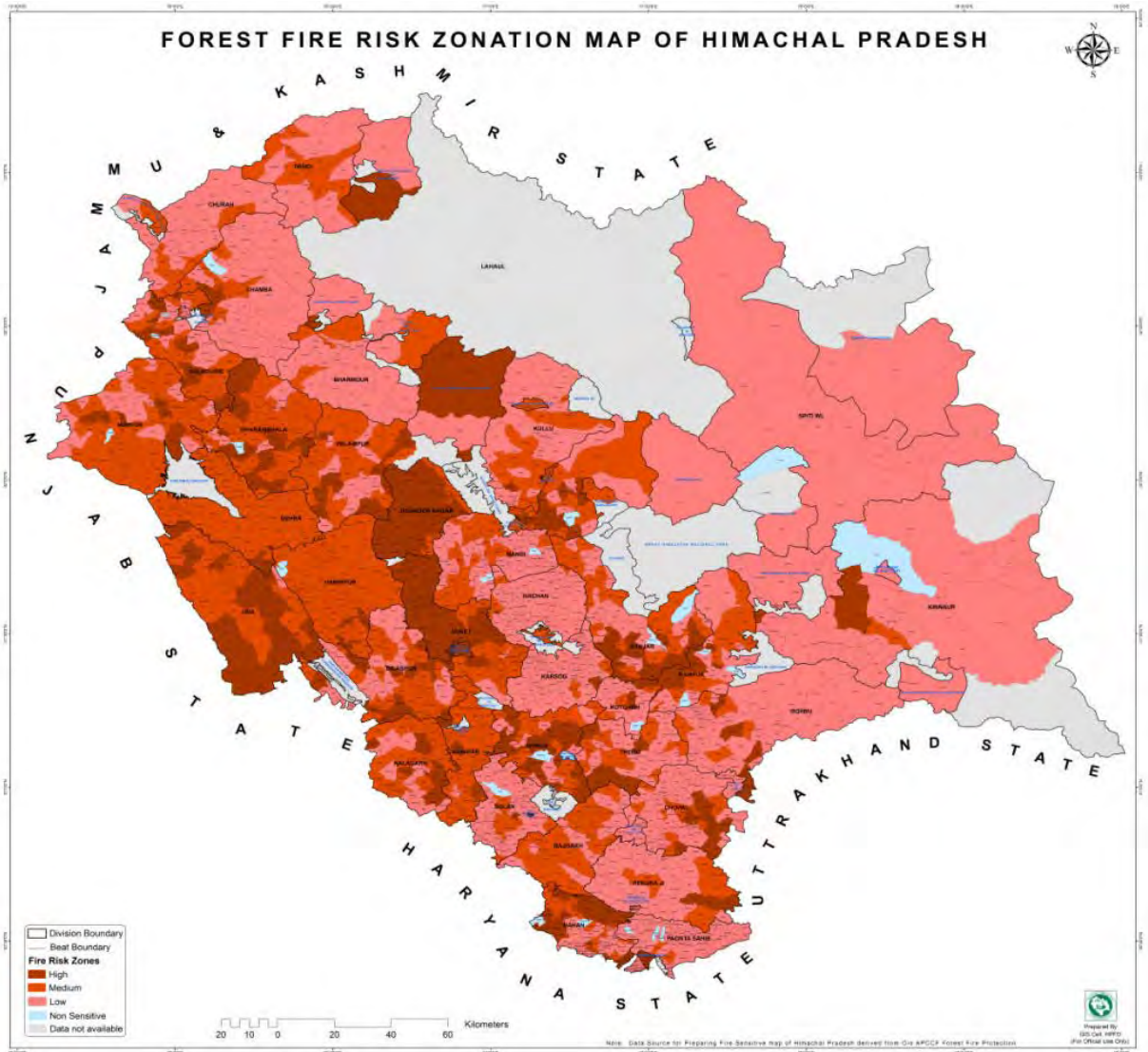
- ◆ Fire watchers and forest workers are deployed during fire season which starts from 15 April to 15 June or till the onset of monsoons exclusively for the purpose.
- ◆ No leave is allowed to the field staff of HPFD during fire season.
- ◆ The Fire Alert Messaging System (FAMS) through the satellite is in force in for early detection of forest fire incidences.
- ◆ Daily fire reporting of all forest fires has been adopted and it has been made mandatory for all the fire incidences to be registered as First Information Reports (FIRs) with the police.
- ◆ Forest staff remains in continuous liaison with PRIs of the area for their support.

In case of occurrence of forest fires, the loss and area affected by forest fires are inspected and remedial measure like afforestation and patch sowing maybe implemented during the rainy season.

For better forest fire control, a centrally sponsored scheme, “Intensification of Forest Management Scheme” is under operation for protection of forests and control forest fires in the state. This scheme started from 2010-11 in HP with annual budget (including both central and state shares) between 34.4 to 55.8 million INR per year with the following three main components:

- ◆ Forest Fire Control and Management
- ◆ Strengthening of Infrastructure for Forests
- ◆ Working Plan Preparation/ Survey & Demarcation.

The major achievements of the scheme are described in **Table 4.5.15**.



Source: HPFD

Figure 4.5.2 Forest Fire Risk Zonation Map of HP State

Table 4.5.15 Major Achievements of Intensification of Forest Management Scheme (2011-12 to 2016-17)

Activity	Unit	Physical Targets achieved					
		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Maintenance of fire Line	Km	1,163	1,009	789	1,474.50	760	1,060
Creation of fire lines	Km	0	0	316	35.52	17.40	79
Engagement of fire watcher	Man days	33,318	58,184	55,190	51,609	48,249	70,000
Assistance to JFMCs	No	181	417	157	393	0	68
Control Burning	Ha	454	3,614	0	0	0	475
Construction of Water Storage Tanks	No	10	23	08	15	25	15
Fire Mapping / Management Plan	No	18	07	07	0	0	0
Construction of Gang Hut	No	22	09	07	10	12	06
Construction of Office Building for Range and Below Level	No	06	02	04	05	05	03
GPS system	No	0	134	140	0	0	0
Construction of Boundary Pillar Large	No	1,185	1,699	1,971	229	165	469
Construction of Boundary Pillar Small	No	0	648	1,103	459	358	190

Source: HPFD Internal Report

## (2) Encroachment

Forest areas are encroached by people for other purpose such as agriculture, orchards raising, ranching, housing and other commercial and non-commercial purposes. To prevent encroachments, all DFOs have been given powers of collector under the HP Public Premises and Land (Eviction and Rent Recovery) Act 1971 (amended in 1994) by the Notification No. 1-21/71-L.S.G issued in June 1994.

High Court of HP has taken a serious note of forest encroachments and is monitoring evictions regularly and the following records are available (**Table 4.5.16**).

- ◆ encroachment cases on forest/ government land more than 10 bighas (in Himachal Pradesh 1 bigha =800 m<sup>2</sup>) in which FIRs registered as per Hon'ble High Court Order
- ◆ encroachment cases on forest/ government land less than 10 bighas under HP Public Premises (Eviction & Rent Recovery) Act, 1971
- ◆ encroachment cases on forest/ government land less than 10 bighas in Revenue Court under Section 163 of HP Land Revenue Act,1954

**Table 4.5.16 Encroachment Cases on Forest Land up to 31 March 2017**

Sub-table 1: Encroachment Cases More than 10 bighas in which FIRs Registered as per High Court Order																	
FIR lodged		Demarcation/ investigation done		Cases filed in Judicial Court		Cases filed before DFO-cum-Collector		Cases decided by Judicial Courts		Cases in which encroached Forest / Govt. land actually evicted		Cases decided by DFO-cum-Collector		Balance Cases Decided By Judicial Courts		Balance No of Actual Evictions	
No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
2,526	2,503	2,537	2,536	2,514	2,358	1,815	1,707	471	494	953	894	1,420	1,236	2,066	2,042	1,584	1,642

Sub-table 2: Encroachment Cases Less than 10 bighas under HP Public Premises Act 1971																	
No. of cases challaned before DFO-cum-Collector		No. of cases decided/ eviction order passed		No. of cases in which appeal filed with Divisional Commissioner		Stay granted by Divisional Commissioner		No. of cases in which appeal filed in High Court		Stay granted by High Court		No. of cases in which land actually evicted		Balance Cases Decided By Judicial Courts		Balance No of Actual Evictions	
No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
10,588	2,005	9,759	1,931	682	115	286	64	131	14	12	2	6,624	1,341	829	74	10,457	1,991

Sub-table 3: Encroachment Cases Less than 10 bighas in Revenue Court under Section 163 of HP. Land Revenue Act 1954							
No. of cases challaned in Revenue Court		No. of cases decided/eviction order passed		No. of cases in which land actually evicted		No. of cases challaned in Revenue Court	
No.	Area (ha.)	No.	Area (ha.)	No.	Area (ha.)	No.	Area (ha.)
4,319	646.422	1,482	170.738	1,079	145.128	3,142	493.451

Source: HPFD Internal Report

District-wise encroachment cases on Forest/Government land are enclosed in **Attachment I.4.5.8**.

## (3) Illicit Felling

Most of the commercial timber species such as deodar, kail, fir, and spruce are illicitly felled either for bona-fide use or commercial sale. The trend of illicit felling is showing a decline from early 1980s, which had around 8,000 to 9,000 cases per year, whereas it is around 3,000 cases per year in the recent years (**Table 4.5.17**).

**Table 4.5.17 Illicit Felling Cases between 1981- 2015**

Year	No. of cases	Year	No. of cases	Year	No. of cases
1981-82	8,941	1993-94	5,362	2004-05	3,867
1982-83	9,559	1994-95	3,731	2005-06	4,262
1983-84	6,667	1995-96	3,821	2006-07	3,638
1984-85	5,364	1996-97	4,231	2007-08	3,459
1985-86	6,097	1997-98	4,568	2008-09	3,190
1986-87	3,994	1998-99	4,110	2009-10	3,513
1987-88	4,177	1999-2000	3,196	2010-11	3,008
1988-89	7,913	2000-01	3,177	2011-12	3,127
1989-90	3,520	2001-02	3,452	2012-13	3,502
1990-91	5,058	2002-03	3,628	2013-14	2,912
1991-92	4,872	2002-03	3,628	2014-15	3,005
1992-93	3,495	2003-04	4,089	2015-16	2,443

Source: HPFD Internal Report

Against the illicit felling, HPFD takes an action by seizure of timber, issuing damage report or challenging in the court of law, depending upon the situation.

Circle/ district wise details of illicit tree felling cases between 2009-10 to 2012-13 in HP is shown in **Attachment I.4.5.9**. Since there are yearly as well as regional fluctuations in occurrence of illicit felling cases, it is difficult to generalise trends. However, illicit felling tends to be high in the Mandi circle which have 500 – 1,000 cases per year between 2009-10 to 2012-13. On the other hand, Daramshala wildlife circle and Shimla wildlife circle have less than 100 cases per year during the same period.

#### (4) Others

##### i. Pests

According to information from HPFD and the detailed project report of HP Ecosystem, Climate Proofing Project, funded by KfW, the following insects and fungi damages are observed in the forests and forest areas of HP.

Anchil borer (*Hypophyla robusta*), has caused some damages to chil pine forest in the state and bugworm caterpillars (*Clemia crameri*) appear occasionally in the chil pine forests and cause defoliation locally. However, the damage has not been much. Locusts (*Acridium peregrinum*) attacks were reported in 1935, 1938, 1950, 1951 and 1955. The damage was serious in the years in 1950 and 1955. This affects the growth of bamboo and chir trees and causes mortality.

Termites have caused tremendous damage to shisham seedlings as well as plants of many broadleaved species up to the sapling stage.

A fungus (*Ganoderma lucidium* and *Fusarium*) has been reportedly responsible for the drying up of shisham crop and creation of permanent gaps in growing stocks. Large numbers of trees of shisham have dried up since the appearance above named fungus in the area during the year 1999 to 2000. The process of drying has not stopped and is still continuing in Kangra division.

#### 4.5.8 On-going Schemes/Projects Related to Forest Management

Plan schemes in the forestry sector and their descriptions as well as outlay/expenditure for three years between 2014-15 and 2016-17 are presented in **Table 4.5.18**. CAMPA, which is the centrally sponsored schemes covering the compensatory afforestation and may other forestry related activities, including the catchment area treatment plan (CATP), has the largest outlay/expenditure of 1,276.8 million INR in 2016-17, followed by the state plan scheme of “Improvement of Tree Cover/Raising of Nursery” with outlay/expenditure of 152.89 million INR, and the state plan scheme of “Soil & Water Conservation” with outlay/expenditure of 75.50 million INR, during the same fiscal year.

**Table 4.5.18 Plan Schemes in the Forestry Sector**

No	Scheme Name	Description	Outlay/ Expenditure (Million INR)		
			2014 -15	2015 -16	2016 - 17
<b>State Plan Schemes (Forestry)</b>					
1	Direction and Administration	Salary of Staff	60.83	67.93	77.40
2	Forest Research and Training	Establishment of seed stands, preservation plots and bio-sphere reserves e	2.30	2.30	3.50
3	Forest Conservation and Development				
3a	Survey & Demarcation	Survey demarcation and fixing of boundary pillars	2.50	0.00	2.00
3b	Forest Protection	Protecting the forests from fires; Effective, adequate infrastructure needs to be developed.	5.70	4.16	4.57
3c	Working Plan Organisation	Revision and up-dating of working plans	1.45	3.90	3.82
4	Afforestation/Rehabilitation Programme under Plan Schemes	Increasing the forest cover and to conserve soil, moisture as well as rehabilitation of degraded forests besides meeting the demand of local people			
4a	Soil & Water Conservation	The Soil Conservation Scheme envisages important activities like training of personnel, protective afforestation of soil binding/colonising/legume/grass species for stabilisation of hill slopes in the hilly eco-system and reduce/stop soil erosion etc. Under this scheme planting of soil binding/colonising species, coupled with soil and water conservation measures like gully plugging, check dams, contour trenches, retaining walls, van sarovars, etc. are taken up in the areas prone to soil erosion.	31.02	42.50	75.50
4b	Development of Pasture & Grazing	Under this scheme the high-altitude pastures as well as grazing lands adjoining to the villages are taken care of by introducing better grasses and raising fodder trees. Besides, these steps are also taken to prevent soil erosion.	7.50	4.90	9.00
4b (i)	Development of Pastures	Details described in Section 4.10.3 of this report.			
4b (ii)	Development of Grazing Lands	Dito			
4c	Improvement of Tree Cover/Raising of Nursery	Take up enrichment of the areas by planting suitable tree species. In order to improve tree cover in areas with less than 0.4 canopy density and in degraded areas activities like afforestation, enrichment planting and re-afforestation of scrub areas are taken up. In afforestation and re-afforestation of scrub areas, 1,100 plants per ha are planted in more degraded areas and in enrichment planting 800 plants per ha are planted in lesser degraded areas	99.50	148.34	152.89

No	Scheme Name	Description	Outlay/ Expenditure (Million INR)		
			2014 -15	2015 -16	2016 - 17
4d	Sanjhi Van Yojana	For educating the masses and creating awareness amongst all stakeholders regarding forestry and environmental concerns through celebrating Van Mahotsava at State, Circle and Division levels. Plantations through school/college students.	1.87	1.24	1.61
<b>Central Sponsored Schemes (Forestry)</b>					
5	Intensification of Forest Management Scheme	Forest Fire control and management. Strengthening of Infrastructure. Survey, demarcation and Working Plan preparation. Protection and Conservation of Sacred Groves. Assistance is on 90: 10 basis (Central: State).	4.00	3.43	3.69
6	National Afforestation Programme (NAP)	National Afforestation and Eco-Development Board (NAEB) of the Ministry of Environment, Forests & Climate Change (MOEF&CC), Govt. of India initiated the National Afforestation Programme (NAP) in the year 2002-03 with the broad objective of regeneration and eco-development of degraded forests. Under NAP, Forest Development Agencies (FDAs) are required to be registered under Societies Registration Act and at present FDAs have been constituted in 36 territorial forest divisions, WL division Chamba and GHNP Shamshi.	7.25	0.00	0.00
7	National Bamboo Mission (NBM)	Focus is given on strengthening the bamboo resource base in the state by way of planting bamboo on forest and non-forest lands and improving the existing bamboo stock through cultural operations. During June 2015, the NBM has been renamed as National Agro-forestry & Bamboo Mission (NABM).	8.11	11.64	2.18
8	Regeneration of Chilgoza Pine	The scheme earlier started as 100% Centrally Sponsored Scheme has been taken up in the State Plan during the year 1987-88. The scheme aims at developing Chilgoza Pine nursery and subsequent raising in field.	0	0	0
9	Amenities to Staff & Labour	This scheme is meant for providing the basic amenities for the staff and labour.	1.50	2.28	1.50
10	Communication & Buildings				
10a	Communication	The scheme envisages to serve the inaccessible productive tracts of forests with adequate communication network, thus increasing the out turn of the produce and its effective management. It aims at providing better means of communications by way of jeepable roads, bridle paths, inspection paths.	5.70	55.30	16.50
10b	Buildings	Under this scheme, functional as well as residential buildings are to be constructed as housing facility to the field staff	34.16	51.20	65.27
11	Preservation of Forest, Conservation & Mgt. under 13th Finance Commission (TFC)	To compensate non-plan revenue deficit to special category states like Himachal Pradesh. Period 2010-11 to 2014-15	26.61	0	0
11a	14 <sup>th</sup> Finance Commission		0	0	0
12	CAMPA	The HP State CAMPA is intended as an instrument to accelerate activities for Compensatory Afforestation, Forest Resource Management, Preservation of Natural Forests, Management of Wildlife, Infrastructure Development in the sector and allied works. It has to provide an integrated framework for utilising multiple sources of funding and activities relating to Protection and	1,195.0	1,025.3	1,276.8

No	Scheme Name	Description	Outlay/ Expenditure (Million INR)		
			2014 -15	2015 -16	2016 - 17
		Management of Forests and Wildlife. Its prime task is to regenerate natural forests and build up the institution engaged in this work			

Source: Compiled by JICA Study Team (2017) based on information from HPFD

Out of on-going schemes, further descriptions of schemes which may have relevance and similarities with the project components/ activities, such as the National Afforestation Programme (NAP), CAMPA, and CATP are presented in **Attachment I.4.5.10**, **Attachment I.4.5.11**, and **Attachment I.4.5.12**, respectively.

Recent and on-going as well as recent major externally aided projects implemented in HP in the forestry sector are listed in **Table 4.5.19**.

**Table 4.5.19 Recent and On-going Major Externally Aided Projects in the Forestry Sector**

No	Project /Status	External Agency	Description	Project Area
1	Mid Himalayan Watershed Development Project	World Bank (IDA)	Multi-sectoral Integrated Watershed Development Project. to reverse the process of degradation of the natural resource base and improve the productive potential of natural resources and incomes of the rural households. (2005 – 2017)	10 districts (710 GPs), 42 Development Blocks
2	Forest-PLUS (Partnership for Land Use Science)	USAID	To improve the management of forested landscapes, towards an ecosystem approach to forest management (EAFM) and that mitigate climate change through Reduced Emissions from Deforestation and forest Degradation (REDD+). The Project focuses on reducing emissions and enhance carbon sequestration through India's forests by taking REDD+ actions. (2010-ongoing)	Satluj Landscape in Rampur/ Ani/ Kotgarh Forest Divisions
3	HP Forest Ecosystems Climate Proofing Project	KfW	Forest ecosystems in HP are managed in a way, that the risks of climate change and its negative impacts are minimised and/or mitigated and contribute to an increase in biodiversity of the Himalayan ecosystems and sustained income in rural areas. (2015 – ongoing)	Chamba and Kangra districts
4	Swan River Integrated Watershed Management Project	JICA	Integrated Catchment treatment of SWAN river on Watershed basis. Forest Department is the nodal agency for the Project. Besides that, department of Agriculture, Horticulture and Animal Husbandry of the State collaborated with the project. (2006 -2016)	Una district (Swan River Catchment)
5	HP Forestry Project	DFID (UK)	To establish viable and cost effective approach to Sustainable Forest Management (SFM) through Joint Forest Management (JFM) in Kullu & Mandi Districts and their replication in other parts of the state. Two Phases 1994 – 97 & 1997 -2000. Outlay – Pound 6.3 million	Kullu & Mandi districts
6	HP Forest Sector Reforms Project	DFID (UK)	The main aim of the project was to establish and implement an integrated and cost effective strategy for sustainable forest management and enhanced livelihoods of the poorest forest dependent women and men in HP	Whole of HP
7	Himachal Pradesh Forest Ecosystem Services Project	GIZ	The Objective is to enable HPFD to introduce/institutionalise the ecosystem approach in the Forest management systems of HP. Period of the project is from April 2016 to April 2020. Outlay is INR 350 million.	14 pilot sites within HP



No	Project /Status	External Agency	Description	Project Area
8	Indo-German Changar Eco-Development Project	GIZ	Village groups manage their natural resources sustainably and on their own responsibility. Period of the project from 1994 to 2006. Outlay was EUR 17.51 million.	Changar area of Kangra district.

Source: Compiled by JICA Study Team (2017) based on information from HPFD

## 4.6 Participatory Forest Management in HP State

### 4.6.1 Participatory Forest Management Policy and Legal Framework

In 1988, the National Forest Policy recognised an importance of the engagement of community in forest management for the sustainable forest management in the country. The Joint Forest Management (JFM), which is a way of forest management undertaken by the community in partnership with the forest department, has been adopted in many parts of the country. In this mode of forest management, the forest dependent communities would undertake the afforestation and other silvicultural operations in the designated forest areas notified by the Forest Department and in

**Table 4.6.1 JFM under NAP**

In the year 2002-03, National Afforestation and Eco-Development Board (NAEB) of the Ministry of Forests and Environment (MOEF), GoI initiated the National Afforestation Programme (NAP) with a broad adjective of regeneration and eco-development of degraded forests. Since 2002-03, NAP continues to be the flagship scheme of NAEB, in so much as it provides support, both in physical and capacity building terms, to the Forest Development Agencies (FDAs) which in turn are the main organs to move forward institutionalisation of JFM under participatory mode by involving two tier set up as FDAs (Divisional level) and JFMC (at village level). Under NAP, FDAs are required to be registered under Societies Registration Act, 1860. The State Forest Development Agencies (SFDA) were constituted as per MoEF guidelines in 2010 to act as Apex institution of all the FDAs in the state.

Source: JICA Study Team (2017)

return, receive a share of the benefit from timber and NTFPs harvested from such areas. In this context, each state has announced its own rule to implement JFM. In HP, it is known as “Himachal Pradesh Participatory Forest Management Rules 2000”.

### 4.6.2 Himachal Pradesh Participatory Forest Management Regulations 2001

In the state, forest management engaging communities have been implemented in compliance with the Himachal Pradesh Participatory Forest Management (HP-PFM) Regulations 2001. The rule calls for formation of a Gram Panchayat Ward based people’s institution called Village Forest Development Society (VFDS), which is to be registered under the Societies Registration Act 1860. HP-PFM defines the composition of the VFDS, usufruct sharing, and other modalities of organisational management. The outline of the HP-PFM is given in **Table 4.6.2**. HP-PFM differs from the JFM Rules in other states. For instance, in other states, member secretary will be mostly forest guard or other front-line staff and the benefit sharing will be between the village based committee and the forest department. As seen in **Table 4.6.2**, in HP, member secretary is to be elected from the general house and the benefits are to be shared between VFDS and Gram Panchayat. HP-PFM is designed to fully empower the community based institution to become a self-sustaining and autonomous body for sustainable forest management. However, some clarities

are needed in the terms of the power to be exercised by VFDS like “the powers of forest officers” and definition of the “selected area” as stipulated in the HP-PFM Regulations 2001.

**Table 4.6.2 Summary of HP Participatory Forest Management Regulations 2001**

Particulars	Description
Executive Committee	<ul style="list-style-type: none"> <li>- President, Vice President, Member Secretary and 4 members to be elected by the general house</li> <li>- Treasurer, Joint Secretary (Reserved for woman) are to be nominated by the elected members</li> <li>- 3 members co-opted from village level committees formed by other government departments, societies, user groups, SHGs, grazing groups</li> <li>- Ward <i>Panch</i>, President of the <i>Mahila Mandal</i>, Representatives of local women group (Ex-officio member)</li> <li>- Total number of members: 12 members + Ex officio members</li> </ul>
Reservation for Women	- 7 members of the executive committee members are to be women.
Term	- 2 years
Power of Executive Committee	- The executive committee is granted to exercise the powers of a “Forest Officer” as assigned by the Government under the Indian Forest Act 1927.
Usefruct Sharing	<ul style="list-style-type: none"> <li>- Collect fallen twigs, branches, lopping, grass, fruits, flowers, seeds, leaf fodder and NTFPs free of cost.</li> <li>- Sale proceeds of all intermediate harvest, subject to protection of forest and plantations for at least 3 years from the date of agreement</li> <li>- Organise and promote vocational activities related to forest product and land and other activities (i.e. SHGs, micro credits, etc.) but shall not impact on the legal status of the forest land.</li> <li>- Recorded rights over the forest shall not be affected by the above benefits.</li> <li>- No royalty will be charged on the forest product within the selected area</li> <li>- After 5 years, the VSIDS may expand the area subject to agreement</li> <li>- After 2 years of the date of agreement, if the forest is sustainably managed, VSIDS receive 75% of the net sale proceeds from the selected area and the rest of 25% will be shared with the Panchayats</li> <li>- VSIDS should spend at least 40% of the net sale proceeds on forest regeneration activities including soil and water conservation</li> </ul>
Funds	- To be generated by VFDS.
Grant in Aid	- HPFD will release the fund to VFDS according to the performance. (subject to availability of funds.)
Micro Plan	<ul style="list-style-type: none"> <li>- To be prepared for 5 years and revised after 3 years.</li> <li>- To be approved by the general house with 60% of the majority of members present.</li> </ul>

Source: Himachal Pradesh Participatory Forest Management Rules 2000

### 4.6.3 Implementation of Participatory Forest Management in HP

As in other states in India, Joint Forest Management Committees (JFMCs) are established for implementation of National Afforestation Programme (NAP). As of July 2017, 1,562 JFMCs have been established at a village level, of which 963 are functional<sup>43</sup>.

In addition to the interventions under NAP, externally aided projects and state funded scheme such as Sanjhi Van Yojana (SVY) have also adopted the participatory mode of forest management and established the community based institutions under different names. A snapshot of PFM initiatives in HP is presented in **Table 4.6.3**. Most of these community level institutions, except those under NAP, are regarded to be dormant after the termination of projects/ schemes. NAP is still an ongoing scheme and according to HPFD, 963 out of 1,567 JFMCs are regarded as “active” as of 2017. SVY is also on-going scheme as of 2017 and adopting PFM regulations 2001 as its fundamental principle. However, according to HPFD budget allocation to SVY and

<sup>43</sup> Source: HPFD. <http://hpforest.nic.in/pages/display/NGY2NTRniGZhNTZz-himachal-pradesh-participatory-forest-management-> (Accessed on 16th July 2017).

activeness of established VFDSs are gradually decreasing and leading to somewhat limited activities by majority of established VFDSs under SVY.

**Table 4.6.3 Projects/ Schemes and Village Level Institutions Organised for Participatory Forest Management**

Name of Projects/Scheme	Year	Name of Village Institution	No. of Village Institutions	Registered under	Remarks
HP Forestry Project(HPFP)	1994-2001	Village Forest Development Committees(VFDCs)	154	JFM Notification dated 12.5.1993	
Indo-German Eco-Development Project	1994-2005	Village Development Committees (VFCs)	294	JFM Notification dated 12.5.1993	
IWD(Kandi) Project	1993-2005	Village Development Committees(VFCs)	137	Societies of Registration Act 1860	
Sanjhi Van Yojana(SVY)	1998 Ongoing	Village Forest Development Societies (VFDS)	360	Societies Registration Act 1860	
Great Himalayan National Park	1993 Ongoing	Village Eco-Development Committee(VEDCs)	18	Director, GHNP	
National Afforestation Project (NAP)	2010 Ongoing	Joint Forest Management Committees (JFMC)	963	Registered by CFs/DFO as per the provision laid down in Revised Operational Guidelines, 2009 of NAEB.	
Swan River Integrated Watershed Management Project	2006 - 2016	Panchayat Development Committees (PDC)	96	Registered under Societies Registration Act	
Mid-Himalayan Watershed Development Project	2005 - 2017	Gram Panchayats	602 + 102	---	
Bio Carbon Project under the Mid-Himalayan Watershed Development Project	2009-ongoing	VFDSs (in 177 Panchayat)	242	Societies Registration Act, 1860/2006	
HP Forestry Reforms Project	2003 - 2007	Pilot Panchayats	85	—	

Source: HPFD.

<http://hpforest.nic.in/pages/display/NGY2NTRniGZhNTZz-himachal-pradesh-participatory-forest-management->  
(Accessed on 16th July 2017).

#### 4.6.4 Status of Participatory Forest Management in HP

Although a number of village level forest management institutions were constituted by different projects since 1990s in the state, the sustainability of such organisations largely dependent on the fund availability. The institutional assessment of these community based organisations by JICA Study Team based on the available documents is given in **Attachment I.4.6.1.**

**Table 4.6.4 Status of JFMCs under FDA – A Case of Shimla Forest Division**

33 JFMCs are registered under Societies Registration Act 1860. These were earlier constituted under Dfid's project. All these JFMCs comply with the PFM Regulations 2002. Out of 33, 16 JFMCs are dormant. Their micro plans are expired and no further micro plans were prepared as there was no funding. 17 JFMCs are undertaking maintenance of the plantation. During FY 2016-2017, 73,400 INR. were allocated by NAP for 17 JFMCs. DFO observed that people's interest quickly recedes when the fund cease to flow.

Source: Compiled by JICA Study Team (2017) based on the interview with DFO Shimla.

The Study Team also reviewed a few micro plans prepared by the JFMCs in Shimla Forest Division. These micro plans indicated the scattered and small patches of afforestation areas within the forest areas. **Table 4.6.5** is an attempt to show the areas of afforestation carried out by JFMCs between 2000-2017. In Karsog, Palampur and Suket indicated less than ten ha per JFMC of afforestation area was available, whereas Kotgarh, Nachan and Outer Serai Forest Development Agency showed 40-55.8 ha of plantation areas were available for each JFMC<sup>44</sup>. This may imply the high operational cost of JFMC based afforestation and silvicultural operations. The Study Team has been informed that the demarcation is only done for the plantation areas but not for the entire forest areas coming under the particular JFMC.

**Table 4.6.5 JFMCs under FDA**

Name Forest Development Agency	Number of JFMCs Formed	Cumulative Total area of Afforestation done by JFMCs since Formation of JFMCs	Average Area of Afforestation per JFMC
Chamba Forest Development Agency	16	0	0.0
Karsog	35	274	7.8
Kotgarh	36	2,007	55.8
Nachan	32	1,299	40.6
Outer Seraj Forest Development Agency	35	1,757	50.2
Palampur	17	131	7.7
Suket	14	117	8.4
WL Div. Chamba	2	100	50.0
Total	187	5,685	30.4

Source: Compiled by JICA Study Team (2017) based on the information provided by HPFDP (2017)

## 4.7 Community Forest Management, Forest Rights Act, Timber Distribution to Right Holders

### 4.7.1 Community Forest Management

Community involvement in forest protection and management existed in the state before the advent of scientific forest management by the Britishers. The state is known as Abode of Gods and in the name of Gods/ local deities sacred trees, forests and landscapes are being protected since hundreds of years. It is believed that sacred groves existed in pre-Vedic period<sup>45</sup>. Sacred groves or Dev Bans are common in Shimla, Mandi, Kullu and Lahaul & Spiti districts. There are about 10,000<sup>46</sup> temples in the state with management committees to look after the temples. For majority of the temples/ deities, there are sacred groves of varied sizes with strong values and practices of conservation.

There was a forest management system called Rakha prevalent in old Kangra region (presently – areas covering Kangra, Hamirpur, Una districts) during 19<sup>th</sup> century<sup>47</sup>. Protection of forest was undertaken by a local forest guard called Rakha, who had accountability of reporting to the local

<sup>44</sup> JFMC related data was collected by the study team from each forest division through HPFD.

<sup>45</sup> Gupta, Hemant K. (2006). "Cultural significance of indigenous institutions and forest management practices in the Indian Himalayas: Implications for policy and sustainable livelihoods". Paper presented in Global Conference of IASCP, June 19-23, 2006, Bali, Indonesia.

<sup>46</sup> Ibid.

<sup>47</sup> Vasan, Sudha (2001). "Community Forestry: Historical Legacy of Himachal Pradesh," Himalaya, the Journal of Association for Nepal and Himalayan Studies, Vol 21, No. 2, Art. 8.

communities as well as to the state. The forest officer used to appoint the Rakhas with the consent of the villages and based on the recommendations of the local Panchayat. Rakhas were paid compensation in terms of food grain and later they received cash compensation for their work related to protection of forest. They used to get a share of zamindari share accruing in the protected forests and unclassed forest.

There are many instances in the state, where the local communities have evolved management systems to regulate use of different forest products including fuel wood, fodder, herbs and medicines. These communities have also systems to collect and market the NTFPs and medicinal plants.

The recorded participatory forest management in the state dates back to 1938, when HPFD launched a scheme named as Kangra Forest Cooperative Society, which was sanctioned by the Punjab Government in 1940. During 1940-1954, 72 Forest Cooperative Societies were formed to protect and manage 23,800 ha forest areas<sup>48</sup>. The Government was providing 50,000 INR to each society per annum as grant-in-aid. These societies were effective in checking illicit felling of trees, lopping, grazing etc. The main objective was to protect and manage the forests assigned to them as per the prescriptions of prevailing working plans, and to check soil erosion. The societies were managing and utilising forest products to the best advantage of members. The scheme was designed initially for five years and thereafter it was reviewed and extended from time to time and finally in 1974, the Government decided to restrict the grant-in-aid to the societies. About 42 societies were active till 2008<sup>49</sup>. In 1990s, the focus of the Government was on promotion of JFM and later it enacted PFM Regulations in 2001 and there was no effort to strengthen the Forest Cooperative Societies.

#### **4.7.2 Implementation of Forest Rights Act in HP State**

The Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, commonly known as Forest Rights Act (FRA) has been implemented in the state since 2009. In the state, Forest Rights Committees (FRCs) were initially constituted at the Gram Panchayat level and the implementation of the Act was limited to Schedule V areas only. FRCs received claims and recommended them to their respective SDLCs (Sub-Divisional Level Committees) and subsequently to DLCs (District Level Committees). There are 57 Sub Divisional Level Committees and 12 District Level Committees to implement the FRA. The FRCs constituted at the Gram Panchayat level received and processed 5,692 nos. of claims (5,409 individual claims and 283 community claims). As per the FRA status report of February 2016 of Ministry of Tribal Affairs (MOTA), GoI, 346 titles were distributed including 108 community claims.<sup>50</sup> But objections were raised by the MOTA on the constitution of FRCs at the Gram

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<sup>48</sup> Ahal, Rajeev (2002). *The Politics of Cooperative Forest Management: The Kangra Experience*, Himachal Pradesh. ICIMOD, Kathmandu, Nepal.

<sup>49</sup> Hessen Forst, Suvigya and Osterreichische Bundesforste (2014). *Feasibility Study on Himachal Pradesh Forest Ecosystem Climate Proofing Project*. Draft Final Report for KfW.

<sup>50</sup> MOTA. *FRA Statewise Report Feb 2016* - <http://forestrights.nic.in/report/individualStateWise.jsp#>

Panchayat level and process of claim settlement. Although DLC approved the distribution of 346 titles, these titles were not given. The state government had to initiate the constitution of FRCs at the revenue village level in 2013.

The state has 17,904 revenue villages and FRCs have been constituted in 17,503 villages as of July 2017. Training and other capacity building programmes were/ are being organised by the Tribal Development Department in different parts of the state. After the new FRCs formed, claims have been received and processed. So far 60 titles have been given i.e. 7 nos. of community rights and 53 nos. of individual forest rights in Chamba district. In no other districts of the state titles under FRA have been given.

#### 4.7.3 Timber Distribution to Right Holders

Rights regimes of local communities were clearly defined in the forest settlement reports prepared during the pre-independence period. The important forest settlement reports with clear definition of rights of local communities are a) Forest Settlement in Kangra (1879 – 97), b) Forest Settlement in Kullu (1866 – 96). In the forest settlement reports, four classes of right holders<sup>51</sup> were applied as mentioned below:

- 1) Proprietary body of the villages and *tikas* in whose name common waste land was recorded. These proprietors and their tenants are the right holders,
- 2) Right holders, who purchased common waste and the seller retaining the agriculture land and paid no land revenue. They were given the rights of grazing, grass cutting, and collection of dry fuel and stones (rights for non-agriculturists),
- 3) Right holders, who paid land revenue and exercised the rights in demarcated forest, and
- 4) Right holders, who exercised rights over un-demarcated waste (rights of non-agricultural residents – rights to graze few cattle, collect dry wood and cut grasses – only for own domestic requirements).

Right holders included both *bartandars* and *khewatdars*. While *bartandar* is a person entitled to right over land or trees in a protected forest, which may be a property of other, *khewatdar* is a person, who has entitlement to rights by virtue of his/ her sole and/ or joint property in subject of right. The admitted rights<sup>52</sup> were mentioned below:

- ◆ Grazing of cattle
- ◆ Grazing of sheep and goats by the Gaddis
- ◆ Timber for agricultural implements, domestic utensils
- ◆ Timber of construction and repair of dwelling houses, cattle sheds and other agricultural buildings
- ◆ Timber/ dry wood for fuel and daily use
- ◆ Timber for marriage, funeral ceremonies

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<sup>51</sup> Sharma, HC (1996). Forest Settlement in Himachal Pradesh. Bisen Singh Mahendra Pal Singh, Dehradun.

<sup>52</sup> Ibid.

- ◆ Timber for charcoal for manufacturing of agriculture implements or repair of implements
- ◆ Grasses and side branches of trees for fodder
- ◆ Brushwood for fences
- ◆ Branches, fallen leaves for manure
- ◆ Leaves of trees for tanning
- ◆ Barks of creepers and stumps of trees for torches
- ◆ Fruits, flowers, medicinal and edible roots and leaves
- ◆ Stones for house construction
- ◆ Earth for plastering, making vessels, bricks
- ◆ Wild honey

Especially the rights admitted were exercised for the *bonafide* agricultural and domestic purposes and these are subject to limitation, without endangering the existence of forest cover.

Forest settlement in erstwhile Bushahar state (presently parts of Kinnaur and Shimla districts) was done in 1884 and compiled as a forest settlement report which was revised in 1921. The rights and concessions<sup>53</sup> of the local people in each demarcated forest were recorded after proper investigation. These rights and concessions were also given in the un-demarcated forests. The rights and concessions included free grazing of all animals of the right holders in their respective chaks. If the right holders intend to graze their animals in other chaks and other divisions, then they have to pay *timi/ cess* to the government. The rights and concessions included right to building timber against payment of nominal fee for different species and there was no mention of ceiling of trees to be sanctioned to the right holders.

**Table 4.7.1 Rules Governing Timber Distribution to the Right Holders**

No.	TD Rules	Key entitlements
1	HP Forest (Timber Distribution to the Right Holders) Amendment Rules, 2015 (Feb 26, 2016)	<ul style="list-style-type: none"> <li>- Persons from outside, who have purchased land for residence, agriculture and other purposes, will not be entitled to get timber under the rules.</li> <li>- If the right holder has landholding in two places, then s/he is entitled to get timber only in one place i.e. at the place of residence. If the right holder contravenes this provision, then s/he will forfeit his/ her rights for the life time.</li> <li>- Right holders will be provided timber only if salvage trees are available. No standing green tree will be allotted to the right holders.</li> <li>- Timber for house construction is being provided once in 20 years and that for repair work is provided once in 10 years.</li> <li>- The right holder has to apply to the Gram Panchayat after getting it verified from the Patwari about the right over the land through inheritance. Then the GP has to undertake a resolution on the genuineness of the requirement. Then the application will be submitted to the Forest Guard and then to the DFO through the Range Officer for final approval.</li> <li>- In case of violation of provisions under the rules, the rights of the right holder will be suspended for 20 years.</li> </ul>
2	HP Forest (Timber Distribution to the Right Holders) Rules, 2013	<ul style="list-style-type: none"> <li>- Timber for house construction is being provided once in 15 years and that for repair work is provided once in five years.</li> <li>- Rights will be granted only if trees are available silviculturally in concerned forest area. If the right holder agrees to pay 50% of the market rate of trees then timber can be provided from other forests.</li> <li>- Timber will be provided to the right holders if they actively cooperate with the FD for forest conservation - in apprehending defaulters, offenders, extinguishing fire.</li> </ul>

<sup>53</sup> HP Forest Department (2003). Working Plan for the Forests of Kinnaur Forest Division (1999-00 to 2014-15), Shimla.

No.	TD Rules	Key entitlements
		<ul style="list-style-type: none"> <li>- If the right holder commits any forest offence/ mis-utilises the timber then s/he will forfeit his/ her rights for 16 years.</li> <li>- Timber will not be given if a right holder has sold timber from his/ her private land in last 10 years.</li> <li>- The right holders who suffered from natural calamities like flash-floods or fire are being given timber free of cost to the maximum limit of 7 cum.</li> <li>- When the right holder has land in two places and s/he is qualified to get timber at both the places then the rates of the trees will be doubled at the second place.</li> <li>- Timber is not distributed to the persons who purchased the land after obtaining permission from the government under <b>section 118</b> of the Tenancy and Land Reforms Act of 1972.</li> <li>- Only the head of the family as per the panchayat records is entitled to get the timber for the construction, repair and addition or alteration of house and cowshed used for domestic purposes.</li> <li>- The earlier provision of granting trees in converted form was suspended and now trees are being allotted in unconverted form.</li> </ul>
3	HP Forest (Timber Distribution to the Right Holders) Rules, 2010	<ul style="list-style-type: none"> <li>- Timber entitlement – 3 m<sup>3</sup> for construction of new house and 1 m<sup>3</sup> for repair/ maintenance/ alteration of existing house. Timber shall be made available from the depots in converted form.</li> <li>- Timber distribution will not be granted for construction and repair of houses for commercial or renting purposes.</li> <li>- Timber distribution will be made for construction of new house once in life time or 30 years and for maintenance it will be made available once in 15 years.</li> <li>- Timber distribution to the right holders, who suffered from natural calamities and fire will get the entitlement free of cost (maximum 3 m<sup>3</sup>).</li> <li>- BPL right holders will get the timber at 10% of rates fixed by the Forest Corporation for commercial sale and will be served on priority basis (first come first serve).</li> <li>- APL right holders will get the timber at 30% of the rates fixed by the Forest Corporation for commercial sale.</li> <li>- Timber distribution will be granted to the head of the family as per the revenue records.</li> <li>- The right holders have to apply to the Forest Guard through the Panchayat before March 31 and timber will be supplied during Sep – Dec.</li> <li>- No timber distribution will be granted in urban areas.</li> <li>- In case of misuse of rights and forest offence the timber distribution rights of the right holders will be suspended for 10 years.</li> </ul>
4	December 1955 – Government order for supply of timber to the right holders	<ul style="list-style-type: none"> <li>- The Government decided to supply timber to the right holders as it came to the notice of the government that the Zamindari right holders were facing hardship to meet their legitimate domestic requirement of timber.</li> <li>- Entitlements for domestic and agriculture purposes for each right holders – one tree each of first class and second class, 3 trees of third class and 4 trees of fourth class.</li> </ul>
5	June 12, 1953 – Government vide memo no. – Ft. 29-60/48-II	<ul style="list-style-type: none"> <li>- HPFD to supply trees for repair of bridges on un-motorable roads/ paths free of charge if the local people are willing to provide voluntary service for the repair works.</li> <li>- HPFD to supply trees for construction of approved schools and dispensaries, where the construction works are done through public donations.</li> </ul>

Source: JICA Survey Team (2017) - Compiled from the TD Rules of HPFD.

There have been several changes in the policies and rules of the state during last six-seven decades. The timber was distributed to families affected by natural calamities free of cost. Despite heavy pressure on the forest resources the timber distribution continued till 2006 and thereafter it was discontinued for a while because of the interventions of HP High Court. The details of timber distributed to the right holders during the last six-seven decades have been presented in **Table 4.7.2**.



**Table 4.7.2 Volume of Timber Distributed to the Right Holders in HP State**  
(Unit: m<sup>3</sup>.)

No.	Year	Timber distributed - Free grantees	Timber Distributed to Right Holders	Total
1	1950-51	2,293	36,443	38,736
2	1955-56	1,727	39,473	41,200
3	1960-61	2,401	33,512	35,913
4	1965-66	13,832	83,528	97,360
5	1970-71	4,282	71,832	76,114
6	1975-76	5,434	126,838	132,272
7	1980-81	4,246	97,069	101,315
8	1985-86	7,984	168,026	176,010
9	1990-91	7,858	95,300	103,158
10	1995-96	2,981	96,274	99,255
11	2000-01	9,429	87,835	97,264
12	2005-06	2,548	54,439	56,987
13	2006-07	780	14,576	15,356
14	2007-08	30	356	386
15	2008-09	0	0	0
16	2009-10	0	0	0
17	2010-11	36	101	137
18	2011-12	0	27	27
19	2012-13	48	266	314
20	2013-14	0	1,337	1,337
21	2014-15	0	40,086	40,086
22	2015-16	0	27,505	27,505

Source: Forest Statistics and Annual Reports of HPFD.

The annual average timber distributed during 1950-51 to 2006-7 was 88,000 m<sup>3</sup>. After that it has been significantly reduced because of the change in TD Rules. The share of timber distribution to the rights holders to the total timber production of the state has been presented in **Table 4.7.3**.

**Table 4.7.3 Share of TD to the Total Production of Timber of HP State**(Unit: m<sup>3</sup>.)

Sl.	Year	Total Timber Production of the State	TD to Right Holders	%
1	1995-96	425,784	99,255	23.31
2	2000-01	341,766	97,264	28.46
3	2005-06	414,100	56,987	13.76
4	2010-11	245,400	137	0.06
5	2015-16	120,630	27,505	22.80

Source: JICA Study Team (2017) – Compiled from the Annual Reports of HPFD

The share of timber distribution to the right holders in total production of timber was 23% during 1995-96 as well as during 2015-16.

#### 4.8 Forest Products and Markets

The forests of HP are managed under the Indian Forest Act, 1927, which was amended by the state in 1968 and 1991. Forest settlements carried out in the erstwhile states during the British period recognised the customary rights over forest products and allowed the communities to enjoy these rights such as to cut grass and bamboo, to remove medicinal plants or roots, fruits, flowers, dried and fallen wood (except some commercial species like deodar, walnut etc.),

splinters of deodar and kail stumps without any prior permission of HPFD<sup>54</sup>. These rights mentioned in the settlement reports are still enjoyed by the local communities in different parts of the state and are now part of the formal forest management systems. The right holders commonly known as *bartandars* have rights to collect different NTFPs and medicinal plants without giving any royalty or cess to the Government. In some areas, the Panchayats were earlier asking for royalties to collect forest products from the common land/ forest areas. In the post-independence era, after the formation of HP, many new policies, laws and rules have been formulated to control and manage different forest products and some of these key policies and laws have been presented below:

- ◆ Forest Sector Policy and Strategy, 2005
- ◆ HP State Medicinal Plants Sector Policy, 2006
- ◆ Payment of Ecosystem Services Policy, 2013
- ◆ H.P. Forest Produce Transit (Land Routes) Rules, 1978 with subsequent amendments (Latest amendment to the rules was made in April 2017)
- ◆ H. P. Forest Produce Regulation of Trade Act, 1982 with subsequent amendments
- ◆ PFM Regulations, 2000
- ◆ The Chamba MFP Exploitation and Export Act, 1946
- ◆ Mandi State Minor Forest Produce Exploitation and Export Act, 1940
- ◆ HP Resin and Resin Products (Regulation of Trade) Act, 1981

#### **4.8.1 Major Forest Products**

Timber, fuel wood and charcoal the major forest products of the state and their harvesting and marketing are done by the HP State Forest Development Corporation Limited (HPSFDCL), which was established in March 1974. HP is the first state to impose a ban on green felling way back in 1986. There is no timber felling in the forest. Only the dried, diseased, uprooted and damaged trees handed over by HPFD are salvaged by HPSFDCL. Annual average of 0.3 million cum of timber is harvested and converted to timber and sold through auction at 8 sales depots (5 major and 3 minor depots) managed by the Corporation<sup>55</sup>. For fuel wood and charcoal the Government fixes the rates for sale to public as well as other departments and commercial organisation.

Earlier the right holders were allowed to cut trees for construction and repair of houses and cow sheds under Timber (Timber distribution to right holders) Rule but now only the salvage trees are used for distribution to the TD right holders.

In HP, 90% of people live in rural areas and majority of them use wood as cooking fuel as well as for water and space heating. From the estimates of the National Sample Survey Organisation, the annual fuel wood requirement is 2.65 million tons<sup>56</sup>. As per a study conducted by Jyoti Parikh,

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<sup>54</sup> Sharma, HC (1996). Forest Settlement in Himachal Pradesh. Bisen Singh Mahendra Pal Singh, Dehradun.

<sup>55</sup> [http://www.hpforestco.in/timber\\_extraction.htm](http://www.hpforestco.in/timber_extraction.htm)

<sup>56</sup> Statistical Cell, HP Forest Dept. Estimated Consumption of Fuel Wood in HP as per the National Sample Survey. Note dated 27th Feb 2017.

Integrated Action for Research and Development, Delhi, during 2009 in 9 districts of HP, 93% of surveyed households use biomass fuel – mostly fuel wood and 7% use clean fuel<sup>57</sup>. As per the Census 2011, 57.54% of the households in HP use fire wood for cooking. The fuel wood production from the state forest has declined significantly between 2005-6 and 2014-15. Most of the fuel wood removals by the right holders go unrecorded. The outturn of major forest products in last 11 years has been presented in the **Table 4.8.1**.

**Table 4.8.1 Outturn of Major Forest Produces and Their Values**

No.	Year	Timber		Fuel wood including Charcoal	
		Production in '000 cum	Value in million INR	Production in '000 cum	Value in million INR
1	2004-5	433.1	1,642.4	30	61.72
2	2005-6	414.1	6,455.49	8	19.64
3	2006-7	236.3	3,952.25	7.5	16.7
4	2007-8	246.9	4,171.48	1.9	4.72
5	2008-9	227.9	3,656.29	0.8	0.98
6	2009-10	277.9	5,677.73	0.8	1.57
7	2010-11	245.4	4,449.29	1	1.36
8	2011-12	146.1	3,682.47	0.1	0.12
9	2012-13	207	4,894.53	0.2	0.38
10	2013-14	245.1	5,109.2	0.2	0.4
11	2014-15	242.9	6,934.67	1.5	6.67
12	2015-16	148.2	1,640.14	NA	NA

Source: JICA Study Team (2017) - Compiled from Annual Reports of HPFD

#### 4.8.2 NTFPs

##### (1) Overview

The state is rich in wild medicinal and aromatic plants and well known for its medicinal plants found in high altitude Himalayan region. As per a study conducted by Mid-Himalayan Watershed Development Project in 2008, 1,489 species were recorded as NTFP and of them 362 species were recorded to be traded in the country as medicinal plants. 99 species have an annual demand of more than 100 MT in the market and 45 of these species have sizable wild population in the state<sup>58</sup>.

**Table 4.8.2 Outturn of Medicinal Herbs in HP State**

Year	Volume in MT	Value in Million INR
2011-12	694	33.19
2012-13	253	33.32
2013-14	1,243	118.39
2014-15	1,558	159.44
2015-16	6,102	419.63

Source: JICA Study Team (2017) - Compiled from the Annual Reports of the Forest Department, Himachal Pradesh

Majority of the rural population depend on forest for fodder, medicines, bamboo etc. The right holders have the right to collect NTFPs/ minor forest products for their own use as well as for sale. As per the categorisation of HPFD, minor forest products include bamboo, resin, bhabbar

<sup>57</sup> Parikh, Jyoti (2011). Hardships and Health Impacts on Women due to Traditional Cooking Fuel: A Case Study of Himachal Pradesh in India in Energy Policy 39, Elsevier, Dec 2011.

<sup>58</sup> Ved D. K. & G. S. Goraya (2008). Non-Timber Forest Produce as Livelihood Option for Rural Communities of Mid Himalayas in Himachal Pradesh. Foundation for Revitalisation of Local Health Traditions, Bangalore.

grass and other fodder grasses, medicinal herbs, khair/ katha and other fruits, flowers, seeds etc. The volume and estimated value of outturn of medicinal plants in the state during 2011-12 to 2015-16 have been presented in **Table 4.8.2**. Details of medicinal herbs collection during last two decades for selected years have been presented in **Table 4.8.3**. As Gram Pachayats were given the responsibility of issuing export permits to the traders, limited data are available with HPFD on the volumes of trade of different NTFPs. The outturn of minor forest products in the state during 2005-6 to 2014-15 has been presented in **Table 4.8.4**.

**Table 4.8.3 Volume of Medicinal Herbs Exported from HP State**

(Unit in MT)

Name of Species	1994-95	1999-2000	2004-5	2009-10	2014-15	Total
Berberis roots	0	0	352.6	1,041.8	1,280.5	2,674.9
Dhoop	326	78	9.6	10.6	2.5	426.7
Muskbala/ Nihani	164.2	93.9	54.7	47.1	37.3	397.2
Neozia	40.3	0	118.1	48.1	7.1	213.6
Dori ghas	2.5	142.3	4	0	0.5	149.3
Revandchini/Chukri	17.4	40.9	56.6	32.3	1.4	148.6
Pathan bel	0	0	46	40	51.9	137.9
Tej patra	67.5	45.9	0	0	23	136.4
Karu	34.3	4.6	13.4	28.7	50	131
Talis patra	78.2	27.4	13.7	0.4	2.6	122.3
Brahmi	92.1	6.3	0	0	0	98.4
Patlain root	0	0	18.6	62.3	2.5	83.4
Datisan roots	0	0	80.8	0	0	80.8
Guchhi	49	10.6	0.7	1.5	1.8	63.6
Chora	6.6	43	0		0.4	50
Rhododendron flower	0	0	4.2	35.2	6.9	46.3
Kuth	32.1	0	6	0	6	44.1
Khanor	0	0	0	0	34	34
Bhutkesi	7.4	5.9	6.7	3.6	4.7	28.3
Thuth	0	13.6	5	6.2	1.2	26
Bankakri	12.2	0.9	0	11.2	0.6	24.9
Bhoj patra	0	15.6	0	2.5	4.2	22.3
Horsechestnut	0	0	22	0	0	22
Mithi Patis	0	16.9	0	0	0.4	17.3
Singli mingli	0.5	14.2	1.3	0	0	16
Marigold	0	0	4	10	0	14
Somlata	0	0	10.5	0	3	13.5
Others	950.9	841.5	108.3	12.2	14.2	1,927.1
Total	942.5	565.9	842.8	1,381.6	1,536.7	5,269.5

Source: JICA Study Team, 2017 – Compiled from records of HPFD

Resin and khair are controlled by the state and harvesting and sale are managed by HPSFDCL. Management of bamboo in the forest areas are done by HPFD, and harvesting and sale is done by HPSFDCL. Prior to February 2011, bamboo was a nationalised produce and thereafter bamboo on the private land has been exempted from harvesting and transit restrictions<sup>59</sup>. Four species of bamboo i.e. *Dendrocalamus strictus*, *Dendrocalamus hamiltonii*, *Bambusa bamboos*, and *Bambusa nutans* do not require any transit pass. National Bamboo Mission (NBM) has been in operation in HP since 2006-7 and the major focus areas of the missions are a) undertaking bamboo plantations on the forestland, b) management of bamboo forest through proper silvicultural operations and c) promotion of bamboo planting on the non-forest areas including

<sup>59</sup> <http://hpforest.nic.in/faq>

the private land. Under NBM between 2007-8 and 2014-15, 3,462 ha bamboo plantations were taken up in the forest areas; 1,094 ha forest areas were treated for improving existing bamboo stocks; 1,224 ha bamboo plantations were undertaken in the non-forest land; nearly 400 farmers entrepreneurs were trained in the state<sup>60</sup>.

The medicinal plants and other NTFPs can be collected by the right holders from the wild but they need to register with HPFD for collection of different NTFPs. Any person or institution, who intends to buy, store and trade NTFPs including medicinal plants (minor forest products) need to register with HPFD (Office of the Divisional Forest Office) and also to register the depots, where the forest products will be stored. The traders/ buyers have to obtain transit pass/ export permit from DFO officers for transportation of these products from the depots to markets within the state and beyond. The rights holders don't require any transit pass/ permit to carry the produce to different places within their revenue estate area. The export permit is issued under Himachal Pradesh Forest Produce Transit (Land Routes) Rules, 1978 and the traders/ buyers have to pay the export fee to HPFD as per the fees fixed by the Government from time to time. The export fees from different NTFPs/ medicinal plants were revised in August 1993 for 42 items and subsequently more items were included in the list. As per the HP Forest Produce Transit (Land Routes) Rules, 2013 the export fee has been fixed for 91 forest products. NTFPs are collected as per the prescription of working plan. Extraction cycles for different NTFPs have been prescribed by HPFD. Based on the prescriptions, one range area is open for collection of specific MFPs for one year and the same range will be again opened for collection after four years.

In February 2003 (HPFD Notification No. FFE-B-G (9)-9/94-II dated Shimla-2, the 28<sup>th</sup> February 2003), the state government decided to appoint the Pradhans of the Gram Panchayats as forest officer to issue the transit pass for transportation of MFPs from the forests in their concerned areas. The Pradhans were empowered to collect export fee for 38 MFPs and the Forest Guard of the area was given the responsibility to verify and recommend to the Gram Panchayat for issuance of transit pass. The Forest Guard was supposed to verify whether the MFP was collected from the areas open for extraction and sustainable harvesting was followed or not. For various reasons powers of the Pradhans were withdrawn in 2015 and the authority to issue transit pass was again vested with DFO.

## (2) Management of Katha (*Acacia Catechu*) Tree on Forest Land

Since there is a ban on green felling; no trees are harvested for extraction of katha. Only the dead, dried, damaged and fallen trees are salvaged from the forest by HPSFDCL and sold to the private katha boilers and bhattis. HPFD takes up khair plantations in the forest areas and also distributes seedlings to the farmers for planting on the private land. Between 1950-51 and 2010-11, HPFD has raised 176,244 ha of khair plantations in the state.

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<sup>60</sup> <http://hpforest.nic.in>

**Table 4.8.4 Outturn of Minor Forest Products during 2005-6 to 2014-15**

(Unit – Quantity in MT and Value in Million INR)

Year	Resin		Bamboo		Bhabbar grass		Grazing/Grass Cutting		Medicinal herbs*		Other Products		Total	
	Qty.	Values (Royalty)	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value**	Qty.	Value	Qty.	Value
2005-06	8,508	64.177	0	1.09	397	0.150	0	0.983	1,744	42.380	0	18.742	0	127.522
2006-07	8,591	75.347	0	1.549	614	0.149	0	0.818	1,244	49.425	0	10.547	0	137.835
2007-08	8,514	48.612	0	0	622	0.227	0	1.003	951	30.272	0	11.16	0	91.274
2008-09	7,596	56.117	0	0	1,113	0.167	0	1.07	376	26.575	0	22.429	0	106.358
2009-10	6,944	62.512	0	0	990	0.16	0	0.932	1,394	50.924	0	82.198	0	196.726
2010-11	5,847	103.258	416	7.693	211	0.103	0	0.881	1,241	28.860	0	81.082	0	221.877
2011-12	5,825	102.457	675	2.901	524	0.332	0	0.947	694	33.19	0	43.718	0	183.545
2012-13	5,577	76.278	508	0.738	460	0.037	0	0.918	253	33.323	0	134.276	0	245.570
2013-14	5,389	85.451	0	0	n.a	0.112	0	0.878	1,243	118.386	0	92.117	0	296.944
2014-15	5,258	83.262	0	0	n.a	0.350	0	1.035	1,558	159.444	0	69.486	0	313.577
2015-16	5,360	94.249	7,912	1.193	n.a	0.041	0	5.42	6,102	4,196.26	0	1,489.72	0	6,646.23

Source: Statistics Cell, HPFD, Shimla

Note: \*Information on Medicinal herbs does not include volume extracted /sold through Panchayats.

\*\*Value of Medicinal herbs is an estimated value.

### (3) Management of Katha/ Khair Tree on the Private Land

Khair trees are available in the wild as well as on the private land in Una, Hamirpur and Bilaspur districts. Katha is extracted from these trees by factories and boilers operated by the private sector. Cutting of trees for katha extraction is controlled by the state even for the trees on the private land. Harvesting of mature khair trees from the private land is allowed if it is prescribed in the working plan of the corresponding forest division. HPFD follows a 10-year working cycle for harvesting of khair trees. The owner of the khair tree has to apply to HPFD with necessary documents for permission to harvest the trees. The block officer, forest guard and revenue officers will verify the land ownership and availability of mature tree. The mature tree will be marked by the block officer and necessary permission will be granted by HPFD for harvesting of trees. Usually the harvesting is undertaken by private contractors, who have been registered with the forest divisions or harvesting and exporting the products outside of the forest division. These contractors carry out harvesting, bark removal etc. and supply the materials to the katha extraction units. The price offered by the contractors to the land owners in Hamirpur forest division area during last two years was between 3,000 INR and 4,000 INR per quintal<sup>61</sup>. The harvesting cost is borne by the contractors. The contractors usually sell these trees/ materials to different katha industries in Una and Hamirpur with a margin of 20-30% after deducting the operating cost. The contractors have to pay the export fee to HPFD before they transport it to the processing units (export fee is 250 INR per quintal for heartwood/ chips and 175 INR per quintal for billets).

**Table 4.8.5 Production of Katha/ Khair in HP State**

Year	Volume in MT	Value in Million INR
2011-12	971	41.98
2012-13	3,042	131.51
2013-14	2,131	92.09
2014-15	1,586	68.54
2015-16	1,703	568.8

Source: JICA Study Team (2017) - Compiled from the Annual Reports of the Forest Department, Himachal Pradesh

### (4) Pine Resin Tapping in HP

Resin is a nationalised products and its tapping, extraction and processing are managed by HPSFDCL under the HP Resin and Rosin Products (Regulation of Trade) Act, 1981. HPSFDCL has been involved in resin extraction work since 1975-76. HPFD does the assessment of the forest block and sections, where tapping of resin would be done. After the assessment, HPFD hands over the forest block with identified tree to be blazed for

**Table 4.8.6 Production of Resin from the Forestland during Last 5 years**

Year	Volume in MT	Value in Million INR
2011-12	5,825	102.457
2012-13	5,577	76.278
2013-14	5,389	85.45
2014-15	5,258	83.26
2015-16	5,360	94.249

Source: JICA Study Team (2017) - Compiled from the annual reports of the FD.

<sup>61</sup> From the discussion with local forest officials in Nadaun forest range, Hamirpur forest division.

resin tapping. With the introduction of Rill Method, the yield of resin has increased i.e. from 3.21 MT in 1988-89 to 4.1 MT in 2004-5 per one section of 1,000 blazes<sup>62</sup>. The yield per section in 1974-75 was 2.827 MT when HPFD was directly doing the resin extraction using cup and lip method. The State Forest Corporation has trained staff to control the quality of resin and the work is done through Labour Supply Mates, who engage professionally trained wage labour to tap the resin.

#### (5) Tapping of Resin from the Private Land

HPFD has elaborate systems for allowing tapping of resin from the pine trees on the private land. The land owner has to apply for permission to the divisional forest officer (DFO) through the range officer. The block officer will carry out the site inspection and enumerate and mark the mature trees to be blazed for resin tapping. Based on the recommendation of the block officer and range officer, the DFO will register the land owner and number of trees to be used for resin tapping. A nominal registration fee is charged to the land owner. Thereafter the land owner engages the contractor for resin tapping. One tree is used for 5 years for resin tapping. The ceiling of production is fixed i.e. 4 MT per section of 1,000 blazes. It is the responsibility of the land owner and contractor to follow the harvesting protocols and HPFD monitors the harvesting process. In case of violation, penalty is imposed on the land owner. The contractor makes necessary payments to the land owner as per their mutual agreement and pays the export fee to HPFD before it is transported to different rosin processing industries within the state and beyond.

#### (6) Honey Production

HP is well-known for its quality of honey. Most of the honey comes from the cultivated sources. As the orchard development has significantly increased and at present 0.23 million ha is under fruits cultivation and the orchardists require bees for pollination. Bee keepers transport their bee boxes to different orchards against payment of rent. Bee keeping was introduced by the Britishers in 1934 in Kullu valley and in 1936 in Kangra valley. Bee keeping was started in lower hills during 1952. The honey production in the state reached 1,000 MT during 2006-7 and 1,600 MT during 2011-12. During 2015-16, the total honey production from the cultivated sources was 1,512 MT<sup>63</sup>. There are 85,000 farmers registered with Horticulture Department for bee keeping in the state and in Kangra alone has 30,000 bee keepers with an annual production of about 1,200 MT. The Horticulture Department has 32 bee-keeping stations and two honey grading laboratories. Honey is being exported to UK, Maldives, Kuwait etc.

#### (7) NTFP Markets

Most of the NTFPs from the state goes to Amritsar and Delhi. There are local traders based in Kullu, Paprola/ Baijnath, Rampur, Shimla, Chamba, Shahpur, Solan etc. who buy the NTFPs

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<sup>62</sup> <http://www.hpforestco.in/products.htm>

<sup>63</sup> HP Horticulture Department (2016). Annual Administrative Report 2015-16. Shimla



from the right holders and send them to Amritsar and Delhi. Major chunk of the produces go to Amritsar. A small volume of NTFPs are being directly bought by the local processing units. Kail and kunish cones and cedar rosette are sent to buyers in Kolkata and Tuticorin.

Any trader/ buyer/ processing unit intending to buy the NTFPs including medicinal plants from the primary collectors (local right holders who collect medicinal plants from the wild) or primary producers (cultivators of medicinal plants on their own land) has to do the following for procurement and transportation of medicinal plants from one forest division:

- ◆ Register as a trader with DFO of the respective forest division, where s/he is proposing to buy NTFP including medicinal plants. If the trader intends to buy products from multiple forest divisions, then s/he has to register in all these forest divisions. S/he has to clarify the NTFPs, which would be collected by him/her,
- ◆ Set up godowns (permanent or temporary) in each range, where the NTFPs including medicinal plants will be collected,
- ◆ Buy the NTFPs from the primary collectors/ producers and store the products in the godowns for inspection by the forest officials, and
- ◆ Obtain transit permit from the office of DFO by paying the desired export fee and then export the materials from the forest division.

There are several prevailing procurement arrangements for marketing of NTFPs including medicinal plants. The traders/ buyers have their agents placed in the areas well-known for different NTFPs and these agents can be the local shop keeper or a right holder or a person from the neighbouring village, who basically buys the materials from the right holders and brings them to the temporary godown. Instant payments are being made by the buyers/ agents to the right holders. Then the materials are being transported to the main godowns of the trader, where necessary cleaning, sorting, grading and packaging are made. The trader then sends the materials to wholesalers/ exporters in Delhi and/ or Amritsar. The major quantum of NTFPs including medicinal plants procured from Kullu, Lahaul & Spiti, Chamba etc. go to the markets in Amritsar and from there the materials are either exported or supplied to different processing industries. The traders/ exporters buy the materials from the right holders or producers through their agents and then materials are properly cleaned, sorted, graded and packed. These materials are exported to different extraction units, pharmaceuticals, nutraceuticals, and perfumeries abroad through shipment agencies. The right holders bring the products to the local processing units, which are then processed to manufacture herbal products but this procurement arrangement constitutes a very small part of the entire procurement of medicinal plants in the state.

In Kinnaur especially for collection and marketing of Neoza pine nuts/ Chilgoza, the right holders/ village councils collectively decide the area from where Chilgoza will be harvested and the area is given on auction to traders/ contractors. The price realised is distributed among the right holders. It is the responsibility of the trader/ contractor to collect the pine cones and harvest the nuts, arrange the transit pass from HPFD and transport the produce to Delhi for sale. The contractor usually engages labourers hired from outside the area.

### 4.8.3 Forest Based Industries in HP State

#### (1) Overview

The forest based industries of the state can be categorised as a) Pharmaceuticals using medicinal plants products, b) Rosin and turpentine oil processing units, c) Deodar oil extraction units, d) Cosmetics industries using natural plant products or derivatives, e) Katha processing units, f) Saw mills, and g) Furniture and other timber products industries. There are nearly 5,645 units<sup>64</sup> in the state dealing different forest products and 99% of them are saw mills, timber sales depots, fuel wood sales depots, joinery units and furniture shops. The HP State Forest Development Corporation Limited (HPSFDCL) runs two resin processing units at Bilaspur and Nahan and two wood based industries in Hamirpur and Shamsi, Kullu. Timber treatment units of the Corporation are there in Hamirpur and Baijnath. In addition to the Forest Based Industries, there are about 180 pharmaceutical units and herbal units in the state producing different herbal medicines, cosmetics and food products.

#### (2) Cedar Wood Oil Extraction Industries

There are 8 nos. of extraction units are registered with the state government to get the raw materials (deodar wood stumps) from the forest. These industries have agreements with the state government for accessing the deodar stumps against the payment of royalty, extraction cost and cost for planting of three trees against one stump. HPFD will extract the stump and supply them to these units as per the schedule decided by HPFD. The stumps will be supplied based on the availability in the respective forest division and there is no guarantee of steady supply of stumps to the industries. The agreement with these industries is renewed for ten years. Permission for setting up of new units is granted only if sufficient stumps are available in any forest division and there is no existing unit accessing stumps from the said division. The rate of royalty is determined based on the market price of cedar wood oil and based on the weighted average oil yield is calculated as 4.82%. The details of these units and their areas of operation for collection of cedar wood have been presented in **Table 4.8.7**.

**Table 4.8.7 Cedar Wood Oil Extraction Units in HP State**

No.	Name of the Industry/ Unit and Year of Establishment	Location	Forest Divisions Providing Cedar Stumps
1	Aum Aroma M/s Vinod Sangar (31/10/1996)	Ratti Industrial Area, Mandi	Jogindernagar, Mandi and Nachan
2	Valley Extraction M/s Krishan Raj (23/05/1997)	Baggi, Mandi	Mandi and Karsog
3	M/s Hill Top (19/06/2007)	Sanarali, Mandi	Mandi and Karsog
4	M/s Namiex Chemical (27/01/1995)	Lodhwan, Nurpur, Kangra	Chamba, Dalhousie and Churah
5	M/s Hari Industries (03/04/1980)	Baggi, Mandi	Sundarnagar and Karsog
6	M/s Mediroma Nirgalits	40, Industrial Area, Shamshi,	Kullu, Parvati and Seraj

<sup>64</sup><http://hp.gov.in/fims/> accessed on 10th Aug 2017.

No.	Name of the Industry/ Unit and Year of Establishment	Location	Forest Divisions Providing Cedar Stumps
	(24/11/1999)	Kullu	
7	M/s Aro Oils International (01/02/1995)	Tikkar, Rohru, Shimla	Rohru

Source: Notification of HPFD (No. FFE-B-F(7) 1/2017 dated 23 Feb 2017).

Note: Recently one more unit has been given permission to extract cedar wood oil in Ani forest division.

### (3) Rosin and Turpentine Factories

Resin from the pine trees is being tapped by HPSFDCL and the resin is supplied to two rosin and turpentine oil Factories at Nahan and Bilaspur managed by the State Forest Development Corporation. The installed capacity of factory at Nahan is 3,700 MT and the factory at Bilaspur is 7,400 MT of raw resin. These factories produce pale grade rosin, turpentine oil, phenyl, varnish, black Japan etc. During 2010-11 to 2014-15, the total volume of resin processed by both the units of the Corporation was 30,926 MT<sup>65</sup>, which is 56% of capacity utilisation of these units. There are number of privately run rosin factories in Hamirpur, Una and Solan and these industries source resin from private land. Some of the resin harvested from the private land also goes to rosin industries in Hosiarpur and other places in Punjab.

### (4) Katha Industries

Khair trees are available in Una, Hamirpur, Bilaspur and Kangra areas both in the forest as well as on the private land. Since there is a ban on green felling, khair trees are harvested only from the salvage operations by the Forest Corporation and auctioned to the registered processing units. There are 5 factories and 37 katha boilers in the state located in Solan, Sirmour, Una, Hamirpur and Kangra districts. All these processing units procure raw materials from HP (from HPSFDCL and Private Contractors registered with HPFD) as well as outside the state. All these units are able to procure raw materials and run in profit. **Table 4.8.8** presents the details of katha industries in the state.

**Table 4.8.8 Katha Industries in HP State**

Forest Division	No. of Katha Factories	No. of Katha Boilers	Installed capacity - MT	Products	Sourcing of Raw Materials
Una	1	25	11,375	Katha, Pan paste, kutch	HP, Gujrat, Maharashtra, Uttarakhand and other places
Rajgarh	1	0	2,500	Katha and Kutch	HP and outside the state
Nahan	1	0	3,600	Katha and Kutch	HP and outside the state
Paonta	1	0	4,800	Katha and Kutch	HP and outside the state
Nalagarh	1	2	1,650	Katha (liquid and dry) and Kutch (liquid and dry)	HP and outside the state
Hamirpur	0	2	750	Katha and Kutch	HP and outside the state
Dehra	0	2	750	Katha and Kutch	HP and outside the state
Nurpur	0	3	1,125	Katha and Kutch	HP and outside the state

<sup>65</sup> HP State Government (2016). Report of CAG of India on Public Sector Undertakings (Economic Sector) for the year ended 31st March 2015.

Forest Division	No. of Katha Factories	No. of Katha Boilers	Installed capacity - MT	Products	Sourcing of Raw Materials
Bilaspur	0	2	750	Katha and Kutch	HP and outside the state
Kunihar	0	1	375	Katha and Kutch	HP and outside the state
Total	5	37	27,675		

Source: Industry unit, HPPFD

#### 4.9 Farm Forestry, Social Forestry and Tree Planting Outside of Forest Area

Farm forestry activities were initiated in HP in 1980 with the launching of first externally aided project – Indo-German Dhauladhar Farm Forestry Project. The project was implemented in 100 villages of Kangra district during 1980-89 with the objective of developing forest resources, horticulture and animal husbandry in order to meet the demand of fuel, fodder and small timber of the local communities. 2,822 ha of plantations were raised, 532 ha of grasslands were treated, fuel efficient Dhauladhar chulla/cooking stove was introduced to reduce the dependency of local communities on the forest for fuel and fodder<sup>66</sup>. The World Bank assisted (IDA and USAID) National Social Forestry Project was implemented in 12 districts of the state during 1985-1993 to enhance the production of fuel, fodder and small timber. About 100,000 ha area was brought under social forestry activities through Village Development Committees (VDCs). The state government launched *Van Lagao Rozi Kamao Yojna* in 1991 – a scheme to green barren hills involving local communities as well as to create employment for them. The scheme intended to provide two ha Government land to each poor/BPL family to plant and protect trees. The scheme was challenged by GoI on legal grounds and finally it was discontinued in 1993<sup>67</sup>. Indo-German Changer Eco-development Project was implemented in 570 villages in Palampur sub-division of Kangra district from 1993 to 2006 in two phases<sup>68</sup>. This project replicated the experiments of Dhauladhar Farm Forestry Project with a number of improvements in approach and institutional arrangements. Efforts were also made to promote plantations on community and private land, and ensure protection of forest through community participation. The World Bank assisted Integrated Watershed Development Project was implemented in 835 villages from 5 districts in Shiwalik region of the state during 1991 to 2005. Among other things the Project activities included afforestation on community land and fodder development. After the closure of National Social Forestry Project (Umbrella Project), the state Government started number of schemes such as Sanjhi Van Yojana (1998 and further revamped in 2001 integrating other schemes) to promote plantations in forest and community land through community participation.

Although there is no exclusive farm forestry and social forestry project in the state, there are a number of projects and schemes that promote plantations on community and private land. HPPFD, on a regular basis, raises nurseries of different plant species for departmental plantations on the community land and for distribution of seedlings to people for planting on their own land. HPPFD,

<sup>66</sup> DEST (undated). State of Environment Report, Himachal Pradesh. Department of Environment, Science and Technology, Government of Himachal Pradesh, Shimla.

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

during 2008, launched a campaign called *Jan Jan Sanjeevani Van Aviyan* to create mass awareness for plantation and conservation of medicinal plants in the state. During Van Mahotsav 2008, efforts were made to distribute 0.956 million medicinal plants to people through their respective Gram Panchayats. Under National Bamboo Mission, bamboo plantations are created in forest and community land, and assistance is being provided to people for planting in private land. Projects of National Medicinal Plants Board promote plantation/cultivation of medicinal plants in the forest and private land.

Under JICA assisted SWAN River Integrated Watershed Management Project (2006-7 to 2016-17) afforestation activities were undertaken in 2,720 ha *Shamlat* Forests and 4,151 ha private land<sup>69</sup>. The Project formed and promoted 55 Plantation Protection Groups to protect the community plantations. Poplar plantations were undertaken in 257.13 ha area (205,307 no. plants) under agro-forestry. In Mid-Himalayan Watershed Management Project (Oct 2005 to March 2017), community plantations were raised on 1,857 ha and agro-forestry activities were undertaken in 716 ha area<sup>70</sup>. The Project promoted horticulture on homestead land and more than two million horticulture plants were distributed to the project beneficiaries.

The felling of trees on the private land is regulated under HP Land Preservation Act, 1978 (with amendments till April 2017). There is a well-defined system for granting of permission to the farmers/ person intending to fell trees from their own land. Online Tree Felling Permission system has been created to make it convenient for the people to apply for permission, and for the concerned officers of HPFD to verify and upload verification report and granting of permission. A clear timeline has been fixed as this service is covered under HP Pubic Service Guarantee Act, 2011. A person has to be provided with the permission within 15 days of receipt of application. There is no restriction on felling of 23 species (exempted species – **Table 4.9.1** from the private land) but the person has to apply online for a verification letter before felling, which has to be issued within seven days of receipt of application. The law mandates the person to plant three trees on his/her land against felling of one tree. Although ban oak (*quercus leucotrichophora*) is included in the list of exempted species but only five nos. of trees can be felled in a year for own use and there will not be any felling for commercial use.

**Table 4.9.1 Species on the Private Land Exempted from Tree Felling Permission**

No.	Local name	Botanical name
1	Kala Siris/Ohi/Siris	<i>Albizia</i>
2	Kachnar/Karial	<i>Bauhinia</i>
3	Safeda	<i>Eucalyptus</i>
4	Kimu/Chimu/Shahotoot/Tut/Mulbery	<i>Morus</i>
5	Poplar	<i>Populus deloidis</i>
6	Indian Willow/Bius	<i>Salix</i>
7	Bamboo culms/Lathi bans/Maggar/Dharainch/Bans	<i>Dendrocalamus hamiltonii/Bambusa nutans/Bambosa bamboo</i>
8	Japanese Shehtoot/Paper mulberry	<i>Broussounita papyrifera</i>
9	Paik/Koi/Kosh/Kunis/Kunish/Nyun	<i>Alnus nitida</i>
10	Khirk/Khadki	<i>Celtis australis, Celtis tetrendra</i>
11	Darak/Bakin	<i>Melia azedarach</i>
12	Fagoora/Phagoora/Tiamble/Timla/Tirmal /Anjiri/Cluster fig/Goolar	<i>Ficus</i>

<sup>69</sup> HPFD (2017). Presentation on Project Overview and Impact Assessment by Swan River Integrated Watershed Management Project Una, HP Forest Department, Shimla

<sup>70</sup> HPNRMS (2017). Status Report on HP Mid Himalayan Watershed Development Project, Solan.

No.	Local name	Botanical name
13	Toon	<i>Toona ciliata</i>
14	Jamun	<i>Syzygium cumuni</i>
15	Teak/Sagun/Sagwan	<i>Tectona grandis</i>
16	Arjun	<i>Terminalia arjuna</i>
17	Semal/Shalmaltas	<i>Bombex ceiba</i>
18	Bihul/Beul/Bhimal/Bhiunal/Dhaman	<i>Grewia</i>
19	Paza/Padam	<i>Prunus cerasus</i>
20	Kamla/Raini/Rohan/Rohini/Sinduri	<i>Mallotus philippensis</i>
21	Aam (wild variety)	<i>Magnifera indica</i>
22	Rishtek/Ritha/Dode	<i>Sapindus mukorossi</i>
23	Ban	<i>Quercus leucotrichophora</i>

Source: HPFD Department Order No. FFE-B-A (3)-1/2017 dated 20<sup>th</sup> April 2017.

The transit of forest products harvested from farm forests/ private land is regulated under the HP Forest Produce Transit (Land Routes) Rules 2013 and amended in April 2017. There is no requirement of transit pass for forest products from 24 plant species mentioned in **Table 4.9.2** harvested from the private land. The land owners are allowed to fell tree for their *bonafide* domestic and agricultural use but the number of trees to be felled has been specified in the rules (Annually three trees of coniferous species except chil and five trees of chil and others). The time for granting transit permit has been fixed under HP Public Service Guarantee Act, 2011 as 15 days from the day of receipt of application. In case of transit free species, a verification letter has to be issued by the range officer within seven days of receipt of application.

**Table 4.9.2 Exempted Plant Species for Transit pass**

#	Local name	Botanical name
1	Kala Siris/Ohi/Siris	<i>Albizia</i>
2	Kachnar/Karial	<i>Bauhinia</i>
3	Safeda	<i>Eucalyptus</i>
4	Kimu/Chimu/Shahoot/Tut/Mulbery	<i>Morus</i>
5	Poplar	<i>Populus deloiidis</i>
6	Indian Willow/Bius	<i>Salix</i>
7	Bamboo culms/Lathi bans/Maggar/Dharainch/Bans	<i>Dendrocalamus hamiltonii/Bambusa nutans/Bambosa bamboo</i>
8	Kuth	<i>Saussurea costus (=s. lappa)</i>
9	Kala Zira	<i>Bunium persicum</i>
10	Japanese Shehtoot/Paper mulberry	<i>Broussounita papyrifera</i>
11	Paik/Koi/Kosh/Kunis/Kunish/Nyun	<i>Alnus nitida</i>
12	Khirk/Khadki	<i>Celtis australis, Celtis tetrendra</i>
13	Darak/Bakin	<i>Melia azedarach</i>
14	Fagoora/Phagoora/Tiamble/Timla/Tirmal /Anjiri/Cluster fig/Goolar	<i>Ficus</i>
15	Toon	<i>Toona ciliata</i>
16	Jamun	<i>Syzygium cumuni</i>
17	Teak/sagun/Sagwan	<i>Tectona grandis</i>
18	Arjun	<i>Terminalia arjuna</i>
19	Semal/Shalmaltas	<i>Bombex ceiba</i>
20	Bihul/Beul/Bhimal/Bhiunal/Dhaman	<i>Grewia</i>
21	Paza/Padam	<i>Prunus cerasus</i>
22	Kamla/Raini/Rohan/Rohini/Sinduri	<i>Mallotus philippensis</i>
23	Aam (wild variety)	<i>Magnifera indica</i>
24	Rishtek/Ritha/Dode	<i>Sapindus mukorossi</i>

Source: HPFD Department Order No. FFE-B-A (3)-4/2016 dated 20<sup>th</sup> April 2017.

## 4.10 Livelihood Pattern

### (1) Overview

As reviewed in **Part I, Section 3.3**, the state has attained high level of education and advanced in economic development. Because of the diversity of opportunities and investments, there has been a significant reduction in the incidences of poverty in the state in last two decades (36.8% in 1993-94 to 8.5% in 2011 in the rural areas). Rural electrification and provision of LPGs also reached most of the households in even the remote areas of this state despite the challenging terrain. On the other hand, the majority of the rural households in the state still depend on fuelwood and fodder that are extracted from the forest areas and in this sense, all the households can be considered as forest users. In the case of nomadic communities/ semi-nomadic communities like *Gaddis* and *Gujjars*, wool, meat and skin of the sheeps and goats contribute significantly to the household income.

### (2) Means of Livelihoods

The India Human Development Survey 2004-05 reported that the household income structure for HP state as below. With high educational attainment in HP, the contribution of salary and other means of livelihoods to the household income is higher in HP in comparison to all India figure.

**Table 4.10.1 Proportion of Income by Source**

Unit: % share in the total income

State/ All India	Salary	Agricultural Wages	Non-Farm Wages	Family Business	Cultivation	Other
Himachal Pradesh	29	8	17	9	21	17
All India	22	18	19	14	20	8

Source: Extracted from Desai, Sonalde B. et. al. *India Human Development Report (2010)*, Oxford University Press. p. 27.

The livelihood activities include orchard, agriculture and wages/ salaries. According to the study on the livelihood patterns of three geographical regions of Northern High Hills, Low Hills and Valley/ Plains undertaken by the Department of Planning, HP, the states that the majority of households adopts the multiple livelihood strategies – farm sector activities as a main source of income supplemented by the non-farm based livelihood activities. The same report also revealed that only the limited number of households are engaged in the NTFP related activities to earn their livelihoods: 7% of the households in the Northern High Hills were engaged in the resin/ oil extraction and 9%, 8.5% in the low Hills and Valley/ Plains Regions respectively.

**Table 4.10.2 Means of Livelihoods in HP State**

Item	Northern High Hills	Low Hills	Valley/ Plains
Altitude/ climate/ geography	2,000m + Cold temperate to alpine Steep slope	1,000m – 2,000m Cold temperate to warm temperate Hills with gentle to steep slopes	1,000m > Warm temperate with pockets of subtropical Valley/ Plains
Districts	Chamba, Kullu, Mandi, Shimla	Chamba, Kangra, Kullu, Sirmaur, Solan	Bilaspur, Hamirpur, Kangra, Sirmaur, Solan,

Item	Northern High Hills	Low Hills	Valley/ Plains
			Una, Mandi
Main Sources of Income – Farm Sector	Cultivation Orchards (apple, plum, peach, apricot, pear, cherries and nuts) Livestock (dairy, wool, meat, skin)	Cultivation Orchards (apple, plum, peach, apricot, pear, cherries and nuts) Livestock (dairy, wool, meat, skin) Poultry	Cultivation Dairy Poultry
Source of Income – Non-Farm Sector	Wages Private jobs Government employment Hospitality Traditional skills based home industry – handloom, knitting	Wages Private jobs Government employment Hospitality Traditional skills based home industry – handloom, knitting	Wages Private jobs Government employment Hospitality
Issues	Limited areas for cultivation Long winter Low yield of milk – open grazing/ local breed Limited options for wage work (season/ terrain) Market linkages for handloom products	Market linkages for handloom products	Lack of access to irrigation Small land holdings

Source: *Pattern and Context of Rural Livelihoods in Himachal Pradesh*. Planning Department, Government of HP.

From the above table, the households in the higher altitudes appear to face many challenges in meeting their livelihood needs. However, one should also keep in mind that there are wealthy orchardists who could be residing in the urban areas while keeping the orchard in their native villages as the report suggests. Furthermore, one should also keep in mind that the large majority of farming population being female as shown in **Part I, section 3.5.5** and play a significant role in agriculture while bearing the domestic chores.

### (3) Emerging Opportunities for Livelihoods

The state's rich diversity of agro-ecological conditions, topographical and altitudinal variations has paved ways for a diversity of livelihood opportunities in agriculture, horticulture, forestry and biodiversity sectors.

In the last three-four decades, horticulture has emerged as a promising sector within the primary sectors of economy. More and more areas are brought under horticulture and vegetables. The area under horticulture has increased from 792 ha in 1950-51 to 226,799 ha in 2015-16. The production of fruits in 2015-16 was 0.929 million tons. The production of ancillary horticulture products such as mushrooms, honey, ginger, hops etc. has distinctly increased. There are around 85,000 farmers in the state involved in bee-keeping and the annual production has reached 1,600 tons. The ginger production in 2015-16 was 32,330 tons. The mushroom production has reached 8,906 tons in 2015-16. The vegetable production has increased from 25,000 tons in 1951-52 to 1.6 million tons in 2015-16. The production of vegetables and seed potato is higher than the total food grain production of the state. 62% of the total workers of the state are directly employed in agriculture and horticulture. The current trend is to bring more focus to enhancement area and



production in both horticulture and off-season vegetables.

In the last two decades, tourism has emerged as an important source of employment in specific pockets of the state – Shimla, Kullu and Kangra. The inflow of tourists has increased from 4.18 million in 1998 to 18.45 million in 2016 – an increase of 4.4 times in last two decades. While the share of agriculture and allied sector to the state’s economy was 9.4% in 2015-16, the share of tourism was 7%. Labour intensive tourism sector offers a diversity of employment opportunities to the people in both rural and urban areas.

On the other hand, in the context of fragile Himalayan ecosystem, the inflow of the bulk of tourists may negatively impact on the nature. While promoting hospitality industry, both the visitors and receiving ends need to be aware of the value of the nature, the mode of eco-tourism demands every visitor and stakeholder to act responsibly and avoid the harmful damages to the nature. HPFD has developed the Revised Policy on Development of Eco-Tourism in Himachal Pradesh (2005) and implements the policy through its Eco-Tourism Society of Himachal Pradesh, an autonomous society established by HPFD towards promotion of eco -tourism. The policy aims at developing HP as a prime eco-tourism destination in India by 2010 through capacity development of the stakeholders, PPP and CBET. Especially in the remote areas in the state, CBET would be relevant which would help the community earn from the hospitality based livelihood activities while the visitors would learn about and act responsibly to nature.

Further investigations were conducted on livelihood pattern and challenges faced in the proposed/ prioritised project areas and reported in **Part II, Chapter 2**.

#### **4.11 On-Going Government/ Donor Interventions for Livelihood Improvements**

##### **4.11.1 Government Livelihood Improvement related Programmes/ Schemes**

HP has made a significant improvement in people’s economic conditions and now the poverty head count ratio of the rural population in the state has reduced to 8.5%<sup>71</sup>. With the high literacy rates and educational achievements amongst men and women, the state is now promoting employment in secondary and tertiary sectors from primary sector and thus, emphasising more on preparing educated youths for the employment in the respective sectors through vocational/ skills training. Asian Development Bank assisted project has commenced in 2015 for this purpose (875,000 USD). On the other hand, agriculture still remains as an important sub-sector in the state’s economy and several centrally/ state funded programmes/ schemes for agriculture development are implemented. Upgrading handloom and handicraft sector is also one of the area that the state government is focusing on. Out of SC/ ST sub-plan, 850,000 INR and 10 million INR respectively were allocated for the establishment of the training centre by HP State Handloom and Handicraft Development Corporation. **Table 4.11.1** provides outlines of such programmes/ schemes. Relevant organisations/ institutions for livelihood interventions are listed in **Attachment I.4.11.1**.

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<sup>71</sup> Source: Bordia Das, Maitrey and et. al. (2015). *Scaling the Heights*. World Bank. Washington, D.C.

**Table 4.11.1 Recent Livelihood Improvement Related Programme/ Schemes Implemented by the Government and Other Relevant Agencies**

Concerned Department/ Agencies	Funding	Area	Outline
Rural Development Department	Central	Skills Development of Youth	Aajeevika Skills: skills and training and assisting placement of the youths from rural poor families in the formal sector. Training of Youth: 15,000 youths to be trained between 2016-19. The minimum of 75% of the trained rural poor youth will be given wage employment in the trades in agriculture, health care automobile, electronics, handlooms, domestic electricians, retail garments & apparel hospitality, constructions, food processing, ICT, and travel and tourism sectors (in pipeline).
		Watershed Development	Integrated Watershed Development Programme/ Drought Prone Area Programme/ Desert Development Programme/ Integrated Watershed Management Programme: To develop wasteland/ degraded lands, drought prone and desert areas.
		Rural Employment	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS): 100 days of wage employment through manual labour is guaranteed for a household. In the state, 1.2 million job cards are issued with 2.24 million workers. Out of which, 710,000 job cards with 984,000 workers (26.83% are SC and 6.89% are ST) are active. Women accounts for 60.55% of the active work force under MGNREGS (FY 2017-18) till date. The average employment days provided per household are around 60 days in a year. <sup>72</sup>
National Rural Livelihood Mission	Central	Financial Security	Women SHG formation Capacity building and institution building Interest subsidy
National Bank for Agriculture and Rural Development	Central	Dairy	Dairy Entrepreneurship Development Scheme: financial assistance for establishing small dairy units, rearing of heifer calves, vermi compost with milk animal units, purchasing of milking machines/bulk milk cooling units, purchasing of dairy processing equipment, establishment of transportation facilities, cold storage facilities, establishment of private veterinary clinics, establishment of dairy marketing outlet, dairy parlour <sup>73</sup> .
	NABARD	Non-farm sector	<i>Swarojgar</i> Credit Card Scheme: assisting rural artisans and other small entrepreneurs by extending credit for working capital/ block capital. Assisting skills/ entrepreneurship development among rural youth

Source: Economic Survey (2016-17), Government of HP. Otherwise noted.

#### 4.11.2 Programmes and Schemes for ST/ SC

##### (1) Programmes and Schemes for STs

As the tribal populations are mostly concentrated in the Fifth Scheduled areas with some pockets in the other parts of the state, the tribal sub-plan is designed and implemented on the basis of geographical areas. Interventions for the dispersed ST populations are also available. The characteristics for the programmes and schemes for STs are given as below.

*Scheduled Tribes in Scheduled Areas:* As per the Fifth Schedule of the Constitution of India, the following districts have been declared as Scheduled Areas, district of Kinnaur, Lahaul & Spiti, and two sub-division of district Chamba viz. Pangi and Bharmour, as majority of the population comprises of communities declared as Scheduled Tribe. These tribal areas are extremely remote

<sup>72</sup> Source: MGNREGS at a Glance ([http://mnregaweb4.nic.in/netnrega/all\\_lvl\\_details\\_dashboard\\_new.aspx](http://mnregaweb4.nic.in/netnrega/all_lvl_details_dashboard_new.aspx) accessed on 8th August 2017)

<sup>73</sup> <http://dahd.nic.in/sites/default/files/Administrative%20Approval%20of%20Central%20Sector%20Scheme-Dairy%20Entrepreneurship%20Development%20Scheme%20for%202016-17.pdf> accessed on 8th August 2017

and inaccessible with tough mountainous terrain and inhospitable climatic conditions. Out of the total geographical area of HP (55,673 km<sup>2</sup>), 23,655 km<sup>2</sup> area falls in the Scheduled Area, which constitutes 42.49% of the total area. The total population inhabiting the Scheduled Area is 173,661, of which 123,585 constitute tribal population, which is 71.16% of the total and density of population in these areas is merely 7 persons per km<sup>2</sup>. In other work, out of the total ST population, 31.52% is residing in the Scheduled Areas.

*Modified Area Development Approach (MADA):* During the Sixth Five Year Plan the ambit of the Tribal Sub-Plan was expanded and the Modified Area Development Approach (MADA) was adopted to cover smaller areas of tribal concentration having a population of 10,000 souls in contiguous areas, in which 50% or more were tribal. In HP, two such pockets, namely, blocks of Chamba and Bhatiyat in the district Chamba were identified in 1981-82. These two pockets cover an area of 881.47 km<sup>2</sup> and the ST population, as per 2011 Census, reported 29,455 persons i.e., 7.51% of the total ST population in the state.

*Dispersed Tribes Population:* Till February, 1987 Special Central Assistance (SCA) to Tribal Sub Plan (TSP) Strategy was in vogue in the Scheduled Areas and Modified Area Development Approach only. However, during the Seventh Five Year Plan the strategy of Special Central Assistance to Tribal Sub-Plan was further extended to cover all tribal populations living outside the Scheduled Area and MADA pockets. Thus, a population of 239,086 (60.97%) belonging to Scheduled Tribes is residing in Non-Tribal areas of the state.

The term "Scheduled Tribes" first appeared in the Article 366 (25) of the Constitution of India, which defined scheduled tribes as "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this constitution".

Generally, STs could have indications of primitive traits, distinctive culture, geographical isolation, limited contacts with the non-tribal communities at large, and delayed socio-economical development. This criterion is not spelt out in the Constitution but has become well established. It subsumes the definitions contained in 1931 Census, the reports of first Backward Classes Commission 1955; the Advisory Committee (Kalelkar), on Revision of SC/ST lists (Lokur Committee), The Government of India has notified 8 tribal groups of HP as STs (The Constitution (Scheduled Tribes) Order 1950 (C.O.22), dated 6-9-1950).

There is no clear evidence on the origins of the STs of HP; it is believed that some of the tribals of HP had migrated from the plains of Punjab, Rajasthan and even as far as Gujarat, while a few are believed to have migrated from Tibet, and other due to Aryan influence. Thus, their early history remains a mystery. The main tribes living in the state include: (i) Gaddi, (ii) Gujjar, (iii) Kinnar/Kinnaura, (iv) Lahaula, and (v) Pangwala. Other tribes, such as Lanba, Khampa and Jads, although in smaller proportions, also live in HP.

The tribes of HP live in the most inaccessible places, mountains and jungles, in the districts of Chamba, Kinnaur, Kangra, Mandi, Bilaspur, Mahasu, Sirmaur and Lahaul-Spiti. They are in

minority in some districts, such as Mandi, Sirmaur and Bilaspur, whereas they are in majority in the districts of Chamba, Kinnaur and Lahaul & Spiti.

## (2) SC Sub-Plan

Since SC population is scattered, need based approach was adopted. The fund under the SC sub-plan is allocated to each district according to the parameters. 25.19% of the state plan is kept for SC sub-plan and used to generate more income and employment for the SC families. In 2016-17, 13 billion INR was spent for the welfare of the SC communities. The planning of SC sub-plan is done at the District Level Review & Implementation Committee. 14.4 billion INR was proposed for 2017-18.

### **4.11.3 Community Level Institutions Relevant for Livelihood Improvement**

#### (1) Community Level Institutions Devised Externally Aided Projects

For the implementation of livelihood improvement activities, various forms of community level institutions were organised or mobilised by different projects and scheme under HPFD in the past and present. In this section, an attempt was made to review such units created under various projects/ schemes for implementation of the livelihood activities.

##### i. HP Forest Project (1994-2001), DfID

The earlier focus was the participatory forest management initiated by DFID funded HP Forest Project (1994-2001). HPFP started as pilot project in Kullu and Mandi and formed 155 Village Forest Development Committees (VFDCs) registered by DFO. As far as livelihood aspects are concerned, the project felt the lack of alternatives to compensate income loss when wage employment stopped. There was no specific livelihood introduced particularly in the phase I of HPFP.

##### ii. Indo-German Eco-Development Project (IGCP), GTZ

GTZ funded Indo-German Eco-Development Project (IGCP) started in 1994 developed 360 Village Development Committees (VDCs) which ensured 40% of female participation and the involvement of weaker section of the society. The Project promoted income-generating activities for women through the formation of Women's Production Groups (WPGs) by making use of forest products. Samridhi Mahila Cooperative (SMC), an agro-business consortium, was formed as a federation of WPGs in 1996 with the support of IGCP. The SMC has grown into a sizable consortium for processing and selling pickles, chutneys and candles wider in the country. The concept of VDC was also adopted by Integrated Watershed Development Project (IWDP) funded by the World Bank (1993-2005). The project empowered the community by organising them into VDCs, SHGs and User Groups for the implementation of micro plans at the Panchayat level. The project also facilitated linkages for the SHGs with NABARD and other banks to avail loans.

iii. Mid-Himalayan Watershed Development Project, World Bank

Mid-Himalayan Watershed Development Project (MHWIDP) was launched in 2005 in succession to the IWDP. One of the key features of the Project is the proactive involvement of the Gram Panchayat (GP) in the implementation and management of the project. As of May 2017, there are 2,852 SHGs, 5,613 Users Groups (UGs) and 4,140 Common Interest Groups (CIGs) were established/ strengthened in MHWDP GPs and 246 SHGs, 1,364 UGs and 1,827 CIGs were established /strengthened in Additional Financing GPs. Although the result of final evaluation was yet to be reported, **Table 4.11.2** summarises some of the key observations on GP as the project implementation agency during the mid-term impact assessment.

**Table 4.11.2 Key Observation on Institutional Set-up of GP during Mid-term Assessment**

Advantages	Disadvantages
<p>The meeting for the project was held along with the panchayat meetings which were held regularly. The members were informed in advance and the agenda is read out in the meeting.</p> <p>Women, BPL, other marginalised people also attend the meeting regularly.</p> <p>Participatory monitoring and social auditing process of the Project promoted transparency and accountability in the working of panchayat.</p>	<p>GPs are overburdened due to work of other development oriented schemes and limited time for project related activities.</p> <p>Panchayat functionaries being “elected representative” are not accountable to the project personnel and it was difficult to keep them focused towards project related work.</p> <p>Panchayat may face less sustainability as their functionaries may keep changing after every election.</p>

Source: Winrock International India “Mid Term Impact Assessment of MHWDP”

The result above indicates that the project operation by GP has both pros and cons. While the project took advantage of the GP as a regular platform to meet the people and to discuss the issues about the project with wider participation, it did not always function as expected that the GPs were concerned with many issues other than the project.

For MHWIDP, User Groups were formed for implementing watershed development sub-projects such as water harvesting and irrigation. SHGs are either newly formed or strengthened by the Project for basic saving, inter-loaning and bank credit activities. SHGs developed further to undertake IGA activities formed CIGs. Activities of CIGs include crop based activities, goat raising, poultry, handloom, knitting etc. While the SHGs were formed by only women, the CIGs, particularly agriculture based IGA groups included some male members. Watershed Participatory Development Facilitator (WPDF) takes the key roles in facilitating and aiding the GPs and community groups for planning and implementation of micro plans. For the exit strategy, the project team adopt the cluster approach leading it up to the federation level. However, at present, only the top performing participants are selected to form an operational cluster who work as a communication and coordination link between the various SHGs and CIGs.

iv. Swan River Integrated Watershed Management, JICA

Swan River Integrated Watershed Management (Swan River IWM) Project in Una district is a JICA funded project implemented between March 2006 and March 2017. Similar to MHWIDP, Gram Panchayat was fully involved in the execution of the micro-plans through Panchayat Development Committees (PCDs). Under 96 PCDs, total 427 Women SHGs, 206 other SHGs and 238 User Groups were organised and mobilised to undertake income generating and

watershed management activities. At the termination of the Project, the 427 women SHGs formed under the project were federated to promote their income generation activities further by providing a linkage with microcredit, collective procurement, marketing of their products and distribution of household articles. Thus, SWAN Women Federation (SWF) was established and registered under the Society's Act in 2014 as an umbrella organisation for over 8,000 rural women in Una district while the SWAN Women Multipurpose Cooperative Society (SWMCS) was registered under the Cooperative Society Act in 2015 to extend its power to extend micro-finance services to their member SHGs. The profiles of SWF and SWMCS are summarised in the **Table 4.11.3**. Within a short span of operation, in less than two years, the SWMCS achieved an annual turnover of 1,400,000 INR (undistributed) and 3,000,000 INR in earnings. Profits accrued from the SWMCS enables the SWF to provide the livelihood and social services with its members often based on their requests. The SWS and SWMCS are often highlighted to be the successful representations to ensure post project sustainability, it was also observed that there were some gaps in its efficient functioning.

**Table 4.11.3 Swan Women Federation and Cooperatives**

	<b>SWAN Women Federation (SWF)</b>	<b>SWAN Women Multipurpose Cooperative (SWC)</b>
Registration	Under Society's Act, March 2014	Under Cooperative Societies Act, Nov 2015
Objectives	To provide a forum for networking and social services for the members of SHGs and MKM (cluster of SHGs)	To provide financial services (saving and credit) to the groups and individual mainly from SWF and individual
Programmes/ Services	Awareness (health camp, gender, cleanliness, road safety, domestic violence) Livelihoods (production, value added, marketing) Procurement (kitchen utensils, blanket) Charity (CSR by private companies) Turmeric group	Group/individual saving and recurring deposit (RD) 8% annum – interest on the deposit (bank rate is 6%) Group/individual loan 9.4%/year, repayment in installment max. 1 year, loan amount is 1.5 times of the group deposit. loan is mostly taken by group (for collateral) and given to individual members. Indiv. loan is available. Total 267 loans are taken from the SHGs (2 loans/day) Financial transactions (remittance)
Support from the SWAN project	Formation of SHGs and operation Salary of the staff (during the project period) Machineries for Turmeric processing	Salary of staff during the project but now it is paid by the cooperative/federation
Governing Body	President and 10 directors (director of each 10 MKMs represent in SWF and Chairperson, Vice-Chair, Secretary, Treasurer were elected by members)	President and 10 directors from SWF 10 Promoter Directors (invested 200,000 INR each in Cooperative at the beginning) CEO (DFO of Una forest division)
Paid staff	15 staff and 20 motivators at village level (staffs work for Both Federation and Cooperative. Their salary is paid by Federation, Cooperative and the spice unit.	
Membership	More than 8,000 women including 460 SHGs in 75 Gram Panchayat	Account Holders: 460 Groups and 390 individuals (saving) 3 categories of membership: AASHA (Hope) – For poor /landless, JAGRITI (Awareness) – Field and Farming, EKTA (Unity) – Money to Invest
Financial Management	Membership fee: 100 INR/year (Currently 3,500,000 INR in account) Federation is slightly at loss due to newly started Turmeric activities.	An annual turnover of 1,400,000 INR (undistributed) and 3,000,000 INR in earnings. Profits accrued from the SWMCS enables the SWF to provide the livelihood and social services with its members often based on their requests.

	<b>SWAN Women Federation (SWF)</b>	<b>SWAN Women Multipurpose Cooperative (SWC)</b>
Voices of the members	Good reason to come out of the house	Cooperative Loan amount is larger and the interest rate is lower.
Capacity building	The members were given brief information about the operational aspect of the project, with on the job learning about the nuances of financial dealings. Secretary was the only member with a Postgraduate degree, hence was selected to manage day-to-day operational activities.	
Challenges	It is not every sure the services available by Federation is reaching the very bottom of its structure, i.e., the members of SHGs provided that most of the activities are done on demand basis.	Existing capacity of the SWMCS is low to take benefits from various central schemes designed around micro finance and financial inclusion targeted through cooperative model.
Future Prospect	Undertake more procurement works for women especially on agriculture Marketing of spices products wider in HP	Up-graded to a non-bank finance company to undertake more financial activities with simple procedure. Involvement in other development projects to support developing the microfinance institution such as SWMCS.

Source: JICA Study Team (2017)

v. Great Himalayan National Park Forest Research and Education Project, World Bank

Another type of forest institute, Village Eco-Development Committees (VEDC) were formed under the GHNP Forest Research and Education Project (FREEP) by each micro-watershed to implement livelihood and conservation micro plan. VEDCs turned out defunct at the termination of the FREEP unable to reflect the common interests of the members. However, GHNP managed to organise poor women of natural resource dependent households into Women Saving and Credit Groups (WSCGs) to undertake microcredit and IGA activities among member women. WSCGs later federated Village Forest Development Society (VFDS) at panchayat level. Further, the WSCGs and their group organisers organised themselves as an NGO called SAHARA to extend mass support to biodiversity conservation. The project demonstrated that small scale initiatives of WSCGs in post project contributed to the forest management conservation as well as to improve livelihoods.

## (2) Government Projects/ Programmes

### i. Sahini Van Yojana, HPFD

In 1998, HP Government commenced state-funded scheme for the entire state called Sanjhi Van Yojana (SVY) and nearly 360 VFDSs has been created and registered by Societies Registration Act 1860. VFDSs had better legal standing than JFMC or VFDC registered by DFO. Compared to pervious similar inistutions, VFDS members were given 100% usufruct right for NTFPs and other intermediate harvests. However, it did not attract people in some parts in the state as they already enjoying most non-timber and user-rights in the forests. SVY has mobilised community level institutions such as Mahila Mandal, schools, user groups, and other CBOs and NGOs for forest based IGA activities.

ii. National Afforestation Programme

National Afforestation Programme (NAP) supports the two-tier forest institutional structure of Forest Development Agencies (FDAs) at Forest Division level and VFDCs at Gram Sabha which allow greater participation of the community, both in planning and implementation to improve forest and livelihoods of people around the forest areas. Under the NAP total 1,567 JFMCs/VFDCs were formed. Other than forest related provisions, NAP also provides entry point activities in which community assets are created with a 'care and share' concept.

(3) Other Existing Community Level Institutions

Mahila Mandal and Yuvak Mandals/ Youth Clubs are found functional in the state. As seen in **Table 4.11.4**, Mahila Mandals are engaged in various community development activities as well as forestry activities.

**Table 4.11.4 Mahila Mandals and Yuvak Mandals**

Institution	Level	Members	Activities
Mahila Mandals	Village or Cluster of Villages  Formalised Institutional Structure registered under Society's Registration Act	All Women between age 18-45 years  Usually 15-20 members with a Chairwoman and Secretary	Anganwari Swachh Bharat Abiyan (Clean India Mission) Literacy Campaigns and Training Women and Child development (Awareness and Nutrition) Family Planning Programmes Legal and Social Awareness Social Forestry (afforestation and rehabilitation of degraded land) Small Savings Small IGA – food processing and Diary
Yuvak/Yuva Mandals / Youth Clubs	Gram Panchayat and Block Level  Registered under the Society's Registration Act at Block Level	Youth (educated) between 13-35 years  Mandatory 30% women members	Social avenue for personal and village level problems and solutions Youth education and employment/entrepreneurship Leadership Development Camps Skill Development Camps Sports, Art & Culture, Theatre Health and Population Issues Drug Abuse and Alcoholism Awareness Gender Sensitisation Monetary Award for Best Youth Club at District Level

Source: JICA Study Team (2017)

(4) Cooperatives

Cooperatives are another popular vehicle for livelihood related activities in the state and are the registered body with the Co-operation Department of HP as per the Himachal Pradesh Co-operative Societies Act 1968 with amendment up to 14<sup>th</sup> July 2015. The Primary Agriculture Credit Societies (PACS) are very popular in the state accounting nearly 50% of the total number of registered cooperatives. Cooperatives are formed for different purposes other than agriculture credit which include livestock and dairy, weavers and for credits. The number of cooperatives registered in the state is given in **Table 4.11.5**.



**Table 4.11.5 Number of Cooperatives in HP State**

Unit: Nos

District	Primary Agriculture Credit Societies (PACS)	Primary Non-Agricultural Credit Cooperative Societies	Livestock and Milk Supply Cooperative Societies	Weavers Cooperative	Total No of the Cooperatives other than PACS	Cooperatives in Dissolution	Total
Kinnaur	35	3	0	17	87	8	95
Shimla	168	111	13	10	634	54	688
Solan	156	95	16	6	391	19	410
Sirmaur	119	40	48	4	302	13	315
Bilaspur	73	19	16	10	214	6	220
Mandi	221	23	101	50	578	14	592
Kullu	126	15	98	205	609	12	621
Lahaul-Spiti	52	2	6	27	129	3	132
Una	218	25	22	1	369	8	377
Hamirpur	222	27	21	2	341	23	364
Kangra	600	63	20	38	994	14	1,008
Chamba	129	15	9	16	242	5	247
Total	2,119	438	370	386	4,890	179	5,069

Source: Compiled by JICA Study Team (2017). Based on Department of Cooperatives, Annual Administration Report, 2015-16 (translated from Hindi Document)

#### 4.11.4 Microfinance and Financial Inclusion through Self-Help Groups

##### (1) National Rural Livelihood Mission (NRLM)

NRLM was launched in June 2011 as a restructured successor to the Swarnajayanti Gram Swarajgar Yojana (SGSY), under the Ministry of Rural Development, Government of India. It aims to reduce poverty by enabling the poor household to access gainful self-employment and skilled wage employment opportunity resulting in a sustainable livelihood. The HP State Rural Livelihood Mission (HPSRLM), a HP society, was established in April 2013 to spearhead and supervise the implementation of NRLM in the state. HPSRLM launched with the strategy of selecting one “Intensive Blocks” in each district in the state. At present, Haroli block in Una district, and Basantpur block in Shimla district are only two intensive blocks established in the state. The mission now covers one development block in each of the 12 districts in the state. The Mission is expected to gradually spread out to all 78 blocks in 12 districts including “non-intensive blocks” by the end of 2020-21. The criteria and the provisions for intensive and non-intensive blocks are described in the **Table 4.11.6** below.

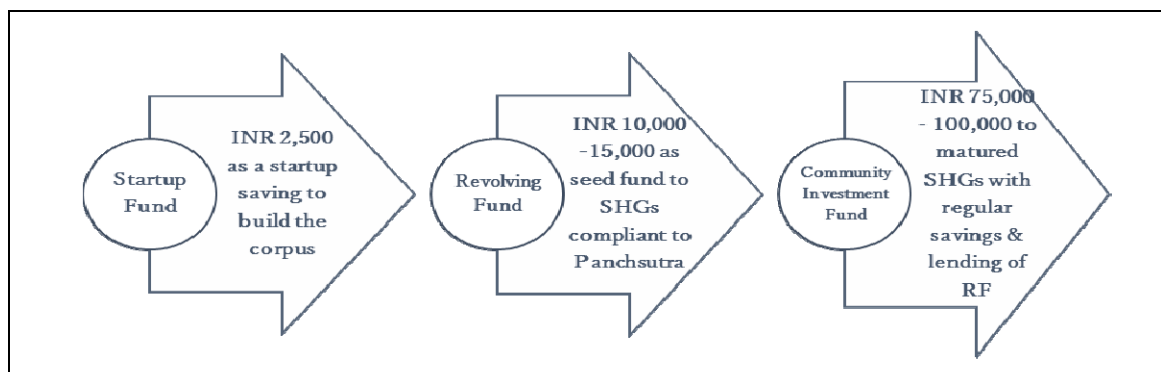
**Table 4.11.6 Criteria and Provision for Intensive Blocks**

Criteria for Intensive Blocks	Key Provisions for Intensive Blocks
Requires urgent and utmost attention on socio economic parameters Existing Social Capital (including institutions for poor other than SHGs and their federations) Existing Best Practices for upscaling	Create a baseline for the mission Institution and capacity building Intensive social mobilisation through CRPS Formation of Federations of new and existing groups
Key Provisions for Non-Intensive Blocks	Financing Mechanisms – Revolving Fund (RF) and Community Investment Fund (CIF) Microcredit Plan by SHGs for Livelihood, Food Security, Education and Health Interest Subvention for bank linkage Setting up of DMMU, BMMU Formation of livelihood collectives and producer groups Creation of Resource Blocks for ICRP development Intensive training of CRPs on SHG/Federation management
Capacity Building of DRDAs, blocks, and other stakeholders Social mobilisation and community development Institutions for Poor including SHG formation Training of existing SHGs to form federation under intensive mode Training of Active Women through ICRPs from Intensive Blocks Skill Development on entrepreneurship and enterprise formation Identification and upscaling of best practices	

Source: Himachal Pradesh Rural Livelihood Mission

i. Financial Assistance to SHGs under NRLM

Implementation of NRLM in HP builds on the existing network of SHGs to move towards formation of bigger community level organisation with financial empowerment. NRLM’s prescribed model works from SHG formation at village level, Village Organisation (VO), Cluster or Block Level Federation. Interest Subvention (IS), Start-up Fund, Revolving Fund (RF), Community Investment Fund (CIF), and Vulnerability Reduction Fund (VRF) are extended to compliant SHGs across the State as shown in the **Figure 4.11.1**. **Table 4.11.7** explains the progresses of SHG formation and linking them with the NRLM funds as of June 2017.



Source: Himachal Pradesh Rural Livelihood Mission

**Figure 4.11.1 Financial Assistance to SHG under NRLM**

**Table 4.11.7 Intensive Blocks and their Progress of SHG Formation and Disbursement of RF and CIF, June 2017**

No.	District	Block (intensive)	No. of SHG	SHG with RF	No. VO	No. CIF
1	Bilaspur	Gumarwin	213	109	3	0
2	Chamba	Tissa	286	48	2	0
3	Hamirpur	Bhoranj	282	44	0	0
4	Kangra	Nurpur	311	157	8	17
5	Kinnaur	Nichar	83	16	0	0
6	Kullu	Kullu	216	40	0	0
7	Lahul & Spiti	Lahaul at Keylong	74	33	0	0
8	Mandi	Mandi Sadar	667	238	44	59
9	Shimla	Basantpur	313	205	17	31
10	Sirmaur	Ponta Sahib	305	72	1	0
11	Solan	Kandaghat	403	118	23	25
12	Una	Haroli	485	222	29	44
	TOTAL	-	3,638	1302	127	176

Source: MIS-NRLM on line

Success of NRLM is highly dependent on support from field level staff – community cadre, selected from the target community. These individuals are selected as book keeper, active women, leaders, volunteers, Community Resource Persons (CRPs), trainers, facilitators at the SHG, CLF, BLF level. In HP, there are 204 cadres, 47 master trainers, 168 institutions building and capacity building cadre. At community level, active women identified are trained on a pre-defined training framework undertaking a 15-days one-on-one interaction with CRPs from other states, followed by eight days training at Himachal Pradesh Institute of Public Administration (HIPA), and finally ten days intensive course at a National Resource Organisation (NRO) or a Capacity Building Agency (CBA). Active women eventually graduate to become a CRP either at the SHG / Village Organisation/ CLF level. In HP, where average education level of women is higher than other states, the chances of being CRPs are also higher.

Detailed explanation and analysis of NRLM is available in **Attachment I.4.11.2.**

## (2) National Bank for Agriculture and Rural Development (NABARD)

### i. SHG-Bank Linkage Programme (SHG-BLP)

NABARD remains the nodal agency to spearhead access to finance for the unbanked and under-banked rural population through its participative developmental programmes. In HP state, NABARD is present in all 12 districts to propagate and facilitate the formation of SHGs and their linkages to the banking system. The social collateral based savings and credit linkages mechanism is supported by ground level SHG Promoting Institutions (SHPI) such as NGOs, Regional Rural Banks (RRBs), Farmers' Clubs, Individual Rural Volunteers and so forth. All rural villages and small towns with population less than 50,000 are covered under the schemes in all 12 districts.

As on March 2017, 45,735 SHGs have been savings linked with commercial, cooperative, and regional rural banks with a total savings of 506.175 million INR. However, the penetration of bank credit remains low with only 8.12% of SHGs availing bank credit during 2016-17,

representing 3,715 SHGs with INR 501.441 million of loan amount. As on March 2016, total of 56,600 SHGs were reported to be credit linked under the bank linkages scheme.

Bank linkages is the first step toward bringing the SHG into the mainstream banking system, the end agenda is to empower these groups to take up sustainable livelihood opportunities and to give them a fair stand in the society at large. NABARD enables the handholding approach to SHG development by sponsoring and supporting various training programmes from basic group management skills to advanced modules on individual's entrepreneurial skills. **Table 4.11.8** gives a brief overview of skill development trainings facilitating members of matured SHGs that have availed credit facilities under the programme.

**Table 4.11.8 Capacity Building for IGA by NABARD**

Programme	Activities	Progress as of Today
Microenterprise Development Programme (MEDPs)	Short-term training course 5-13 days for producer's specific to the product. Cover intensive training and hand holding on market understanding and potential assessment, development of entrepreneurial skills to manage their enterprise.	15 programmes were organised and 440 SHG members were trained for IGA in 2016/2017
Livelihood Enterprise Development Programme (LEDPs)	One year intensive training on skill building, refresher workshops, backward-forward supply chain linkages, and escort support. Provide end to end solution to SHG members on project basis covering 15-30 SHGs in a cluster of villages. Currently, this approach is in its nascent stage and being tested as a pilot intervention	240 SHGs trained in 2016/17

Source: Economic Survey 2016-17, Economics and Statistics Department, HP

ii. Other Main Schemes for SHGs and NABARD

Other key interventions relevant for the Project's reference are described in **Table 4.11.9**.

**Table 4.11.9 Key Interventions of NABARD**

Scheme/ Programme	Stakeholder	Focus	Status	Project Relevance
Eshakti - Digitisation of SHG Programme	SHG	<ul style="list-style-type: none"> <li>- SHG Mapping (bank wise, branch wise) -Android-based data capture by Animators and Leaders</li> <li>- Informed Credit Decisions- visibility on SHG capacity</li> <li>- Easy loan process for SHGs</li> </ul>	Launched as pilot study in Mandi district	<ul style="list-style-type: none"> <li>- Digitised records to help identify matured SHGs fit for IGAs (in Mandi district)</li> <li>- Synergies from established SHG bank credit linkages</li> </ul>
Banking Refinance	RRBs/Coops	100 per cent refinance to Banks in lieu of banking services through SHG-BLP	On-going Support	<ul style="list-style-type: none"> <li>- Refinancing support for IGA loan to SHG</li> </ul>
Grant Support Assistance and Capacity Building	SHPIs	<ul style="list-style-type: none"> <li>- Support to carryout ground level activities for SHG promotion, formation, and bank linkages</li> <li>- Training and capacity building through workshops, seminars, exposure visits</li> </ul>	Grant Support as on March 2017 <ul style="list-style-type: none"> <li>- 43 NGOS with INR 5.9m</li> <li>- 1 RRB with INR 0.2m</li> </ul> Capacity Building: 54,900	<ul style="list-style-type: none"> <li>- Empowered SHPIs to help in mobilising in case of NABARD driven project areas</li> </ul>
Interest Subvention	NRLM	Interest Subvention in Category I and II districts	NA	<ul style="list-style-type: none"> <li>- Complaint SHGs to take IGA and Bank credit at reduced interest</li> </ul>
Joint Liability Groups	Community	<ul style="list-style-type: none"> <li>- Credit to group of 4-10 for similar economic activities without collateral</li> <li>- Small/marginal farmers, tenant/landless farmers, oral lessees, sharecroppers, and micro entrepreneurs</li> <li>- Two Models of Credit - to individual members on group's guarantee; or directly to JLG</li> <li>- Supported to JLPs: grant assistance and training</li> </ul>	As on March 2017, <ul style="list-style-type: none"> <li>- INR 392m to 3,692 JLGs</li> <li>- INR 4m grant</li> <li>- Capacity Building: 1,417</li> </ul>	JLG also covers micro entrepreneurs (4 -10 people) hence this set-up might be useful in remote regions of Chamba and Lahaul & Spiti with dispersed population
Kisan Credit Card Scheme (KCC)	Farmers	<ul style="list-style-type: none"> <li>- Farm credit for agriculture and allied services</li> <li>- Individual/joint farmer; tenants, oral lessees, SHG/JLG</li> <li>- Issued as RuPay Cards/ATM Cards</li> <li>- Limit in accordance to Scale of Finance (fixed finance for crop cultivation per ha)</li> <li>- Loans at 7%/annum max for INR 300,000</li> </ul>	As on March 2017, <ul style="list-style-type: none"> <li>- INR 95.89 bn to 806,639 farmers</li> <li>- In FY 2016-17, INR 19.28 bn to 130,3254 farmers</li> </ul>	Support to main agricultural activities translated in secured family income, thus more chances of IGAs in SHGs

Source: JICA Study Team (2017)

iii. NABARD and Financial Inclusion

Within the scope of Financial Inclusion Fund (FIF), NABARD supports Financial Inclusion & Literacy Centers, running of Business and Skill Development Centers including Rural Self Employment Training Institute (RSETI), and IT interventions in enabling digitisation of banks on Core Banking Solution network. The benefits of Financial Inclusion Fund (FIF) through banks are extended to support NGOs, SHGs, Farmers' Club, Cooperatives, Panchayats, Rural Multipurpose Kiosks and more. In HP, NABARD is supporting installation of solar powered connectivity using small terminals called VSAT in sub-service areas (SSA) to ensure uninterrupted access to financial services in the rural and remote branches.

In 2016-17, NABARD sanctioned 128,713,000 INR to banks and NGOs as financial literacy support and strengthening of banking infrastructure in the state. Some of the key programmes are listed in the **Table 4.11.10** as below:

**Table 4.11.10 Financial Inclusion Programmes by NABARD**

Name of Programme	Programme contents target and achievement
Financial Literacy Awareness Programme (FLAP)	With the motto of spreading financial awareness, NABARD sanctioned in 1,013 FLAP to Cooperative Banks, RRB, and NGOs.
Digital Financial Literacy Awareness Programme (dFLAP)	So-called "Go Digital" campaign focus on helping demonstrate the usage of cards, internet banking and various other modes of cashless transactions to the citizens. NABARD undertake this programme through Grameen Bank, H.P. State Cooperative Bank, Kangra Central Cooperative Bank and
Bachat ki Paathshala	Targeting senior secondary and higher secondary school children through <i>nukkad melas</i> (street corner). NABARD supported HP Gramin Bank and cooperative banks to setting 12 Financial Literacy Center under Financial Inclusion Fund.
Bank Sakhi Model	SHG/SHG members aware of banking and record keeping activities, operate as Bank Sakhi/Agents to provide a range of financial services to their group and the community. NABARD provides the financial support for the training and development by RRB, SHG Federation. She is paid a commission by the bank in return of her services.

Source: JICA Study Team (2017)

NABARD supports the development of Financial Literacy Centres (FLCs), physical locations set up by banks in each district, managed by HP Gramin Bank and Cooperative Banks. These centres are required to facilitate organisation of financial literacy camps to educate rural and urban population on range of financial products and services offered by the formal banking and financial system. NABARD funds the broadcasting of awareness jingles on radio, animation films, booklets and brochures, and street plays engaging school children. As on March 2016, NABARD had released FIF funds to the tune of 35.9 million INR in grant assistance to support abovementioned interventions.

Detailed explanation of NABARD programmes is described in **Attachment I.4.11.3**.

### (3) SHG formation by Anganwari Centers, Directorate of Women and Child Development

WCD, initiated in the year 1999-2000, is involved in the formation of SHGs and SHG-Bank Linkages through the Integrated Child Development Service Scheme (ICDS), the nation-wide scheme of the Central Government. Under ICDS, Anganwadi (AW) Centre set up at community level provide a package of six services viz., supplementary nutrition, immunisation, health checkups, referral services, nutrition and health education for mothers/pregnant women, nursing mothers and to adolescent girls (kishoris) through Anganwadi workers. Other than the package of these health services, AW workers are expected to play a role to organise SHGs in the community to make women economically empowered. In HP, total 27,608 SHGs were formed by ICDS. While almost all of them are linked with banks for saving, 12,325 SHGs are linked with banks for microcredit purposes.

WCD also organises awareness camps with the help of NABARD and provide basic information to the members of SHGs on topics like SHG concept, group dynamics, book keeping, opening bank accounts etc. by the AW workers. At present, more than 20,420 field functionaries (Child Development Project Officers at block level/ CDPOs, supervisors and AW workers) are involved in the promotion of SHGs. The WCD has a well-established monitoring system from the State up to AW center as shown in **Figure 4.11.2**.



Source: JICA Study Team (2017)

**Figure 4.11.2 Monitoring Structure of WCD and Anganwari Centers**

Limited SHG linkage with credit by WCD is owing to its no further budgetary provision for the SHG promotion other than ICDS. At each block level, SHG federations were developed but the most of them are defuncted as to date unable to provide the services which member SHGs require. For capacity building of SHGs and federations as well as identification of specific IGA that benefit member women, WCD has to rely heavily on the interventions by other departments or programmes.

**Table 4.11.11 Progress of SHG Formation and Linkage with Banks by WCD, March 2017**

No.	District	No. SHG formed	SHG in saving	SHG linked with bank for microcredit	Amount of loan taken from Bank (INR,000)	No. of Block level Federation formed
1	Bilaspur	1,821	1,821	1,091	448,344	3
2	Chamba	951	951	231	35,109	5
3	Hamirpur	1,671	1,671	1107	78,849	6
4	Kangra	5,597	5,597	1,493	88,552	15
5	Kinnaur	1,674	1,672	1,026	37,852	5
6	Kullu	318	318	233	32,702	3
7	Lahul & Spiti	42	42	11	482	2
8	Mandi	4,196	4,197	2,472	7,400	10
9	Shimla	4,198	4,198	2,476	206,816	11
10	Sirmaur	2,824	2,824	0	206,335	6
11	Solan	2,453	2,453	1,448	266,220	5
12	Una	1,863	1,863	737	23,670	5
	<b>TOTAL</b>	<b>27,608</b>	<b>27,607</b>	<b>12,325</b>	<b>1,432,331</b>	<b>78</b>

Source: Directorate of Women and Child Development

Observation in the study area revealed that the SHGs under WCD were formed in the early years of the emergence of SHGs in HP. In Neen village, Basantpur block of Shimla district, even after receiving a new financial support by NRLM with the creation of new SHGs, WCD SHG formed in 2004 still function as an autonomous body for the community women as it is open for anyone to participate unlike other programmes with specific criteria for membership. Although no provision for additional financial support, SHG could survive if the member women appreciate its functions.



## **CHAPTER 5 REVIEW OF PAST AND ON-GOING FORESTRY RELATED PROJECTS/ SCHEMES SIMILAR TO THE PROJECT**

### **5.1 Major ODA Forestry Project in India**

#### **5.1.1 Introduction**

There were around 173,000 villages (rural units) located in and around forests of India in early 2000s<sup>1</sup>, which corresponds to approximately 11% of total villages in India as per the 2011 census. Though there are no official figures for the forest dependent population in India, some estimates indicate 200 million<sup>2</sup> to 400 million<sup>3</sup> of such population, which comprise 16% to 32% of total population as per the 2011 census. The forest dependent population rely upon forest resources and their usage or dependency on the forest resources is one of the driving factors of deforestation, forest degradation and depletion of biodiversity at certain scale, which also affect the vulnerabilities to disasters in the hilly and mountainous regions of the country. Thus, the Government of India and state governments have undertaken afforestation and regeneration programmes to restore ecological balance, either with their own resources and/or with assistance from international donors such as the Japan International Cooperation Agency (JICA), the World Bank, the Department for International Development (DFID), Kreditanstalt Für Wiederaufbau (KfW) and Agence Française de Développement (AFD). The reviews of such past and on-going forestry related projects/ schemes similar to the proposed Project are required to identify or extract lessons learnt which shall be taken into account for the proposed Project.

While Japanese Official Development Assistance (ODA) through JICA has started since 1958 in India, JICA's assistance in forest and natural resource management sector in the country commenced in 1991. Since then, ODA loan projects in the sector have been extended to 25 projects, across 15 states as of April 2017, making Japan as the largest donor in the sector<sup>4</sup>.

The World Bank has provided financial assistance to about 40 projects related to forests, environment management, ecosystem, biodiversity, etc. The following projects are currently active; (i) India Ecosystems Service Improvement Project, (ii) Uttarakhand Decentralised Watershed Development II Project, (iii) Biodiversity Conservation and Rural Livelihoods Improvement, and (iv) Integrated Coastal Zone Management.

Germany's Gesellschaft für Internationale Zusammenarbeit (GIZ) also has contributed a lot to the field of environment management in India. An Umbrella Programme on Natural Resource Management (UPNRM) was launched in 2009 and jointly implemented by the National Bank for Agriculture and Rural Development (NABARD), India, and German government-owned development banks (KfW and GIZ). The UPNRM provides combined packages of loans and grants to financially viable and small initiatives of NGOs, producer companies, corporates and

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<sup>1</sup> Based on Report of the National Forest Commission, Ministry of Environment and Forests 2006

<sup>2</sup> Information cited in "Numeracy and Financial Literacy of Forest Dependent Communities Evidence from Andhra Pradesh" 2013, Indian Institute of Forest Management

<sup>3</sup> Information cited in "Asia-Pacific Forestry Sector Outlook Study II: India Country Report", 2009, FAO

<sup>4</sup> Brochure, JICA Assisted Forestry Projects in India, and JICA webpage

communities. The “umbrella programme” included more than 75 projects by August 2011 that included forest-based medicinal plants, eco-tourism, integrated dairy management in developed Watershed areas and other livelihood activities, etc.<sup>5</sup>

### **5.1.2 Review of JICA’s Forestry Projects in India**

This section summarises the review of six JICA’s forestry loan projects based on the impact assessment study reports<sup>6</sup>. **Table 5.1.1** summarises project frameworks including institutional arrangements of three projects; i) Gujarat Forestry Development Project Phase 2 (IDP-183), ii) Odisha Forestry Sector Development Project (IDP-173), and iii) Rajasthan Forestry and Biodiversity Project 2 (IDP-221), and **Table 5.1.2** indicates project frameworks of remaining three projects; iv) Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (IDP-194), v) Tamil Nadu Biodiversity Conservation and Greening Project (IDP-214), and vi) Karnataka Sustainable Forest Management and Biodiversity Conservation Project (IDP-163).

From the reviews of these JICA assisted projects, some lessons can be highlighted for the examination on the institutional arrangement in the proposed Project.

There are two different implementation modes are adopted, namely, “departmental” and ‘society’ mode<sup>7</sup> which shall be determined as per the agreements made between the forest department in the state and JICA. Even in Tamil Nadu earlier to the Tamil Nadu Biodiversity Conservation and Greening Project (TBGP), the Tamil Nadu Afforestation Phase 1 Project (TAP I) and Phase 2 Project (TAP II) were implemented following “departmental” mode. Both these approaches have merits as well as demerits, and have been carefully analysed recently concluded in “Impact Assessment study of JICA assisted project”. The study states that “society” mode has certain advantages and recommends as reproduced below. A Project Management Unit (PMU) as a society provides the following benefits for operational efficiency;

- ◆ Dedicated department
- ◆ Smoother fund flow
- ◆ Quick decision making
- ◆ Better M&E
- ◆ Able to mobilise experts and skill with good remuneration
- ◆ Able to generate more fund from donor and support agencies
- ◆ Free to decide own operational and HR policy
- ◆ When the PMU functions in Society mode, all the Project Directors play a pivotal role in efficient implementation and resultantly ensure the success of the project.

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<sup>5</sup> Brochure, Indo-German Development Cooperation, Principles and Projects to Tackle Shared Challenges, edited by the German Embassy New Delhi, India-2012

<sup>6</sup> Impact Assessment Study of JICA assisted Projects (2016) by All State Finance services Pvt. Ltd. and BASIX Consulting and Training Services Ltd.

<sup>7</sup> “society mode” is which a society, under the Society Registration Act, serve as the main implementation body for a project, whereas “department mode” is which the main implementation body for a project is department itself.

Table 5.1.1 Review of JICA Forestry Projects (1)

No.	Items	Gujarat Forestry Development Project 2 (IDP-183)		Odisha Forestry Sector Development Project (IDP-173)		Rajasthan Forestry and Biodiversity Project – 2 (IDP-221)	
1	Financial Assistance	JICA		JICA		JICA	
2	State	Gujarat		Odisha		Rajasthan	
3	Implementation period	2007 ~ 2015; 8 year; extended by 2 year i.e. till March 2017.		2006 ~ 2013; 7 year, extended by 2 year i.e. till March 2015.		2012~2019; ongoing	
4	Generation	Second generation JICA project Second forestry sector project in the state		Second generation JICA project First forestry sector project in the state		Second generation JICA project Fifth forestry sector project in the state	
5	Project Cost	<b>Total</b>	<b>8,303 mil INR (20,923 mil JPY)</b>	<b>Total</b>	<b>6,598 mil INR (16,429 mil JPY)</b>	<b>Total</b>	<b>11,525 mil INR (20,514 mil JPY)</b>
		JICA	6,953 mil INR (17,521 mil JPY)	JICA	5,597 mil INR (13,937 mil JPY)	JICA	8,848 mil INR (15,749 mil JPY)
		State	1,350 mil INR (3,402 mil JPY)	State	1,001 mil INR (2,492 mil JPY)	State	2,677 mil INR (4,765 mil JPY)
		Beneficiary	Nil	Beneficiary	Nil	Beneficiary	Nil
6	Implementation Mode	Society Mode		Society Mode		Society Mode (earlier to this all previous projects were implemented through departmental mode)	
7	Project Objective(s)	The objectives of this Project are to regenerate the forest and raise the living standards of the residents by conducting community-based afforestation and activities to improve livelihoods in the state of Gujarat in western India, thereby contributing to improvement of the local environment and poverty reduction.		The objectives of the Project include restoration of degraded forests and livelihood promotion for the resident community by promoting sustainable forest management and community/tribal development, with larger goals of improving environment and alleviating poverty.		To enhance forest area and livelihood opportunities of the forest dependent people and to conserve Biodiversity by undertaking afforestation and Biodiversity conservation measures through JFM approach are the objectives of the project. The project ultimately aims at contributing to environmental conservation and socio-economic development of Rajasthan.	
8	Key Project Components	<ul style="list-style-type: none"> <li>a) Afforestation (including mangrove planting)</li> <li>b) Wildlife Conservation and Development</li> <li>c) Community/ Tribal Development</li> <li>d) Supporting Activities for forest conservation activities</li> <li>e) Consulting services (assistance in procurement and fund management, and technological assistance, etc.)</li> </ul>		<ul style="list-style-type: none"> <li>a) Restoration of Degraded Forests (Forest Management under JFM &amp; Non-JFM Mode &amp; Farm Forestry) – ANR, Block plantation, AR Teak, Coastal plantation, Mangrove, Casuarina</li> <li>b) Biodiversity Management including Ecotourism development and establishment of community reserves/ heritage sites</li> <li>c) Community/ Tribal development including IGAs</li> <li>d) Supporting Activities</li> <li>e) Consulting Services</li> </ul>		<ul style="list-style-type: none"> <li>a) Afforestation</li> <li>b) Agro-forestry</li> <li>c) Water Conservation Structures</li> <li>d) Biodiversity Conservation</li> <li>e) Poverty Alleviation and Livelihood Improvement</li> <li>f) Capacity Building Training &amp; Research</li> <li>g) Community Mobilisation</li> <li>h) Project Management</li> <li>i) Monitoring &amp; Evaluation</li> </ul>	

No.	Items	Gujarat Forestry Development Project 2 (IDP-183)	Odisha Forestry Sector Development Project (IDP-173)	Rajasthan Forestry and Biodiversity Project – 2 (IDP-221)
9	Implementation Arrangements	<p>PMU was created for the overall management of the Gujarat Forest Development Project (GFDP) Phase II. PMU is headed by APCCF and supported by the officers in the rank of CCF, CF, and DCF &amp; Ministerial staff. The Circles, Divisions and Range offices implementing the project components have been provided with various regular field executives /office staff as well as experts for Capacity Building/ Skill Up gradation on contractual basis. For the purpose of PRA works at field level, the ground staffs were supported by Livelihood Enhancement Teams (LETs). The PMU wing mainly directs allotment of Targets, collecting and compiling Physical and Financial progress of various components and submitting to GOI &amp; JICA for reimbursement of the eligible expenditure.</p>	<p>OFD has the overall responsibility for all the activities in the Project. Project Management Unit (PMU) will be established at the headquarters in Odisha for the smooth implementation and coordination under the Project. Specific functions include overall project coordination, procurement management, financial management including checking of all accounts and preparation of disbursement requests to JBIC, arrangement of audit, monitoring and evaluation, and preparation of reports such as Progress Reports and Project Completion Report in line with PSR format. PMU consists of 36 staff headed by an Additional Principal Chief Conservator of Forests (APCCF). In addition, DMU and FMU consist of 154 and 1,207 employees respectively.</p>	<p>The Project is being implemented by Rajasthan Vaniki Evam Jaiv Vividhata Sanrakshan Society registered under Rajasthan Societies Registration Act 1958. The Society forms the State level Project Management Unit (“PMU”) of the Project. The Project Director, RFBP-2 is the ex-officio Chief Executive Officer of the Society and is responsible for the implementation of the Project. He is also the head of the Project Management Unit whose office is located in Aravalli Bhavan, Jhalana Institutional Area, Jaipur.</p> <p>Respective forest/wildlife divisions, implementing the project are called Divisional Management Unit (DMU) of the Project. The Ranges implementing the project are called Field Management Unit (FMU) of the project. At the lower levels, the Project is being implemented by Village Forest Protection and Management Committee (“VFPMC”) or Eco-Development Committee (“EDC”). A VFPMC/EDC is formed as per the extant resolutions/regulations issued by Government of Rajasthan (GoR). Livelihood Promotion activities are envisaged to be undertaken through formation of Self Help Groups (SHGs) from within the members of VFPMCs/EDCs.</p>

Source: Compiled by JICA Study Team (2017) from Impact Assessment Study of JICA assisted Projects by All State Finance services Pvt. Ltd. and BASIX Consulting and Training Services Ltd.

Table 5.1.2 Review of JICA Forestry Projects (2)

No.	Items	Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (IDP-194)		Tamil Nadu Biodiversity Conservation and Greening Project (IDP214)		Karnataka Sustainable Forest Management and Biodiversity Conservation Project (IDP-163)	
1	Financial Assistance	JICA		JICA		JICA	
2	State	Uttar Pradesh		Tamil Nadu		Karnataka	
3	Implementation period	2008 ~ 2016; eight year; extended by 1½ year i.e. till December 2017.		2011 ~ 2018; seven year,		2005~2013; the project closed in year 2014 (September)	
4	Generation	Second generation JICA project First forestry sector project in the state		Second generation JICA project Third forestry sector project in the state		Second generation JICA project Second forestry sector project in the state	
5	Project Cost	<b>Total</b>	<b>5,752 mil INR (16,938 mil JPY)</b>	<b>Total</b>	<b>6,860 mil INR (12,899 mil JPY)</b>	<b>Total</b>	<b>7,450 mil INR (18,477 mil JPY)</b>
		JICA	4,680 mil INR (13,841 mil JPY)	JICA	4,696 mil INR (8,829 mil JPY)	JICA	6,132 mil INR (15,209 mil JPY)
		State	1,072 mil INR (2,557 mil JPY)	State	2,164 mil INR (4,070 mil JPY)	State	1,318 mil INR (3,268 mil JPY)
		Beneficiary	Nil	Beneficiary	Nil	Beneficiary	Nil
6	Implementation Mode	Society Mode		Society Mode		Department Mode	
7	Project Objective(s)	<p>The Project envisages poverty alleviation and improving natural resources through a) participatory rehabilitation and management of degraded forests, and b) enhancing the livelihoods of the local people. There are the following objectives:</p> <ul style="list-style-type: none"> <li>- To restore degraded forest and to augment forest resources.</li> <li>- To secure sustainable forest management by improving Forest administration, Community organisation and other stakeholders.</li> <li>- To conserve and better manage the wild life.</li> <li>- To improve the income of target forest dependents and their livelihood options.</li> </ul>		<p>The key objectives are a) Conservation of vital Biodiversity both inside the Protected Areas as well as in other Reserved Forests (by removing invasive and exotic species), b) Large scale tree cultivation in private lands to increase the natural resource base outside the forest area and c) Ecologically sustainable development initiatives by promoting community participating in eco-development, tribal development and eco-tourism.</p>		<p>To restore forest to bring about ecological restoration and also to facilitate livelihood improvement of the inhabitants of the project villages by afforestation through Joint Forest Planning and Management (JFPM) in the State of Karnataka, which further contributes to reducing poverty and preserving Biodiversity conservation of the area.</p>	
8	Project Components	<ul style="list-style-type: none"> <li>a) Plantations, regeneration of forests, etc.</li> <li>b) Institutional Strengthening of PMU/DMUs/FMUs</li> <li>c) Rehabilitation of Forest Training Institute at Lucknow</li> <li>d) Communication and Publication.</li> <li>e) Monitoring and Evaluation</li> <li>f) Physical Contingency</li> <li>g) Consulting Services</li> </ul>		<ul style="list-style-type: none"> <li>a) Biodiversity Conservation</li> <li>b) Increasing the Natural Resources base</li> <li>c) Institutional Capacity Development</li> <li>d) Consulting Services</li> </ul>		<ul style="list-style-type: none"> <li>a) Afforestation</li> <li>b) Income Generation Activities for Poverty Alleviation,</li> <li>c) Biodiversity Conservation,</li> <li>d) Provision of Basic Infrastructure Support for Field work,</li> <li>e) Supporting Activities for Forest Management (Research and Training, Consultancy, and Enhancement of GIS and Management Information System (MIS)</li> </ul>	

No.	Items	Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (IDP-194)	Tamil Nadu Biodiversity Conservation and Greening Project (IDP214)	Karnataka Sustainable Forest Management and Biodiversity Conservation Project (IDP-163)
9	Implementation Arrangements	<p>At the apex Empowered Committee (EC) chaired by Chief Secretary, Govt. of UP is the highest body to provide policy guidance and to review project performance at state level.</p> <p>Principal Secretary (Forests), Govt. of UP with Principal Chief Conservator Forests (PCCF) as its Vice-Chairperson to guide the project during implementation and also review the progress periodically. The Chief Project Director, who leads the Project Management Unit (PMU) reports to the Chairperson, Governing Body and also functions as Member secretary to this body.</p> <p>PMU has been established at Lucknow to assume overall responsibility for management, coordination and procurement of good and services including hiring consultants/ NGOs. PMU is also assisted by PMC.</p> <p>At the divisional/ sub-divisional (range) level, there exist two institutional set-ups, the Division Management Units (DMUs) and Field Management Units (FMUs). At the implementation level JFMCs/ EDCs shall take up the responsibility of planning, implementation and Operation &amp; Maintenance/ management of project interventions.</p>	<p>The project will be implemented through the PMU at the HQ, which will be established as an autonomous society as per the Tamil Nadu Societies Registration Act, 1975. A High Level Empowered Committee (HLEC) headed by the Chief Secretary to Government will be constituted. High Level Empowered Committee will be the highest decision-making body for the project.</p>	<p>All activities were implemented by the KFD. PMU was set-up at the HQ at Bangalore to facilitate proper and timely implementation of the project activities. PMU consisted of around 40 staff under the control of Project Director in the rank of Additional PCCF. Empowered Committee, State level Advisory Committee, Circle Level Advisory Committee, and Division Level Executive Committee has taken care of the review and monitoring works at relevant stages.</p>

Source: Compiled by JICA Study Team (2017) from Impact Assessment Study of JICA assisted Projects by All State Finance services Pvt. Ltd. and BASIX Consulting and Training Services Ltd.

The study further recommends some of the processes the implementing agency needs to ensure while preparing the standard guidelines. During the preparation, concerned experts (i.e. tax, legal etc) shall be consulted with. These guidelines should cover the following issues:

- ◆ How to incorporate PMU and get it registered with Societies Act
- ◆ How to apply for income tax exemptions, so that grants, receipts or donations are exempt from income tax
- ◆ Conceptual clarity on issue of transfer of funds from PMU to divisional management units (DMUs) and field management units (FMUs) to community level implementation organisation such as VFC (village forest committee) when PMU is a society incorporated for Charitable Purposes while DMUs are a part of forest department and not a separate entity. Similarly, not only the PMU but also VFCs are registered societies. So how will such transfers be treated.
- ◆ Further PMU formed for charitable purposes and it consolidates their financial statements with that of DMUs for submission with Income Tax Department for claiming exemption. Is it proper from income tax point of view
- ◆ Guidelines based on income tax provisions for fund management including application of receipts, so as to avoid unnecessary tax liabilities. Proper clarifications should be sought with regards to the Income Tax Rules for ‘application of funds’ as income tax authorities can disallow the exemption if the funds are not applied properly as per rules and can have severe tax liabilities and penalties.
- ◆ Policy with regards to the proper documentation, compliances and timelines of the same
- ◆ Guidelines for annual compliances, requirements, roles and responsibilities
- ◆ Awareness of tax liability of non-compliance
- ◆ Clarity on who will bear the cost of non-compliance and taxes in case of delays
- ◆ Engagement of consultant for regular compliance, advice, changes in law and internal audit
- ◆ Clarity on taxation, legal process for transfer of assets after the term of PMU ends
- ◆ Clarity on process of support, sustenance and continuity of projects after the term of PMU ends in terms of roles, responsibility and financial support.

In addition to the above highlighted points in the impact study, there are some operational and policy issues that are being suggested by the impact study for future projects. Essence of some of the key recommendations specific to the JICA assisted projects is presented below:

- ◆ Adoption of landscape approach for afforestation and conservation activities
- ◆ Use of improved technology and practices for raising quality planting material in nurseries
- ◆ Promotion of agro/ farm forestry models outside forest areas
- ◆ Identification of keystone, flagship and umbrella species for biodiversity conservation, and creation of People’s Biodiversity Registers
- ◆ Shift from ‘JFM’ to ‘community forest management (CFM)’ approach particularly in light

of FRA, 2006 and PESA, 1996 act provisions

- ◆ Need of strengthening current revolving fund mechanism
- ◆ Requirement of strong institutional arrangements for focused intersectoral convergence
- ◆ There is need for engaging professional/ expert organisations for livelihood support and financial inclusion
- ◆ Exploring CSR opportunities for securing additional funds for natural resource management and livelihood promotion activities.

### **5.1.3 9th Annual Workshop on Forestry and Natural Resource Management Projects, and Impact Assessments**

The 9<sup>th</sup> workshop titled ‘Sustainable Forest Management with People's Participation and Modernisation of Management’ was organised by the West Bengal Forest Department (WBFD), the executing agency, through the West Bengal Forest and Biodiversity Conservation Society implementing the JICA assisted project during 11- January 2017 at Kolkata and Sundarbans.

The 9<sup>th</sup> Workshop basically worked further on the recommendations made during the 8<sup>th</sup> annual national workshop organised by the Sikkim Biodiversity Conservation and Forest Management Project (SBFP) at Gangtok, Sikkim during February 29 and March 1, 2016.

The recommendations were made during the sessions of the 8<sup>th</sup> workshop in four broad themes; a) Sustainable Forest and Biodiversity Management, b) Livelihood Security, c) Institutional Strengthening and Capacity Building, and d) Technology based Monitoring. During, 9<sup>th</sup> workshop, further deliberations took place, and these recommendations were further fine-tuned and made actionable. Synopsis of these recommendations is given in subsequent paragraphs. Almost all recommendations are relevant and could be applicable in the current proposed Project by HPFD. The key recommendations of the 9<sup>th</sup> Workshop are listed hereunder.

#### **(1) Sustainable Forest and Biodiversity Management**

- ◆ Intersectoral linkages and coordination for convergence at all levels (state, district and Panchayats) would be key for achieving sustainable forest and biodiversity management. For better synergy of efforts and optimal utilisation of funds, there must be scope as well as formal arrangement for inter-departmental consultations and sharing of action plans. Ecosystem based management should be taken into account to ensure sustainable use of traditional services/practices in the overall forest resource management;
- ◆ Community efforts for sustainable forest management must be recognised, and transparent and equitable sharing of benefits/ usufructs mechanism must be operationalised and monitored. For inculcating sense of belongingness and ensuring involvement of community, more focus must be given on marginalised people specially women and forest dependent groups within the village. For extending continuous handholding support, a local educated youths must be engaged at Panchayat/ village level, and capacitated during the project implementation; and



- ◆ The project implementing agency must give due emphasis on ensuring convergence and continuous monitoring of the project performance. System of conducting social audits and financial audits must be institutionalised at the community institutions/ village level. Objectively verifiable indicators need to be developed at the start of the Project, and also the methodology to assess the same at mid-term and end term. Protocols for monitoring of the ecosystem services specially stream flow and water quality should be developed and shared with the community.

## (2) Livelihood Security

- ◆ Institutionalisation of livelihood activities is critical for the long-term sustenance. Wherever possible, adoption of cluster based and federation based approach should be taken up. In the forestry sector, all livelihood initiatives should have direct connection with the conservation objectives. Ecotourism could be promoted as sustainable livelihood opportunity in biodiversity rich areas;
- ◆ For effectiveness and sustenance of livelihood initiatives, synergy with activities of gram panchayat is very important. Institutions such as NABARD, KVIC, Skill India Mission etc. should be used as platform for the purpose;
- ◆ Adequate emphasis must be given on product designing, development and branding. Unique Selling Proposition of the products should be identified, recognised, created and promoted, for easier marketing; and
- ◆ Marketing professionals should be engaged for developing marketing strategies and facilitating marketing processes, guiding on the quality control and branding. Business viability of the initiatives should also be worked out well in advance. For sustainability of IGAs/ enterprises, the state Forest Department should explore for financial inclusion as well as options such as CSR initiatives, on-going government schemes, linkages with Rural Livelihoods Mission, NABARD, Lead banks etc.

## (3) Institutional Strengthening and Capacity Building

- ◆ JFMCs/ EDCs are recognised through some rules or administrative government orders, though these institutions may not have strict legal status. Mechanism for management of Village Development Fund needs to be evolved. Usufructs sharing must be institutionalised with proper guidelines and government notifications;
- ◆ Need based training and training of trainers (ToT) should be organised by employing reputed training agencies/ institutions. Programmes should be organised to orient and sensitise the NGOs/ supporting organisations towards the project approach and objectives;
- ◆ Priority should be given for in-house capacity building of the forest department. A comprehensive Training Need Assessment (TNA) exercise is prerequisite for planning capacity building strategy and conducting regular trainings. Annual Training Calendar

needs to be developed as per TNA. All stakeholders should be identified as per the training needs; and

- ◆ State forest training institutes should be developed as ‘Centre of Excellence’, and operated with full autonomous status. Collaboration with the local universities and institutions could also be explored.

#### (4) Technology based Monitoring

- ◆ Utility of GIS technology is well recognised for forestry sector for planning and management of the forest areas. The state forest department should be well equipped with remote sensing and GIS technology at the preparatory stage of the project, and staff must be well identified and capacitated through national and international trainings. This will also ensure utilisation of the GIS set-up after the project completion;
- ◆ Resource maps should be developed to study the “before” and “after” effects of the project /management interventions. Periodical forest coverage change assessment using high resolution images and satellite based estimation is important for MRV procedure and identification of pressure points to enable forest officers for better management practices; and
- ◆ Monitoring should be done on real time basis using advanced GIS applications and mobile Apps by the implementing units involving the community. There should also be emphasis on continuous updating of technology and integration of GIS-MIS.

## **5.2 Reviews of Past and On-going Similar Projects**

In this section, project outlines as well as i) issues, ii) learning/ good practices, and iii) issues and lessons which can be reflected to the proposed Project, of some major past and on-going forestry related project/schemes in HP are described hereunder.

### **5.2.1 Forest Ecosystem Climate Proofing Project (KfW)**

The Himachal Pradesh Forest Ecosystem Climate Proofing Project funded by KfW has been implementing with the core strategy to provide for proactive adaptation interventions to sustain the forest ecosystems in a productive manner, as impacts of climate change on forests are expected to be irreversible with most of them becoming visible after a lapse of considerable time. Under this project, nine territorial forest divisions in the districts of Chamba and Kangra were identified to implement project components based on a climate vulnerability assessment approach. The Project formally commenced on 31 January, 2016.

Forest dependent communities in 600 villages have been targeted as part of this Project. The project is proposed to be implemented over a period of seven years, which include one year of preparatory and capacity building activities. HPFD will execute this Project with participation of the formally registered village forest management societies (VFDS) on the core principles of PFM. The details of the project are provided in **Table 5.2.1**. This project is covering Pangi/

Bharamour sub-divisions of Chamba district, which are also proposed for the JICA Project.

Though this project is still at its initial stage, the following issues and lessons can be reflected in the proposed Project:

- ◆ While initiating the village level institutions, willingness of the community is given the importance and sufficient orientation is ensured to be given; and
- ◆ Not only VFDS, but involvement of Gram Panchayats maybe essential after the project for O&M of assets/ infrastructure created under the project

**Table 5.2.1 Review of Forest Ecosystem Climate Proofing Project (KfW)**

No.	Items	Forest Ecosystem Climate Proofing Project	
1	Financial Assistance	KfW - Kreditanstalt für Wiederaufbau	
2	Implementation period	2016 - 2022; six years; may get extended by one year due to late start	
3	Project Cost	<b>Total</b>	<b>30,845 mil INR (37.6 mil EUR)</b>
		KfW	26,240 mil INR (32 mil EUR)
		State	3,423 mil INR (4.17 mil EUR)
		Beneficiary	1,182 mil INR (1.44 mil EUR)
4	Project District(s)	Chamba and Kangra	
5	Project coverage/ area	nine forest divisions and 32 ranges falling in the districts. Around 325 VFDS to be formed – 140 in Chamba and 185 in Kangra district, covering some 600 villages;	
6	Project Objective(s)	Forest ecosystems in HP are managed in a way, that the risks of climate change and induced negative impacts are minimised and/or mitigated, resulting in an increase of Biodiversity of the treated Himalayan ecosystems and raised income rural areas from sustainable management of natural resources.	
7	Project Components	The key project components are: a) Lantana eradication and conversion, b) Enrichment planting of existing bamboo areas, c) Enrichment planting of degraded chir pine forests with multi-purpose trees (BL Species), d) Sylvicultural operations in chir pine, e) Soil and water conservation measures on micro-watershed basis, f) Spring rehabilitation, g) Nursery development and improvement, h) Human-wildlife conflict management (Good Idea Fund), i) Training and capacity building, j) M&E, k) Project facilitation, l) JFMC Coordination User Group Meetings, m) Forest protection incentives, n) Preparation of micro working plans, o) Project management (SPMU and DPMU), p) Accompanying measures (Project Management Consultants)	
8	Implementation Arrangements	<p>The structure already existing in the state for implementing NAP of GoI is adopted for implementation of the project.</p> <ul style="list-style-type: none"> <li>- For coordination State Level Steering Committee (SLSC) of the SFDA is the apex institution for the state. This committee is headed by Forests Minister. In addition, two committees, viz., Operations Committee and Finance Committee were established to guide day-to-day operations of the State Project Management Unit. For implementation, a State Project Management Unit is constituted for the project under the umbrella of the State Forest Development Agency (SFDA).</li> <li>- At the division level a Divisional Project Management Unit is established in each of the divisions in the project districts. DFO oversees the functioning who also works under the overall supervision of the circle office and the Forest Development Agency (FDA).</li> <li>- At the panchayat level, the project is implemented by VFDSs that are created having its representation from the villages around the target forest area.</li> </ul>	
9	Major Achievements	No reports/ data available from relevant officers	
10	Issues	<ul style="list-style-type: none"> <li>- There are no project specific formats for reporting; DFO under regular reporting include the progress made under the project;</li> <li>- CPD has no direct authorities to ensure compliance of the annual plan of operation;</li> <li>- DFOs are not directly responsible for the project implementation;</li> <li>- NGOs are not being involved as of now;</li> <li>- VFDS are created as registered society representing 3~4 wards in vicinity of the target forest area selected for treatment/ interventions not very effective in coordinating the interventions</li> </ul>	

No.	Items	Forest Ecosystem Climate Proofing Project
		<ul style="list-style-type: none"> <li>- So far, there are no initiatives for inter-departmental coordination; System already in place at the circle level is not been able to effectively coordinate with other line departments;</li> <li>- So far there have been two missions from KfW to review the project performance; project is delayed by one year</li> <li>- There is no provision of EPA in the Project</li> </ul>
11	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- PMC support is extended for the entire project implementation period;</li> <li>- Certain flexibility and authority to be vested with the PMU/ CPD to steer the project as envisaged</li> <li>- Full-time dedicated staff to work on project is necessary to better manage the project</li> <li>- Assessment of target area for intervention must be done well to ease the implementation else staff finds difficult to identify areas as per the pre-defined area selection criteria</li> <li>- Community mobilisation and awareness campaign should lead to formation of village institutions indicating willingness to participate and contribute to the project cause</li> </ul>
12	Issues and Lessons which can be reflected in proposed Project	<ul style="list-style-type: none"> <li>- Sufficient orientation and willingness of community is foremost prior to initiating formation of village level institutions;</li> <li>- Post project main-streaming of the project specific village institutions with the Gram Panchayats – statutory institutions is essential for O&amp;M of assets/ infrastructure created under the project</li> </ul>

Source: Compiled by JICA Study Team (2017) based on i) Draft Final Report: Feasibility Study on HP Forest Ecosystem Climate Proofing Project by Österreichische Bundesforste AG Consulting on behalf of KfW, ii) field interview to the project relevant stakeholders and following websites  
<https://www.fresheRSworld.com/jobs/hp-forest-ecosystem-climate-proofing-recruitment-for-project-support-co-ordinator-in-dharamshala-244483>  
<http://www.tribuneindia.com/news/himachal/community/RS-310-cr-project-to-mitigate-climate-effects/190281.html>  
[http://timesofindia.indiatimes.com/city/shimla/Kangra-Chamba-villages-in-climate-proofing-project/articleshow/52058910.cms?TOI\\_browsertnotification=true](http://timesofindia.indiatimes.com/city/shimla/Kangra-Chamba-villages-in-climate-proofing-project/articleshow/52058910.cms?TOI_browsertnotification=true)

## 5.2.2 Swan River Integrated Watershed Management Project (JICA)

The Swan River Integrated Watershed Management Project (SRIWMP)<sup>8</sup> commenced from 2006-07 and was implemented for a period of ten years until 2015-16. The operational area for the project was identified over an area of 619 km<sup>2</sup>., which included 22 sub-watersheds out of the total of 42 sub-watersheds of Swan River. In all 96 Panchayats in district Una were selected for implementation of the SRIWMP. The project cost was 2,273 million INR, while JICA share (85%) was 1,932 million INR, while the remaining 341 million INR was Share Government's share (15%). The review of the project is summarised in **Table 5.2.2**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Full-time dedicated staff should be spared by HPFD and project staff (including on contact) should work in synergy and minimise duplication of interventions as well as responsibilities to get focus on the process and quality service delivery.
- ◆ Realistic assessment of available area for treatment is required prior to setting project targets.

<sup>8</sup> Source: <http://swanriverproject.nic.in/index.aspx>

**Table 5.2.2 Review of Swan River Integrated Watershed Management Project (JICA)**

No.	Items	Description		
1	Financial Assistance	JICA - Japan International Cooperation Agency		
2	Implementation period	2006 ~ 2016 (revised); ten years, originally for eight years		
3	Project Cost	<b>Total</b>	<b>2,273 mil INR (4,113 mil JPY)</b>	
		JICA	1,932 mil INR (3,493 mil JPY)	
		State	341 mil INR (620 mil JPY)	
		Beneficiary	Nil	
4	Project District(s)	Una		
5	Project coverage/ area	22 sub-watersheds (out of 42 sub-watersheds) having geographical area around 619 km <sup>2</sup> which covers 96 Gram Panchayats (out of 181) of the catchment area		
6	Project Objective(s)	To regenerate the forests, protect the agricultural land, and enhance agricultural and forestry production in the catchment area of the Swan River by carrying out the integrated watershed management activities including afforestation, civil works for soil and water management, soil protection and land reclamation, and livelihood improvement activities, thereby improving living conditions of people including the poor in the catchment area.		
7	Project Components	There were six key project components: a) Afforestation, b) Civil Works for Soil and Water Management, c) Soil Protection and Land Reclamation, d) Livelihood Improvement, e) Institutional Building, and f) Consulting Services		
8	Implementation Arrangements	<p>The project had established both implementation as well as coordination mechanisms for implementing the project.</p> <ul style="list-style-type: none"> <li>- For coordination at the apex level State Level Steering Committee (SLSC) was constituted. The SLSC was chaired by Secretary (Forests), and CPD as its Member Secretary. The SLSC was responsible for project monitoring, decision on policy matters, approvals etc.</li> <li>- For project implementation, PMU is established at the state level which is headed by Chief Project Director.</li> <li>- At watershed level, Project Implementation Units (PIUs) were established which were headed by full-time DCF rank officer.</li> <li>- At the district level District Level Coordination Committee (DLCC) was constituted. Since only one district was involved in project implementation thus one such committee was established for overall project monitoring, approval of annual work plan, annual training plan, and other technical plans, and coordination among concerned departments on pending issues.</li> <li>- At the field level Block-Level Expert Committee (BLEC) was formed at block level, while Group Development Support Team (GDST) was formed at the Panchayat level in the project areas.</li> <li>- At the Panchayat Level Panchayat Development Committees (PDCs) were established that were registered under HP Societies Registration Act, 2006.</li> </ul>		
9	Major Achievements as of June, 2017	Key achievements* are:		
		<b>No.</b>	<b>Key Activities</b>	<b>Achievements</b>
		1	Strengthening of Nurseries:	10 nos.
		2	Afforestation of Government Land by Government (including maintenance)	2,000 ha (no change)
		3	Afforestation of Government Forests through JFM (including maintenance)	2,720 ha. (6,000 ha original)
		4	Afforestation of Private Land (including maintenance)	4,150 ha (1,700 ha original)
		5	Soil Protection Works in Government Forests and non-governmental forests	3,630 ha (4,000 ha original)
		6	Brushwood and Small Scale Check Dams:	19,328 (3,301 original)
		7	Silt Detention Dam (Large Scale Check Dam)	738 (50 original)
8	Spur and Embankment	8,500 mt. (14,100 mt. original)		

No.	Items	Description
		* at the moment, the information is available till March 2014; would be updated later The original project target for the afforestation were reduced from 14,000 ha and set as 8,870 ha that includes 2,000 ha in government forest managed by Forest Department, 2,720 ha in government forest/Shamlat Land under JFM, and 4,150 ha in private land. The key reasons for reducing the target area was – a) lack of realistic area assessment data at the time of setting targets, b) non-availability of government forest and the difficulty in spreading forest areas in private land. Under Soil Protection works were also undertaken on private lands stretching beyond the Government Forest land.
10	Issues	<ul style="list-style-type: none"> <li>- Sustainability of PDCs – registered autonomous society, and its linkage with the Gram Panchayat – no funds after project completion</li> <li>- Post project operation and maintenance (O&amp;M) mechanism</li> <li>- Handing over of asset/ information generated under the project with HPFD</li> <li>- PMU – society was created for the project implementation, and now not being considered for another JICA assisted project under discussion. The efforts for creation of new society has to be made again.</li> <li>- Lack of ownership and acceptance of project within HPFD during and post project</li> <li>- Lack of coordination and synergy with the territorial DFO office for project implementation</li> <li>- Since the project was implemented only in one district, to many layers institutions created to coordinate, supervise and implement the project - could have been minimised;</li> </ul>
11	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- The full time human resources dedicated to the project worked well to ensure project interventions and coordination</li> <li>- Locating the state office in the project district served as advantage for close supervision and follow during implementation</li> </ul>
12	Issues and Lessons which can be reflected in proposed Project	<ul style="list-style-type: none"> <li>- The project design and institutional set-up must enable HPFD to own and implement the project;</li> <li>- Full-time dedicated staff should be spared by HPFD to get focus on the process and quality service delivery;</li> <li>- HPFD and the project staff (on deputation or on contact) should work in synergy and minimise duplication of interventions as well as responsibilities</li> <li>- Realistic assessment of available area for treatment, prior to setting project targets</li> <li>- To ensure sustainability of efforts, training plan must address more on developing capacities of the front-line staff and communities</li> </ul>

Sources: Compiled by JICA Study Team (2017) from i) Quarterly Progress Report (January -March 2014); Swan River Integrated Watershed Management Project, Una, H.P., ii) field interview from the project relevant stakeholders and the following web-site (<http://swanriverproject.nic.in/>)

Short-term impact assessments have been carried-out by the “Central Soil & Water Conservation, Research & Training Institute, Dehra Dun” and “Himachal Pradesh Krishi Vishva Vidyalaya Palampur”. These studies have revealed that the project activities have played a pivotal role reversing the trends of degradation in the catchment of Swan River and further improving the socio-economic conditions of the beneficiaries.

### 5.2.3 Mid-Himalayan Watershed Management Project (World Bank)

The Mid Himalayan Watershed Management Project (MHWMP)<sup>9</sup> with the financial assistance of the World Bank has been operational since 1 October 2005 in ten districts of HP. This Project has been built-up on the successful experience of the Integrated Watershed Development Project (Kandi Project) which concluded on 30-Sep-2005. The MHWMP was intended to enhance the achievements of the Kandi Project, firstly by expand its spatial extent from the Shivaliks to the Mid-Hills (which covers 1/3 of the state and 1/2 of the cultivated land), and entrust the local

<sup>9</sup> Source: <http://www.hpmidhimalayan.org/>

governments, i.e., the *Gram Panchayat* with the responsibility for implementation of most of the Project activities. This was in contrast to the Kandi Project, where in the village development committees were responsible for implementation of project activities.

Overall, the project envisaged the reversal of degradation of the natural resource base, improvements in the productive potential of natural resources and rise in income levels of rural households within the project area through community-driven development (CDD) approach. A secondary objective of the project was intended towards support of policy and institutional development in the state, thus harmonising watershed development projects and programmes across the state. Review of the project is summarised in **Table 5.2.3** and further details of the project, especially focusing on general principles, monitoring and evaluation (M&E), and Management Information System (MIS) adapted in the project are depicted in **Attachment I.5.1.1**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Involvement of Gram Panchayats as partner institution is one of realistic initiatives for ensuring sustainability and building social capital in long run. Furthermore, strengthening support to the Gram Panchayats is useful for generating interest for engagement of Panchayats and community for action.
- ◆ Forest frontline staff to be involved for verification of the works, but the challenge would be to ensure focused time for the project as they are already overloaded with regular departmental works and priority.

**Table 5.2.3 Review of Mid-Himalayan Watershed Management Project (World Bank)**

No.	Items	Details/ Remarks														
1	Financial Assistance	World Bank														
2	Implementation period	October 2005 to March 2016;														
3	Project Cost	<table border="1"> <tr> <td><b>Total Project outlay</b></td> <td><b>3,650 mil INR</b></td> </tr> <tr> <td>World Bank Share (80%)</td> <td>2,700 mil INR</td> </tr> <tr> <td>State Share (20%)</td> <td>675 mil INR</td> </tr> <tr> <td>App. Beneficiaries' Contribution*</td> <td>275 mil INR</td> </tr> </table> <p>* Beneficiaries' contribution will not contribute toward the capital costs of the project but it will be maintained in a separate account of the respective Gram Panchayat and utilised as Village Maintenance and Development Fund</p> <p>Additional Financing for Mid Himalayan Watershed Development Project (Approved on 27 Sep 2012) for scale up the project's impact and maximise development effectiveness</p> <table border="1"> <tr> <td><b>Total Outlay</b></td> <td><b>2,312.5 mil INR</b></td> </tr> <tr> <td>Credit Amount</td> <td>1,850 mil INR</td> </tr> <tr> <td>State Share</td> <td>462.5 mil INR</td> </tr> </table>	<b>Total Project outlay</b>	<b>3,650 mil INR</b>	World Bank Share (80%)	2,700 mil INR	State Share (20%)	675 mil INR	App. Beneficiaries' Contribution*	275 mil INR	<b>Total Outlay</b>	<b>2,312.5 mil INR</b>	Credit Amount	1,850 mil INR	State Share	462.5 mil INR
<b>Total Project outlay</b>	<b>3,650 mil INR</b>															
World Bank Share (80%)	2,700 mil INR															
State Share (20%)	675 mil INR															
App. Beneficiaries' Contribution*	275 mil INR															
<b>Total Outlay</b>	<b>2,312.5 mil INR</b>															
Credit Amount	1,850 mil INR															
State Share	462.5 mil INR															
4	Project District(s)	Bilaspur, Chamba, Hamirpur, Kangra, Kullu, Mandi, Shimla, Sirmaur, Solan, and Una														
5	Project coverage/ area	The project covered 272 micro-watersheds that were spread over 602 gram panchayats, 42 blocks and 10 districts. The project was to benefit 25,000 target poor families. The project area is spread over the mid-hill and high-hill zone of the state which ranges between 600-1,800 m MSL. However, areas of the Shiwalik hill to an altitude of 600m has not been considered within the ambit of this project, as it has already been covered under the Kandi Project (Hills-I and II).														
6	Project Objective(s)	<ul style="list-style-type: none"> <li>- The key feature of the project included proactive involvement of village level institutions of self-governance i.e. the Gram Panchayats (GP); large majority of the project activities, and the project funds, would be channelised directly through the GPs.</li> <li>- Reversing the process of degradation of the natural resource base and improving the productive potential of natural resources and incomes of the rural households in the project area using the Community-driven Development (CDD) approach, was the main goal of the project.</li> <li>- Project objectives will be achieved using the following strategies and guiding principles:</li> <li>- Identify and dovetail the poor and poorest, mobilise beneficiaries (especially women) to get organised into community managed organisations, such as self-help groups (SHGs),</li> <li>- Formation of Common Activity Groups and special programmes by targeting vulnerable groups, such as women, landless, and nomads, etc.</li> <li>- An integrated watershed management framework (within the broad Hariyali framework) as a strategy for incorporating all technical information on productive capacity and conservation planning, as well as using water as a nucleus for a time- bound community-based programme.</li> <li>- An integrated livelihoods enhancement framework for improving the livelihoods of the poor including financing productive demand-driven sub-project investments</li> <li>- Adding value to agricultural production though increasing productivity, promotion of high value crops, and developing commercial agriculture and horticulture through production, post-harvest management, and marketing development.</li> <li>- Supporting innovations in livelihoods enhancement and disseminate the successful results to the communities</li> <li>- Improving the farm and non-farm livelihoods opportunities to the poor</li> <li>- Building the skills and capacities of the poor, their service providers for improved livelihoods and improved governance in the institutions of/for the poor and for influencing the local organisations to be inclusive and responsive to the needs of the poor</li> <li>- Project finance as a leveraging fund so as to access funds and credit from banks and other sources</li> <li>- Improving accessibility recognition that this is often the binding constraint to development remote villages.</li> <li>- Supporting decentralisation by strengthening the Panchayati Raj Institutions as agents of planning and implementation as well as providing incentive fund</li> </ul>														



No.	Items	Details/ Remarks
		<ul style="list-style-type: none"> <li>- Sensitising line departments and banks to be inclusive of and responsive to the needs of the poor</li> <li>- Facilitation and technical support in analysis, planning, developing forward and backward linkages, and identifying and establishing partnerships including financing partnerships.</li> </ul>
7	Project Components	<p><b>(A.) Institutional Development;</b></p> <ul style="list-style-type: none"> <li>a) Information, education &amp; communication,</li> <li>b) Local-level capacity building,</li> <li>c) Human resource development,</li> <li>d) Knowledge management, and</li> <li>e) Harmonisation of Watershed approaches.</li> </ul> <p><b>(B.) Watershed Development and Management;</b></p> <ul style="list-style-type: none"> <li>a) Treatment of Non-arable land;                             <ul style="list-style-type: none"> <li>(1) Plantation (Multistoried Plantations of grasses and fruit bearing trees, community plantations to increase fodder production, NTFP areas are being developed to supplement the income of the community, (2) Soil Conservation Works, (3) Water Harvesting;</li> </ul> </li> <li>b) Treatment of Arable Land;                             <ul style="list-style-type: none"> <li>(1) Agriculture and Horticulture Development programmes, High value crop demonstration of vegetables, spices, medicinal plants, aromatic plants and floriculture are being given to farmers. Special attention is being paid to promote Homestead Horticulture, Organic Farming, IPM and Pre&amp; Post harvesting low cost innovative technologies in the project area, (2) Rural Infrastructure, (3) Livestock and Fodder Development;</li> </ul> </li> <li>c) Mountain Livelihoods;                             <ul style="list-style-type: none"> <li>(1) Dairying (cost model), (2) Backyard poultry, (3) Goatary (cost model), (4) pisciculture (trout farming), (5) Vermicomposting (cost model), (6) Sericulture, (7) knitting, (8) Khaddi unit, (9) Floriculture, (10) High value agriculture crops. (cost model), and (11) Eco-tourism</li> </ul> </li> </ul>
8	Implementation Arrangements	<p>On the whole project was an extension of the Integrated Watershed Development (IWDP-II) except for its implementation arrangements. It was contemplated to adopt the IWDP model focusing on project created Village Development Committees or implementation through bodies of local self-governance (GPs). The later was selected as the approach of the project as it was consistent with the Haryali Guidelines for Watershed Development and powers devolved to GPs and strengthening GP capacity is more likely to yield sustainable impact than building ad hoc village committees, which may disappear once the project concludes. These institutions, including GPs, SHGs, UGs and CIGs etc., will provide platforms to manage the natural resources and promote their livelihoods, improve their bargaining power and create a safety net for the downward risks for the poor.</p>
10	Major Achievements as of June, 2017	<ul style="list-style-type: none"> <li>- Institutional strengthening; Formation and strengthening of 2,852 Self Help Groups, 5,613 User Groups, and 4,140 Common Interest Groups</li> <li>- Formation and strengthening in additional financing GPs: 246 Self Help Groups, 1,364 User Groups, and 1,827 Common Interest Groups</li> <li>- Community Capacity Building activities conducted, in which 55.88% women participated: 6,200 workshops, 2,153 trainings, and 926 exposure visits</li> <li>- Human Resources Development activities conducted: 1,806 workshops, 290 trainings, 143 exposure visits, and 9 international trainings</li> <li>- 1,594 IPM/ INM/ Awareness camps organised, which were attended by 2,883 staff members, 1,229 motivators, 1,331 gram panchayat executives, and 71,048 farmers</li> <li>- Watershed Development and Management; Forestry plantations over an area of 16,364.89 ha, 8,752.2 ha lantana infested areas rehabilitated with grass, construction of 708,765 Rmt Brushwood check dams, construction of 236,625 cum dry stone and 1,207,570.22 cum crate wire structures, construction of 13,795 structures and 467.937 km Kuhals (irrigation structures), 11,453.36 ha of culturable land brought under irrigation; 79,231 households benefitted in Project GPs, 2,615 households adopted micro-irrigation systems; 402 ha land brought under micro-irrigation systems, 203 ha of ponds have been developed under water harvesting structures; 28.46% vulnerable households have been benefitted</li> <li>- 51.66% area used for High Value Crops (HVC) in Project GPs; 19,020 HVC demonstrations conducted</li> </ul>

No.	Items	Details/ Remarks
		<ul style="list-style-type: none"> <li>- 17,174 vermi compost pits were constructed</li> <li>- Cropping pattern changed: - irrigated area under traditional crops decreased by 7% and irrigated HVC increased by 118%, irrigated area for fodder crops increased by 58%, 20.85lakh fruit trees planted</li> <li>- More than 19,800 fodder augmentation and 26,100 fodder conservation demonstrations were given to farmers</li> <li>- About 300 buffalo natural breeding centres were opened under the breed improvement programme</li> <li>- 129 trainings/ workshops organised under tribal action plan and attended by 7,370 participants</li> <li>- Enhancing Mountain Livelihood; 32 livelihood activities implemented by 5,494 groups with 63,186 members</li> <li>- Participation in group activities - more than 70% vulnerable groups and more than 60% women</li> <li>- 262 clusters were formed while engaging 1,280 CIGs, 7,532 beneficiaries were covered under service sector activities</li> <li>- Income amounting to 721.8 mil INR was generated from different activities against the project investment of 359.7 mil INR in MHWDP</li> <li>- Bio Carbon Sub Project: Carbon Sequestration works carried out in 139 GPs covering 3,216.48 ha of degraded land, and 4,374 benefitted from carbon revenue; 19.3 mil INR earned on account of carbon sequestration</li> </ul>
11	Issues	<ul style="list-style-type: none"> <li>- Exiting sub-committees of the Panchayats were utilised and entrusted with the tasks of the project. This committee does not have adequate representation from the entire GP;</li> <li>- No clear guidelines to utilise maintenance fund after the project that was created by way of beneficiary contribution;</li> <li>- Similarly, no clear guidelines for assets and record maintenance kept at the Panchayat level;</li> <li>- A Deputy Ranger was made responsible for around 18~20 GPs (viewed as overloaded with project works), and thus had no time to religiously visit all the work sites to complete the Measurement Book;</li> <li>- There are no collective marketing initiatives by the SHG members rather its being done at individual level.</li> <li>- Although the Gram Panchayats were involved in the project but Gram Pradhan had no role in selection process of Motivators – the handholding support extended by the project at GP level.</li> </ul>
12	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- Office space for the project purpose was provided by the Gram Panchayat within Panchayat office;</li> <li>- The project supported strengthening GP like office furniture and almirah, printed registers and expenditure bill books, and some operation expenses for the office.</li> <li>- The Users Groups also functioned as thrift group, and the savings were deposited in the Cooperative Society/ Bank that exists at the GP level.</li> <li>- Series of trainings were conducted for the women for skill improvements and initiating IGAs</li> <li>- Trainings for school dropouts were conducted on computer literacy organised at local authorised Computer Training Centres identified by the project.</li> <li>- The expenditure bills were processed after entries were verified and recorded by the Deputy Ranger in the MB.</li> </ul>
13	Issues and Lessons which can be reflected in proposed Project	<ul style="list-style-type: none"> <li>- Involvement of Gram Panchayats as partner institution for project implementation is realistic initiative for ensuring sustainability and building social capital in long run.</li> <li>- Strengthening support to the Gram Panchayats is useful for generating interest for engagement of Panchayats and community for action.</li> <li>- Handholding support at Gram Panchayat level is essential, and Panchayats must necessarily be involved for procurement of goods &amp; services, planning, execution and monitoring of project works.</li> <li>- Forest frontline staff to be involved for verification of the works, but the challenge would be to ensure focused time for the project as they are already overloaded with regular departmental works and priority.</li> <li>- Users Groups could be engaged at implementation level for undertaking project works.</li> </ul>

Source: Compiled by JICA Study Team (2017) from i) interview from relevant stakeholders and ii) <http://www.hpmidhimalayan.org/>

#### 5.2.4 Indo-German Changar Eco-development Project (GTZ)

The Changar region in HP is located in Shivalik of outer Himalayas, and characterised with naturally sensitive geology and unstable soil profiles. Rise in human and livestock population, deforestation, and unfitting land management had resulted in degradation of natural resources, especially land and water. During the hot dry months, the region experienced acute shortage of water and fodder; the most pressing problems. Thus, the Indo-German Changar Eco-Development Project (IGCEDP) started in 1994, in view to resolve the above-mentioned problems. The details of the IGCEDP are depicted in **Table 5.2.4**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Quality and timely planted mixed plantations are most effective to achieve rehabilitation and conservation objectives in a short span of time.
- ◆ Protected plantations within few years enrich biodiversity.
- ◆ Grass production increases substantially after the plantation enclosure and has good economic potential
- ◆ Natural regeneration of various plants (e.g. medicinal herbs and trees, fruit species) enhances the economic value spontaneously.
- ◆ Exit Policy shall be developed and disseminated at least one year prior to completion of a project so that all stakeholders concerned know well in advance about their roles, rights and responsibilities after the project.

**Table 5.2.4 Review of Indo-German Changar Eco-development Project (GTZ)**

No.	Items	Description	
1	Financial Assistance	KfW Development Bank	
2	Implementation period	April 1994 to December 2006	
3	Project Cost	<b>Total Project Cost</b>	<b>17.51 million €</b>
		German contribution	09.19 million €
		Indian contribution	08.32 million €
4	Project District(s)	Kangra	
5	Project coverage/ area	Encompassing less than 440 km <sup>2</sup> in one small area of one district.	
6	Project Objective(s)	The IGCEDP had varied objectives during its implementation duration. The basic aim was to impede or reverse the environmental degradation in selected parts of the Changar area of Kangra district in HP. During the final extension phase (2004-2006) the objective was for village groups to manage their natural resources in a sustainable manner and on their own responsibility.	
7	Project Components	<p>There were six key project components: a) Afforestation, b) Civil Works for Soil and Water Management, c) Soil Protection and Land Reclamation, d) Livelihood Improvement, e) Institutional Building, and f) Consulting Services</p> <p>The indicators were the number of independent village groups (with at least 40% female participation) that implement resource management plans, the number of households in the project area able to satisfy their drinking water demands from springs, the income generated by cooperatives processing forest products, the financial inputs of the democratic local government institutions (panchayati raj), and the implementation of the project's concept of forest management plans and transfer of usufructory rights to village groups by the Forest Department.</p>	
8	Implementation Arrangements	<p>The project had established both implementations as well as coordination mechanisms for implementing the project.</p> <ul style="list-style-type: none"> <li>- For coordination at the apex level State Level Steering Committee (SLSC) was constituted. The SLSC was chaired by Secretary (Forests), and CPD as its Member Secretary. The SLSC</li> </ul>	

No.	Items	Description																											
		<p>was responsible for project monitoring, decision on policy matters, approvals etc.</p> <ul style="list-style-type: none"> <li>- For project implementation, PMU is established at the state level which is headed by Chief Project Director.</li> <li>- At Watershed level Project Implementation Units (PIUs) were established which were headed by full-time DCF rank officer.</li> <li>- At the district level, District Level Coordination Committee (DLCC) was constituted. Since only one district was involved in project implementation thus one such committee was established for overall project monitoring, approval of annual work plan, annual training plan, and other technical plans, and coordination among concerned departments on pending issues.</li> <li>- At the field level, Block-Level Expert Committee (BLEC) was formed at block level, while Group Development Support Team (GDST) was formed at the Panchayat level in the project areas.</li> <li>- At the Panchayat Level Panchayat Development Committees (PDCs) were established that were registered under HP Societies Registration Act, 2006.</li> </ul>																											
9	Major Achievements as of June, 2017	<p>Key achievements* are as follows:</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Key Activities</th> <th>Achievements</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Strengthening of Nurseries:</td> <td>10 nos.</td> </tr> <tr> <td>2</td> <td>Afforestation of Government Land by Government (including maintenance)</td> <td>2,000 ha (no change)</td> </tr> <tr> <td>3</td> <td>Afforestation of Government Forests through JFM (including maintenance)</td> <td>2,720 ha. (6,000 ha original)</td> </tr> <tr> <td>4</td> <td>Afforestation of Private Land (including maintenance)</td> <td>4,150 ha (1,700 ha original)</td> </tr> <tr> <td>5</td> <td>Soil Protection Works in Government Forests and non-governmental forests</td> <td>3,630 ha (4,000 ha original)</td> </tr> <tr> <td>6</td> <td>Brushwood and Small Scale Check Dams:</td> <td>19,328 (3,301 original)</td> </tr> <tr> <td>7</td> <td>Silt Detention Dam (Large Scale Check Dam)</td> <td>738 (50 original)</td> </tr> <tr> <td>8</td> <td>Spur and Embankment</td> <td>8,500 mt. (14,100 mt. original)</td> </tr> </tbody> </table> <p>* at the moment, the information is available till March 2014; would be updated later</p> <p>The following targets were achieved:</p> <ul style="list-style-type: none"> <li>- Participatory micro-planning was adopted</li> <li>- The following institutions were developed and strengthened for O&amp;M and post project sustainability of assets             <ul style="list-style-type: none"> <li>▪ 96 panchyat development committees</li> <li>▪ 427 SHGs of Swan women federation</li> <li>▪ 1 district level women association</li> <li>▪ 55 plantation protection groups (PPGs)</li> <li>▪ 81 water user's groups (WUGs)</li> <li>▪ 75 production groups</li> <li>▪ 32 fisheries groups</li> </ul> </li> <li>- Activities related to Afforestation and Soil and Water Management             <ul style="list-style-type: none"> <li>▪ Afforestation in 12,456 ha of government and private lands</li> <li>▪ Soil and Water Conservation activities, which included construction of</li> </ul> </li> <li>- 18,331 small scale check dams</li> <li>- 560 large scale check dams (silt detention structures)</li> <li>- 23,849 m<sup>3</sup> spur and embankments</li> <li>- 362 ground sills             <ul style="list-style-type: none"> <li>▪ Construction of 130 water harvesting structures, having a capacity of 1,930,390 cum</li> <li>▪ Soil protection in 1,179 ha of damaged private land, and land reclamation in 325 ha damaged private land</li> </ul> </li> <li>- Strengthening of livelihoods             <ul style="list-style-type: none"> <li>▪ 254.830 million INR disbursed as grant and other assistance to 96 PDCs</li> <li>▪ Horticulture demonstration of fruit crops over an area of 116 ha</li> <li>▪ 391 animal health awareness camps organised</li> </ul> </li> </ul>	No.	Key Activities	Achievements	1	Strengthening of Nurseries:	10 nos.	2	Afforestation of Government Land by Government (including maintenance)	2,000 ha (no change)	3	Afforestation of Government Forests through JFM (including maintenance)	2,720 ha. (6,000 ha original)	4	Afforestation of Private Land (including maintenance)	4,150 ha (1,700 ha original)	5	Soil Protection Works in Government Forests and non-governmental forests	3,630 ha (4,000 ha original)	6	Brushwood and Small Scale Check Dams:	19,328 (3,301 original)	7	Silt Detention Dam (Large Scale Check Dam)	738 (50 original)	8	Spur and Embankment	8,500 mt. (14,100 mt. original)
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8	Spur and Embankment	8,500 mt. (14,100 mt. original)																											

No.	Items	Description
		<ul style="list-style-type: none"> <li>▪ Constructed 11,093 mangers, renovated 4,150 cattle-sheds and provided 5,964 chaff cutters</li> <li>▪ Planted 205,307 poplar trees in an area of 257.13 ha</li> <li>▪ 7.54 ha of land brought under lemon grass cultivation, potential to produce 255 quintals. Till date 21.27 kg of lemon oil has been extracted from 38.9 quintals of lemon grass.</li> <li>▪ 7.09 ha brought under kharif onion cultivation; 338 beneficiaries benefitted</li> <li>▪ 34 water bodies with surface area of 25.5 ha stocked with 491,100 fish seeds. Cage culture technique introduced on pilot basis in six water bodies. 32 fishery groups with 198 beneficiaries organised</li> <li>▪ 427 women SHGs associated with turmeric production; Swan Spices Unit being established in the project area</li> <li>▪ Construction of 95.14 km of village foot path, 639 roof-top rain water harvesting tanks, 32 foot bridges and renovation of 34 village ponds, as part of community infrastructure development activities</li> </ul> <p>- GIS being applied for effective planning, management and monitoring of interventions</p>
10	Issues	<p>- Sustainability of the Village Development Committee (VDC) created for project implementation; no government department recognised these projects created institutions, including the Forest Department – the key stakeholder in the project, and so they eventually became defunct after the project ended.</p> <p>- Exit strategy is not developed and decided prior to the completion of the project.</p>
11	Learning/ Good Practices	<p>- Memorandum of Understanding (MoU) consisting of rights and responsibilities of the main stakeholders such as the VDCs/user groups, Panchayat and Forest Department</p> <p>- Training of Forest Department and linkage of Community Forest Management Plan (CFMP) with Forest Management /Working Plan of the department</p> <p>- Building consensus amongst the community prior to plantation/ undertaking activities on a site; later successful plantations increased local community's interest and cohesion.</p> <p>- Identification of area, selection of species and design of plantations and adjustment of species to a given site and micro-sites according the needs of local communities/ users group</p>
12	Issues and Lessons which can be reflected in proposed Project	<p>- Quality and timely planted mixed plantations (i.e. in early monsoon, with good technical standards and right choice of species with local community's consent) are most effective to achieve rehabilitation and conservation objectives in a short span of time.</p> <p>- Protected plantations, even on the most degraded areas within few years enrich Biodiversity.</p> <p>- Grass production increases substantially after the plantation enclosure and has good economic potential (e.g. through sale of grass) if technical management interventions are timely.</p> <p>- Natural regeneration of various plants (e.g. medicinal herbs and trees, fruit species) enhances the economic value spontaneously.</p> <p>- Creation of Forest Management Plan, working with the community institutions, and building consensus amongst the community prior to plantation/ undertaking activities.</p> <p>- Signing of MoU between the key stakeholders and the Forest Department</p> <p>- Exit Policy be developed and disseminated at least one year prior to completion of a project so that all stakeholders concerned know well in advance about their roles, rights and responsibilities after the project.</p>

Sources: Compiled by JICA Study Team (2017) from the following websites:  
<https://www.giz.de/en/downloads/gtz2006-en-indien-changaRSchlussvaluierung.pdf>  
[http://www.india.diplo.de/contentblob/3159026/Daten/656035/DD\\_50yearbrochure.pdf](http://www.india.diplo.de/contentblob/3159026/Daten/656035/DD_50yearbrochure.pdf)  
[http://www.india.diplo.de/contentblob/3476630/Daten/2148968/EZ\\_Brochure.pdf](http://www.india.diplo.de/contentblob/3476630/Daten/2148968/EZ_Brochure.pdf)  
<http://www.punenvvis.nic.in/water/case4.htm>

### 5.2.5 National Social Forestry Project (World Bank/ USAID)

The National Social Forestry Project was the seventh Bank-assisted social forestry project in India that provided assistance to the GoI and four states, viz., Gujarat, Uttar Pradesh, Rajasthan, and Himachal Pradesh, which was jointly supported by USAID. Overall, the project aimed to increase production of fuel-wood, small timber, poles, and fodder; increase rural employment, farmers' incomes, and economic opportunities for landless people; afforest degraded areas and wastelands, and reduce soil erosion; and strengthen forestry institutions. The details of the project are summarised in **Table 5.2.5**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Planning process should be bottom-up. Community must be actively involved in planning process to have greater ownership.
- ◆ Commitment from the state government for continued financing support for the project initiatives.

**Table 5.2.5 Review of National Social Forestry Project (USAID)**

No.	Items	Description	
1	Financial Assistance	World Bank and USAID	
2	Implementation period	18-June-1985 to 31-March-1993; 27 months behind schedule	
3	Project Cost	<b>Total Project Cost</b>	<b>17.51 million €</b>
		German contribution	09.19 million €
		Indian contribution	08.32 million €
4	Project District(s)	--	
5	Project coverage/ area	The National Social Forestry Project was planned to aid the Government of India and four States, viz., Gujarat, Uttar Pradesh, Rajasthan, and Himachal Pradesh. This Project was intended to provide continuing assistance to two states, viz. Uttar Pradesh and Gujarat, to expand and improve social forestry activities started under earlier Bank-assisted projects, while it initiated investments in two states, viz. Rajasthan and Himachal Pradesh.	
6	Project Objective(s)	The project aimed at increasing production of fuel-wood, small timber, poles, fodder and other minor forest products; rural employment and incomes and opportunities for participation of landless persons; afforestation of degraded areas and wasteland; and strengthening forestry institutions through provision for additional staff, training, research and equipment.	
7	Project Components	The National Social Forestry Project was planned and implemented to provide both goods and services from forests and trees. It had two major components and several sub-components as follows: 1) Tree Planting activities - Private farm forestry - Public forestry on government and community lands - Experimental programmes – providing tree tenure for poor and landless farmers 2) Institutional Development, which included activities related to - Organisation - Policy - Research and studies - Technical assistance - Training and extension - Planning and monitoring and evaluation	
8	Implementation Arrangements	The implementation arrangements of the project were established within the framework of the existing institutions at Centre and the state levels. To provide better policy directions, the Social Forestry Support Office (SFSO) was established in the MoEF, GoI. The primary responsibility of SFSO was to undertake forestry sector reviews and analysis, and to develop sound sector policies. SFSO worked in close cooperation with the states and the state forest departments. In Himachal Pradesh, additional social forestry staff was added under each of the DFOs to support project	

No.	Items	Description
		implementation. At state level, Steering Committee headed by Forest Secretary was established that would meet at least once every quarter to review and provide directions on work priorities.
9	Major Achievements as of June, 2017	The following targets were achieved: <ul style="list-style-type: none"> <li>- 100,670 ha of plantations raised against proposed target of 112,833 ha (~90% target achievement)</li> <li>- The final figure on the date of completion, the project would spend ~655 million INR</li> <li>- Although separate staff has been provided at the field level, supervisory level the work is still managed by the territorial staff</li> </ul>
10.	Issues	<ul style="list-style-type: none"> <li>- The Village Development Committees (VDCs) could not evolve participatory mechanisms or bottom-up systems well for planning and management.</li> <li>- Lack of representation of local forest users and domination by the elite reduced the experiment to pro forma 'involvement' of the people. As ex-office member Secretary of the VDC, the FD forest beat guard formulated the integrated resource management plan (IRMP) for the village, leading to FD rather than community ownership.</li> <li>- The VDCs became defunct after the project completion; no attention was given to sustenance of the programme during the project period.</li> <li>- Training aspect were not given importance to the level required for the changed working.</li> <li>- The farm forestry could not be well established as without continued support and resolution of technical issues which affect productivity, sustainability of activities initiated through the project is uncertain.</li> <li>- Inadequate community involvement to have larger measure of responsibilities to protect and maintain the established plantations.</li> <li>- Vested departmental interests and traditional modes of operation were the biggest obstacles to promoting genuine community participation.</li> <li>- Absence of continued government financing support institutional facilities and incremental staff brought in by the project remain underutilised.</li> </ul>
11.	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- VDC were engaged in developing Integrated Resource Management Plans (IRMP)</li> <li>- Selecting the species to be raised with community consent and encouraging the villagers to raise Kisan nurseries.</li> <li>- Investment in training, especially overseas training is only warranted if linked to staffing plans which enable those who have been trained to apply their newly acquired skills.</li> <li>- Even resource poor farmers are prepared to commit land and labour to planting slow maturing forest tree species on significant scale in spite of lack of immediate benefits.</li> </ul>
12.	Issues and Lessons which can be reflected in proposed Project	<ul style="list-style-type: none"> <li>- Planning process should start from the lowest level of implementation. Community must be actively involved in planning process to have greater ownership whereas the forest department must play facilitative role and for extending continuous technical guidance.</li> <li>- Training has important intervention for capacity development. Policy must be in place for nomination and serving the project after training for a certain duration.</li> <li>- Commitment from the state government for continued financing support for the project initiatives.</li> </ul>

Source: Compiled by JICA Study Team (2017) from [http://pdf.usaid.gov/pdf\\_docs/XDABE511A.pdf](http://pdf.usaid.gov/pdf_docs/XDABE511A.pdf); <http://projects.worldbank.org/P009848/national-social-forestry-project?lang=en>

### 5.2.6 Himachal Pradesh Forest Sector Reform Project (DFID)

The details of the Himachal Pradesh Forest Sector Reform Project funded by DFID are depicted in **Table 5.2.6**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Community institutions of forest resource users can be empowered to address livelihood needs, particularly through linkages with local government, and other government departments

**Table 5.2.6 Review of Himachal Pradesh Forest Sector Reform Project (DFID)**

No.	Items	Description	
1	Financial Assistance	DFID	
2	Implementation period	2002~2006	
3	Project Cost	Total Project Cost	8.247 mil £ (Grant)
		DFID contribution	8.247 mil £ (Grant)
4	Project District(s)	Kullu & Mandi	
5	Project coverage/ area	85 pilot locations (Panchayats)	
6	Project Objective(s)	The main aim of the project was to establish and implement an integrated and cost-effective strategy for sustainable forest management and enhanced livelihoods of the poorest forest dependent women and men in Himachal Pradesh.	
7	Project Components	<p>The following five project components and outputs have been laid down:</p> <p><b>Output 1:</b> Developing a multi-stakeholder forest sector policy and strategy for Himachal Pradesh.</p> <p><b>Output 2:</b> Strengthening government, especially HPFD to enable them to provide integrated livelihood support mechanisms.</p> <p><b>Output 3:</b> Strengthening non-government institutions to enable them to provide integrated livelihood support mechanisms.</p> <p><b>Output 4:</b> Developing a cost-effective model for empowering and supporting the poorest forest dependent women and men to strengthen their own livelihoods.</p> <p><b>Output 5:</b> The dissemination of project experience and lessons through reports, process documentation, workshops and networks.</p>	
8	Implementation Arrangements	The project was implemented through the regular department structure working with VFDS adopting the PFM Regulations, 2001. The project selected five Panchayats in each of the eight territorial and three wildlife circles in the state.	
9	Major Achievements as of June, 2017	<ul style="list-style-type: none"> <li>- The state government has developed a Forest Policy, known as Forest Sector Policy and Strategy 2005 through a multi-stakeholder consultation process by the Policy Analysis and Planning Unit (PAPU) which was set up under the HP Forest Sector Reforms Project (HPFSRP) supported by DFID.</li> </ul>	
10	Issues	<ul style="list-style-type: none"> <li>- The post-project phase of HPFSRP is characterised by the abandoning of virtually all the pilot locations of community participation in the state; non-implementation of plethora of recommendations and reports generated during the project; and dismemberment of Policy Analysis and Planning Unit (PAPU) which was one the greatest achievement of this project.</li> </ul>	
11	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- Elaborate process for the micro planning was developed</li> <li>- The livelihood development model implemented through Women Saving &amp; Credit Groups (WSCGs) to initiate collective income generation activities.</li> <li>- WSCGs were federated at Panchayat Ward (village) level for microplanning, which in turn were to be part of a Panchayat based Micro Plan.</li> <li>- WSCGs served as a good tool for women empowerment, and get accepted as leader of Panchayats and as income earner for a household, areas which normally belonged to male fraternity.</li> </ul>	
12	Issues and Lessons which can be reflected in proposed Project	<ul style="list-style-type: none"> <li>- Community institutions of forest resource users can be empowered to address livelihood needs, particularly through linkages with local government, and other government departments</li> <li>- Micro Plans for execution of works to be formulated at Panchayat level.</li> </ul>	

Source: Compiled by JICA (2017) from <http://www.fao.org/docrep/008/af349e/af349e01.htm>

### 5.2.7 Central and State Schemes and Programmes

#### Sanjhi Van Yojiana (SVY) Scheme

The Sanjhi Van Yojiana (SVY) is a scheme basically for empowering people, and the communities to assume a greater role and responsibilities in management of the natural resources in the state. SVY was started in 2001 after merging various schemes such as Sanjhi Van Yojna Scheme of 1998, the Parisharam Hamara Van Hamara Scheme, 2000 and the Apna Van, Apna



Dhan Scheme (Gouri et al., 2004; HPFD, 2014). It gave 100% income from plantations and usufruct rights to people through local institutions and emphasised the involvement of women and other marginalised sections in the process of the management decisions. The scheme attempts to ensure improving planning and management skills of the communities and staff by adapting “a process approach”, which skills would become their lasting assets. The details of the scheme are indicated in **Table 5.2.7**.

The following issues and lessons can be reflected in the proposed Project:

- ◆ Thorough understandings and analysis on the dependence of natural resources of targeted beneficiaries for determining interventions.

**Table 5.2.7 Review of Sanjhi Van Yojna Scheme**

No.	Items	Description																												
1	Financial Assistance	State Government																												
2	Implementation period	The scheme shall be governed by the Participatory Forest Management (PFM) Rules, 2001																												
3	Project Cost	<p>The funding under Sanjhi Van Yojna scheme to the VFDSs for works to be carried out by them shall be made in the form of Grant-in-Aid (GIA) to the concerned society by the DFO concerned (GIA shall be governed and regulated as per the GIA Rules notified vide Notification No. FFE-B- (G)9-6/99 dated 31.05.2000) The GIA shall be deposited in the bank account of the VFDS and unspent funds shall be allowed to roll over to the next financial year.</p> <p>The statement of annual plan of operations under various micro plans shall be submitted by the DFOs to their respective Conservators, who shall scrutinise these APOs vis-à-vis Micro plans submitted to them and shall allot the budget accordingly. Component wise allocations shall be made as per the ratio proportions given in the following table.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>No.</th> <th colspan="2">Key Activities</th> <th>Proportion of Budget</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Lump sum</td> <td>Preparation of Micro Plan (MP)</td> <td>5,000 INR/ for each MP</td> </tr> <tr> <td rowspan="3">2</td> <td rowspan="3">Micro plan activities. (80%: 15% is to be contributed by the VFDS)</td> <td>Plantation including grasses, NTFPs</td> <td>60%</td> </tr> <tr> <td>Soil &amp; water conservation</td> <td>15%</td> </tr> <tr> <td>Income Generation Activities</td> <td>25%</td> </tr> <tr> <td rowspan="5">3</td> <td rowspan="5">Departmental Expenditure (20%)</td> <td>Establishment of nursery</td> <td>50%</td> </tr> <tr> <td>Trainings</td> <td>20%</td> </tr> <tr> <td>Workshops</td> <td>10%</td> </tr> <tr> <td>Monitoring</td> <td>10%</td> </tr> <tr> <td>Contingencies</td> <td>10%</td> </tr> </tbody> </table> <p>In the first and second year of the execution of the scheme, emphasis shall have to be placed on the initial processes of establishing nurseries, preparation of the MPs, soil and moisture conservation measures, workshops, and training. Accordingly, in the first two year of the scheme, the budget allocation shall be at variance.</p>	No.	Key Activities		Proportion of Budget	1	Lump sum	Preparation of Micro Plan (MP)	5,000 INR/ for each MP	2	Micro plan activities. (80%: 15% is to be contributed by the VFDS)	Plantation including grasses, NTFPs	60%	Soil & water conservation	15%	Income Generation Activities	25%	3	Departmental Expenditure (20%)	Establishment of nursery	50%	Trainings	20%	Workshops	10%	Monitoring	10%	Contingencies	10%
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		Workshops	10%																											
		Monitoring	10%																											
		Contingencies	10%																											
4	Project District(s)	Kullu and Mandi (shall be extended to other areas subsequently)																												
5	Project coverage/ area	<ul style="list-style-type: none"> <li>i. To begin with the existing 364 VFDSs and 153 VFDCs formed earlier under the Sanjhi Van Yojna and the Himachal Pradesh Forestry Project in Kullu and Mandi shall be brought under the umbrella of this scheme;</li> <li>ii. The scheme shall be extended to other areas subsequently.</li> <li>iii. In tribal areas of the state the scheme shall be implemented from the current financial year i.e. 2001-02.</li> </ul>																												
6	Project Objective(s)	<ul style="list-style-type: none"> <li>i. Involvement of grass root level institutions such as gram panchayats, mahila mandals, yuvak mandals, schools, Village Forest Development Societies (VFDS), NGOs, etc. in eco-restoration</li> </ul>																												

No.	Items	Description
		<ul style="list-style-type: none"> <li>ii. Regeneration of degraded forest area through community involvement</li> <li>iii. Creation of social assets for the benefit of the communities</li> <li>iv. Increasing productivity of the forest area by improvement of nursery stock through adoption of modern nursery techniques</li> <li>v. Re-orientation of the forest staff for facilitating community participation</li> <li>vi. Generation of employment opportunities rural area</li> <li>vii. To bring more area under tree cover by encouraging rehabilitation/plantations of private wastelands on cost/benefit sharing basis</li> </ul>
7	Project Components	<p>The following are the key project components;</p> <ul style="list-style-type: none"> <li>- Plantation (including grasses/NTFPs)</li> <li>- Soil and water conservation</li> <li>- Income generation activities</li> <li>- Establishment of nursery</li> </ul> <p>It also should be noted that the Process Approach has been adapted for Participatory Forest Management, so that the Sanjhi Van Yojna scheme shall not be target driven, rather proper and adequate methods of community organisation and management are followed for the long-term success and the sustainability of the village level institutions. Thus, normally in the first year where the scheme is introduced, major emphasis shall be on the systematic and sequential formation of VFDSs, training of staff, CBOs and community members. Towards the end of the first year, a well-documented but simple and understandable micro-plan needs to be ready for approval and implementation during the next year. The procedure for approval of micro-plans as laid out in the PFM processes must be strictly followed.</p>
8	Implementation Arrangements	<p>The scheme shall be governed by the PFM Regulations, 2001 promulgated vide Notification No. Fts.II (B)15.10.87 dated 23.08.2001. Responsibilities and duties of HPFD and VFDS are as follows.</p> <p><b>Responsibilities and Duties of HPFD:</b></p> <ul style="list-style-type: none"> <li>- To recognise VFDS in letter &amp; spirit and give full weightage to its recommendation</li> <li>- To explain contents of the MP to the VFDS members</li> <li>- To provide technical know-how to the Executive Body to carry out its responsibilities</li> <li>- To honour commitments made with the VFDS</li> </ul> <p><b>Responsibilities and Duties of VFDS:</b></p> <ul style="list-style-type: none"> <li>- To maintain the physical assets created for the VFDS concerned. For plantations, however, the forest department shall continue to supply planting material to the VFDS on demand, free of cost for three years including the year of plantation. Thereafter, for any more supply of plants price shall be charged from the VFDS.</li> <li>- In order to encourage social fencing, funds that are normally spent on fencing, including cost of materials, shall be made over to the VFDSs. The VFDS 's shall then be free to use this money for protection of the plantations as they deem fit.</li> <li>- To inform HPFD about forest offenders including encroachments</li> <li>- To persuade villagers to give available area for plantations</li> <li>- Just and fair distribution of usufruct</li> <li>- Settlement of disputes among the VFDS members</li> </ul>
9	Major Achievements as of June, 2017	<p>To solicit community, cooperation entry point activities, such as water harvesting and its use for irrigation/drinking purposes were introduced. Total of 687 VFDS were formed including 153 formed in HPFS (Kullu &amp; Mandi). Substantial budget support was provided. During 1998-99 around 7.52% budget was allocated for SVY. The scheme was operationalised in 1998-99 and detailed guidelines developed for VFDS formation, Micro plan preparation, Entry Point Activities, Fund Flow, Sharing mechanism etc (Scheme Booklet).</p>
10.	Issues	<ul style="list-style-type: none"> <li>- This continued to function for next 5-6 year and there after funding was stopped or funds were used not through VFDS.</li> <li>- Data available for the last three year shows that outlay in the scheme has been toned down and funds are used for educating the masses and creating awareness amongst all stakeholders regarding forestry and environmental concerns through celebrating Van Mahotsava at State, Circle and Division levels and Plantations through school/college students.</li> </ul>
11.	Learning/ Good Practices	<ul style="list-style-type: none"> <li>- The SVY has been implemented following the principle that forest communities should be motivated to identify themselves with the development and protection of forests from which</li> </ul>

No.	Items	Description
		their requirements of the fuelwood, fodder and small timber such as house building material are met.
12.	Issues and Lessons which can be reflected in proposed Project	- One of the essentials of forest management is the involvement of the forest dependent communities, however, it should be carefully analysed the dependence of natural resources in the targeted districts and also, continuous commitment of the state government is required to encourage the participation of the local communities

Source: Compiled by JICA Study Team (2017) from SANJHI VAN YOJNA SCHEME - 2001 GOVERNMENT OF HIMACHAL PRADESH DEPARTMENT OF FOREST File No FFE-C (9).1/2001 Dated 23.8.2001 Notification, Policy influences on forest-based livelihoods in HP, Gouri, Sushil Mudgal, Elaine Morrison and James Myers (2004), IIED, and <http://hpforest.nic.in/files/Sanjhi%20Van%20Yojna.Pdf>,

### 5.3 Reviews of Pipeline Projects

#### 5.3.1 Himachal Pradesh Forests for Prosperity Project (World Bank)

This project intended to ensure an increase in the green cover and protection of environment and cover major activities like fuelwood plantations, improving forest products and participatory forests management. The review of the project is summarised in **Table 5.3.1**. Currently, the project has overlaps in terms of target areas with the proposed JICA Project. Shimla district and Pangi/ Bharamour sub-divisions of Chamba districts are overlapping.

**Table 5.3.1 Review of Himachal Pradesh Forests for Prosperity Project (WB)**

No.	Items	Description
1	Financial Assistance	The World Bank (WB)
2	Implementation period	2017 ~ 2022; 5 years,
3	Project Cost	<b>Total</b> <b>200 mil USD</b>
		IDA/ IBRD                      150 mil USD
		State                              50 mil USD
		Beneficiary                      Nil
4	Financial Arrangements	Results based disbursement – first of its kind in the country for forestry sector;
5	Project District(s)	Una, Kangra, Hamirpur, Solan, Shimla, Sirmour, Chamba (including tribal area of Pangi & Bharmour)
6	Target population/ Group	Forest dependent rural households, residents and visitors to the state
7	Project Objective(s)	The current project is follow-up to the recently concluded project on development policy financing to the state for the policy and institutional reforms to support inclusive green growth and sustainable development.
8	Project Components	The project components are: - Forest Management (i) Production and Protection Forestry, (ii) Non-Timber Forest Product: 3,500 mil INR - Nature-based Tourism Industry: 1,000 mil INR - Ecosystem services to Hydro Power Plants: 3750 mil INR - Technical and Institutional Capacity, Innovative Approaches: 1,000 mil INR - Project Management (including Administrative Cost): 750 mil INR
9	Implementation Arrangements	The project will be implemented by HPFD in collaboration with the relevant sector departments like hydropower, tourism, irrigation, water supply and rural development. A centralised coordinated Project Implementation Unit will be constituted for smooth functioning across the participating departments.
10	Key highlights	HP is the first state in the country to pilot cash transfers under the Land Area Development Fund. Forests also help to determine central government revenue allocations to the state, as per the 14 <sup>th</sup> Finance Commission 7.5% of the share of tax revenue will be allocated on the basis of a state's forest cover. HP was allocated only 2.43% of the 7.5% allocations.

Source: Compiled by JICA Study Team (2017) from Project Concept Note: HP Forests for Prosperity

### 5.3.2 Catchment Treatment for Source Sustainability and Climate Resilient Rainfed Agriculture (World Bank)

The details of the “Catchment Treatment for Source Sustainability and Climate Resilient Rainfed Agriculture” funded by World Bank are depicted in **Table 5.3.2** as follows. This in pipeline project is regarded as a successor project of the Mid-Himalayan Watershed Management Project.

**Table 5.3.2 Review of Catchment Treatment for Source Sustainability and Climate Resilient Rain fed Agriculture (WB)**

No.	Items	Catchment Treatment for Source Sustainability and Climate Resilient Rain fed Agriculture (CTSS-CRRA)
1	Financial Assistance	The World Bank (WB)
2	Implementation period	2017 ~ 2024; seven years
3	Project Cost	<b>Total</b>   <b>1,580 mil INR (240 mil USD)</b> <b>(According to HPFD to be down-sized to half)</b>
		IDA/ IBRD   1,270 mil INR (192 mil USD)
		State   310 mil INR (48 mil USD)
		Beneficiary   Nil
4	Financial Arrangements	The project will follow 80:20 cost sharing norm between IDA/ IBRD and the state govt. It will also leverage financial resources through the on-going projects and programmes of the state and central govt.
5	Project District(s)	400 Gram Panchayats in Shivalik and Mid Hills agro-climatic zones spread across various watersheds in the state
6	Target population/ Group	Farmers, landless poor, other inhabitants in the catchment / watershed / sub-watershed villages. Project will reach and benefit all stakeholders in the project area.
7	Project Objective(s)	The project development objective of the project is to improve climate resilience around springs and streams in selected catchments and Gram Panchayats areas leading to: <ol style="list-style-type: none"> <li>a) Source Sustainability and Catchment Treatment – for climate resilient water infrastructure</li> <li>b) Water source mapping and monitoring</li> <li>c) Enhanced carbon stocks (above and below ground) – both in arable and non-arable lands</li> <li>d) Innovation, diversification and transformation rainfed production systems, including post-harvest supply chain management</li> <li>e) Inclusive growth with special emphasis on climate co-benefits in agriculture and forestry sectors</li> <li>f) Piloting on small scale, Green Financing through Bonds (Climate Bonds) or other instruments to test models which can work in Indian markets for long term financing of Green projects with private sector engagement in order to meet and raise ambitious mitigation targets</li> <li>g) In consonance with the stated policy of the State govt., the project will work towards carbon neutrality. Low carbon technologies will be preferred and carbon budgeting will be factored in while making decisions and technology choices. Renewable Energy model on-grid and off-grid will be tested.</li> <li>h) Project will endeavour to use modern scientific tools of Remote Sensing and GIS for watershed development planning, monitoring and decision support systems.</li> <li>i) Project will give special focus on coping strategies for climate change mitigation through field research, studies and best practices documentation.</li> <li>j) Payment of Ecosystem Services (PES) and complexities on interactions of upstream –downstream communities will be attempted on pilot basis.</li> </ol>
8	Project Components	The project has four main components: <ol style="list-style-type: none"> <li>a) Institutional Development – (a.1) Inclusive Development</li> <li>b) Ensure Source Sustainability – (b.1) Hydrological Monitoring, (b.2) Carbon Sequestration around sources, (b.3) Piloting models (on small scale) Green Financing (Climate Bonds), Carbon Budgeting (Footprints) and Renewable Energy Use (on/ off grid)</li> <li>c) Rainfed agriculture and post-harvest supply chain development – (c.1) Livestock development and processing, (c.2) selected high value commodity and its supply chain development</li> <li>d) Project Management and Capacity Building</li> </ol>
9	Implementation Arrangements	The project will be implemented by the HP Natural Resource Management Society (HP NRMS) registered under societies Registration Act, 2006 and has experience of implementing HP Mid-Himalaya Watershed Development Project (HP MHWDP). HPFD will be the nodal department supported with other line departments.

No.	Items	Catchment Treatment for Source Sustainability and Climate Resilient Rain fed Agriculture (CTSS-CRRA)
10	Key highlights	HP Bio Carbon Project wherein carbon credits have been distributed to the user group and Gram Panchayats under Clean Development Mechanism (CDM) under Kyoto Protocol.

Source: Compiled by JICA Study Team (2017) from Project Concept Note: Catchment Treatment for source Sustainability and Climate Resilient Rainfed Agriculture

### 5.3.3 Green India Mission

The Green India Mission (GIM) is one of the eight national missions as announced by the prime minister of India under the National Action Plan on Climate Change (NAPCC) in 2008. The main objectives are to address the issue of climate change through the enhancement of carbon sinks in the India's forests and attempt simultaneously to increase resilience capacity of the forest ecosystem as well as forest dependent communities' capacities for adaptation in the face of climatic vulnerability. Double the area under the flagship mission has been planned to be taken up in the next ten years between 2010-11 and 2019-20 for afforestation and eco-restoration activities through strengthening local community institutions such as JFM. The proposed Mission costs 440,000 mil INR for 'greening' 10 million ha in India.

In HP state, 458 landscapes (L2: covering area of 10,000 to 20,000 ha) have been prioritised for GIM, perspective plans covering 34 landscapes has been sent to GoI, but the plans are not approved yet as of 2017-18. Within 34 L2 landscapes, 40 micro plans have been prepared for smaller landscapes (L3: covering mini-micro watersheds of 500 to 1,000ha).

Further details of the GIM are elaborated in **Attachment I.5.3.1**.

## CHAPTER 6 ISSUES AND LESSONS LEARNED FROM FOREST MANAGEMENT IN THE STATE

### 6.1 Overview of Forest Management and Livelihood Status in HP

Based on the findings as well as reviews of forest management and livelihood status of HP, issues and lessons which can be reflected in the proposed Project are summarised in this chapter. The overall reviews of the forest management and livelihood status in HP are described in **Table 6.1.1**. Specific issues and lessons learned are described in sections followed.

**Table 6.1.1 Overall Reviews of Forest Management and Livelihood Status in HP**

Issues and Features	Description
<p><b>1. Application of JFM/PFM approach as well as definition of JFM/PFM areas differ among projects/schemes</b></p>	<ul style="list-style-type: none"> <li>- JFM/PFM related interventions in HP have been supported by various projects and mixture of village level institutions under different names (VDC, VFDC, VFDS, and JFMC) of similar nature have been established.</li> <li>- Therefore, both the national level JFM guideline and the state level PFM regulation provide the fundamentals of JFM/PFM approaches in HP. However, their applications at field varied from project to project.</li> <li>- In most of the past project/schemes, JFM/ PFM treated areas were recorded or demarcated, but JFM/PFM areas beyond treated areas were not demarcated or recorded.</li> <li>- Definitions of JFM/PFM areas (beyond treated areas), varies among projects/schemes, which ranges from forest areas within revenue village, ward, gram panchayat, or entire ward/ gram panchayat. This may have been the results of different kinds of rights endowed to people in various forest settlement reports determined in respective princely states (prior to formation of HP).</li> <li>- Compared to other states, the treatment (treated) area to each JFM/PFM institution seem to be smaller and not more than 30 ha.</li> <li>- JFM/PFM areas could be scattered and fragmented which may downgrade the efficiency and effectiveness of interventions.</li> </ul>
<p><b>2. Not much strong relationships among poverty, forest dependency, and forest degradation are observed in HP</b></p>	<ul style="list-style-type: none"> <li>- There are high demands for the fuelwoods (especially for heating during winter) and other forest resources. There has been an increase in the demand for fuelwood according to the Forest Development Corporation statistics. But at the same time, many households have other sources of energy for cooking and other household requirement and reduced dependency on fuelwood.</li> <li>- Many communities have varieties of livelihood options (i.e. government;/ private sector work) and access to commercial facilities (bank, etc.). However, Lahaul &amp; Spiti and a part of Kinnaur have limited access to amenities including means of communication. Especially during winter, the life in the areas is generally met with severe challenges as the lifeline gets affected by the snow and freezing temperature.</li> <li>- In HP, though there may be areas/ communities which rely exclusively on forests, there is a tendency that forest dependents or users of forest resources are not always relying to the forest for daily survival.</li> <li>- In the surveyed households, the survey results indicated that the income level of the ST households was the highest compared to other social groups, which was also reflected in the field observation. It was difficult to conclude the clear linkage between the social group and economic marginalisation.</li> <li>- In some part of the state (Kinnaur etc.), ST households could be hiring labourers to collect fuelwoods and other forest resources for their domestic consumptions and other purposes.</li> <li>- In consideration of the above, compared to other states, a vicious cycle of forest degradation by forest dependent communities<sup>1</sup> which is one of the key justifications of JICA forestry sector projects in India appears to be very limited in HP. Rather, necessity of improvements of forest conditions/ health without strong linkages with poverty, forest dependency, and forest degradation seems to be more relevant.</li> </ul>

<sup>1</sup> Poor households having no alternative sources of livelihood other than forest resources and heavily relying on forest and forest resources for daily survival that have been regarded as the ones significantly impacting on the forest resources and thus caused further forest degradation.

Issues and Features	Description
<p><b>3. Tendency that the JFM/PFM approach and livelihood activities closely related to JFM/PFM institutions are not fully applicable in HP (in comparison to other states)</b></p>	<ul style="list-style-type: none"> <li>- In general, in HP, people and communities surrounding the forest areas already have some kinds of rights and access to forest areas and forest resources. This is more prevalent than in the other states.</li> <li>- Since benefits from the forest are available as their entitlement, JFM/PFM seen in other states will not always give incentives for forest resource management for people and communities in the forest fringe areas.</li> <li>- In consideration of existing livelihood conditions of many, the kind of investment required to further improve on the livelihood situation could be significant and may not be feasible within the scope of the proposed Project.</li> <li>- In the case of NTFP based livelihoods, though not many are engaged in these days, potential can be seen in improving the post harvest technologies and ensuring sustainable harvesting methods.</li> <li>- The seasonal variations in livelihood vulnerability need to be looked into along with gender issues in grassland/ pasture utilisation.</li> <li>- Lahaul &amp; Spiti with lack of forest and grassland, households need to procure their requirement from outside of the area. This increases further vulnerability of the households as their livelihoods options are limited since the area is remote and less accessible.</li> </ul>
<p><b>4. Quantified data explaining increase of forest degradation is not fully available</b></p>	<ul style="list-style-type: none"> <li>- As a general description, degradation of forest areas and their resources of the state are often raised. However, there is not much of detailed quantified data which indicate the changes in the status of forest degradation.</li> <li>- Rather forest cover is gradually increasing as per data and analysis from FSI data.</li> <li>- On the other hand, there are statistical data for illicit felling, forest fires, encroachment, etc.</li> <li>- HPFD recognises forests having crown density under 70% are eligible for forest improvement. Improvement of moderately dense forest (crown density 40%~70%) to higher crown density is one of priorities. However, forests site specific breakups of crown density within moderately dense forest are not fully available within HPFD.</li> </ul>
<p><b>5. Nearly half of notified forest areas in HP are without tree cover. 57% of notified forest area is not demarcated.</b></p>	<ul style="list-style-type: none"> <li>- Notified forest area in HP is 37,033km<sup>2</sup> and this represents 67% of total geographical area of the state.</li> <li>- 44% of notified forest area (16,376km<sup>2</sup>) is without forest/ tree covers and dominated by the permanent snow or glacier (unculturable forest area).</li> <li>- According to the HP Forest Sector Policy and Strategy 2005, majority of these unculturable forest areas will continue to be managed as glaciers, permanent snow and alpine pastures.</li> <li>- Approximately 57% of notified forest area in the state (21,293km<sup>2</sup>: 38% of total state geographical area and 59% of notified forest area managed by HPFD) is either un-demarcated protection forest or un-classified forest and their boundaries are not demarcated.</li> <li>- Existence of many un-demarcated forests makes it difficult to detect forest offences/ encroachments and increase risks of conflicts and forest offences.</li> </ul>
<p><b>6. Necessity for further biodiversity conservation and management in the state</b></p>	<ul style="list-style-type: none"> <li>- The state is rich in fauna and flora.</li> <li>- There are 31 protected areas in HP. Approximately 15% of state's geographical area is under protected area (8,358 km<sup>2</sup>). Size and numbers of protected areas are in mass-scale.</li> <li>- However, some protected areas are isolated.</li> <li>- There are further needs for biodiversity conservation and management outside of protected areas (including human-wildlife conflict measures) .</li> </ul>
<p><b>7. There were many externally aided projects and centrally sponsored schemes having similar activities</b></p>	<ul style="list-style-type: none"> <li>- Many externally aided projects adopting JFM/PFM approach have been implemented in HP since 1990s.</li> <li>- Securing sustainability and continuity of these JFM/ PFM have been the challenge in most of the past interventions.</li> <li>- KfW project using the JFM/PFM approach is already implemented in Pangi/Bharmour sub-divisions under Chamba district, which divisions were proposed to be covered under this project.</li> <li>- Two World Bank projects are in-pipeline. Of these, one would mainly deal with treatment of stream bank and rainfed agriculture, whereas the other would mainly deal with improvement of forest areas. Shimla district and Pangi/Bharmour sub-divisions of Chamba district are overlapping with the proposed Project.</li> </ul>
<p><b>8. Limitations in accessibility and activity period</b></p>	<ul style="list-style-type: none"> <li>- Due to snow and other climatic factors, majority of proposed project areas (Lahul &amp; Spiti, Kinnaur, Chamba, etc.) have seasonal limitations for undertaking various project activities (including livelihood activities) and access in and out.</li> <li>- Depending on the regions, field activities and travelling would not be feasible during winter (4-6 months in a year).</li> </ul>

Issues and Features	Description
	<ul style="list-style-type: none"> <li>- Remaining months of years are spent for livelihood and income generation activities.</li> <li>- In consideration of the above, time available for the proposed project interventions will be limited and tend to overlap with other existing activities.</li> </ul>
<p>9. <b>Tendency for longer duration required for raising seedlings</b></p>	<ul style="list-style-type: none"> <li>- Majority of seedlings raised by HPFD require nursing period of two years and above. This is relatively longer period compare to other states in lower areas having nursing period of 3 months to 1 year.</li> <li>- Furthermore, the state promotes “tall plants” which require longer nursing period of 3.5 years and above to secure large seedlings. Most of species require a maximum of 3.5 years but some species such as <i>Fraxinus spp.</i> require around 5 years.</li> <li>- For project implementation, the duration required for seedling raising shall be taken into account for the implementation schedule. Also, this factor may limit total quantities of seedling which can be produced and total areas which can be taken up in the Project.</li> </ul>

Source: JICA Study Team (2017)

## 6.2 Forest Administration

### 6.2.1 Institutional Setup

If all the projects in pipeline, including the one in the forestry sector, comes through, it is likely that there would be overlap of institutional responsibilities, particularly for forestry sector projects at circle and division level. Also, most of the externally aided projects that are implemented adopting the autonomous society model, will require to create functional institutional set-ups at various levels for management and decision making during the project duration. Thus, at the apex level, requirements would arise either quarterly or semi-annually to review the project performance. These responsibilities would be multiplied with the number of projects being handled by the state across the sectors.

Indirectly, responsibilities would also come at district administration and line departments for inter-sectoral convergence and coordination. Also, since the unit of implementation for some of the components would be Gram Panchayat/ villages, lots of synergy and coordination is required to execute the planned interventions.

In the state, HPFD has gained substantial experience in implementing externally aided projects (EAPs), but at the same time the projects have not made demonstrative success in sustaining the lowest level institutions. Involving communities would require sufficient time to be invested to undertake the project process in addition to their routine works and livelihood activities. Thus, one has to carefully plan the involvement of communities while proposing the interventions. Creation of multiple community institutions may also be deterrent to sustainability of efforts.

### 6.2.2 Human Resources

One of the up-coming challenge with the HPFD would be to provide dedicated human resources at the project management and implementation level. Forest Department is already occupied with a number of administrative and regulatory functions, particularly at divisional and range level. On the other hand, to ensure for the project to achieve the intended outcomes, additional quality time from the existing staff is required. At the operational level, some of the experienced and



capacitated human resources, who were engaged during previous EAPs, are already available with HPFD.

The state is also facing a pressure to continuously engage such human resources and the Himachal Pradesh Natural Resource Management Society (HPNRMS) was created as an autonomous society, registered under Societies Registration Act, 1860, to implement the World Bank assisted HP Mid-Himalayan Watershed Development Project and continues to function even after closure of the project on March 31, 2017. After the completion of the project, HPNRMS houses such human resources those worked as contractual and daily wage staffs at various capacities and positions in different projects such as HPMHWDP (The World Bank), Swan River Project, Una (JICA); Kandi Project I & II (The World Bank) and Indo-German Changar Project (GIZ).

All such experienced project staff would now be deployed through HPNRMS for various upcoming projects. (Refer Notification no. FFE-A(B)2-9/2016 dated Shimla-2, the April 19, 2017).

### **6.2.3 Training Mechanism**

For any time bound and process oriented project interventions, foremost requirement is to have trained human resources. Even if the human resources already possess required skills and experiences prior to the project commencement, still training is needed to align with the project processes and to achieve the results within the stipulated timeframe. For efficient project management, the most required areas where the trainings are very useful across all stakeholders are communication skills, inter-personnel relationships and conflict resolution, participatory techniques, microplanning, documentation and reporting, GIS, MIS and M&E.

Although HPFD has well established systems of conducting induction and refresher trainings, periodicity of getting trained after the initial induction training is quite long. Majority of the forest staff, particularly at the range level and below get very few chances in their entire service tenure to adequately get trained on the latest subjects, policies/ acts etc. Forest manual is also not being accessible to all.

In the absence of sound training calendar for the frontline staff, process followed for identification of nominee is not robust to select the right candidate. Thus, the overall training strategy needs to be well developed so that the capacity development activities can effectively nurture the capacity of the frontline staff in a timely manner.

### **6.2.4 Information Technology**

#### **(1) Geographical Information System (GIS)**

Some of the major issues and lessons learned with respect to use of GIS in forest/ ecosystem management in the state are elaborated below:

i. JFMC Boundary Survey

In HP state, presently overall JFMC boundaries of only 40 JFMCs are available with IT lab of HPFD out of 1,562 registered JFMCs in the state. The boundaries of 40 JFMCs were recently digitised by the IT cell of HPFD for preparation of micro plans under GIM. As stated in **Section 6.1**, only treated (treatment) areas are recorded in most of existing JFMCs. And as of now, there is no uniform definition for overall JFM/PFM areas defined in HP and interpretations of JFM/PFM areas differ among projects/schemes. Also, there are often cases that various right holders from different communities, villages, etc. exist in the same forest area. These may be one of the reasons which JFM/PFM boundaries were not confirmed up to now, except for the direct intervention areas.

ii. Quality Control and Quality Assurance

Quality control and quality assurance is very critical activity in GIS data creation and analysis and need to be an integral part of data management. Edge matching of forest compartment boundaries for respective divisions need to be looked into in detail. For the forest boundaries data completed by HPFD, there are overlaps and voids that needs to be rectified for seamless data creation. **Table 6.2.1** summarises status as well as issues of forest boundary digitisation

**Table 6.2.1 Status of Digitisation of Forest Compartment Boundaries in HP (March 2017)**

No	Name of Circle	Territorial Division	Status	Whether validated by DFO?	Remarks (based on the QC/QA of the data supplied by HPFD to the JICA Study Team)
1	Chamba	Chamba	Completed	No	
2		Churah	Completed	No	
3		Dalhousie	Completed	No	
4		Pangi	Completed	No	
5		Bharmaur	Completed	No	
6	Mandi	Karsog	Completed	No	Edge Matching error with Suket
7		Mandi	Completed	No	Edge matching error with Nachan, Parvati
8		Jogindernagar	Completed	No	
9		Nachan	Completed	No	Edge matching error with Mandi
10		Suket	Completed	No	Edge matching error with Bilaspur, Karsog
11	Dharamshala	Dharamshala	Completed	No	
12		Nurpur	In Progress	No	
13		Palampur	In Progress	No	
14	Hamirpur	Hamirpur	Completed	No	
15		Dhera	In Progress	No	
16		Una	Completed	No	
17	Shimla	Shimla	Completed	No	Edge matching error with Theog, Shimla, Rampur
18		Thwog	Completed	No	Edge matching error with Chopal
19		Chopal	Completed	No	Edge matching error with Theog
20		Rohru	Maps not received	No	
21		Shimla (Urban)	Maps not received	No	
22	Rampur	Rampur	Completed	No	Edge matching error with Theog
23		Ani	In Progress	No	
24		Kinnaur	Maps not received	No	
25		Kotgarh	In Progress	No	
26		Renuka	Completed	No	

No	Name of Circle	Territorial Division	Status	Whether validated by DFO?	Remarks (based on the QC/QA of the data supplied by HPFD to the JICA Study Team)
27	Nahan	Nahan	In Progress	No	
28		Rajgarh	In Progress	No	
29		Solan	Completed	No	
30		Paonta Sahib	In Progress	No	
31	Bilaspur	Bilaspur	Completed	No	Edge matching error with Suket
32		Nalagarh	Completed	No	
33		Kunihar	In Progress	No	
34	Kullu	Kullu	Completed	No	
35		Banjar	In Progress	No	Edge matching error with Parvati
36		Parvati	Completed	No	Edge matching error with Banjar, Mandi
37		Lahaul	Maps not received	No	

Source: Compiled by JICA Study Team (2017) based on information from HPFD

### iii. Field Validation/ Verification

Field validation of the digitised boundaries of the forest divisions is yet to be done by the DFO's of the respective divisions. For field verification of these boundaries, it is recommended that all the existing maps along with the digitised boundary maps need to be verified in the field using GPS instrument for better positional accuracy and geographical areas.

### iv. Realignment and Rationalisation of Boundaries

Currently there are forest areas that are excluded from the wildlife sanctuaries. These "excluded areas" (polygons in GIS admin boundaries) need to be either merged with the neighbouring forest administration unit's polygon or, if new forest administration unit is created out of it, needs to be depicted accordingly in GIS data layer for clarity and true reflection of ground situation.

### v. Perimeter Survey of Plantation/Intervention Areas

The data regarding GPS based perimeter survey of intervention areas is kept with the respective project office/schemes rather than being maintained at HPFD headquarter level with GIS cell. Presently, there is no centralised mechanism of maintaining GIS database with the GIS Cell covering final versions of perimeter surveyed boundary data of all intervention areas under different projects/schemes of HPFD. There is a need to prepare centralised database at the headquarter level so that the information is readily available at the centre as well as to avoid data loss.

### vi. Field Survey Method

At present the field based surveys are done using hand held GPS instruments. Other details are recorded in paper based formats. The location based GPS data collected from the field is either directly downloaded from the GPS instrument on a desktop. Alternatively, if coordinates are recorded in a paper form, the recorded data is to be converted to location points and plotted/imported. Other associated non-spatial information recorded in the field is again converted from paper based forms to digital formats. This whole process takes time to be ready for meaningful use and the detailed information is always kept at the lowest unit of implementation. There is a need to have a system/mechanism by which the data (both spatial and

non-spatial) is collected in systematic uniform formats in near real-time basis and is stored in a centralised database server.

Brief summary of the GIS data layers along with identified issues and recommendations are elaborated in **Table 6.2.2**. Area variation status of protected areas is presented in **Attachment I.6.2.1**.

**Table 6.2.2 GIS Data Layers: Key Issues and Recommendations**

No	GIS Layer	Status	Details as per GIS	Issues	Recommendation
1.	Forest Compartment Boundaries (RF/PF/UPF)	Completed	23 Divisions	Out of 23 Divisions for which data is created none was validated in the field by the DFO/Division till date	Field validation is necessary for correctness/accuracy and must be completed soon.
		In Progress	10 Divisions		
		Maps not Received	4 Divisions		
2.	Forest Admin Boundaries (Circle, Division, Range, Block, Beat)	Circle (polygons)	9 Terri., 3 WL	In the GIS data, certain polygons are marked as 'excluded'. (Excluded Polygons = 16 in Division file, 19 in Range, 20 in Block and 19 in Beat file)	Based on notification, such polygons to be either merged with existing admin unit or if newly created then proper name to be incorporated in GIS
		Division (polygons)	37 Terri., 8 WL		
		Range (polygons)	164 Terri., 34 WL		
		Block (polygons)	501 Terri., 72 WL		
		Beat (polygons)	1,846 Terri., 130 WL		
3	Protected Areas	All Protected Area (polygons)	5 NP, 2 CR, 26 WLS	There is difference in the area reported and area as per GIS shape file	Major variation in the area reported versus GIS area need to be properly validated

Source: Prepared by JICA Study Team (2017)

## (2) Management Information System (MIS)

HPFD has developed several MIS systems (described in **Part I, Section 4.2.7**). All systems are web enabled and cater to the need of various functioning of HPFD. Some of the highlighting points, major issues with regard to data and IT initiatives noticed under various schemes and projects along with recommendations are described in the following section.

### i. Integrated Forest Management System (IFMS):

MIS is very much required for systematic and timely storage of valuable information with respect to the progress of activities. But developing MIS system is a very tedious and time intensive exercise. Also, operationalisation of the systems is another area which requires a lot of time and effort in the form of trainings and capacity building of the staff (specifically field staff) in understanding the system, familiarisation with functionalities and utilising it for timely data recording, reporting etc. Due to this reason, one must strengthen the existing centralised systems in place, fill in the gaps by adding required modules first rather than developing completely new systems for every scheme/project. The web based IFMS system in place does cater to the need of HPFD as a comprehensive IFMS system. Details of some of the key modules, activities, data forms and reports are depicted in **Table 6.2.3** below.

**Table 6.2.3 Summary of IFMS**

Main Modules		Key Activities	Key Forms/ Reports
Annual Plan of Operation (APO)	[Digital Process of APO submission and approvals along with additional facility for Supplementary allocation, Revision of APO, Monthly Physical Achievement against each APO etc.]	-APO	New Plantation, Maintenance of Plantation Forest Fire Control & Mgmt. Soil Conservation Road building and Bridges Thirteenth Finance Comm. Item wise work proposed for WL Ranges
		-APO Reports	APO Proposed target reports APO Consolidated (proposed & Approved) APO wise Monthly Physical Achievement
		-Nursery Register Entry	
		-Nursery Register Report (including stock)	
		-Plantation Brochure	
		-Plantation Brochure Report	
Budget		-Budget Estimates	
		-Budget Revenue Estimates	
		-Budget Received	
		-Budget Allotment/ Revised (from HO to Circle/Functional Circle/DDO)	
		-Budget Excess & Surrender	
Govt. Accounting with Cash Book maintenance		-Reports (Estimates, Received, Allotment, Revenue Estimate, Excess and surrender report)	
		-Cash Book Entry (Cash book entry, Salary, Arrears, Forest Remittance entry)	
		-Govt. Reports (Cash book, Debit & Credit, Details of expenditure, Monthly Expense Summary etc.)	
		-Reports to AG (Register of cheque drawn, Monthly Revenue & Expenditure summary)	
Wildlife		-Reports Download (Download Cash book for Range, Progress of Externally Aided Projects, Monthly Achievement for Externally Aided Project Entry)	
		-Wildlife (APO Item wise proposed, Range wise Expenditure Statement, Utilisation certificate)	
Stock Accounting (for various offices)		-Reports (Item wise Work Proposed, Expenditure statement)	
		-Timber Seizure	
		-Timber Stock Register	
		-Material Stock Register	
MIS Reports		-Stock Transfer	
		-Financial Achievement (Consolidated or As per Demand)	
		-Physical Achievement (Consolidated or As per Demand)	
		-Annual Plan wise Physical Target Achievement	
		-Annual Plan wise Financial Expenditure	
Monitoring and Evaluation		-Progress Report Externally Aided Project	
		-Inspection Details Entry with quantified data [covering all key field based interventions/activities] -Inspection Report	
Master Definitions	[Master Data Tables]	-Global Master	- Location Master - Budget Head Master (Major/ Sub Major/ Minor/ Sub minor Heads) -Scheme Master -Account Head master -Beat Master -Protected Area Master -JFM Master -Scheme SOE mapping
		-Location Dependent Masters	-Employee Master -SL Code Master -Sub Disburser/ Cash Book Code -Constituency Master -Forest Block Master -Forest Area Master
		APO Master	-Activity Master -Activity Norms Master -Road, Building & Bridges Projects Plan Master -Fire Lines Master -Plant Species Master -APO Description of Work -Budget Approved by Govt. Head Wise -Species Category Master

Main Modules	Key Activities	Key Forms/ Reports
		-Nursery Master
	Stock A/c Master	-Depot/Stock Master -Item category master -Produce Master -Material Item Master

Source: Prepared by JICA Study Team (2017)

ii. Linking of Location Coordinates within IFMS:

For location based individual activity/feature, presently in IFMS, there is a provision of recording of single point geographical coordinate (one latitude, longitude coordinate) of the individual feature along with respective MIS data. Since field based activities and individual features are of different types such as point (discrete location based feature), line (linear features) and polygon (area bounded feature) thus it is advisable to have a mechanism of uploading individual GPS based surveyed feature data in GIS format along with MIS information for individual feature/entity. For example, for plantation areas, which are area bounded feature, it is advisable to have a provision of uploading polygon file in GIS format (e.g. shape file) or kml format instead of recording single point coordinate in IFMS.

iii. Lack of Central Repository of Data:

Most of the forestry projects/ schemes related data pertaining to physical progress/ achievements, survey/research, monitoring, evaluation and impact assessment studies, is mostly kept with the project office itself or is scattered and not systematically kept. Once the Project is over and/or staff is transferred, it is very difficult and rather impossible to get the detailed information back. For the past/recently completed projects it is highly recommended that HPFD must record the detailed information (both spatial and non-spatial data) in a well-structured database at a centralised server at headquarter level, so that the data is secured and readily available for use.

### 6.2.5 Monitoring and Evaluation in HPFD

M&E system established within the department is limited to the forestry operations. Such system is universal all across the country under state forest departmental functions. The state also got benefited by way of various EAPs where one of key focus areas of institutional support has been project management and M&E activities.

Even after having a long experience of working on EAPs (over 30 years), the documentation and reporting system is weak. There are no systematic record keeping about the departmental operations or on the projects where the divisions were engaged. There are no standard formats for reporting progress, still one has to refer respective files to find out information, particularly at division level.

There seems to no knowledge management system at the state level. No systematic information has been kept on the projects implemented so far by HPFD. Centralised repository of information has not been created. MIS including financial management system that has been developed in one of the earlier EAPs is yet to be fully implemented at the division/ range level. It is expected to be fully rolled-out from this year.

## **6.3 Forest Management and Forestry**

### **6.3.1 Forest Management System**

#### **(1) Discontinuation of Scientific Silvicultural Operations**

Legal forest areas of the state have been managed in a planned manner, since scientific forest management was introduced in India some 150 years ago. The unit of planning/ management is forest compartment, which may vary in size from few hectares to more than 1,000 ha. Each compartment is assigned to a working circle (**Part I, Section 4.5.1**) wherein different management objectives are prescribed. All compartments with same or similar management objectives are kept in one working circle. A working plan is prepared for a period varying from 10 – 20 years following the instruction of the state or central government. In each working plan, working circles are to be managed on scientific basis to achieve the objectives of management.

For the last 25 – 30 years, the HP state government has taken a decision to ban green felling and hence most of the silvicultural operations prescribed in the working plans are not being done including thinning and felling. However, there has been extractions from the forests to meet bonafide demands/ requirements of communities i.e. timber distribution (TD) rights, grants and removals of dead, dying trees or snow/ wind thrown trees etc.

The green felling ban is affecting proper regeneration of forest stands at some extent. An operation of “seeding felling” (felling of silviculturally mature trees to create openings allowing regeneration) has been stopped thus adversely influencing the regeneration operations and capacity of such forests. In many forest compartments, planting, sowing and cultural operations could not be conducted due to ban on green felling.

Besides, because of meagre or non-availability of budget, even secondary silvicultural operations (climber cutting, cleaning, bush cutting etc.) are not fully conducted in some compartments, which affects the health and productivity of the forests. In certain areas, non-removal of overhead shade with younger regeneration is impacting their survival and growth thus resulting into reduction in younger age class trees. In other areas, removal of mature trees for timber distribution, forest fires, developmental projects, etc. have created patches of open spaces within mature stands.

Discontinuation of silvicultural operations has risks to undo efforts of century old forest management, managed dominantly under Punjab Irregular Shelterwood System (120 years of rotation and 30 years of regeneration period). General growing stock may not have depleted but emergence of skewed variation in the age class in the same periodic blocks may affect long term sustainability of the forest management. Ban on green felling, skewed removals from forests (TD, fire, snow damage), resulted in limited or no specific resources for implementation of working plan prescriptions, which also lack effective monitoring system on the implementation.

## (2) Limitation in Applications for Forest Ecosystems Management

Healthy ecosystems provide ecosystem services which fall into several categories: provisioning, regulating, and cultural services. The ecosystem management integrates activities of different land uses at varying scales.

Policymakers are increasingly calling for an ecosystem-based approach (EBA) to climate change adaptation, which “incorporates biodiversity and ecosystem services into an overall adaptation strategy to help people to adapt to the adverse effects of climate change”. Furthermore, the ecosystem-based approach has been recognised as an important strategy for the ecosystem-based disaster risk reduction (Eco-DRR)<sup>2</sup>, healthy and functional ecosystems help reduce climate change vulnerability and disaster risk by: a) reducing physical exposure to hazards by serving as protective barriers or buffers and so mitigating hazard impacts, including in wetlands, forests and coastal ecosystems; and b) reducing socio-economic vulnerability to hazard impacts. In addition to protective and hazard regulatory functions of ecosystems, they also sustain human livelihoods and provide essential goods such as food, fibre, medicines and construction materials, which strengthen people’s resilience to disasters.

EBA is a multi-sectoral approach, with examples of measures shown to be effective for adaptation across sectors, including forestry, agriculture, water management, disaster risk reduction, coastal management or biodiversity conservation.

A closer look at working plans revealed that existing plans have not much of ecosystem outlook or approach towards the ecosystem based management. Spatial units of management are compartments and main features of management is timber harvesting/ production. Although some prescriptions are made regarding community needs in JFM and NTFP working circles, treatment of subject is fragmented and still lacks concrete action plans based on EBA.

However, it should be emphasised the importance of the concept of EBA and its key principles need to be applied for forest management. Management of spatial scale needs to be made appropriate to be factored in when assessing ecosystem services. GIS cell of HPFD has identified some 458 vulnerable landscapes in HP where ecosystem based management can be implemented on priority basis.

### **6.3.2 Departmental Natural Forest Management, Reforestation, Afforestation**

#### (1) Natural Forest Scenario

Floral diversity of forests in HP is high because of altitudinal variations, micro-climatic conditions, rock and soils, etc. Intense anthropogenic pressures, including developmental projects have taken their toll of the natural high forests of the state. As already mentioned in **Section 6.3.1**, that because of green felling ban and limited operations in natural forests, rotation cycle has been disturbed. There are a number of issues in the natural forests, major among them are – forest fires,

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<sup>2</sup> defined as “sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development”



invasive species, faulty resin tapping in chir, faulty timber distribution, encroachments, illicit felling, excessive lopping, non-execution of silvicultural operations (thinning, cleaning, climber cutting), unclear boundaries, have resulted in degradation of forest areas and their quality.

## (2) Forest Fires

Summer enhances the vulnerability of forests to devastating fires. More prone to fires are chir pine forests which have a needle retention time of one year, and as broad leaf species are mostly missing, the litter on the soil is only formed by the dry chir pines needles. This needle litter without any mixture of leaves from deciduous species does not decompose quickly and increases the risk of fire. Similarly, scrub forest is also prone to frequent fires. Ban oak and high-altitude species (deodar, kail) are more prone to fires in winter dry spells. Fires adversely affect the regeneration capacity of young seedlings/sapling and result in early dying of older stand. Fires not only destroy forest ecosystems but also affect the supply of NTFPs thus decreasing forest resources. The fires are predominantly ground fires. Various causes of fire are accumulation of dry pine needles, thick under growth, dry grass, felling debris, drought, defective resin tapping etc. Absence of controlled burning and other silvicultural operations like pruning, cleaning and thinning in regenerating areas have result in wiping out tracts of forests by forest fires. Forest fires also aggravate the cause of death of trees where faulty resin tapping is done. In such cases, death of trees occurs due to burning of cambium layer all around the trees.

## (3) Faulty Resin Tapping

The chir pine forests are adversely affected by unsustainable methods adopted for resin tapping. The rill method for extraction of resin is practiced by the HP Forest Development Corporation. Resin tappers, in order to maximise yields practice, tapping methods incorrectly and unscientifically (by excessive use of acid); inappropriate tapping virtually girdles the tree and repeated fires weaken the stem as a result of which trees fall due to wind and storm.

## (4) Excessive and Illegal Lopping

Right holders lop branches for fodder, twigs for fuelwood and spreading leaves under the domestic cattle to protect them against moisture created by animal excreta which later on after dumping becomes a source of manure for agricultural fields. Lopping is not restricted to the vicinity of villages but has found its way deep into the forests of reserved or protected forests.

## (5) Unsustainable Timber Distribution

Trees are generally marked for felling by right holders and the HP Forest Development Corporation. At the time of marking, interest of the individual is given priority over silvicultural requirement of the forest. As result, a good seed bearer with clear bole and well spread crown is felled. Furthermore, avoidable and unavoidable damage causes a great set back to the growth of

the vegetation. The situation becomes worse when debris is left in the forests, aggravating fire hazard.

#### **(6) Artificial Regeneration**

Afforestation is resorted to quickly fill the gaps in existing forests or regenerate forest areas requiring special treatment or soil amendments. Plantation is also practiced in JFM/PFM areas requiring quick growth of fuelwood and fodder trees. There has been reduction in plantation targets over years from approximately 28,000 ha/year in 1980s & 1990s to 11,000 to 12,000 ha/year currently (**Part I, Section 4.5.2**). Success of plantations has been partial due to harsh climatic conditions, inappropriate nursery practices, grazing pressures, removals for fuelwood and fodder, fire, wild animals and other anthropogenic factors and natural factors.

#### **(7) Nursery Practices<sup>3</sup>**

Seed sources used for nursery operations are often taken without genetically known provenances. Seeds are collected locally or purchased from dealers or from local people without certification. Although few seed stands (of coniferous species) were maintained in the past, nowadays there are no such provenances selected or maintained anymore and for broad-leaved species such seed sources do not exist. Seedlings are raised in polybags through traditional methods. It seemed that the roots generally do not develop well in this kind of container and remained short and spindly. The reason for this is most probably the inappropriate mixture of the growing medium without enough air-filled pores. Moreover, the roots start curling in the bags when the roots reach the sides and bottom of the plastic bag which may occur in the second year of growth. Curling of roots is one of the most adverse effects which could happen to seedlings as it induces a habit during its whole life span, even after being planted in the field, resulting in perishing of the plant after several years through self- strangulation of the root system. Furthermore, production of planting stock in poly bags has the following disadvantages if not managed properly.

- ◆ production time of up to three years (and in some cases even more, when raising of “tall plants”) is relatively long compared to the root trainer grown seedlings under controlled conditions
- ◆ weight of pots with potting materials is heavy for handling (to be transported and transplanted in the fields) especially on extremely steep slopes
- ◆ unsatisfactory root development does not ensure fast and stout growth in the field in the long run.

### **6.3.3 Joint Forest Management**

Joint Forest Management (JFM) is a way of co-management of forest and forest resources by the forest department and local communities. One part of the notified forest areas is assigned to

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<sup>3</sup> Based on DPR, HP Ecosystems Climate Proofing Project (KfW)

village level institutions to be managed/ benefited from forest resources. Village level institutions often called Joint Forest Management Committee (JFMC) or in the case of HP, may also be known as Village Forest Development Society (VFDS) is organised for implementation of activities. These institutions will develop a plan called micro plan comprising of community development and forest development/ management jointly with HPFD.

As reviewed in **Part I, Section 4.6**, the state has implemented externally funded projects for forest management with community participation since 1980s. In each project, community level institutions were created and forest management activities were undertaken along with the community development/ livelihood improvement interventions which were envisaged to reduce the dependency on the forest resources. Central and state government schemes of similar nature are facing diminishing and erratic fund flow and thus, only a meagre amount is given to a small number of JFMCs. Micro plans, once prepared, would not be renewed due to the fund shortage.

Till date, with the limited government finance, the major driver of JFMC in the state has been the externally aided projects. As in **Part I, Section 4.6**, most of the community institutions created for JFM are not functioning at the moment and the records that we could refer to is the JFMCs created under National Afforestation Programme (NAP), which are kept at division level but not in a systematic manner and only limited information is available for the Study Team to understand the status of existing JFMCs assisted by NAP.

As the timber distribution rights are already settled in the state and Panchayats are to give permit for export of the NTFPs, JFMC needs to be seen in a context which differs from other states where such rights and involvement of Panchayats are yet to be institutionalised in forest and forest resource management. With this broad context of JFM in the state, the following lessons can be drawn and integrated into the project approaches and interventions in the proposed Project.

#### (1) A Need for an Institutional Set Up that Sustains

HP has effectuated the Participatory Forest Management (PFM) Regulations 2001. Under the rule, VFDS is to be established at the Gram Panchayat level for participatory forest management. The linkage between the Gram Panchayats and the VFDS could benefit both parties. Firstly, VFDSs can benefit from the enhanced convergence by working closely with the Gram Panchayat and mobilising resources for forest management activities. It would further enhance accountability and transparency if VFDSs are taken as an integral part of the Gram Panchayat by way of recognising them as working groups under a sub-committee for natural resource management or forest management. This could open an avenue for the continuous fund flow from the funds allocated to Panchayats and accountability through its reporting and M&E system. Establishing such linkage, Gram Panchayats could also enhance the effectiveness in issuing the permit to for NTFP extraction and also keeping the illicit/ unsustainable NTFP extractions on the check.

## **(2) A Need for Enhanced Capacity of the Community Level Institutions**

The review of the community level institutions constituted by various projects revealed that most of such institutions have not survived after the project completion. FDA assisted JFMCs also do not have adequate capacity to mobilise its own resources, plan and implement their own activities but becomes functional when the fund is made available for them. Once the fund flow from the Project or programme recedes, the activities of such community level institutions come to an end. The issues are two folds. These community level institutions need to have sustaining funding sources and acquire capacity to plan and implement the activities. In achieving this, having appropriate institutional set up keeping in view of the post project period for sustained funding would be important. And their capacity in planning and implementation of their own activities should also be nurtured during the project period so that these institutions can be transformed into “self-propulsion organisations” rather than remaining as “passive implementing unit” of forest management activities.

## **(3) JFMC for Effective and Systematic Management of Forests**

In HP state, Timber Distribution Rights (TDR) are settled and the rights holders are to replenish the resource base by planting and protecting new seedlings<sup>4</sup> and protect forest from natural calamities. However, this has not been practiced rarely except the forest fire protection. Grazing and fuelwood extraction are also practiced widely where the villagers hold the rights and also in the area beyond due to the scarcity of the resources. In some cases, more than one village may be using the same patch of forest and thus, the conflict over the resources or over extraction may occur. Without taking care of the resource base, the resources would only degrade and thus, the forest resource users would negatively be affected. Especially women who take the responsibility of grazing and fuelwood extraction would be significantly impacted by the degradation of the forest resources.

JFMC or VFDS as a community institution could function as a vehicle for systematic management of a forest areas especially where used by more than one village. For this, demarcation of the forest areas for management purposes would also be required and the management plan should be prepared for the defined forest area used by the villagers but the management work will be equally shared amongst the village level institutions. In this way, the forest resource base can be replenished in a systematic manner and also be utilised by the villagers in a sustainable manner. Furthermore, these institutions can also function as a platform to resolve conflicts that may occur between the villagers over the forest resources.

## **(4) Centralised Monitoring System of Community Level Institutions**

These community level institutions, in the case of FDA, are monitored by the divisional FDA and thus, the data was not readily available at the state level. Likewise, the data on these community

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<sup>4</sup> Sharma, H. C. (1996). Forest Settlement in Himachal Pradesh. Bishen Singh Mahendra Pal Singh, Dehradun.

level institutions established by EAPs are kept by each project and once the project ceases, the data will also remain with the ceased project which makes it difficult to trace. The records of community level institutions can be kept by HPFD along with the records of assigned areas which can be linked with the GIS system, which would enable HPFD to assess the contribution of participatory forest management to the improvement of forest conditions.

#### **6.3.4 Community Forest Management, Forest Rights Act, Timber Distribution to Right Holders**

##### **(1) Issues in Community Forest Management**

Introduction of JFM/PFM approach through various projects and schemes has brought in changes in the functions of traditional institutions in community forest management. These institutions are gradually becoming project or fund driven. In the changing context, availability of fund has become an important motivating factor for the community institutions to initiate and sustain their activities which they were doing in the past without any support from external institutions. Institutional sustainability is a major challenge. A number of new institutions has emerged to implement different projects and their existence is insignificantly felt after the termination of the Project. Lack of adequate capacity building, institution development, and ability of raise resources have contributed to poor sustainability of the community institutions. Despite these challenges, majority of the Devta committees do perform their duties in many parts of the state conserving the sacred groves and managing the religious institutions.

##### **(2) Issues in Implementation of FRA**

The state is lagging behind in implementation of FRA. Initial decision of the Government was to limit the scope of implementation only to the Schedule V areas<sup>5</sup>. Another issue was the constitution of Forest Rights Committees (FRCs). 151 FRCs were constituted at the Gram Panchayat level in the Scheduled Areas till March 2012<sup>6</sup> and these FRCs received applications from the claimants and processed them as per the provision of FRA and its Rules. 346 cases were approved by the District Level Committee for distribution of land titles but the Ministry of Tribal Affairs (MOTA) raised objections on formation of FRCs at the GP level and process followed to recommend the cases to SDLCs. Thus, no land titles could be distributed to the forest dwellers. On the directions of MOTA, the process of formation of FRCs at the revenue village level was initiated during 2013. The process of implementation is very slow in the state. It was generally perceived that the rights of the local people were already recognised in the forest settlements done during the British Period and there is no relevance for implementation of FRA. In March 2012, the state government decided to extend its implementation to non-scheduled areas but no claims have been received and titles have not been given yet in non-scheduled areas. Chamba is the only district where 60 land titles have been distributed as of July 2017.

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<sup>5</sup> Joint Committee of MOEF and MOTA (2010). Report of the National Committee on Forest Rights Act. MOTA, Delhi.

<sup>6</sup> Ibid.

There were issues in interpretation of the Act by the implementing agencies. It was decided to entertain claims of persons residing inside the forests. The claims of people residing on the revenue land adjacent to forest and having claims over the forest land were not accepted<sup>7</sup>. The forest right claims of income tax payers, businessmen and government employees (regular or on contract) were not entertained<sup>8</sup>. No importance was given on creating awareness on community forest resource rights as it was commonly understood that the communities are already having the traditional rights over the forest and there was no need for filing claims for Community Forest Rights (CFR). No special efforts have been made to address the issues grazing rights of nomadic communities/ graziers/ Gaddis and Van Gujjars in scheduled and non-scheduled areas under CFR.

### (3) Issues in Timber Distribution to the Right Holders

Around 95%<sup>9</sup> of the rural families are right holders and accumulated demand for distribution of timber to the right holders is quite high in comparison to salvage trees available in the respective forest areas. It has remained as a huge pressure on the health of the forest. During 1999-2000<sup>10</sup>, the share of distribution of timber to the right holders was one-third of the total timber production of the state (Planning Commission of India). More than 45 % of the total wood extracted by the rights-holders was deodar and about 25 % was kail. In 2005-06, timber worth 1.16 billion INR was granted under the earlier policy and more than 1.9 million trees were removed by the right holders.

There has been a common perception among different stakeholders that the Government has taken away the traditional rights of the local communities over timber, which they have been exercising since pre-independence period (for more than 130 years). Another issue flagged by some researchers is poor assessment of genuineness of requirement of timber by the right holders. This has led to inequitable access of poor in remote areas to the timber distribution rights. The decision-making process is highly centralised without participatory assessment to determine the genuineness of requirements of the right holders. The genuine right holders are devoid of timber distribution if salvage trees are not available in their respective area.

During 2006, public interest litigation<sup>11</sup> was filed in the state High Court by Mr. Ratanjeet Singh, a local resident, complaining the misuse of timber distribution rights by influential people. The timber provided under the TD rights were not used for house construction rather it finds a way to the furniture factories and other places. The honourable High Court directed the state government not to allow felling of trees for TD rights. Although the honourable court was not in favour of terminating the traditional rights of the local people, it gave direction to the government to take up measures to avoid the misuse.

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<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> TERI (2015). Green Growth and Forestry in Himachal Pradesh. TERI, New Delhi.

<sup>10</sup> Govt. of India (2004). HP Development Report. Planning Commission, New Delhi.

<sup>11</sup> [https://socialissuesindia.files.wordpress.com/2010/06/td\\_rights\\_in\\_hp\\_-\\_final.pdf](https://socialissuesindia.files.wordpress.com/2010/06/td_rights_in_hp_-_final.pdf)

After the intervention of the High Court, the new timber distribution rules were framed in 2010 restricting the rights of the right holders. These rules were further modified/ amended during 2013 and 2015 to make it more stringent to limit the TD rights of the right holders.

### **6.3.5 Grassland / Pasture Management**

Apart from issues of grassland and pasturelands described in **Part I, Section 4.5.3** (i.e. pastoralism, collection of medicinal herbs, collection of fuelwoods), issues with sedentary farmers and migratory gaddis exist in relation to the grassland and pasture management in HP.

Sedentary farmers have issues like, preponderance of small land holdings, shortage of green and dry fodder, failure of cross breeding programmes, disease incidence, inadequate health care, post birth mortality, lack of marketing facilities of livestock are major concerns of the farmers. Genetic potential of the livestock in the area has degraded, grasslands infected by obnoxious weeds, legume component in the grasslands is negligible. Plantation of broad leaved trees in the plantation as desired and lack of extension activities were major problems in this area.

Similarly, migratory Gaddis's issues are that the herbage production in the pasture is constantly decreasing. Since last 20 years, biomass production has decreased by 20-30%<sup>12</sup>, edible species are being replaced by weeds and thereby the quality of herbage is deteriorating. The nomads face a lot of problems while migrating with their animals. They are trapped in snow, rains, piercing cold winds particularly on the higher reaches and on mountain passes resulting in many casualties of their animals<sup>13</sup>.

### **6.3.6 Cold Desert /Permanent Snow Area Management:**

Major areas of cold desert falls in Spiti sub-division of Lahul & Spiti district (Spiti wildlife division of HPFD). Currently, there are no comprehensive programmes for cold desert management and development by HPFD except for the Cold Desert Biosphere Reserve (CDBR), centrally sponsored scheme, covering the protected areas such as the Pin Valley National Park, Chandra Tal, Kibber wildlife Sanctuaries and habitations in between. In the past, the Tribal Development Department ran a comprehensive programme/ project for the desert development, called Desert Development Project.

Spiti wildlife division has major programmes/ projects under Pin Valley National Park development, Project Snow Leopard, and CDBR (**Attachment I.4.4.11** for details). Under improvement of Pin Valley National Park, works like construction of buildings to all categories of staff, construction of bridle path/inspection paths, construction of water ponds, water harvesting structures, habitat improvement, fire protection measures, study and research works, soil conservation works are carried out. The Project Snow Leopard, where effort is made to protect snow leopard, (flagship species of the cold desert) through habitat improvement,

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<sup>12</sup> Inder Dev, Virender Singh and Bimal Misri (2016). Socio-economic Profile of Migratory Graziers and Participatory Appraisal of Forage Production and Utilisation of an Alpine Pasture in North-West Himalaya. ENVIS Bulletin Vol 11(2): Himalayan Ecology

<sup>13</sup> Same as above

anti-poaching activities, community awareness/ education programmes, prey population enhancement, monitoring (radio collaring). In the last five years, approximately 20 million INR have been spent on the programme mostly through the NGO, Nature Conservation Foundation (NCF). CDBR's effort is to develop and demonstrate harmonious relationship between conservation and development needs of the communities. Primary goal of management is to link the village level development issues (local livelihoods) with conservation of biodiversity in the CDBR. CDBR project is up to 2018-19 and likely to be extended.

For the cold desert area, certain projects/schemes have been already implemented. However, since these ecosystems are unique and have special niche, still there are potentials for further development of high value medicinal herbs niche agriculture, development of seabuckthorn (*hippophae rhamnoides/ h. salicifolia*) and its value addition are options to be explored besides interventions in production of fuel and fodder, and rehabilitation of junipers.

#### **6.4. Wildlife and Biodiversity**

##### **6.4.1 Lack of Sufficient Scientific Data/ Information Required for Planning and Management of Biodiversity Conservation**

As indicated in **Part I, Section 4.4**, HP has rich flora and fauna, and the entire state falls into the Himalayan hotspot. Within the state, there are certain numbers of key biodiversity areas and other sites/areas which are of high biodiversity values.

Though there are certain data/ information accumulated in respect to fauna/ flora and biodiversity of HP, the following issues exist:

- ◆ Lack of information on flora and fauna in their habitat and niche losses. Thus, the real current situation of biodiversity in HP is not fully clear.
- ◆ Lack of information on time series data of population estimate and distribution on certain indicative species such as those listed in the IUCN Red List, ecological information on their habitats and niches, analytical studies of biodiversity degradation and its dynamics with human influences.
- ◆ Uncertain mechanism to identify species along with the checking procedures for the IUCN Endangered Species Red List.
- ◆ Lack of information on the impact of invasive species such as lantana on natural ecosystem succession, particularly in protected areas. Such information is required to focus on rehabilitation of the treated area.

For improved scientific conservation and management of biodiversity, comprehensive biodiversity censuses and baseline surveys which enable to establish extensive database and develop strategies to address issues are further required in HP.



#### **6.4.2 Necessity of Biodiversity Corridors**

There are 31 protected areas within HP and the total area is about 15% of state's geographical areas. Numbers and areas of protected areas are in mass scale, but some protected areas are isolated. Some protected areas play a critical role in protection and recovery of some endangered species, while human-wildlife conflicts need to be addressed as one of the key issues outside protected areas. In order to tackle these different issues with accordingly-appropriate approaches, establishment of carefully-designed protected area network will provide a functional platform for biodiversity conservation and management. National Parks and Wildlife Sanctuaries already exist to secure conservation efforts, and a concept of biodiversity corridors needs to be examined to effectively connect these protected areas. Conservation Reserves and Community Reserves are potential designations to constitute such Biodiversity Corridors. Management of Biological Corridors requires understanding and cooperation of local communities, and human-wildlife conflict needs to be mitigated while securing local people's sustainable livelihood.

Although the proposed Project may not be able to establish biodiversity corridors in the given time frame and the current project framework, components and activities of the proposed Project shall contribute to support enhancing biodiversity corridors.

#### **6.4.3 Necessity of Community Based Biodiversity Conservation**

Importance of biodiversity conservation outside protected areas is emerging, including human-wildlife conflicts and provisions for biodiversity corridors. Further emphasis on community-based biodiversity conservation should be highlighted in the state. Such direction is in a line with the statement of The HP Forest Sector Policy and Strategy 2005. BMC and People Biodiversity Register (PBR) can be one of practical options to promote the community based biodiversity conservation in HP. Currently, BMCs and PBR have the following issues and limitations.

- ◆ State Biodiversity Rules are yet to be notified
- ◆ The numbers of BMCs and PBRs created are still very small and the capacities of BMC are limited as there is no major support provided by the state to BMCs yet
- ◆ Prioritisation criteria of GP for preparation of PBRs is not available.

Although BMCs and PBRs are not the mandate of HPFD, the proposed Project can facilitate promotion of BMCs and PBRs and contribute to community based biodiversity conservation at the project intervention areas. This approach can be justified by i) biodiversity richness of HP, ii) importance of biodiversity conservation, and iii) state government notification determining HPFD to support field implementation of BMCs and PBRs. In relation to the community based biodiversity conservation, the conceptual framework of SATOYAMA initiative can be used for a designing of a holistic approach of interventions for wildlife as well as territorial divisions. The HP Forest Sector Policy and Strategy 2005 also highlights such approach to sustainable forest management as well as biodiversity conservation.

Major learning from the past practices concerning invasive species is that efforts to remove invasive species need to be integrated with rehabilitation of the treated areas and require persistence and long-term commitment. Considering the daily activities of local communities in natural resource use, they would be able to monitor the status of invasive species comparatively easily. They would be able to play a big role in eradication of invasive species if they recognise the needs and commit themselves. From the past trials, however, they did not favour using removed lantana for furniture, bricket or composting, and *Parthenium* eradication campaigns in association with educational institutions were too limited to create large scale impact. How to effectively involve local communities is still a big issue in exotic species management.

Eco-tourism has been promoted in partnerships among local communities, NGOs, academic institutions, private enterprises/businesses, HPFD, Tourism Department and other departments concerned in the state. The involvement of local communities is expected to support livelihood needs and conservation of local culture, ecosystem and environment. Eco-tourism, however, requires certain assets to attract tourists such as unique landscapes and nature experiences, thus not all the places nor communities have sufficient potentials to develop eco-tourism. Where eco-tourism potential is observed, opportunities shall be explored considering the characteristics of the area, the needs and capacity of the community, and tourism perspective.

Eco-tourism development can benefit local communities, but it has negative side as well. Local people benefiting from tourism can be limited, which may cause conflicts within the community. Benefit sharing is one of the issues in eco-tourism development. Another issue is management of tourism impact on natural and social environment, which should be regulated properly. Pristine wildlife habitats are suggested not opened up for tourism, for example<sup>14</sup>. Balancing of conservation and benefits to local economy should be the key underpinnings for eco-tourism management and development.

## **6.5 Forest Products and Markets**

### **6.5.1 Issues in NTFP Collection from the Wild, Cultivation and Marketing**

- ◆ The key issue is the lack of information on the potentiality and production of different NTFPs including medicinal plants/ herbs/ shrubs. The information is available only on resin and katha, which are dealt by the HP State Forest Development Corporation Limited. Some information is available on the NTFPs, which are exported outside the state after payment of export fees to the Forest Department and this does not include volume for which Gram Panchayat has given export permits during 2003-4 to 2014-15.
- ◆ There has been a significant decline in availability of some NTFPs from the wild because of excessive extraction. A trader in Amritsar market informed that few years ago, the volume of *atis* from HP was more than 100 MT and now it is not even 5 MT. Similar trend has been observed in other NTFPs. There has been unhealthy competition

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<sup>14</sup> Management Plan Rupi Bhaba Wildlife Sanctuary, Himachal Pradesh, 2010-2015, HPFD

among the rights holders as well as paid wage labourers to extract as much as possible without leaving a scope for further regeneration. Some of the medicinal plants such as *Nagchhatri*, *Patis* etc. are not available in the forest. Currently, the wild garlic from the forest is being removed indiscriminately, which may eventually become scarce.

- ◆ Although there is a four-year rotational system of extraction of NTFPs i.e. one forest range is open for extraction once in four years, apparently the rights holders in certain areas do not follow the rules and there is no control by the villagers and other concerned institutions. Apart from closure of the area, there are limited efforts by the government to enhance production and for capacity of right-holders for sustainable management of resources.
- ◆ Dependency on NTFPs is less in areas with high growth of horticulture and inflow of tourists. In the lower altitude people have to look for different livelihoods opportunities including collection of forest product while in apple growing areas of Shimla, Kinnaur and Kullu very few people go for collection of NTFPs. The rights holders who have developed orchards don't bother to go for collection of NTFPs or participate in forest conservation efforts. For wage earners, NTFP collection is not as remunerative as wage work under MGNREGS and other schemes. Educated youths don't show any interest in NTFP collection, value addition and trade. They rather look for non-forestry based livelihood activities in nearby urban settlements. For collecting some of high altitude medicinal plants, the people have to climb steep hills and camp there for days and there is also no guarantee that they would get a volume, which could fetch them a good income. It has been observed that nomad graziers and wage labourers from outside (even Uttarakhand/Nepalese emigrants) take advantages of the situation and collection NTFPs from these inaccessible areas. They don't follow any system or regulation while harvesting NTFPs.
- ◆ The state government has no clear policy to regulate the pricing mechanism for NTFPs. In addition to that, there is no support from any state department/agencies to right holders in primary processing and marketing of the NTFPs/MAP. None of the districts has any well-developed NTFP/MAP market, for which right holders have to pay higher costs to access market (transportation and time) or they have to sell their products to local buyers at discounted price. Collectors and growers lack bargaining power the terms and conditions of the procurement and trade are largely determined by the traders who are either based in Delhi or Amritsar.
- ◆ Projects on *in-situ* and *ex-situ* conservation of medicinal plants were/are being implemented by the HPFD, NMPB and other states and private agencies but the scale of production of different medicinal plants from the non-forest areas remains low. Barring few examples, cultivation of medicinal plants in the private land has not picked up well.
- ◆ Although there are 180 pharmacies in HP using different medicinal plants and their derivatives, there is no information available on the volume consumed by them and their

current sources of procurement. Most of them procure raw materials from wholesalers and exporters based in Amritsar and Delhi.

- ◆ There are three Ayurvedic pharmacies (jogindernagar, paprola and majra) in the state and these pharmacies supply Ayurvedic medicines to about 1,200 institutions including hospitals and their raw materials are procured through tender by the Department of Ayurveda and State Civil Supply Corporation. Most of the raw materials come from outside the state.
- ◆ The challenges in cultivation of medicinal plants in the state are mentioned below;
  - i. Small patch of land is available (nearly 88% of the operational holdings in the state are marginal and small holdings) with the farmers for cultivation of medicinal plants. Rather the farmers are keen to devote their land for vegetables and fruit production, which provides them security of returns and pays them relatively well in comparison to the medicinal plants. For vegetable and fruits cultivation all type of supports are readily available and value chain and markets are developed. Very few farmers are interested to lock up the land for three to five years for cultivation of medicinal plants because of the long gestation period. In case of high altitude medicinal plants, sometimes the harvest will come even after five to six years. Even if a group of farmers intends to go for cultivation of medicinal plants, there is always a situation of uncertainty over economic returns. Since market information system is weak and skewed in favour of trader, there is no guarantee of marketing as well as remunerative sale price.
  - ii. There are other risks involved in cultivation of medicinal plants such as lack of quality planting materials, inadequate technical support and extension service for cultivation, lack of proper harvesting and post-harvest techniques, storage infrastructure and support services etc. If the planting materials are of low quality then the yield will be poor as well as the marker compound/ active ingredients required for medicines will be low.
  - iii. In many cases it was found that the buyers, who agreed to buy the products from the cultivators, have backed out for various reasons. The price offered by the buyers/ traders is low and sometime does not match with the cost of production as well as expectation.
- ◆ Plantation and cultivation of medicinal plants in JFMC areas/ degraded pastureland are possible if the communities commit to secure adequate care and maintenance for plantations and enrichment sites. State agencies also have to develop business services at grass root level for regular handholding support to growers. A “price stabilisation

fund” needs to be created to rescue growers during market failure. Given the current status of JFMCs in the state, a lot of efforts need to be made to convince communities for *in-situ* and *ex-situ* conservation of NTFPs and medicinal plants.

### 6.5.2 Issues in Functioning of Forest Based Industries

- ◆ Availability of quality as well as adequate raw materials is a challenge for the forest based industries in the state, whether it is pharmaceuticals or herbal cosmetics and food industries or aromatic oil industries. The state has a number of cedar wood oil industries, katha industries and aromatic oil, and oleoresin processing industries and many of them import raw materials from outside the state.
- ◆ Availability of labour is often a problem, which increases the cost of extraction and transportation of the materials from the forest to processing units.
- ◆ Because of cheap import of rosin and turpentine oil from China and Indonesia, sometimes the Forest Development Corporation faces difficulties in getting better deals for marketing of the product.
- ◆ Although pine needles are available in plenty, there is hardly any industry to produce briquettes and other materials. Community based briquettes making units could be promoted to reduce dependency on fuelwood for water heating and space heating. It could be linked with programmes of the Forest Department on the removal of weeds and invasive species.

### 6.6 Farm Forestry

Land availability is a major issue in the state to promote farm forestry. The average size of land holding is around 1 ha and 88% of the operational holdings are of marginal and small holdings. The total area under agriculture during 2015-16 was 764,850 ha and area under horticulture was 226,799 ha<sup>15</sup>. The land use pattern is changing in favour of horticulture. The expansion of orchards and vegetable farming has given significant returns to the farmers. Hence, the farmers do not intend to lock up their lands for growing forestry species including medicinal plants. The benefits will be received after a long period and further there is no guarantee of high economic returns. Efforts were made to promote bamboo cultivation in non-forest areas with the support of the National Bamboo Mission and bamboo on the private land was de-regulated in 2011 for felling and transit to different markets for sale. During 2007-8 to 2014-15, 1,223.5 ha of non-forest area was brought under bamboo cultivation.

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<sup>15</sup> Economics and Statistics Department (2017). Economic Survey 2016-17. Government of Himachal Pradesh, Shimla.

## **6.7 Socio Economic Perspectives in Forest/ Forest Ecosystem Management**

### **6.7.1 Livelihoods and Forest Resources**

#### **(1) Fuelwood and Fodder**

As seen in the previous chapters, all the socio-economic indicators of the state are far better than those of many other states in India. Further, the forest resources are no longer the main source of livelihoods for the majority of the households. On the other hand, majority of the households still depend on fuelwood and fodder which are mostly collected by women.

Despite the diversification of the household energy sources, fuelwood still remains as a major and preferred source of energy for cooking. During the harsh winter time, the fuelwood consumption increases for warming the houses in addition to cooking. As for the fodder, the requirement is not fully met by the grass from the forest and thus, the villagers supplement with agriculture waste from their own agriculture plots and purchased feeds. As coping strategies, many families limit the number of livestock that they keep at homestead and others set the cattle at large when they do not produce milk. Thus, the interventions reducing fuelwood consumption and increasing the availability of fodder would be relevant from the general context of rural households in the state.

#### **(2) Forest as a Tourism Resources**

Forest in HP has also been a tourist attraction. Tourism industry has been flourishing. As the tourism sector develops, allied sectors like handicraft sector also gain by selling the local products to the tourists and employment by hospitality industry increases which lead to the enhancement of cash income to the local households. Thus, maintaining or improving forest condition would contribute to the development of the tourism sector which could promote the livelihood improvement of the communities in the forest fringe areas. However, bringing more tourists may cause distraction to the existing natural condition. Visitors may not always be disciplined or aware of what not to do to the nature. Thus, in the context of responsible tourism, i.e. eco-tourism, the potential activities for the Project are proposed in **Part II, Section 3.7.2.4** “Component 2.4: Community Based Biodiversity Management”.

### **6.7.2 Grazing**

Grazing is still widely practiced in the pastures in the forest and outside the forest by the local communities and nomadic or semi-nomadic communities such as Gaddis and Gujjars. As reviewed in the previous chapters, Gaddis and Gujjars often set fire on the forest to promote the growth of green fodder, which fire may lead to forest fire. These communities also have the defined route and obtain permission from the Forest Department for grazing. However, in recent years, due to the lack of availability of the fodder en-route or the conversion of grasslands to other land use, they are bound to divert from their traditional route and take alternative route which could be seen as encroachment on the pasture land used by the local communities, which

may result in a conflict with them. Furthermore, where the rights of grazing in the forest are given to the multiple number of villages, overlapping of grazing areas may become a cause of conflicts and overgrazing. Invasive species like lantana or the pine needles could also deter the regeneration of the fodder grasses.

The above issues related to the grazing could have direct bearing on women from the local communities who are the primary users of the grazing areas. The situation in the project areas needs to be further investigated and conflict resolution and sustainable pasture management/ grazing methods, in which JFMC or any other community based forest management institutions could play a vital role, may also be considered for the benefits of both the pasture users and grazing communities.

### **6.7.3 Forest Dependence**

As stated in **Part I, Chapter 4** and **Section 6.1**, although there are high usages of resources from forest areas in HP, there is a tendency that these users are not fully dependent on these resources for their daily survival. The nature of forest dependence differs from most of other states which JICA forestry loan projects have been implemented so far. Different approaches and interventions for livelihood improvement of communities using forest resources shall be taken into account in the proposed Project.

### **6.7.4 Gender and Forest Resources Management**

Like in other rural areas in the country, fuelwood and fodder collection are predominantly the work of women. As the forest resource base degrades, the workload of and time spent by women in search of fuelwood and fodder increase. As a consequence, their spare time that could be utilised for other activities including economic activities would reduce.

Thus, the interventions related to fuelwood and fodder could potentially have direct impact on the women's workload and contributes to drudgery reduction. This would create more opportunities for women to take part in other activities. And such interventions may motivate women to actively take part in the forest resource management. By giving them opportunities to earn, it would contribute to reducing the financial vulnerabilities and thus, may enhance safety nets against various livelihood shocks especially that may occur in the winter time. Further gender based forest resource uses such as NTFP harvesting and processing and their role in forest management in the state are reviewed and summarised in **Part II, Section 2.7.4**.

### **6.7.5 Self Help Groups (SHGs)**

As shown in **Table 6.7.1**, formation and promotion of SHGs or other community organisations such as CIGs or users groups have been an important part of forest management projects in particular, for livelihood improvement. However, as in the case of village forest organisations, the sustainability of SHGs heavily relied on the operational and financial management of the projects. Due to the limited information available on the existing SHGs in forest management projects, the

Study Team attempted to interact with the SHGs organised by NABARD, NRLM and Anganwadi Centres to collect and analyse the issues and lessons learned from the operation of SHGs and other CBOs in HP. The result of this survey is available in **Part II, Section 2.7**.

**Table 6.7.1 Review of the Projects Related to Forest Management in HP State**

Donor Project Name (Year operated)	Target Area (District)	Village Organisation for Forest Management	SHGs or other CBOs for Livelihood Improvement	Issues and Lessons drawn on Institutional arrangements by the Project review reports
DFID  <b>HP Forestry Project</b>  (1994-2001)	Kullu Mandi (pilot)	Village Forest Development Committees (VFDCs)	<ul style="list-style-type: none"> <li>No IGA promoted to ensure sustainability</li> <li>Involvement of NGOs, to support women's groups and CBOs were suggested for Phase-II</li> </ul>	<ul style="list-style-type: none"> <li>Many VFDC's were "forced" into the FD structure of beats and ranges. So VFDC could not always reflected the collective interests of the members.</li> <li>Formation of VFDC greatly reduced the burden of GP by taking the role of screening timber distribution.</li> <li>Lack of alternatives to compensate for income loss when wage employment stops and the project realised the need of new IGA.</li> </ul> <p><i>Source: HPFD (1999) "Forest Project Impact Assessment Report"</i></p>
GTZ  <b>Indo-German Eco-Development Project (IGCP)</b>  (1994-2006)	Kangra	Village Development Committees (VDCs)	Samridhi Mahila Cooperative (agro-business consortium) formed in 1996 for pickles, chutneys and candles  <i>*Source: HP Development Report 2005</i>	<ul style="list-style-type: none"> <li>Project strengthened the panchayat institutions by adapting its advisory and assistance programme from the initial village approach to one that addresses the panchayats. This simplified the relationship of GP and VDC.</li> <li>VDC included weaker section of society and 40% female participation.</li> </ul> <p><i>Source: GTZ (2001) Final Evaluation 2006: IGCP, India"</i></p>
World Bank  <b>Integrated Watershed Development Project (IWDP)</b>  (1993-2005)	Kandi area	VDCs  (30% of Panchayat members in VDCs)	254 SHGs 295 User Groups (UGs)	<ul style="list-style-type: none"> <li>Formation of VDCs brought community living in different villages on a common platform.</li> <li>Close relations between GP and CBOs.</li> <li>Convergence: NABARD loan and KVKs for training of IGA</li> <li>67% of SHG and 68% of UGs performed well with good chances of being sustainable.</li> </ul> <p><i>Source: Environment and Forest Consultant (2005) "Final Impact Evaluation Report"</i></p>
World Bank  <b>Great Himalayan National Park Forest Research and Education Project (FREEP)</b> (1994-1999)	GHNP area in Kullu	Village Eco Development Committee (VEDC)  (Developed 32 VFDSs in post project)	Women Saving & Credit Group (WSCGs) were developed in post project for microcredit and later federated into VFDC	<ul style="list-style-type: none"> <li>VEDC defunct after FREEP but WSCGs were formed and federated into VFDS (at GP level) and registered under HP JFM Rules 2001.</li> <li>Ward level VFDS consolidate micro-plan at WSCGs and integrate into Panchayat VFDC.</li> <li>WSCGs and group organisers established a NGO (SAHARA)</li> </ul> <p><i>Source: S. Pamdey (2008) "Linking eco-development and biodiversity conservation at GHNP, India: lessons learned"</i></p>
State Govt  <b>Sanjhi Van</b>	All districts	Village Forest Development Societies	GP, Mahila Mandal, schools, user groups, other	As of Jul 2001, the status of VFDSs is ambiguous as the HPFD faced a resource crunch and new projects required fund allocation.



Donor Project Name (Year operated)	Target Area (District)	Village Organisation for Forest Management	SHGs or other CBOs for Livelihood Improvement	Issues and Lessons drawn on Institutional arrangements by the Project review reports
Yojana (SVY) (1998-		(VFDS)	CBOs and NGOs were mobilised for forest based IGAs	<i>Source: Sudha Vasan (2001) "Community Forestry: Historical Legacy of Himachal Pradesh"</i>
World Bank  <b>Mid-Himalayan Watershed Development Project</b>  (2005-2016)	Bilaspur, D/shala	Gram Panchayats (GP)	2,852 SHG, 5,613 User group 4140 CIG in MHWDP GPs. 246 SHGs, 1,364 UGs and 1,827 CIGs in Additional GPs. 262 clusters & 4 Federations were formed	<ul style="list-style-type: none"> <li>GP was overburdened due to other works and had limited time for project</li> <li>Question of transparency and accountability</li> <li>Panchayat members keep changing by election</li> <li>But meeting attendance was good because it was held with GP meeting</li> </ul> <p><i>Source: Winrock International India "Mid Term Impact Assessment of MHWDP"</i></p>
Govt of India  <b>National Afforestation Project (NAP)</b>  2002-2014/5	All districts	Joint Forest Management Committee (JFMC)		<ul style="list-style-type: none"> <li>Size of JFMC varied by village population. Nomadic communities were generally left out.</li> <li>People come together in village meetings and take collective decision, Women's participation increased. But the level of involvement of villagers in plantation activity was low as their perceived that it to be a FD's internal affairs.</li> </ul> <p><i>Source: Indian Council of Forest Research and Education (2008) "Mid-term Evaluation of NAP schemes implemented through FDAs"</i></p>
JICA  <b>Swan River Integrated Watershed Management Project</b>  (2006-2017)	Una	Panchayat Development Committee (PDC)	427 Women SHGs 206 Other SHGs 238 User Groups SWAN Women Federation (SWF) and Cooperative	<ul style="list-style-type: none"> <li>427 Women SHGs formed developed into Swan Women Federation and Cooperative for post project sustainability.</li> <li>Ownership of micro-plan is uncertain at post project</li> </ul> <p><i>Source: SRIWMP (2016) "End Term Impact Evaluation: Final Report"</i></p>

Source: Compiled by JICA Study Team (2017) based on respective project related reports/ documents

### (1) SHGs as Beneficiary Organisations

The majority of SHGs are organised by the government or donor projects as beneficiary organisation rather than self-help institutions. During the observation of a newly formed SHG under the NABARD programme in Kullu district, it was found that the member women are also members to another SHG organised by an NGO (Jagruti) some years before. Expecting financial and technical supports from two different sources, this SHG ended up saving and inter-loaning in both the groups. Perception of the SHGs as beneficiary groups was largely built by the practice of the promotor agencies in treating them as the project target wherein they provide not just knowledge and skills but other resources and inputs. For instance, knitting machines were provided to each SHG member by a donor-funded project (10 % of beneficiary cost share) during the implementation. Now the group is able to generate income owing to increasing demand from local area that now more women want to join their group. With the addition of new members,

they will be able to meet bigger orders. However, the promoting agency could not make any concrete action because of the limitation from the 'beneficiary' status of the group that left them unable to supply new machines. If the machines were shared by the group or financed by individuals from the beginning, the group could have made a better decision on the new members. The Project should be able to provide a conducive environment to support the development and not dependence of the SHG towards the project. In attaining such, creating common village properties such as day care centres or a common production space may be the options.

## **(2) Market Issues for Income Generating Activities**

Almost all SHGs undertaking income-generating activities struggle to connect with rewarding marketing channels. Saturday market, neighbours, and the outlet shops are the key localised avenues for them to sell their products. In Great Himalayan National Park (GHNP), newly formed SHGs making pine needle baskets, socks, or food processing sell all their products to their SHPI who runs a small souvenir shop in Sai Ropa. But solely relying on the capacity of promotor agencies for marketing risks the sustenance of SHGs in the long run. Creating a producer-buyer relationship between the promotor agency and the SHG again imposes the SHGs to stay as a beneficiary organisation. Nearly 60 Women Saving and Credit Groups (WSCGs) organised by GHNP are no longer in operation because the agencies used to purchase their products such as apricot oils and vermi-compost have now moved out to find other suppliers that can produce in large volumes. These SHGs had no control over their market. Further, the same SHGs engaged in pine needle handicraft were observed to have limited business acumen in terms of product costing and selling price, even when the quality of produce was of marketable quality. The promotor agency is expected to assume a bigger role by extending not only the technical skills but also the business management skills of the groups covering pricing, marketing, and linkages to the wider markets in response to the nature of IGA dictates its target market and the extent of intervention. For activities, such as handloom, there exists mature markets. Thus, the need would be to link them with existing cooperatives and/or facilitate them to take the similar route. Additionally, a handicraft product such as pine needle and other local craft, owing to its exclusive nature, can be promoted to a niche market nationally and overseas.

## **(3) Active Women and Leadership**

Strong and inspiring leadership is a key factor responsible in ensuring sustainable success of an SHG. Among the interviewed SHGs during the field survey, a courageous and dedicated leader, without an exception, led every successful SHG. A knitting and sewing SHG met in Mandi district is a good example for this. The group works together to produce knitted sweaters to be sold at Saturday market. The group had devised an interesting understanding to draw synergies for capabilities and capacities of individual members. Not all members (only four) had a personal knitting machine, and not all members were adept in hand knitting. Further, the hand-woven products would fetch better price but are time consuming to meet the market demand. Thus, the

group divided the production process into two sections: the members with machine made sweater's back, while others hand knit the front with intricate patterns. This approach not only takes less time to manufacture but also makes their products stand out from the products solely knitted using machines. SHG's president, though not highly educated (only up to class five) is motivated to drive the group to learn from others better selling products in the markets such as in design and type to improve the quality of their woollens. These effective and efficient group dynamics has enabled the SHG to earn INR 2,500 per month per member even during the off season, a figure that they expect to be higher during winters based on which they have entered a third credit cycle with 200,000 INR loan.

Apart from the SHG leaders, field interactions were held with so-called "*Active Women*", motivated and driven individuals selected from SHGs to be trained as resource persons in the wide communities. When the active women graduate to become a resource person, they are given more responsibilities to supervise other groups on community mobilisation, bookkeeping, administration, etc. It is a good model to empower local women as they are given opportunities to utilise their full potentials and abilities to work, with a sense of belonging to the bigger institutional system governing the intervention. This positive reinforcement helps the active women to enable other group members with efficient information dissemination and building social networks, upon which the initial success of SHGs depends. The inherent potential of these active women can help in mobilising independent SHGs and to organise them into cluster organisations, which could subsequently be transformed into larger institutional setups such as (farmers) producers organisations and cooperative societies.

#### **(4) Forest related activities by the SHGs**

Forest resources remain as a vital income source for forest dependent communities for most parts of the target area, even though there is a growing trend of reduced forest dependence with more people getting access to modern means such as LPG and alternative livelihoods like tourism. It was observed, while most such groups are drawing resources from their designated forest covers such as pine needle for fruit packaging, firewood collection and sale, extraction of medicinal oil/plants from NTFP, they have no interaction with HPFD or any other community level forest institutions to support or resist their activities. Through our discussion, it was realised that there is a significant gap in understanding of these groups about their extraction of NTFPs and forest access rights, products & markets, an area where they should be empowered to reform the income generation strategies to their benefit.

#### **(5) Poor Implementation of Sustainable Exit Strategy**

Despite considerable achievements in formation and operations, the sustainability of SHGs is constrained by the lack of institutional supports that could uplift them to undertake activities in more profitable and efficient manner. Promoting agencies are aware of the significance of SHG clusters or federations as reflected in their proposed exit strategies for SHG promotion, but most

have been observed to struggle to execute. NABARD started to promote the formation of Farmers' Producer Organisations (FPOs) in 2014-2015 but the Project is still in its early stages. Further, HPSRLM's cluster level federations at block level are not in existence till date. This momentum of federation movement should be supported and strengthened as long as it helps SHGs become institutionally and financially more sustainable, especially when the project support ceases. The Project in its implementation plan should account for requisite gestation period for the formation and operation for these proposed cluster and federations to gain self-sufficiency.

#### **6.7.6 Micro Finance and Financial Inclusion**

Issues and lessons learned from the micro finance in HP state were drawn by the extensive fieldwork undertaken by the Study Team and interaction with NABARD and HP Gramin Bank, Kullu district. The following three areas of barriers were found as the main issues of microfinance and financial inclusion.

##### **(1) Barriers to Credit Inclusion**

While the state has achieved absolute savings inclusion, 100% credit inclusion is yet to be realised. During our discussions with the banking stakeholders, two key issues were unearthed with specific relation to SHGs and micro finance. First, absence of a demand side pulls for credit linkages. Himachal Pradesh is characterised by populace with limited materialistic aspirations and heavy reliance on neighbours and family members for loans. Second, public sector in the state is the most favoured professional destination for the population. 25 per cent of men and women are yearly engaged in the government sector i.e. 350,000 to 400,000 individuals out of the total population of 1,400,000. The job security and access to financial services such as insurance, pension results in lower reliance on banking sector to meet their credit needs.

##### **(2) Barriers to SHG-Bank Credit Linkages**

Low demand for bank credit may not always be true, as was found in the field survey. It was understood that the SHGs tend to hesitate to take their first loans from the banks because of the lack of confidence in repayment or social concerns attached to debts. Some groups or even the group facilitators misunderstand about the loan eligibility. On these issues, NABARD through their SHPIs encourage the groups to start with the small amount, less than INR 10,000 by setting a short repayment period (normally two months). Not just the SHGs but also the banks have benefitted from this approach as it enables the latter to evaluate the financial capacity of SHGs. As observed in the field survey, once the group manage to get and repay their first loan, they gain more confidence, thus are willing to proceed for bigger loan amounts through IGA expansion. Therefore, NGO and field level functionaries become a critical link between the banks and the SHGs.

### (3) Obstacles to Outreach

The introduction of the digitisation under Core Banking Solution (CBS) provided many positive impacts for both the bank and its beneficiary SHGs as explained in **Part I, Chapter 4**. Nevertheless, it resulted in a significant decline in bank personnel across board, thus affecting the extent of community outreach and interaction. Shukla (2014) in her assessment of NABARD's SHG-BLP, describes it as a 'savings first programme with credit as a logical corollary' that is cost-effective and a flexible approach to micro finance but extends caveats around its accessibility and potential to result in Non- Performing Assets (NPAs), at the same time. Through the evaluation of literature on schemes and statistics, the author identifies major challenges around acceptance of SHGs as a business proposition, lack of sufficient bank personnel, gaps in integration of IT into management of SHGs.

RBI's banking through Banking Correspondence Model was aimed to address the growing challenge of declining banking manpower. However, its efficacy in the state remains unsatisfactory. Inadequate compensation and incentives, and restrained connectivity are the quoted reasons for BC's reduced motivation. As stated in NABARD's State Focus Paper, engagement of SHG leaders / Active Women as Bank *Sakhis* (Agents) could be one of the strategies to facilitate the update of micro finance and insurance in the state.

## 6.8 District-wise Key Issues and Possible Measures related to Forest Management and Forest Areas

In consideration of information/data collected and analysed in the study, some of key issues and lessons learned for the project districts proposed by HPPD are summarised in **Table 6.8.1**. In the same, possible measures against issues/ lessons learned are also presented.

**Table 6.8.1 Indicative Key Issues and Possible Measures for Forest Management/ Forest Areas in Proposed Districts by HPPD**

District	Key Issues	Possible Measures
Bilaspur	Lantana Infested Area	- Rehabilitation and improvement of lantana infested forest area
	Pine Forest Stands	- Fire prevention - Effective use of pine needles
	Increasing demand for forest products	- Afforestation/reforestation - NTFP development
	Forest Fire	- Fire patrol, fire line management
	Forest area diversion for developmental use	- Boundary management - Compensatory afforestation
Mandi	Increasing demand for forest products	- Afforestation/reforestation - NTFP development
	Water scarcity	- Afforestation/reforestation - Water harvesting/ storage
	Grazing of grassland and pastures (local and migratory grazers)	- Pasture rehabilitation/ improvement - SWC measures in pasture land - Alternative fodder development - Strict control and monitoring of annual permit
	Human-wildlife conflicts	- Human-wildlife conflict mitigation/ management - Wildlife Habitat Improvement
	Pine Forest Stands	- Fire prevention - Effective use of pine needles

District	Key Issues	Possible Measures
	Lantana Infested Area	- Rehabilitation and improvement of lantana infested forest area
	Forest Fire	- Fire patrol, fire line management
	Forest area diversion for developmental use	- Boundary management - Compensatory afforestation
Kullu	physical damages to forest areas by avalanche and snow	- SWC measures (including drainage line treatments) - planation/ vegetation cover development
	Degraded sub-alpine hills	- SWC measures (including drainage line treatments) - planation/ vegetation cover development
	Increasing demand for forest products	- Afforestation/reforestation - NTFP development
	Constant demand for fuelwood	- Establishment of forest planation - Introduction of alternative source of energy
	physical damages to alpine pasture and forest areas by avalanche and snow	- SWC measures (including drainage line treatments) - Planation/ vegetation cover development
	Grazing of grassland and pastures (local and migratory grazers)	- Pasture rehabilitation/ improvement - SWC measures in pasture land - Alternative fodder development - Strict control and monitoring of annual permit
	Forest Fire	- Fire patrol, fire line management
	Encroachment of Agricultural Land	- Boundary management - Invasive plant prevention
	Forest area diversion for developmental use	- Boundary management - Compensatory afforestation
Lahaul and Spiti	Physical damages to alpine pasture and forest areas by avalanche and snow	- SWC measures (including drainage line treatments) - Planation/ vegetation cover development
	Undemarcated Protected Forest Area	- Forest boundary management
	Cold desert area	- Livelihood activities - Irrigation - Tourism development - Other small business development, etc.
	Constant demand for fuelwood	- Establishment of forest planation - Introduction of alternative source of energy
	Overgrazing alpine pastures (local and migratory grazers)	- Pasture rehabilitation/ improvement - SWC measures in pasture land - Alternative fodder development - Strict control and monitoring of annual permit
	Water scarcity	- Afforestation/reforestation - Water harvesting/ storage
	Existence of special interest/ niche species (Juniper, Seabuckthorn)	- Special interest/ niche species development
Kinnaur	physical damages to forest areas by avalanche and snow	- SWC measures (including drainage line treatments) - Planation/ vegetation cover development
	Grazing of grassland and pastures (local and migratory grazers)	- Pasture rehabilitation/ improvement - SWC measures in pasture land - Alternative fodder development - Strict control and monitoring of annual permit
	Constant demand for fuelwood	- Establishment of Forest Plantation/Reforestation
	Existence of special interest/ niche species (Ash, Juniper, Chilgoza, Seabuckthorn)	- special interest/ niche species development
	Encroachment of Agricultural Land	- Boundary management - Invasive plant prevention
	Undemarcated Protected Forest Area	- Forest boundary management
	Forest area diversion for developmental use	- Boundary management - Compensatory afforestation
	Water scarcity	- Afforestation/reforestation - Water harvesting/ storage
Shimla	Increasing demand for forest products	- Afforestation/reforestation - NTFP development
	Urbanisation/ Development Activities	- Boundary management - Compensatory afforestation

District	Key Issues	Possible Measures
	Human-wildlife conflicts	- Human-wildlife conflict mitigation/ management - Wildlife Habitat Improvement
	Pine Forest Stands	- Fire prevention - Effective use of pine needles
Chamba	Physical damages to forest areas by avalanche and snow	- SWC measures (including drainage line treatments) - Planation/ vegetation cover development
	Increasing demand for forest products	- Afforestation/reforestation - NTFP development
	Constant demand for fuelwood	- Establishment of forest planation - Introduction of alternative source of energy
	Grazing of grassland and pastures (local and migratory grazers)	- Pasture rehabilitation/ improvement - SWC measures in pasture land - Alternative fodder development - Strict control and monitoring of annual permit
	Existence of special interest/ niche species	- Special interest/ niche species development

Source: Compiled by JICA Study Team (2017) based on field surveys, literatures and interviews with concerned stakeholders.

## CHAPTER 7 REVIEW OF DRAFT PROJECT REPORT (DPR)

### 7.1 Overall Review of Proposed Project by HPFD

The proposed project area in the draft project report (DPR) and what has been confirmed between HPFD and JICA before the commencement of the Study are different and described hereunder.

- ◆ DPR: six districts of Kinnaur, Lahaul & Spiti, Sirmour, Solan, Shimla and Chamba (Bharmour & Pangri sub-divisions only)
- ◆ Before commencement of JICA Study: seven districts of Kinnaur, Lahaul & Spiti, Bilasapur, Mandi, Kullu, Shimla and Chamba (Bharmour & Pangri sub-divisions only)

Before the commencement of the Study, districts of Sirmour and Solan were excluded and districts of Bilasapur, Mandi and Kullu were proposed to be added as the project targeted districts.

The project outline described in DPR is summarised in **Table 7.1.1**.

**Table 7.1.1 Outline of the Project Proposed in DPR**

Item	Description
Project Name	Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project
Implementing Agency	Himachal Pradesh Forest Ecosystems and Livelihood Project Society (HPFELPS), Himachal Pradesh Forest Department (HPFD)
Project Area	<u>Six Districts</u> : Kinnaur, Lahaul & Spiti, Sirmour, Solan, Shimla and Bharmour & Pangri Subdivision of Chamba.
Implementation Period	<u>8 Years</u>
Total Budget	<u>8 billion INR</u>
Overall Goal/ Project Purpose	<p>Aim of the Project:                      “To increase the cover, density &amp; resultant productive potential of Himachal’s forests, with active community participation, improving livelihoods of forest dependent communities &amp; livelihood security, in general.”                      Furthermore, the following are the broad objectives of the Project.</p> <ul style="list-style-type: none"> <li>➤ Increase forest cover, density and productive potential using scientific &amp; modern forest management practices in order to generate sustained flow of forest ecosystem goods and services and their effective provisioning/delivery.</li> <li>➤ Improvement of resource base and reversal of degradation of natural ecosystems, enhancement of forest carbon through strategies aimed at reducing pressure/ stress on forest resources, and biodiversity conservation practices, in collaboration with village communities.</li> <li>➤ Strengthening livelihoods of the people dependent on forest resources and providing them with alternative economic choices.</li> <li>➤ Capacity build-up of communities &amp; PRIs to empower them to manage and use their forest resources.</li> <li>➤ Targeting vulnerable sections of the community - women, marginal farmers, nomads through special programmes.</li> </ul>
Major Proposed Component	<ol style="list-style-type: none"> <li>1. Institutional Capacity Building including Orientation/ Sensitisation &amp; General Preparedness</li> <li>2. Forestry (Department mode and JFM mode)</li> <li>3. Soil &amp; Moisture Conservation</li> <li>4. Livelihood Activities</li> <li>5. Wildlife Habitat Improvement</li> <li>6. Environmental Rehabilitation</li> <li>7. Research, Studies and Documentation</li> <li>8. Strengthening of ICT in HPFD</li> <li>9. Monitoring and Evaluation</li> <li>10. Project Management Unit (PMU)</li> <li>11. Office building for the Project</li> </ol>



Item	Description
Major Target Proposed	- Afforestation of open forests: 5,000 ha
	- Densification of moderately dense forests: 4,000 ha
	- High density energy plantations 1,000 ha
	- Introduction of local B/L multiple use species in chir forests close to habitation forests 5,000 ha
	- Improvement of stocking of native B/L species in High Conifer forests 2,000 ha
	- Management of bamboo forests- decongestion, regeneration, 3,640 ha
	- Pasture Management 3,000 ha
	- Rehabilitation of forest areas infested with invasive alien 7,300 ha
	- Non-Timber Forest Products (plantations) 3,000 ha
	- Forest fire management 2,000 ha
	- Forest Boundary Management: geo-referencing, new construction & repairs. 15,400 pillars
	- Rejuvenation of springs 150 catchments

Source: Compiled by JICA Study Team (2017) based on DPR

Before the commencement of the Study, the tentative proposed outline for the Project has been restructured by HPFD and JICA is described in **Table 7.1.2**.

**Table 7.1.2 Tentative Proposed Outline of the Project before JICA Study**

Item	Description
Project Name	Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project
Implementing Agency	Himachal Pradesh Forest Ecosystems and Livelihood Project Society (HPFELPS), Himachal Pradesh Forest Department (HPFD)
Project Area	<u>Seven Districts</u> : Shimla, Bilaspur, Kullu, Kinnaur, Mandi, Lahaul & Spiti and Chamba (only Bharmour and Pangi sub-divisions)
Implementation Period	<u>8 Years</u>
Total Budget	<u>8 billion INR</u>
Overall Goal/ Project Purpose	Overall Goal: Contributing to environmental conservation and sustainable socio-economic development of the state Project Purposes: enhancing forest ecosystem conservation and livelihood improvement in the project area through implementing biodiversity / forest ecosystem conservation activities and alternative livelihood activities
Major Proposed Component	<ol style="list-style-type: none"> <li>1. Forest Ecosystem Management (improved nursery management, afforestation management of bamboo forests, pasture management, rehabilitation of forest areas infested with invasive alien species, NTFP management, soil and moisture conservation, forest fire management, forest boundary management, forest infrastructure development, and participatory forest improvement and development)</li> <li>2. Biodiversity Conservation (wildlife habitat improvements, strengthening of buffer zone management, etc.)</li> <li>3. Community Development/ Livelihood Improvement (Institutional and capacity development of CBOs such as self-help group (SHGs), livelihood improvement through introduction of alternative livelihoods, etc.))</li> <li>4. Institutional Capacity Development (Institutional and capacity development for establishment/ strengthening of forest ecosystem management foundations, Implementation setup strengthening with active involvements of NGOs and CBOs, etc.)</li> <li>5. Consulting Services (Project Management Consultants)</li> </ol>

Source: Compiled by JICA Study Team (2017) based on the Minutes of Meetings on the Study and the terms of reference (TOR) of the Study

The review of DPR in this report has been undertaken by the Study Team keeping in view of the restructured project framework by HPFD and JICA prior to the commencement of the Study, which outline is given in **Table 7.1.2**.

The results of DPR review presented hereunder revealed some shortcomings and the need for further confirmation of the data as well as the need for further restructuring of the project framework and approach in response to the condition in the proposed project areas.

## **7.2 Project Needs and Rationale**

As stated in **Part I, Chapter 6**, trends on increase in forest degradation as well as necessities of alternative livelihood options of forest dependent communities to reduce adverse impacts to forest areas /resources were not fully confirmed with sufficient justifications associated with quantified data during the Study. Like in the other JICA forestry loan projects in India, the vicious cycle of forest degradation caused by marginal forest dependent communities was one of the fundamental assumptions described in DPR for the proposed Project. However, this assumption was not fully applicable and justifiable in the HP context. In this context, the relevance of the livelihood improvement components/ activities in the proposed project could be to the limited extent.

Though the increase of forest degradation is not clearly visible in HP, there are needs for improving forest quality for further sustainable forest management and biodiversity conservation. In this respect, livelihood improvement activities shall be introduced. Based on findings as well as analyses conducted during the Study, modified project needs and rationale were confirmed and presented in **Part II, Chapter 3** of this report.

## **7.3 Project Objectives and Approaches**

Overall goal, project objective, outputs, and approaches presented in DPR were not fully organised. During the initial stage of the study narrative summary of the proposed Project was reviewed by HPFD and the Study Team. The project objective and approaches are presented in **Part II, Chapter 3**.

## **7.4 Component-wise Review of Proposed Project by HPFD**

### **7.4.1 Overview**

Based on the component structure of DPR and the restructured project framework by HPFD and JICA prior to the commencement of the Study, the review was done in the following aspects.

- |   |  |
|---|--|
| 1) Institutional Capacity Building including Orientation/ Sensitisation & General Preparedness (Preparatory Work) | 7) Research, Studies and Documentation |
| 2) Forestry (Departmental mode and JFM mode)  | 8) Strengthening of ICT in HPFD        |
|   | 9) Monitoring and Evaluation           |
|   | 10) Project Management Unit (PMU)      |
|   | 11) Office Building for the Project    |

- |                                 |  |
|---------------------------------|--|
| 3) Soil & Moisture Conservation | 12) Consulting Service                     |
| 4) Livelihood Activities        | 13) Environmental and Social Consideration |
| 5) Wildlife Habitat Improvement |  |
| 6) Environmental Rehabilitation |  |

In general, descriptions of each activity and their work quantities including region-wise work quantities were not fully described in DPR. Therefore, such were elaborated in the process of reformulation of the proposed Project and summarised in **Part II, Chapter 3**.

#### 7.4.2 Institutional Capacity Building including Orientation/ Sensitisation & General Preparedness

The points in relation to the Institutional Capacity Building including Orientation/ Sensitisation & General Preparedness (Preparatory Work) in DPR are given in **Table 7.4.1**.

**Table 7.4.1 Observation, Further Actions Required and Findings: Preparatory Work**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	- Section 13-A of the DPR provides details of the interventions planned for the Project. Although some of the sub-components are included in the cost estimate (refer Annex IX(b) of DPR), but it appears that these are not well aligned with other components/ sub-components, and thus further detailing would be required; Around 4% of the base project cost is allocated for this component.	- Clear identification of stakeholders and batch size, periodicity of training; - Type and topic of trainings; - Detailing of In-state/ Outside-state and Exposure visits (national/ overseas); - Identification of Training institutions and local resources for conducting in-situ trainings particularly for community institution office bearers/ members	- Since the project activities are still being explored for finalisation, stakeholder identification has not been completed yet. - Institutional capacity of the frontline staff has not reached to execute the process intense interventions. - The participatory processes require quality time on handholding that is not ensured by forest frontline staff with multiple responsibilities and priorities. - Institutional capacity development interventions were explored by study team experts, and firmed-up with the finalisation of sub-components/ activities. - Discussions were held with HPFD and a consensus has been established on the institutional arrangement for project implementation.
	- Involvement of HPFD at the community level is not clear.	- The intention as well as plans of HPFD on human resource allocation	- HPFD has trained and experienced human resources, particularly on contract from pervious EAPs, and some of these could be utilised for the proposed Project. - Requirement of additional human resource support at the operational level i.e. ranges and divisions would be explored. This aspect needs to be deliberated upon as it would have a cost implication and may also lead to liability for HPFD.

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.3 Forestry (Departmental mode and JFM mode)

The points in relation to the Forestry (Departmental Mode) in DPR are given in **Table 7.4.2**.

**Table 7.4.2 Observation, Further Actions Required and Findings: Forestry (Departmental Mode)**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
Improved Nursery Management	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not clear about details.                             <ul style="list-style-type: none"> <li>(a) establishment of Modern Nurseries</li> <li>(b) vegetative Propagation</li> <li>(c) clonal Hedges</li> <li>(d) standardisation of Nursery Protocols especially for local species &amp; NTFPs</li> <li>(e) improved Gene Pool Programme</li> </ul> </li> <li>- Especially, purposes and what to be done for vegetative propagation &amp; clonal hedges is not clear</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to nursery management</li> <li>- Existing nursery infrastructure available with HPFD and its existing production capacity</li> <li>- Technical expertise of staff in raising quality nursery stocks</li> <li>- Available existing nursery technology</li> <li>- Quality germplasm availability from clonal seed orchards or seed stands</li> <li>- Existing root trainer based nurseries in HPFD and type of medium used</li> <li>- Details in terms of types, specifications, quantities and locations of proposed nursery management</li> </ul>	<ul style="list-style-type: none"> <li>- Most of ranges in the proposed project area have at least one permanent nursery.</li> <li>- Details about activities originally proposed in the DPR was not confirmed.</li> <li>- Because of limited land availability for new nurseries, upgrading/ renovation of some of existing nurseries for increase in production of better quality seedlings seems to be the priority for FD.</li> </ul>
Afforestation	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not fully clear about details.                             <ul style="list-style-type: none"> <li>(a) afforestation of open forests</li> <li>(b) densification of moderately dense forests</li> <li>(c) high density energy plantations</li> <li>(d) introduction of local broad leaves (B/L) multiple use species in chil forests and close to habitation forests</li> <li>(e) improvement of stocking of native B/L species in high conifer forests</li> </ul> </li> <li>- High density energy plantation may be unsustainable component in hilly terrains due to difficulties of forest cover establishment. Instead, activities on agroforestry - fuel/ fodder tree/ shrubs on-farm bunds and private pastures (ghasanis) maybe also explored.</li> <li>- Improving density in open and</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to afforestation</li> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes</li> <li>- Details in terms of types, specifications, quantities and locations of proposed afforestation</li> </ul>	<ul style="list-style-type: none"> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas could not be able to confirm.</li> <li>- Though overall needs and necessities of afforestation/ reforestation activities exist in the state, data/information to justify specific needs/necessities for the project interventions were not fully available.</li> <li>- Especially information on potential intervention areas for the activities was not fully available and such needed to be confirmed in the initial stage of project implementation.</li> <li>- Also, details on objectives of such activities as the project intervention were not fully confirmed during the study and</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>moderately dense forests which generally have good root stock of naturalised species. Therefore, assisted natural regeneration (ANR) through closure, patch sowing, dibbling and other means maybe also explored,</p> <p>-</p>		<p>need to be re-confirmed/ re-clarified in the initial stage of project implementation.</p> <ul style="list-style-type: none"> <li>- Forest operations (mainly planting) during the monsoon season, tend to have shortage of labours due to conflicts with labour requirements for agriculture and other productive activities. Contents and scale of this activities shall consider such limiting factors.</li> <li>- The activities require re-clarification, re-justification and re-planning in consideration of the above.</li> </ul>
Management of Bamboo Forests	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not fully clear about details.                             <ul style="list-style-type: none"> <li>(a) decongestion</li> <li>(b) regeneration</li> <li>(c) rehabilitation of bamboo forests infested with invasive alien species (mainly lantana)</li> </ul> </li> <li>- Areas under bamboo requiring decongestion need to be identified through surveys and quantified.</li> <li>- Potential project area may have limited area for bamboo management (only Bilaspur and Sundernagar divisions). Thus, available treatment area shall determine if stand-alone sub component is needed or not.</li> <li>- Decongestion of bamboo requires special skills / training to be imparted to labours and field staff which needs to be further confirmed,</li> <li>- Skill development in bamboo products, value addition, market chains, clustering are all part of bamboo management, which should be covered under this sub-component or relevant component/ sub-component in the Project.</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to management of bamboo forests</li> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes including National Bamboo Mission</li> <li>- Details in terms of types, specifications, quantities and locations of proposed management of bamboo forests</li> <li>- Bamboo based livelihood activities</li> </ul>	<ul style="list-style-type: none"> <li>- While management of bamboo in the forest areas is done by HPFD, the State Forest Development Corporation does the harvesting and marketing. Prior to February 2011, bamboo was a nationalised product and thereafter bamboo on the private land has been exempted from harvesting and transit restrictions. Four species of bamboo i.e. <i>dendrocalamus strictus</i>, <i>dendrocalamus hamiltonii</i>, <i>bambusa bamboos</i>, and <i>bambusa nutans</i> do not require any transit pass. National Bamboo Mission (NBM) has been in operation in HP since 2006-7 bamboo plantations on the forest and non-forest areas and for proper silvicultural management of bamboo. Between 2007-8 and 2014-15, 3,462 ha forest areas and 1,224 ha non-forest areas were brought under plantation. 1,094 ha forest areas were treated for improving existing bamboo stocks.</li> <li>- Small scale bamboo based livelihood activities are possible in selected pockets of Bilaspur and Mandi districts. Production of bamboo shoots and marketing may need to be further investigated.</li> </ul>
Pasture Management	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not fully clear</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to pasture</li> </ul>	<ul style="list-style-type: none"> <li>- Pasture/ grassland management is relevant in most of the areas in</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>about details.</p> <p>(a) introduction of rotational grazing in alpine pastures</p> <p>(b) introduction of tree fodder species &amp; reseeded with local grasses/ legumes in low lying pastures</p> <p>(c) moisture retention operations in low lying pastures</p> <ul style="list-style-type: none"> <li>- In HP, grasslands have been classified based on altitude, temperature, and rainfall into 5 or 6 classes, each having specific issues and treatments which has not been highlighted in the DPR</li> <li>- Besides improving pastures or bringing more area under it, a sub component or activities on increasing fodder use efficiency/ reducing wastage may need to be also looked into.</li> <li>- Mass production of grass seeds and vegetative propagation in nursery need to be looked into augmentation of fodder resources through field bunds and agro-forestry forage tree species shall be further explored.</li> </ul>	<p>management</p> <ul style="list-style-type: none"> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes including other departments (Animal Husbandry/ Agriculture/ Horticulture)</li> <li>- Details in terms of types, specifications, quantities and locations of proposed pasture management</li> </ul>	<p>addition to alpine pastures.</p> <ul style="list-style-type: none"> <li>- Depending on the location, community based pasture/ grassland management would be highly relevant not only for the forest ecosystems point of view but from perspectives of women's drudgery reduction and grazers community.</li> <li>- In the Alpine pasture areas, the pasture management needs to be done through departmental mode as the human habitation is scattered and community based approach may not be fully feasible. Involving graziers community may be considered while implementation.</li> </ul>
<p>Rehabilitation of forest areas infested with invasive alien species</p>	<ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- This can be an activity under sub-components ii) Afforestation, iii) Management of Bamboo Forests, iv) Pasture Management, or wildlife habitat improvement component since after removal of alien species the area is to be converted into one of the above component/ sub-components</li> <li>- Need to clarify the present situations of the rehabilitation work in the field.</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to invasive alien species</li> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes</li> <li>- Details in terms of types, specifications, quantities and locations of proposed interventions</li> <li>- Explore use of invasive alien species for any value-added products under livelihood component (ex. fuel briquettes; furniture; charcoal; insect repellent etc.)</li> </ul>	<ul style="list-style-type: none"> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Mechanical extractions of invasive plants are conducted by HPFD, but require continuous treatments to eradicate invasive plants. These continuous treatments are not fully exercised.</li> <li>- For shade-intolerant invasive plants, introducing shade (canopy) covers may be more practical operation which can be introduced in the Project.</li> </ul>
<p>Non-Timber Forest Products</p>	<p><u>NTFP Plantation</u></p> <ul style="list-style-type: none"> <li>- More clarity is required on mode of NTFP plantations - whether departmental operation or through</li> </ul>	<ul style="list-style-type: none"> <li>- Selection of species to be planted based on consultation with HPFD and also based on the</li> </ul>	<ul style="list-style-type: none"> <li>- The production of important medicinal plants has significantly declined. Hence the need for plantation of NTFP</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>VFDS and whether this will also include wasteland/ village commons.</p> <p><u>NTFP Distribution</u></p> <ul style="list-style-type: none"> <li>- More clarity is required on the strategies for promotion of cultivation of NTFP/ medicinal plants: whether promotion of cultivation is through distribution of seedlings alone or other package of inputs and services would be provided to the forest dependent communities.</li> </ul>	<p>agro-ecological conditions.</p> <ul style="list-style-type: none"> <li>- Prioritise the species for cultivation on the private land based on the inputs from market survey and from research institutions.</li> </ul>	<p>including medicinal plants in the forest, JFM areas and non-forest areas.</p> <ul style="list-style-type: none"> <li>- A preliminary list of species to be planted in forest areas has been prepared based on consultation with primary and sources, which has been further verified and finalised during the course of market survey.</li> <li>- A primary list of species to be promoted for cultivation on the private/ non-forest land has been prepared based on consultation with different stakeholders, which has been finalised after the market survey.</li> <li>- Promotion of cultivation of medicinal plants should be emphasised in high altitude areas. The cultivation should be promoted through growers societies and all the inputs required should be provided to the growers societies.</li> </ul>
Forest Fire Management	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not fully clear about details. <ul style="list-style-type: none"> <li>(a) Clearance of inflammable material from Fire lines, roads and paths;</li> <li>(b) Water storage structures</li> <li>(c) Modern Fire Control Tools &amp; equipment</li> </ul> </li> <li>- There may be a need of component on fire line creation besides fire line clearance.</li> <li>- Removal and utilisation of chir needle, which is one of major fire hazard, has not been specified.</li> <li>- Strengthening PFM for fire management has not be sought including rewarding VFDSs or GPs for fire prevention mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to fire management</li> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes including Intensification of forest management. Scheme and its implementation in the state</li> <li>- Details in terms of types, specifications, quantities and locations of proposed interventions</li> <li>- Good practices on removal of chir pine needles from forests</li> <li>- Good case studies on VFDS and fire control</li> </ul>	<ul style="list-style-type: none"> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- As department mode, creation and maintenance of fire lines in the project interventions areas seems to be feasible. Community involvement for removal of forest slash and chir needles may further considered.</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
Forest Boundary Management	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not fully clear about details.                             <ul style="list-style-type: none"> <li>(a) geo-referencing of boundary pillars</li> <li>(b) construction of new boundary pillars</li> <li>(c) reconstruction of existing boundary pillars</li> </ul> </li> <li>- Basically, these activities are regarded as regular mandatory activities of HPFD and justifications for taking these as project activities need to be further clarified.</li> <li>- As activities, the following issues may need to be further clarified.                             <ul style="list-style-type: none"> <li>➤ No mention has been made on developing capability in digital record keeping of forest boundary records (GIS) by forestry establishment</li> <li>➤ A road map to expedite demarcation, notification and entry of huge backlog of un-demarcated protection forests (UPFs) not elucidated and any activities requiring project assistance not made clear,</li> <li>➤ Reconstruction of existing boundary pillar is not clear, it could have been repair of existing boundary pillar</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to forest boundary management</li> <li>- Projections of tentative targets based on treatable area figures of forest landscapes to be treated/ tackled</li> <li>- Actions/ activities under other projects and schemes</li> <li>- Details in terms of types, specifications, quantities and locations of proposed interventions</li> </ul>	<ul style="list-style-type: none"> <li>- Details on proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Since forest boundary management is a routine task of HPFD, the interventions in the Project shall be limited to improve forest boundaries related to project intervention area.</li> </ul>
Forest Infrastructure Development (Rest houses, Roads, paths, bridges)	<p><u>Residential/office accommodation for field staff.</u></p> <ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- There are prescribed classes(s) of accommodation like class 1 for lowest and then class 2,3,4,5,6 etc. as per ranking in hierarchy, notified by the State Government of HP for each category of employees, hence category wise class and number of houses are required from HPFD along with probable location to justify costs.</li> </ul> <p><u>Project related buildings &amp; infrastructure</u></p> <ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- HPFD may define different types of buildings with probable location and area of buildings</li> </ul> <p><u>Maintenance of forest bridal/inspection paths/ foot bridges</u></p> <ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to forest infrastructure development</li> <li>- Actions/ activities under other projects and schemes including intensification of forest management. Scheme and its implementation in the state</li> <li>- Details in terms of types, specifications, quantities and locations of proposed interventions</li> </ul>	<ul style="list-style-type: none"> <li>- Details on proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- DEA, GoI does not permit excessive infrastructure in the loan project.</li> <li>- nrastructure development to be limited to infrastructure which enhance implementation and achievement of other project activities.</li> </ul>



Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- This seem to be a regular activity of HPFD</li> </ul>		
	<u>Improvement &amp; strengthening of forest check posts</u> <ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- What infrastructure is proposed by HPFD to strengthen the check posts is required.</li> </ul>		
	<u>Improved mobility (jeeps etc.)</u> <ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- Jeeps can be purchased through exclusive permission of the state government of HP only. However, HPFD to indicate type, model numbers etc. to work out costs.</li> </ul>		

Source: Prepared by JICA Study Team (2017) based on the content of DPR

The points in relation to the Forestry (JFM Mode) in DPR are given in **Table 7.4.3**.

**Table 7.4.3 Observation, Further Actions Required and Findings: Forestry (JFM Mode)**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- General description as "Participatory Forest Improvement and Development" is provided in DPR. However, details on activities and their cost estimates are not fully described.</li> </ul>	<ul style="list-style-type: none"> <li>- Details on JFM approaches/ modes considered for the project interventions</li> <li>- Achievements, issues and good practices of existing JFM related interventions by HPFD</li> </ul>	<ul style="list-style-type: none"> <li>- Outputs (i.e. activities initiated, community institutions, infrastructures) from the past projects have not been sustained in many places except the projects completed recently.</li> <li>- So far JFM under FDA has done plantation in small patches as the funding from NAP is declining.</li> <li>- To create community level institutions that sustain and proactively engage in forest ecosystems management is a challenge.</li> <li>- Strong linkage with Gram Panchayats could positively contribute to the sustainability of the community level institutions. Appropriate institutional arrangement shall be proposed.</li> <li>- The nature of micro plan and planning process at community level shall be revisited and micro plans need to be prepared for long term, mid-term and short term so that the activities are planned in perspectives.</li> <li>- The forest areas available for JFM forestry operation may be limited at a community level and thus, the site selection may need to consider the geographical contiguity of the forest areas suitable for JFM mode operation so that the effectiveness of the treatment could be ensured.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.4 Soil & Moisture Conservation

The points in relation to the Soil & Moisture Conservation (SMC) in DPR are given in **Table 7.4.4**

**Table 7.4.4 Observation, Further Actions Required and Findings: SMC**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<u>in situ moisture conservation</u> - Not fully clear about details in DPR.	<ul style="list-style-type: none"> <li>- Existing soil and moisture conservation related activities implemented by HPFD</li> <li>- Drawings/designs of some typical engineering measures viz, gully plugging, water retaining structures (pucca or kaccha), snow harvesting, plantation or others taken in past as also reports on their sustainability over the years</li> <li>- Technical capacity of HPFD for soil moisture conservation related activities.</li> <li>- Details in terms of types, specifications, quantities and locations of proposed soil and moisture conservation for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that existing technologies by HPFD are to be covered in the project area.</li> <li>- Confirmed that the intervention to be applied primarily in forest areas for purposes of soil conservation/ stabilisation and water/moisture conservation to improve soil/water/moisture regimes of forest areas for better forestry operation and biodiversity conservation. If needs are confirmed, water harvesting structures to be considered under the community development/ livelihood activities under the Project.</li> </ul>
	<u>Water harvesting through engineering measures</u> - Not fully clear about details in DPR.		
	<u>Civil engineering structures</u> - Not fully clear about details in DPR.		

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.5 Livelihood Activities

The points in relation to the Livelihood Activities (Livelihood) in DPR are given in **Table 7.4.5**.

**Table 7.4.5 Observation, Further Actions Required and Findings: Livelihood**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
Livelihood (Overall)	- The component was proposed on the basis of 2001 census data and other descriptive information, which does not highlight the livelihood related issues in the target communities.	<ul style="list-style-type: none"> <li>- The socio-economic status of the proposed project area using the latest available data including Census 2011 and livelihood survey in the sample villages in the proposed project areas</li> <li>- Priorities in the community development and livelihoods needs based on the reviews and analysis of the primary and updated secondary data</li> </ul>	<ul style="list-style-type: none"> <li>- The field findings suggest significant improvements in the rural livelihoods in most part of the state through various government interventions.</li> <li>- Thus, the livelihood improvement by way of small scale income generation activities to strengthen financial security may not hold relevance in the current situation but rather activities that can be linked with the existing enterprises.</li> <li>- Community infrastructures and access to alternative energies also improved significantly. The energy saving mechanism and drudgery reduction of women would be relevant.</li> </ul>
EPA: creation of community assets	- Under EPA, creation of community assets was suggested by utilising 15% of the micro plan. It was also suggested to	<ul style="list-style-type: none"> <li>- Potential community and livelihood improvement needs based on the primary and secondary data</li> <li>- Process of EPA selection</li> </ul>	<ul style="list-style-type: none"> <li>- EPA has been implemented through FDA assisted JFM and other livelihood/ community development activities in other externally aided projects.</li> <li>- In this Project, community development</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>take advantage of convergence. For the execution of the EPA, "tripartite agreement" between Gram Panchayat/ JFMC and Common Interest Group (CIG) / SHG are to be signed. Fund is to be released in instalments based on the agreed milestones/ approved business plan.</p>	<p>and micro planning, implementation framework, process of convergence while defining the field level institutional arrangement</p> <ul style="list-style-type: none"> <li>- The "tripartite agreement" in this Project as the field level institutional arrangement</li> <li>- Fund flow and management for the community development livelihood improvement.</li> <li>- Identification of the possibilities for convergence, current issues in service delivery and priorities in community and livelihood improvement based on the study of the public service delivery system and its status in the 5<sup>th</sup> scheduled areas and other remote areas</li> </ul>	<p>activities which are considered EPA in DPR shall be made as an integral part of the project implementation but not as one time implementation prior to the plantation activities, which has been the case in the previous interventions.</p> <ul style="list-style-type: none"> <li>- Designing community institutional arrangement cohesive to the PRIs would help in implementing community development/ livelihood components as it would help the project to tap into available resources through PRI.</li> <li>- Community development activities shall be planned and implemented in response to the micro plan prepared by each community. Convergence shall also be considered as one of the important mode of resource mobilisation and implementation of the community development activities.</li> <li>- So far, across the communities, activities related to promotion of alternative energies especially for winter (solar heating system) and fodder/ feed related activities could be considered under community development/ livelihood, which not only contributes to the sustainable forest ecosystems management but also the drudgery reduction for women.</li> <li>- The type of agreements to be signed between the community level institutions are to be finalised once the activities, community level institutional arrangements, and modus operandi are finalised in the later stage of the Study.</li> <li>- In 5<sup>th</sup> schedule areas, the government has already made substantial investments and poverty level amongst the tribal communities has improved significantly. No significant statistical evidences are seen in terms of gaps in terms of poverty level between the tribal communities and others. Field investigation in the tribal areas and PA areas was conducted in to advance the understanding of the situation.</li> </ul>
<p>Training and capacity building of communities</p>	<ul style="list-style-type: none"> <li>- Training programmes/ capacity buildings needs are not defined in DPR.</li> </ul>	<ul style="list-style-type: none"> <li>- Preliminary training needs for different community level institutions and other stakeholders along with the possible service providers, training outline and training costs.</li> <li>- Potential resource</li> </ul>	<ul style="list-style-type: none"> <li>- Preliminary assessment of the training needs has been done. Fine tuning shall be necessary as the activities and roles and responsibilities of the community level institutions get defined.</li> <li>- Preliminary list of potential resource organisations for capacity building of the community level institutions has</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
		organisations are needed in three thematic areas: organisational capacity building, financial management, and skills development.	been prepared. Necessary unit rates are collected.
NTFP/ Non NTFP based livelihoods (overall)	<ul style="list-style-type: none"> <li>- As there is no data indicating the status of livelihoods amongst the forest dependent communities in the proposed project areas, needs for the livelihood interventions to be assessed and defined.</li> </ul>	<ul style="list-style-type: none"> <li>- The status of livelihoods and the needs for the livelihoods improvement based on the results of livelihood survey along with PRA exercises</li> <li>- Financial arrangement for promoting livelihoods interventions from its requirement, procurement, and management while taking into account of the financial security of the forest dependent households</li> <li>- The economic and financial status of the households based on the livelihood survey, secondary data review and PRA exercises</li> <li>- The appropriate measures for enhancing the financial resilience with the introduction of alternative and enhanced access to financial services for income generation activities</li> </ul>	<ul style="list-style-type: none"> <li>- PRA exercises revealed that villagers have adopted multiple means of livelihoods to meet their ends. Many households also depend on income from salaries or wages. In the case of wage work, gender gap in wages and seasonal fluctuation of income have been observed.</li> <li>- Many women do not have time for any other work but domestic chores. The number of women lacking literacy skills increased after 40s. Some of the younger women are employed.</li> <li>- Not many SHGs are functional in the field.</li> <li>- Fear of default was apparent amongst men and women.</li> <li>- To validate the findings from PRA exercises, data from the livelihood survey are referred to.</li> </ul>
NTFP including medicinal plants- harvesting techniques, productivity enhancement, value addition, marketing etc.	<ul style="list-style-type: none"> <li>- Potential livelihood options for NTFP and non NTFP based are broadly identified in DPR. However, no basis for such NTFP based interventions were given in the same.</li> </ul> <p>More clarity is required on the cluster approach to be adopted - size of cluster, institutional arrangements, magnitude of operation etc.</p>	<ul style="list-style-type: none"> <li>- Identification of the potential activities among the proposed activities such as vermi composting, chir pine needles, bamboo, honey and other traditional forest based livelihood activities, taking into account the local conditions and process of development.</li> <li>- Approach and operational strategies</li> <li>- Possibility of cultivation and value addition of potential medicinal plants</li> </ul>	<ul style="list-style-type: none"> <li>- As per the preliminary field level assessment, the focus of NTFP enterprise development will be on developing clusters for cultivation/ plantation of high altitude medicinal plants, sustainable harvesting, primary processing and collective supply to different pharmaceuticals and other processing industries.</li> <li>- There will also be a scope for village level NTFP based income generation activities based on the availability of raw materials. This will be identified and confirmed during the process of microplanning.</li> </ul>
Collection and utilisation of chir pine needles	<ul style="list-style-type: none"> <li>- Commercially important NTFPs are identified, however which species are relevant in the project areas and issues</li> </ul>	<ul style="list-style-type: none"> <li>- Challenges and economically important potential NTFPs and medicinal plants based on the situational analysis on value chain of NTFPs and</li> </ul>	<ul style="list-style-type: none"> <li>- Not much has been done so far for collection and utilisation of pine needles. One women group with 16 members was promoted by the Mid-Himalayan Watershed Development Project to make briquettes</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>associated with value chain are not defined. Thus, the relevant interventions are not included in DPR.</p> <ul style="list-style-type: none"> <li>- More clarity is required on the kind of enterprises to be promoted for utilisation of pine needles. The budget allocated is 10 million INR.</li> </ul>	<p>medicinal plants</p> <ul style="list-style-type: none"> <li>- Issues to be resolved based on the findings from the value chain assessment and appropriate measures to mitigate</li> <li>- Outline process of the NTFP/ Non-NTFP medicinal plants based livelihood activities at a suitable scale (SHG/ cluster etc.)</li> <li>- Capacity development for skills enhancement and business development</li> </ul>	<p>on small scale.</p> <ul style="list-style-type: none"> <li>- Ambuja Cements started purchasing pine needles from the local people by paying Rs. 1.65 per kg for its factories/ kilns during 2011-12. The company is no more purchasing pine needles because of high transaction costs and the local people were demanding for higher price.</li> <li>- It is also heard that the pine needles of HP have low calorific value, which is one of reasons of not being used for briquette making.</li> </ul>
Bamboo-skill enhancement, marketing etc.	<ul style="list-style-type: none"> <li>- Once the scope for the livelihood interventions are identified, the process of planning and implementation to be clearly defined.</li> </ul>	<ul style="list-style-type: none"> <li>- Potential project interventions based on the efforts of Mid-Himalayan Watershed Project and others for pine needles utilisation</li> </ul>	<ul style="list-style-type: none"> <li>- As mentioned earlier, bamboo based small enterprise development possibilities exist in Bilaspur and Mandi districts (in selected pockets). Possibilities for cluster level enterprise development on bamboo shall be further explored. In case of promising scopes, necessary capacity building and institution development will be articulated.</li> </ul>
Honey	<ul style="list-style-type: none"> <li>- There is no clarity on proposed interventions - whether cluster level enterprises would be promoted for bee keeping and processing, or streamling collection of honey from the wild.</li> </ul>	<ul style="list-style-type: none"> <li>- Potential traditional forest based livelihood enterprises through livelihood survey, consultations with different EAPs, State Rural Livelihood Mission etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Honey production can be promoted where cluster can be constituted and linked with existing marketing channel.</li> <li>- Most of the honey comes from the cultivated sources. Since bee keeping helps in pollination in fruit orchards, there is enormous scope for promotion of bee keeping and collective marketing of honey under the brand to be registered by the project/ Forest Department.</li> </ul>
Traditional forest based livelihood products such as leaf-plates, rope making, basketry, mats, wood carving etc. and linking to markets	<ul style="list-style-type: none"> <li>- Some of these activities may be undertaken at the village or cluster level. There is no information in the DPR on the existing efforts of FD or other stakeholders on these livelihood activities, significance of these activities in livelihood security of mountain people.</li> </ul>		<ul style="list-style-type: none"> <li>- These activities may be relevant in the selected areas. Preliminary mapping exercises of the activities are done in Part II of the report.</li> </ul>
Vermi composting	<ul style="list-style-type: none"> <li>- Only vermi composting was proposed for non-NTFP based livelihood activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Non NTFP based livelihood activities in order to diversity the means of livelihoods, to reduce vulnerability of the forest dependent households and to promote sustainable forest resource management.</li> </ul>	<ul style="list-style-type: none"> <li>- Non NTFP based livelihood activities may be relevant in the selected areas. Preliminary mapping exercises of the activities are done in Part II of the report.</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
		<ul style="list-style-type: none"> <li>- Non-NTFP based livelihood activities depending on the local condition</li> <li>- Potential livelihood activities based on the value chain assessment and accordingly, the possible livelihood activities along with modus operandi</li> <li>- The appropriate scale of livelihood activities</li> <li>- The relevant training/ capacity building activities along with costs.</li> <li>- Lessons learned from other JICA assisted forestry sector projects and donor assisted projects in the state</li> </ul>	
Eco-tourism/ Nature based tourism	<ul style="list-style-type: none"> <li>- The basis for proposing eco-tourism was not clearly stated in DPR.</li> </ul>	<ul style="list-style-type: none"> <li>- Its relevance, scope and feasibility of the potential activities with consideration of biodiversity conservation and its sustainability</li> <li>- Lessons learned from other JICA assisted forestry projects</li> </ul>	<ul style="list-style-type: none"> <li>- It seems to have potential in some parts of the project areas. Some activities can be proposed to work with HPETDS under HPFD or small-scale investment for community based responsible tourism may also be considered. Further results of assessment are summarised in <b>Part II, Chapter 3, Section 3.7.2.4.</b></li> </ul>
Payment for ecosystem services (PES)	<ul style="list-style-type: none"> <li>- PES based interventions were not clear in DPR.</li> </ul>	<ul style="list-style-type: none"> <li>- The relevance and feasibility of PES in the Project through the assessment of successful cases/ on-going PES activities</li> </ul>	<ul style="list-style-type: none"> <li>- Case studies of PES in HP state are summarised in <b>Part I, Section 4.4.10</b> and also summarised in <b>Part II, Section 2.4.6.</b></li> <li>- This shall be dealt with under the biodiversity conservation component instead of community development/ livelihood since it requires technical inputs and models which are readily applicable to communities are not available/ established thus far.</li> </ul>
Livelihood (Cost)	<ul style="list-style-type: none"> <li>- Total cost proposed for the component is 750 million INR.</li> <li>- The lump sum is given to cost heads as indicated as sub-component in this table.</li> </ul>	<ul style="list-style-type: none"> <li>- As the field level assessment in community development needs, potential livelihood interventions and how modus operandi are concretised, the cost estimate shall be scrutinised and further cost break ups to achieve the reasonable level of accuracy to assess EIRR.</li> </ul>	<ul style="list-style-type: none"> <li>- The cost for the livelihood shall be determined as the project activities are finalised. The Project shall be proposed to mobilise the resources through convergence as much as possible and also propose cost-sharing mechanism as deemed appropriate.</li> </ul>
Institutional Arrangements of Community based organisations.	<ul style="list-style-type: none"> <li>- Definition of Common Interest Group (CIG) and Self-Help Group (SHG) is not clear. Further, organising many new groups for</li> </ul>	<ul style="list-style-type: none"> <li>- Implementing setup for the project at community level through the review of the existing local structure</li> </ul>	<ul style="list-style-type: none"> <li>- Community level institutions created by the externally funded projects have not survived in most cases. In the case of FDA assisted JFMCs, these institutions had weak linkages with PRI.</li> <li>-</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>the sake of the project may create the issue of sustainability.</p> <ul style="list-style-type: none"> <li>- There are many suggestions on IGA but the institutional mechanism on sustaining and expanding these CIGs or SHGs should be stipulated more in detail.</li> </ul>		
	<ul style="list-style-type: none"> <li>- Role of JFMC/VFDS in livelihood is not clear. It is not clear whether or FD has any preference or priority on Gram Panchayat or JFMC as a focal point of livelihood activities.</li> </ul>	<ul style="list-style-type: none"> <li>- Roles and extent of JFMC for the project intervention</li> <li>- Issues and good practices of existing JFMC</li> </ul>	<ul style="list-style-type: none"> <li>- The roles of existing FDA assisted JFMCs are often confined to execution of Entry Point Activities, plantation and maintenance. The micro plans are not renewed after the initial planning period as often seen in the field.</li> <li>- In some divisions, JFMCs are comprised of 10-12 members.</li> <li>- The Study Team has not come across JFMCs that sustained beyond the intervention period.</li> <li>- The process of micro planning needs to be made participatory. Problem solving capacity needs to be nurtured amongst JFMCs. Training on planning, implementation and other management skills need to be provided.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.6 Wildlife Habitat Improvement

The points in relation to the Wildlife Habitat Improvement (Wildlife) in DPR are given in **Table 7.4.6**.

**Table 7.4.6 Observation, Further Actions Required and Findings: Wildlife**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
Writing of Management Plans adopting Landscape Approach	<ul style="list-style-type: none"> <li>- Philosophy and basis on which Management Plans are to be revamped not described.</li> <li>- Further activities not elucidated.</li> <li>- What kind of support is required from the Project is not clear since preparation management plans are normal departmental activity.</li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to preparation and revamping of management plans</li> <li>- Justifications to be taken up as project intervention</li> </ul>	<ul style="list-style-type: none"> <li>- Only one-fifth of the management plans (7) are effective and approved as of now.</li> <li>- Necessity of updating management plans exist. However, this is a task to be done by the department and not as the activity of the Project.</li> </ul>
Revamping of Management Plans			
Human-wildlife Conflict Mitigation	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not clear about details.                             <ol style="list-style-type: none"> <li>(a) Setting up of New Monkey Sterilisation Centres</li> <li>(b) Vanar Vatikas</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>- Issues and needs in relation to this component</li> <li>- Actions/ activities under other projects and schemes</li> <li>- Technical capacity of HPFD for implementation of this</li> </ul>	<ul style="list-style-type: none"> <li>- Monkey sterilisation requires a great amount of budget and effort, such as dart gun, tranquilizer, and collection of darted animals in the forest, etc. which is considered not cost-effective.</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>(c) Human-Leopard Conflict</p> <p>(d) Equipment &amp; Rapid Response Teams</p> <p>(e) Relief scheme to mitigate losses to humans &amp; livestock</p>	<p>component</p> <ul style="list-style-type: none"> <li>- Details in terms of types, specifications, quantities and locations of proposed interventions</li> <li>- Consideration for demarcation and buffer zone establishment</li> <li>- Consideration for stopping the further fragmentation and destruction of wildlife habitats</li> </ul>	<ul style="list-style-type: none"> <li>- Vanar Vatikas (monkey shelter homes) is to keep sterilised monkeys. It is a good practice from the animal welfare viewpoint, however priority of this activity may not be high considering the urgency of the other conservation activities.</li> <li>- A national action plan was developed for human-leopard conflict management, and there are advanced examples in other states.</li> <li>- The rapid response team is already established at the circle level. Details of current status of equipment &amp; rapid response teams remains unclear.</li> <li>- Relief scheme already exists as compensation, and this is a task by HPFD, not by the Project.</li> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that the activity to be re-clarified and determined at the initial stage of project implementation.</li> </ul>
<p>Habitat Improvement:</p> <p>Habitat Enrichment to provide natural food resources to Wildlife including Monkeys</p>	<ul style="list-style-type: none"> <li>- Not fully clear about details in DPR.</li> <li>- The following points to be clarified:                             <ol style="list-style-type: none"> <li>1. Which species be selected</li> <li>2. What were its justifications</li> <li>3. Who are the stakeholders</li> <li>4. How a work plan has been prepared, and by whom.</li> <li>5. What kind of achievements has been made.</li> </ol> </li> </ul>		<ul style="list-style-type: none"> <li>- Provision of natural food resources to wildlife far away from the livelihood areas of local communities may decrease human-wildlife conflict for a short period. However, nutritional condition of wildlife may be improved, and their population may increase, which may cause bigger conflicts with people after the population break. Provision of natural food resources is therefore a temporary makeshift measure and may not always contribute to long-term solution. Project interventions related to provision of natural food resources needs to take into account of the above and examined for their feasibilities.</li> <li>- In the Project, habitat improvement and enrichment can be emphasised as recovery of damaged habitat and support for in-situ conservation programmes,</li> <li>- Provision of water drinking place</li> </ul>



Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
			<p>for wildlife may be included as a part of habitat improvement.</p> <ul style="list-style-type: none"> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that the activity to be re-clarified and determined at the initial stage of project implementation.</li> </ul>
Protection and Plantation of endemic species of flora	<ul style="list-style-type: none"> <li>- Details are not described</li> </ul>		<ul style="list-style-type: none"> <li>- Concept of rotational grazing reserve was proposed to prevent overgrazing by livestock and to encourage recovery of fragile vegetation, which sounds effective.</li> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that the activity to be re-clarified and determined at the initial stage of project implementation.</li> </ul>
Recovery Programmes for Endangered Wildlife	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not clear about details.                             <ul style="list-style-type: none"> <li>(a) in-situ conservation of critically endangered vultures</li> <li>(b) ex-situ &amp; In-situ Conservation of Endangered Pheasants</li> <li>(c) Snow Leopard Conservation Programme</li> </ul> </li> <li>- Confirmation of impacts and effectivity of existing facilities and programmes are required (examples: wildlife rehabilitation centres such as Nehru Pheasantry in Manali which take care of injured wildlife, public education facilities to promote biodiversity conservation)</li> </ul>		<ul style="list-style-type: none"> <li>- Conservation breeding of endangered pheasants are already in place and need strengthening.</li> <li>- In-situ conservation of vultures and snow leopards are already in place, but clarification/ consultation are required to determine further detailed activities after the commencement of the Project.</li> <li>- Awareness raising should be considered as a part of recovery programme for endangered wildlife, which is necessary to achieve long-term support from the society.</li> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that the activity to be re-clarified and determined at the initial stage of project implementation.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.7 Environmental Rehabilitation

The points in relation to the Environmental Rehabilitation in DPR are given in **Table 7.4.7**.

**Table 7.4.7 Observation, Further Actions Required and Findings: Environmental Rehabilitation**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
Landslide/ control	<ul style="list-style-type: none"> <li>- Details on typical designs and activities to be undertaken in the project as landslide control are not fully clear.</li> <li>- Also, landslide control is mainly undertaken by Irrigation and Public Health Department at macro level as per need and such activity in isolation at few places may not contribute much to environmental rehabilitation</li> </ul>	<ul style="list-style-type: none"> <li>- Existing landslide control related activities implemented by HPFD</li> <li>- Technical capacity of HPFD for landslide control related activities.</li> <li>- Details in terms of types, specifications, quantities and locations of proposed landslide control</li> </ul>	<ul style="list-style-type: none"> <li>- Landslide control related to roads is managed by PWD. The landslide in the forest is managed by HPFD. But interventions by HPFD is limited in forest area</li> <li>- The scale of most of the landslide occur along roads is large and is seemed to be difficult to be managed by HPFD due to capacity &amp; experience of HPFD.</li> <li>- Details on originally proposed activities, especially region (district, division) -wise specific types of interventions and their possible intervention areas were not able to be confirmed.</li> <li>- Confirmed between HPFD and the Study Team that interventions to be taken up in the Project shall be limited to technically feasible by the current capacity of HPFD, and effective in terms of input/output.</li> <li>- Small scale and in the forest area where not related to the important facilities such as road can be included in the JICA loan project.</li> <li>- HPFD considers both landslide and land slip but the Study Team was not able to confirm the available information of HPFD experience of land slip, which is called as landslide generally. Therefore, the landslide control by HPFD is considered as: <ul style="list-style-type: none"> <li>➤ small scale and shallow surface landslides,</li> <li>➤ landslide which doesn't effect to any important facilities such as road, resident property,</li> </ul> </li> <li>- Considered measures for landslide controlled by HPFD are 1) small walls (dry stone, dry stone with wire, masonry), 2) geo jute (slope covering by jute), 3) log crib, and 4) gunny bag.</li> <li>- HPFD doesn't have construction experiences of 3) and 4) above and only a few of 2).</li> </ul>
Spring rejuvenation	<ul style="list-style-type: none"> <li>- Details on typical designs and activities to be undertaken in the project as springs were rejuvenated are not fully clear.</li> <li>- Also, how this sub-component contributed to environment rehabilitation is not fully described.</li> </ul>	<ul style="list-style-type: none"> <li>- Existing spring rejuvenation related activities implemented by HPFD</li> <li>- Technical capacity of HPFD for spring rejuvenation related activities</li> <li>- Details in terms of types, specifications, quantities and locations of proposed spring rejuvenation</li> </ul>	<ul style="list-style-type: none"> <li>- Most of ongoing/ past practices conducted by HPFD or projects implemented by HPFD in this aspect was more of i) improving piping and water storage facilities in the spring areas, and/or ii) re-vegetation of trees and grasses at surroundings of the spring areas.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.8 Research, Studies and Documentation

The points in relation to the Research, Studies and Documentation (Preparatory Work) in DPR are given in **Table 7.4.8**.

**Table 7.4.8 Observation, Further Actions Required and Findings: Research**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not clear about details.</li> <li>(i) need based Research on Key areas of intervention</li> <li>(ii) studies on Forestry, Livelihoods, Eco-system services, Biodiversity Conservation, Wildlife etc.</li> <li>(iii) documentation and publications</li> </ul>	<ul style="list-style-type: none"> <li>- Research related issues and needs directly relevant to the project interventions</li> <li>- Research related issues and needs relevant to HPFD as a whole</li> </ul>	<ul style="list-style-type: none"> <li>- Existing Research initiatives by HPFD have been studied and assessed;</li> <li>- HPFD has limited in-house strengths for undertaking result oriented quality research, and thus mainly rely on specialised state institutions.</li> <li>- Research areas are being explored and identified by the study team experts as per project needs in consultation with HPFD.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.9 Strengthening of ICT in HPFD

The points in relation to the Strengthening of ICT in HPFD (ICT) in DPR are given in **Table 7.4.9**.

**Table 7.4.9 Observation, Further Actions Required and Findings: ICT**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- The following activities are proposed in DPR but not clear on how majority of these activities relate to the Project.</li> <li>(i) Creation/ strengthening of IT infrastructure at Headquarters, FTIs/ Working Plan offices and in Field offices</li> <li>(ii) MIS software modules for HPFD</li> <li>(iii) MIS module for JICA Project</li> <li>(iv) Training programme</li> <li>(v) Acquisition and use of geo-data devices and field MIS devices</li> </ul>	<ul style="list-style-type: none"> <li>- Needs for ICT strengthening directly related to the project interventions</li> <li>- Needs for ICT strengthening as HPFD as a whole.</li> </ul>	<ul style="list-style-type: none"> <li>- HPFD has already developed various web-enabled Forest Management Information System (FMIS) applications and most of them are already operational. IFMS application is also operational. Any need for separate MIS Module for JICA is being reviewed.</li> <li>- As per the discussion between the Study Team with HPFD, presently with there is no mechanism (mobile app) of systematic near real time field based spatial data and MIS data collection through a handheld device (smart phone/ tablet) in HPFD.</li> <li>- During the discussion with HPFD, it was learnt that operationalisation of FMIS at field level is slow. Thus, more focussed training programmes need to be designed and implemented for desired results for institutionalisation and timely data recording through IFMS and mobile apps (proposed to be developed).</li> <li>- In HPFD, presently there is time lag in field based information collection/ sharing, inconsistency in data structure as data is stored at multiple locations which is prone to data loss. Also, in the field, data is being collected through paper based mechanism and smart phone devices with required apps would be crucial to fill the gap.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.10 Monitoring and Evaluation

The points in relation to the Monitoring & Evaluation (M&E) in DPR are given in **Table 7.4.10**.

**Table 7.4.10 Observation, Further Actions Required and Findings: M&E**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>- Section 13-H of the DPR provides a brief paragraph on M&amp;E component that mentions about the concurrent monitoring, mid-term and end-term evaluations and use of ICT for M&amp;E.</p> <p>Preparation of the Project Log frame has been attempted, and is given at Appendix-VIII of the DPR. The log frame only provides output indicators and activities, but has not included the goal and objectives. Indicators related to all project components are addressed in the log frame, but need to be fine-tuned with the objectives and goals.</p> <p>Assumptions and likely risks are also not included. Around 3% of the base project cost is allocated for the component.</p>	<ul style="list-style-type: none"> <li>- Performance reviews at divisional, circle, state - PMU and GB/ HPC level</li> <li>- System of undertaking concurrent monitoring, supervision and reporting</li> <li>- Annual Performance Assessment exercise against the approved annual plans,</li> <li>- Social Audits and Self-monitoring system by Community Institutions</li> <li>- Statutory Financial Audits at different levels,</li> <li>- Circle-level/ district-level inter-sectoral meetings, and record of proceedings and follow-up actions</li> <li>- Grievance Redressal system and RTI cell for enhancing transparency and accountability</li> <li>- Annual Planning and Review Workshops with stakeholders</li> <li>- Socio-economic and Physical - Baseline &amp; Impact Surveys</li> <li>- Computerised Financial Accounting System (double-entry Tally based) at FMU level</li> <li>- Logical framework, operation and effect indicators</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment of the existing processes and ICT has been made, and accordingly robust M&amp;E system for the Project shall be proposed.</li> <li>- Standard accounting software is already procured by the forest department through CAMPA funds, and installed in divisions. This, could also be utilised for project accounting purpose.</li> <li>- Logical framework has been drafted afresh based on the project objectives and components/ activities being finalised with HPFD. Operation and Effect indicators are suggested for the outputs/ outcomes visualised.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

### 7.4.11 Project Management Unit (PMU)

The points in relation to the Project Management Unit (PMU) in DPR are given in **Table 7.4.11**.

**Table 7.4.11 Observation, Further Actions Required and Findings: PMU**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<p>- Section 15 of the DPR provides details on the Implementation Arrangements including PMU - being called as Project Management Directorate. Although the institutional arrangements have been spelt out including circle, division, range and GP/ village level, involvement of NGOs for community mobilisation and</p>	<ul style="list-style-type: none"> <li>- Setting-up autonomous institution as a society within state Forest Department to implement and report on project, which is one of the key requirements for a JICA forestry projects</li> <li>- Proposed institutional arrangement structure (figure on pg.41 of the DPR) and requirements of modifications/</li> </ul>	<ul style="list-style-type: none"> <li>- The institutional arrangements have been worked out in consultation with HPFD, including incorporating the experiences from other EAPs implemented by HPFD.</li> <li>- In accordance with the institutional arrangements, human resource requirement for the Project has also been assessed.</li> </ul>

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	handholding, engagement of resource organisations, role of consulting services etc. during project implementation has not be detailed or explained. Around 14% of the base project cost has been allocated basically for salaries of the contractual staff and office buildings for the project operations.	<ul style="list-style-type: none"> <li>incorporation of any additional institution required in context of the project,</li> <li>- Assessment of human resources, particularly at circles, divisions and ranges, and requirements for their strengthening,</li> <li>- Existing rules and regulations/ protocols, guidelines and its relevance for smooth implementation of the Project, and requirements for any modifications,</li> <li>- Improvement in infrastructure, building construction, equipment/ facilities, mobility etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Roles &amp; responsibilities for each position has also been worked-out.</li> <li>- Existing rules and regulations have been studied and considered while working on the institutional arrangements.</li> <li>- Assessment for strengthening of infrastructure, buildings, equipment/ facilities, mobility is being done.</li> <li>- Govt. notification (No.FFE-A(B)2-1/2017 dated March 9, 2017) spells out the manpower structure of the proposed Project with its headquarter created in Shamshi (Kullu) and Regional Office at Rampur (Shimla).</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.12 Office Building for the Project

The points in relation to the Office Building for the Project (Office) in DPR are given in **Table 7.4.12**.

**Table 7.4.12 Observation, Further Actions Required and Findings: Office**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	- 200 million INR is allocated for this component but details are not described in DPR.	<ul style="list-style-type: none"> <li>- Details in terms of types, specifications, quantities and locations of proposed office buildings for the Project.</li> <li>- Unit cost of such buildings since, there is a large variation in costs of labour &amp; materials in HP even within districts either due to remoteness from transportation zones or lack of availability of skilled &amp; unskilled labours at competitive prices</li> </ul>	<ul style="list-style-type: none"> <li>- Details on proposed activities, especially region (district, division) wise specific types of interventions and their possible intervention under the Project were not able to be confirmed.</li> <li>- Due to limited availability of lands for new construction, existing buildings need to be used or renovated.</li> <li>- Renting of office spaces may be an option.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.13 Consulting Service

The points in relation to the Consulting Service in DPR are given in **Table 7.4.13**.

**Table 7.4.13 Observation, Further Actions Required and Findings: Consulting Service**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- This component is not fully described in DPR</li> </ul>	<ul style="list-style-type: none"> <li>- Needs and necessity for project management consultants (PMC)</li> <li>- Specific expertise required in the PMC</li> </ul>	<ul style="list-style-type: none"> <li>- HPFD has limited experience to work with PMC.</li> <li>- Terms of Reference of the consultants was proposed and required inputs by the consultants are identified.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

#### 7.4.14 Environmental and Social Consideration

The points in relation to Environmental and Social Consideration in DPR are given in **Table 7.4.14**.

**Table 7.4.14 Observation, Further Actions Required and Findings: Environmental and Social Consideration**

Sub Component/ Key Activity	Observations (Issues not clear or clarifications required)	Confirmed/ Examined Points in the Study	Findings
	<ul style="list-style-type: none"> <li>- This aspect is not fully described in DPR</li> </ul>	<ul style="list-style-type: none"> <li>- Existing environmental and social management system within HPFD and the relevant environmental/ social safeguard system introduced in other donor funded projects.</li> <li>- Experiences and capacities of HPFD and its staff in relation to environmental and social safeguard.</li> </ul>	<ul style="list-style-type: none"> <li>- There is no permanent office nor full-time officer/staff dedicated for the environmental and social safeguard issues within HPFD.</li> <li>- Some externally aided projects (i.e. Mid-Himalayan project) established environmental and social safeguard system but it is no longer functional.</li> <li>- Necessity for establishing frameworks for environmental and social safeguards, in line with the JICA Environmental and Social Consideration Guideline (2014) was confirmed between HPFD and the Study Team.</li> </ul>

Source: Prepared by JICA Study Team (2017) based on the content of DPR

## CHAPTER 8 ENVIRONMENT AND SOCIAL CONSIDERATIONS

### 8.1 Legal Framework and Institutional Arrangement of Environmental and Social Considerations in India and HP State

The JICA's Guidelines for Environmental and Social Considerations (April 2010) indicate that the Project must comply with the laws, standards, policies, and plans of the host country and if the standard set by the host country differs from the international standard, the project proponents are advised to adopt the better standard that serves the purpose of attaining a higher level of Environmental Social Consideration (ESC). In this regard, this section reviews and analyses the policies, laws and regulations of relevant ESC with respect to the Project whether they fully respond the requirement of the JICA Guideline as well as World Bank's safeguard policies which provide foundation for the JICA Guideline.

#### 8.1.1 Major State Level Laws, Regulations Relevant to Environmental and Social Considerations

Same as many other states in India, HP state has prepared their own laws, rules, regulations, notifications, guidelines, policies and standards with respect to different aspects of ESC which ensure the consistency with the key relevant national laws and regulations (please refer **Part I, Chapter 2, Section 2.5 (Table 2.5.1 to Table 2.5.4)** for the descriptions on national level legal framework). **Table 8.1.1** outlines the important and relevant state level legal framework which shall be applicable for ESC with respect to the Project, namely, environment protection and Environmental Impact Assessment (EIA), prevention and control of pollution, and land acquisition and involuntary resettlement. Furthermore, some sub-projects<sup>1</sup> will involve the local communities to work in designated areas, and thus the labour laws that might be pertinent under the proposed Project are provided in **Attachment I.8.1.1**.

**Table 8.1.1 State Level Legal Framework for Environmental and Social Considerations**

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
<b>A. Environment Protection and EIA</b>		
Environment Policy Guidelines	The policy guidelines cover an array of important areas such as Land, Water, Air, Mineral Resources, Health, Biodiversity, Agriculture, Horticulture, Energy and Tourism etc. The intension of these guidelines is to develop approaches that are compatible with the mountain eco-systems and its unique characteristics vis-à-vis fragility, inaccessibility, marginality, diversity, climatic peculiarities, etc. The state government of HP expresses its resolve to conserve and enhance the environment and follow a policy of sustainable development; it calls upon people, Panchyati Raj and local bodies, institutions, and the organs of the state for extending their full co-operation in this effort.	Department of Environment, Science and Technology (DEST)
Environmental Regulations	The HP state has adopted, the following Union level regulations and laws pertaining to environment protection and control of pollution:	DEST, HPSPCB

<sup>1</sup> In this Project, "Sub-project" is micro plan level activities which shall be screened, selected and approved by PMU for implementation with following the requirement of environmental and social safeguards.

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
	<ul style="list-style-type: none"> <li>- The Water (Prevention &amp; Control of Pollution) Act, 1974 and Rules framed there under.</li> <li>- The Air (Prevention &amp; Control of Pollution) Act 1981 and Rules framed there under.</li> <li>- The Water (Prevention &amp; Control of Pollution) Cess Act, 1977, as amended by Amendment Act, 1991, 2003 and Rules framed there under</li> <li>- Environment (Protection) Act, 1986 and the following Rules/Notifications framed there under:               <ul style="list-style-type: none"> <li>▪ Environmental Protection Rules, 1986.</li> <li>▪ Environmental Impact Assessment Notification, 1994, 1997, 2002, 2004, 2006 as amended.</li> <li>▪ Hazardous Waste (Management, Handling, and Trans-boundary Movement) Rules, 2008.</li> <li>▪ Manufacture, Storage and Import of Hazardous Chemical Rules, 1989;</li> <li>▪ Plastics Manufacture, Sale and Usage Rules, 1999 and 2003;</li> <li>▪ Bio-Medical Waste (Management &amp; Handling) Rules, 1998 and Amendment Rules 2000 and 2003;</li> <li>▪ The Noise Pollution (Regulation &amp; Control) Rules, 2000;</li> <li>▪ Municipal Solid Wastes (Management &amp; Handling) Rules, 2000;</li> <li>▪ Ozone Depleting Substances (Regulation) Rules, 2000;</li> <li>▪ Batteries (Management and Handling) Rules, 2001;</li> <li>▪ Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro Organisms, Genetically Engineered Organisms or Cells Rules, 1989.</li> <li>▪ Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996.</li> </ul> </li> </ul> <p>The following Rules, which have bearing on the environment and health of the society, are also in existence. Under these Rules, the HP State Pollution Control Board is not the only agency responsible for the implementation of these Rules but nevertheless these Rules and enactments are of great significance. They are as under:</p> <ul style="list-style-type: none"> <li>- Public Liability Insurance Act, 1991.</li> <li>- H.P. Non-Biodegradable Garbage (Control) Act, 1995.</li> <li>- Motor Vehicle Act, 1988.</li> </ul>	
Hazardous Waste (Management, Handling, and Trans-Boundary Movement) Rules, 2008.	These Rules impose restrictions and prescribe procedures for management, handling, disposal and trans-boundary movement of hazardous wastes; These rules apply to the management of hazardous and other wastes as specified in the Schedules appended to the Rules, and shall not apply to (a) waste-water and exhaust gases; (b) wastes arising out of the operation form ships beyond five km; (c) radio-active wastes; (d) bio-medical wastes; and (e) municipal solid wastes	DEST, HPSPCB
Manufacture, Storage and Import of Hazardous Chemical Rules, 1989	These Rules apply to an industry that manufactures, stores and imports chemicals that are toxic, flammable and explosive. The Rules recommend isolated storage of hazardous chemicals; identification of major accident hazards; prevent such major accidents; prevent their consequences to persons and environment; provide site personnel with information, training and equipment necessary to ensure their safety.	DEST, HPSPCB
Plastics Manufacture, Sale and Usage Rules, 1999 and 2003;	The central government had notified the “Recycled Plastics Manufacture and Usage Rules, 1999 (as amended in 2003)” under the Environment (Protection) Act, 1986 to regulate the manufacture, sale and use and recycling of plastic bags. These rules, inter alia, provided that plastic carry bags should have a minimum thickness of 20 microns; carry bags or containers made of recycled plastic shall not be used for packaging of food stuffs and recycling of plastic waste in accordance with BIS specifications. Powers have been delegated to the State Pollution Control Boards / Pollution Control Committees for taking action for violation of Rules promulgated under the Environment (Protection) Act, 1986	DEST, HPSPCB
Bio-Medical	These rules apply to all persons/ agencies/ institutions that generate, collect, receive,	DEST,



Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
Waste (Management & Handling) Rules, 1998 and Amendment Rules 2000 and 2003;	store, transport, treat, dispose, or handle bio-medical waste in any form. Institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment. Bio-medical waste shall be treated and disposed of in accordance with Schedule I, and in compliance with the standards prescribed in Schedule V. Persons/ agencies/ institutions shall set up requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or ensure requisite treatment of waste at a common waste treatment facility or any other waste treatment facility.	HPSPCB
Municipal Solid Wastes (Management & Handling) Rules, 2000;	These rules shall apply to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes. In these rules, unless the context otherwise requires, Municipal Solid Wastes (Management and Handling) Rules, 2000 are being implemented by the municipal authorities as these authorities are responsible for management of municipal solid waste (MSW). The Rules are in force from September 2000. Local bodies are required to ensure that solid waste generated in city/town is managed in accordance with the provisions of the Rule relating to collection, segregation, storage, transportation, processing and disposal. Central Pollution Control Board (CPCB) during the reporting year interacted with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) in union territories and provided feed-back on various aspects of the Rule. SPCBs/PCCs persuaded local bodies to seek authorisations and formulate action plan for management of solid waste.	DEST, HPSPCB
Ozone Depleting Substances (Regulation) Rules, 2000;	These Rules provide regulations on production and consumption of ozone depleting substances. The rules provide that no person shall produce or cause to produce any ozone depleting substance after the date specified in column (5) of Schedule V unless he is registered with the authority specified in column (4) of that Schedule. Further, no person shall import or cause to import from or export or cause to export to any country any ozone depleting substance after the commencement of these rules.	DEST, HPSPCB
Batteries (Management and Handling) Rules, 2001.	These Rules provide the responsibility of a manufacturer, importer, assembler and re-conditioner to: (i) ensure that the used batteries are collected back as per the schedule against new batteries sold excluding those sold to original equipment manufacturer and bulk consumer(s); (ii) ensure that used batteries collected back are of similar type and specifications as that of the new batteries sold; (iii) file a half-yearly return of their sales and buy-back to the State Board in Form- I latest by 30 June and 30 December of every year; (iv) set up collection centres either individually or jointly -at various places for collection of used batteries from consumers or dealers; (v) ensure that used batteries collected are sent only to the registered recyclers, (vi) ensure that necessary arrangements are made with dealers for safe transportation from collection centres to the premises of registered recyclers; (vii) ensure that no damage to the environment occurs during transportation; (viii) create public awareness through advertisements, publications, posters or by other means with regard to the following (a) hazards of lead; (b) responsibility of consumers to return their used batteries only to the dealers or deliver at designated collection centres; and (c) addresses of dealers and designated collection centres. (ix) use the international recycling sign on the batteries; (x) buy recycled lead only from registered recyclers; and (xi) bring to the notice of the State Board or MoEF&CC any violation by the dealers.	DEST, HPSPCB
Rules for the Manufacture, Use, Import, Export and Storage of	These rules shall be applicable in the following specific cases: (a) sale, offers for sale, storage for the purpose of sale, offers and any kind of handling over with or without a consideration; (b) exportation and importation of genetically engineered cells or organisms; (c) production, manufacturing, processing, storage, import, drawing off, packaging and repacking of the genetically engineered products; (d)	DEST, HPSPCB

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
Hazardous Micro Organisms, Genetically Engineered Organisms or Cells Rules, 1989.	production, manufacture etc. of drugs and pharmaceuticals and food stuffs distilleries and tanneries, etc. which make use of micro-organisms genetically engineered micro-organisms one way or the other.	
Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996.	These rules shall be applicable in the following specific cases; (a) sale, offers for sale, storage for the purpose of sale, offers and any kind of handling over with or without a consideration; (b) exportation and importation of genetically engineered cells or organisms; (c) production, manufacturing, processing, storage, import, drawing off, packaging and repacking of the genetically engineered products; and (d) production, manufacture etc. of drugs and pharmaceuticals and food stuffs distilleries and tanneries, etc. which make use of micro-organisms genetically engineered micro-organisms one way or the other.	DEST, HPSPCB
Public Liability Insurance Act, 1991.	An Act to provide for public liability -insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.	DEST, HPSPCB, Insurance Company
HP Non-Biodegradable Garbage (Control) Act, 1995.	An Act to prevent throwing or depositing non-biodegradable garbage in public drains, roads and places open to public view to regulate the use of non-biodegradable material in HP state.	DEST, HPSPCB
Motor Vehicle Act, 1988.	The legislation has been prepared to provide for – (a) modification and amplification of certain definitions of new type of vehicles ; (b) simplification of procedure for grant of driving licenses; (c) putting restrictions on the alteration of vehicles; (d) certain exemptions for vehicles running on non-polluting fuels; (e) ceilings on individuals or company holdings removed to curb “benami” holdings; (f) states authorised to appoint one or more State Transport Appellate Tribunals; (g) punitive checks on the use of such components that do not conform to the prescribed standards by manufactures, and also stocking / sale by the traders; (h) increase in the amount of compensation of the victims of hit and run cases; (i) removal of time limit for filling of application by road accident victims for compensation; (j) punishment in case of certain offences is made stringent; (k) a new pre-determined formula for payment of compensation to road accident victims on the basis of age / income, which is more liberal and rational	DEST, HPSPCB, Ministry of Surface Transport Police Department Judiciary Insurance Companies
<b>B. Prevention and Control of Pollution</b>		
Himachal Pradesh State Water Policy 2013	The objective of the state water policy is to understand the current situation, to recommend contexts to put-together arrangement of laws and institutions and for a plan of action with a unified national perspective. Certain basic principles are required to govern public policies on water resources, so that there is some commonality in approaches in dealing with planning, development and management of water resources. It also emphasises the need to evolve a State Water Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive powers by the States and the local governing bodies. The policy recommends optimal utilisation of water, with the appreciation that water is a scarce resource and needs to be fostered. A scientific assessment and periodic review of the availability of water resources and its use by various sectors in various basin and states in the country is recommended in the policy. The policy emphasises pricing of water, which should ensure its efficient use and reward conservation. It also says that the conservation of rivers, river corridors, water bodies and infrastructure should be undertaken in a scientifically planned manner through community participation.	HPSPCB
Water (Prevention	The National Water Act is adapted in HP state and no separate rules have been	HPSPCB

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
and Control of Pollution) Act 1981	prepared specifically for HP.	
Air (Prevention and Control of Pollution) Act 1981	The National Air Act is adapted in HP state and no separate air rules have been prepared specifically for HP.	HPSPCB
<b>C. Land Acquisition/ Involuntarily Resettlement</b>		
Himachal Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules 2015	The rule provides procedures to be applied in the state for land acquisition as well as providing rehabilitation and resettlement benefits to the affected/ displaced persons in accordance with the “Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013” (30 of 2013) which is the applicable law at the union level.	Government of HP - District Collector(s)
Himachal Pradesh Panchayati Raj Act, 1994	An Act to consolidate, amend and replace the law relating to Panchayats with a view to ensure effective involvement of the Panchayati Raj Institutions in the local administration and developmental activities.	Government of HP

Source: Compiled by JICA Study Team (2017) based on information indicated below:

<http://xgn.hp.nic.in/home.aspx>

<http://hpforest.nic.in/pages/display/NjVzZDRiNHhkZmE=-actsrules>

<http://desthp.nic.in/notifications.html>

<http://hppcb.gov.in/>

[http://himachal.nic.in/index1.php?lang=1&dpt\\_id=13&level=0&linkid=418&lid=750](http://himachal.nic.in/index1.php?lang=1&dpt_id=13&level=0&linkid=418&lid=750)

### 8.1.2 Comparison between the JICA Guidelines and ESC Framework in India

An analysis of ESC framework in India against JICA Guidelines is summarised in **Attachment I.8.1.2**. In the process of comparison, World Bank’s safeguard policies are also referred to as directed by the JICA Guidelines on the Environment and Social Safeguards. It should also be noted that according to the World Bank<sup>2</sup>, a new Environmental and Social Framework (ESF) was prepared in August 2016 as the replacement of the current safeguard policies, however, they announced to set a transition period and the two sets of policies (conventional safeguard policies and ESF) will operate in parallel for about seven years to govern the Project approved before and after the date the ESF starts to be applied, which is expected to go into effect during 2018. Therefore, current safeguard policies, including operational policies on environmental assessment (OP 4.01), Natural Habitats (OP 4.04), Involuntary Resettlement (OP 4.12), Indigenous Peoples (OP 4.10), and other relevant policies, are referred for this review and comparison.

Overall, environmental and social safeguard policies and related legislation in India do not deviate from the requirements of the JICA guidelines. Particularly, “Environment (Protection) Act, 1986 (and Amendment 1991)”, and “EIA Notification 2006 (and Amendments 2007, 2008, 2009, 2011 and 2012)” for environmental consideration and “The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013” for social

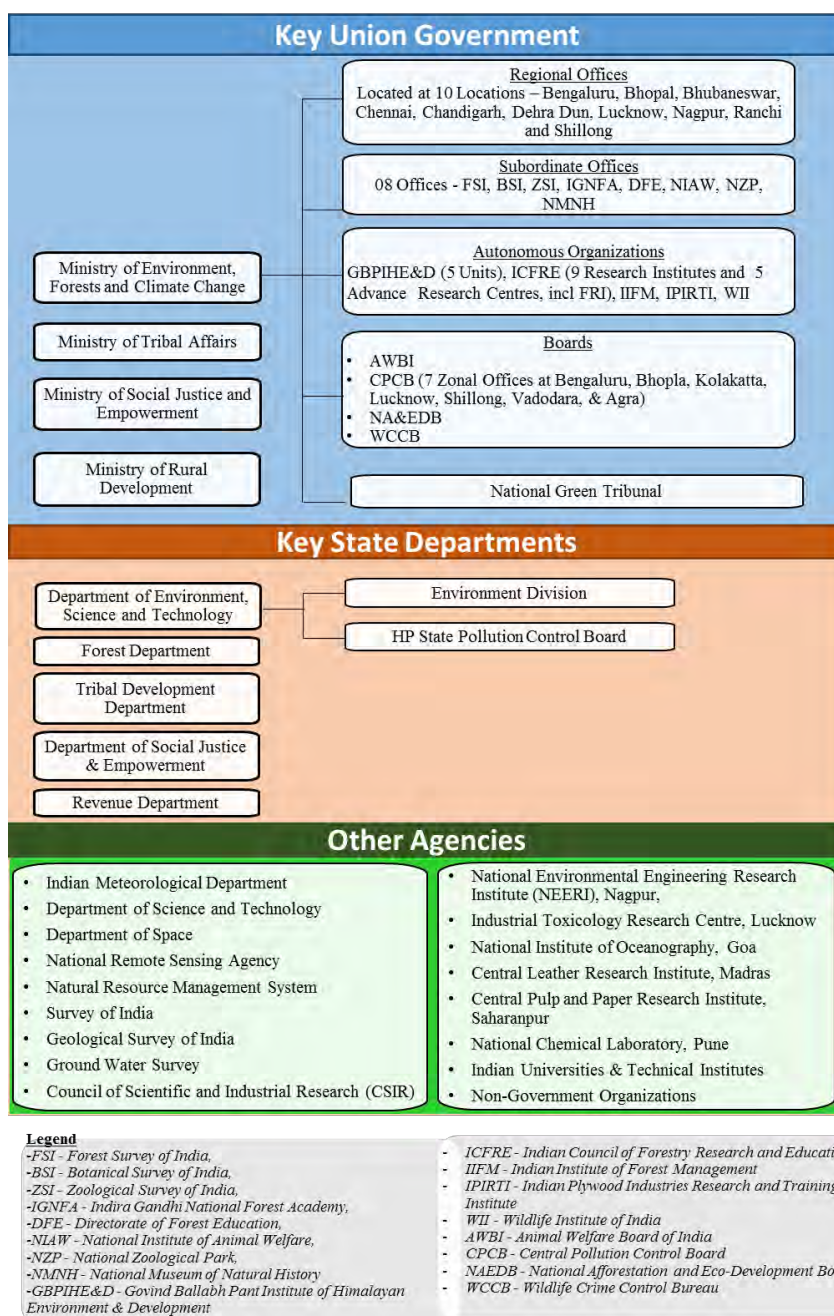
<sup>2</sup><http://www.worldbank.org/en/programs/environmental-and-social-policies-for-projects/brief/environmental-and-social-safeguards-policies>

consideration have provided the solid legal foundation to avoid or minimise the negative impacts on environment and local communities, and to prevent the occurrence of unacceptable adverse impacts.

### **8.1.3 Institutions Relevant to Environmental and Social Considerations**

There are a number of ministries, departments, institutions, autonomous bodies and agencies that are involved in environmental management, monitoring and surveillance, within the country.

MoEF & CC, GoI is the apex body and central ministry in the country for regulating and ensuring environmental protection including planning, promotion, co-ordination and supervision of environmental and forestry policies/programmes for the implementation. The Central Pollution Control Board (CPCB) under MoEF & CC at the union level and the State Pollution Control Boards (SPCB) at the state level together form the regulatory and administrative core of this sector. **Figure 8.1.1** provides an overview of the major institutions involved in ESC in the country.



Source: Created by JICA Study Team (2017) based on existing information

**Figure 8.1.1 Major Institutions Involved in Environment and Social Considerations**

In HP state, the Department of Environment, Science and Technologies (DEST) was set up on April 13, 2007 with objectives to improve the effectiveness of environmental management, protect vulnerable ecosystems and enhance sustainability of development. DEST is a focal point in charge of environmental protection and pollution control under relevant Act and Rules. Furthermore, they are entrusted for the implementation and enforcement of all legislations related to environmental protection and pollution control on behalf of the state government, which cannot be implemented by State Board, or any other agencies.

#### 8.1.4 Environmental Impact Assessment: Environmental Clearance

The process of conducting ‘Environmental Impact Assessment (EIA)’ in India commenced in 1976, primarily to evaluate river valley projects from the environmental perspective. Thereafter, in 1978, EIA was introduced as an administrative measure, initially for river valley projects and thereafter for industrial projects. Under the Environment Protection Act 1986, the process of carrying-out EIA was not a prerequisite, yet EIA studies were required only for large projects (also called mega projects), which were typically with government undertakings. Moreover, the decision to grant Environmental Clearance (EC) was based on the discretion of the Ministry of Environment and Forest. Thus, overall system lacked a transparent review process.

Subsequently, on 27 Jan 1994, the EIA notification, under the Environmental (Protection) Act (1986), was issued, which made the process of EIA a “statutory requirement” rather than an “administrative requirement” for a number of projects/activities which are likely to have significant environmental impacts and health implications. Thereafter, the EIA notification has undergone several amendments, whereby the provisions for conducting “Public Hearing” has been incorporated, and several important projects/activities have been brought into the ambit of EIA, thus requiring an “Environmental Clearance” by MoEF & CC. The EIA Notification 2006 was issued with further improvements in the EIA procedure. In the draft notification (19 January 2009), revised “threshold criteria” were introduced for different categories of projects. Further, an effort has also been made to make EIA procedure more transparent and to provide societal vigil of projects affecting the environment through “Public Hearing/ Consultation” by moving the environment protection agenda into public domain.

In this section, the processes adopted in India and the requirement for EC is described although the Project is not anticipated any environmental clearances.

##### (1) EIA System and Requirements

Projects/ developmental activities have been divided into eight major categories<sup>3</sup> that require EC either from the central government (MoEF & CC) or at state level from State Environmental Impact Assessment Authority (SEIAA). The categories with thresholds for the sub-projects or activities requiring prior EC are described in **Attachment I.8.1.3**.

All projects and activities are broadly categorised into two types - **Category A** and **Category B**, based on the size/scale of the concerned projects as well as spatial extent of potential impacts and potential impacts on human health and natural and man-made resources. The detailed stages prior to EC are highlighted below.

**Category ‘A’** projects or development activities are mandated to conduct EIA studies along with conducting the “Public Consultation” as per the procedure stipulated in the notification, and EC is required from the central government or MoEF & CC.

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<sup>3</sup> 1) mining, extraction of natural resources and power generation, 2) primary processing, 3) material production, 4) material processing, 5) manufacturing/ fabrication, 6) service sectors, 7) physical infrastructure including environmental services, and 8) building/construction projects/ area development projects

**Category ‘B’** projects fall under the purview of the state authority as mentioned in EIA notification 2006 and decentralised procedure is done. GoI has constituted the State Expert Appraisal Committee (SEAC) and State Environmental Impact Assessment Authority (SEIAA) committee for decentralised procedure of EC. The category ‘B’ projects are further divided into **Category ‘B1’** which require an EIA report submission and **Category ‘B2’** which do not require EIA report.<sup>4</sup>

## (2) Stages and Procedure to obtain Environmental Clearance

The stages in EC procedure as per EIA notification 2006 is described in the following **Table 8.1.2** and **Figure 8.1.2**. For convenience, stages of EIA have been divided into the following six stages in this report; 1) *Screening*, 2) *Scoping*, 3) *EIA Study*, 4) *Public Consultation*, 5) *Appraisal*, and 6) *Monitoring*. **Attachment I.8.1.4** provides details of stages in EC as per the EIA Notification 2006. All details of EC application, public hearing details for upcoming and approved TOR, state wise is updated on the website of MoEF&CC.

**Table 8.1.2 Stages in Environmental Clearance Procedure as per EIA Notification 2006<sup>5</sup>**

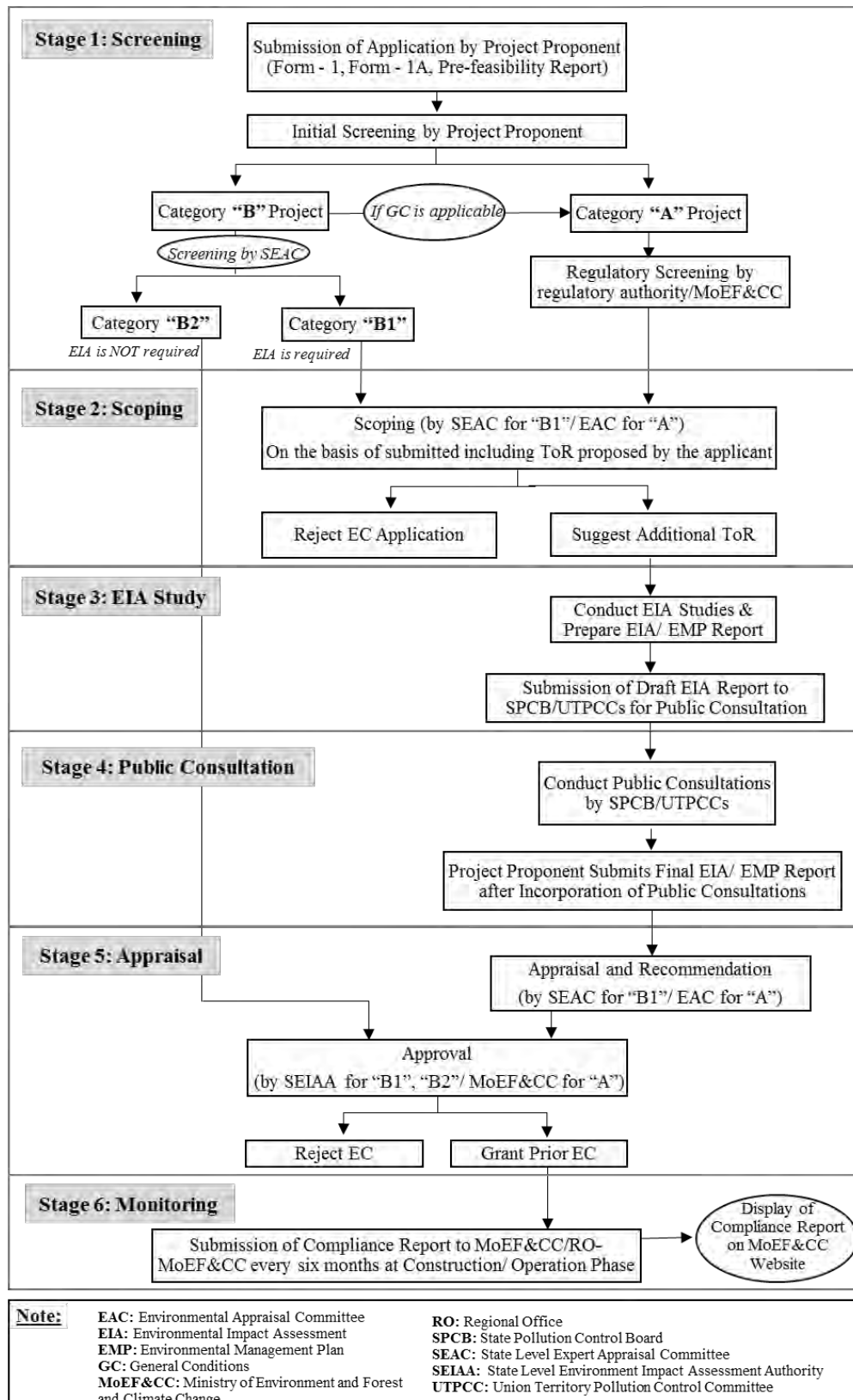
Actors Stages in EIA	Project Proponent	IAA/ MoEF & CC	Consultant	SPCB	Public/ NGO
1.Screening	Decides the type of project after guidance by a consultant	Provides site clearance, if required	Guides the proponent in the initial screening	Provides site clearance	Not involved
2.Scoping	Provides Terms of Reference (optional)	Provides guidance if proponent requires	Establish if an EIA study is required	Not involved	Not involved
3.EIA Study 3.1.EIA Studies	Conduct EIA studies	Not involved	Conduct EIA Studies	Not involved	Not involved
3.2 EIA Report	Submit EIA report to SPCB	Not involved	Assist the proponent	Arrange for public hearing	Have access to Executive Summary
4.Public Consultation	Obligated to respond to issues raised during the hearing	Not involved	Assist the Proponent	Hold the Public Hearing and forward NOC and Minutes to MoEF & CC	Can provide oral/ written comments
5. Appraisal	Submit EIA report to MoEF & CC	Reviews the project and accords clearance	Clarify queries from MoEF & CC	Not involved	Not involved
6. Monitoring	To adhere to the clearance conditions	To monitor progress	To assist Proponent	To monitor progress	Not involved

**Note:** IAA = Impact Assessment Authority; SPCB = State Pollution Control Board; NGO = Non-governmental Organisation

Source: Compiled by JICA Study Team (2017) based on information from [http://shodhganga.inflibnet.ac.in/bitstream/10603/25724/1/11\\_chapter\\_03.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/25724/1/11_chapter_03.pdf)

<sup>4</sup> Source: EIA Notification 2006 and <http://www.sciencebeing.com/2012/10/eia-notification-and-its-implementation-in-india/>

<sup>5</sup> The National Environment appellate authority is not included in this table as they come into picture only if there is any appeal against the Environmental Clearance



Source: Compiled by JICA Study Team (2017) based on information from EIA Notification 2006

**Figure 8.1.2 Flow for Environmental Clearance Procedure as per EIA Notification 2006**



### (3) Forest Clearance Process

As per the applicable law, the proposed Project does not require forest clearances. However, the processes and stages in the forest clearance procedure is described below.

Forest clearance from the statutory authority will be required, if any forest area is to be diverted for the Project (including, notified roadside plantations). For this purpose, application is submitted to the state government, which in turn recommends the case to MoEF & CC. The applicant/ requiring body is required to submit the following documents along-with the application:

- ◆ Summary report of the Project
- ◆ Map showing required forest land, boundary of adjoining forests (1: 50,000)
- ◆ Cost of Project
- ◆ Justification of the project location in forest area
- ◆ Cost benefit analysis (not applicable up to 20 ha in plains and 5 ha in hills)
- ◆ Employment likely to be generated
- ◆ Purpose wise breakup of total land required
- ◆ Details of displacement of people
- ◆ Requirement of EC
- ◆ Undertaking to bear the costs of Compensatory Afforestation (CA)
- ◆ DGPS map of the area under diversion and of the areas identified for CA

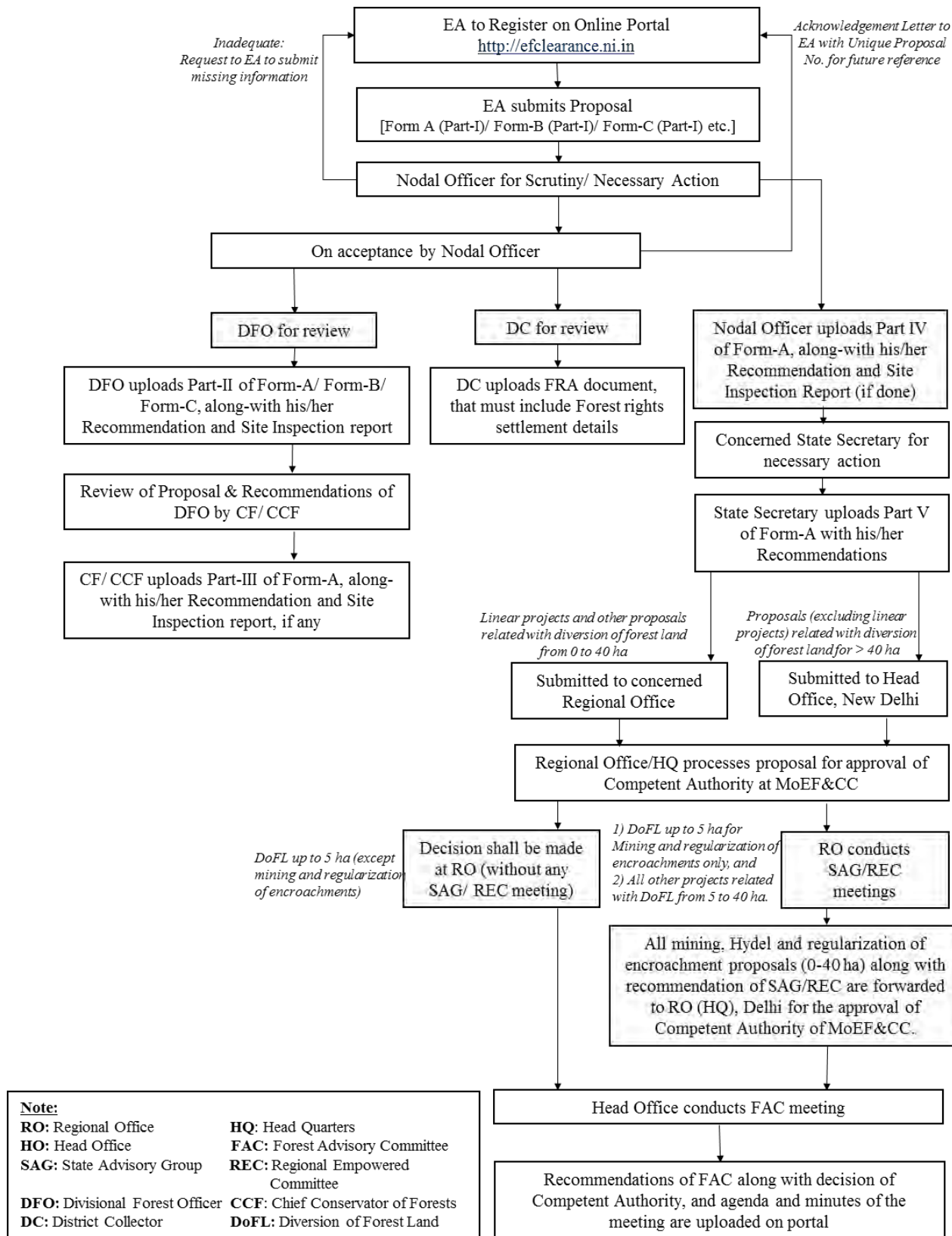
The process of Forest Clearance consists of two stages; First Stage Clearance and Second Stage Clearance. In the First Stage Clearance, the application could be granted “In Principle Approval”, or it could be subject to fulfilment of conditions, if applicable, which could include: deposition of Net Present Value of Forest (@ 438,000 to 1,043,000 INR/ha), money for Compensatory Afforestation, plantation of at least double the number of trees felled, submission of plan for afforestation, certificate of compliance under FRA, etc. During this phase, no activity will be allowed until final clearance is accorded and the state can stipulate additional conditions<sup>6</sup>. In the Second Stage Clearance process, it will be ensured if the conditions prescribed have been fulfilled. The applicant will submit the following documents, if applicable and required:

- ◆ Proof of depositing amount for compensatory afforestation
- ◆ Proof of depositing amount for net present value
- ◆ Proof of depositing amount for meeting other conditions - roadside plantations, compensation for damage/ dismantling of assets, etc.
- ◆ Undertakings for compliance on other generic and specific conditions
- ◆ Certificate from the district collector(s) on settlement of all rights under the Forest Rights Act, 2006

**Figure 8.1.3** depicts the process of forest clearance.

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<sup>6</sup> Source: [http://www.teriuniversity.ac.in/mct/pdf/new/environment/Infrastructure\\_development\\_and\\_environment.pdf](http://www.teriuniversity.ac.in/mct/pdf/new/environment/Infrastructure_development_and_environment.pdf)



Source: Compiled by JICA Study Team (2017) based on information from MoEF&CC web-site <http://www.moef.gov.in/citizen/specinfo/forflow.html>

**Figure 8.1.3 Flow Diagram Depicting Forest Clearance Process**

#### **(4) Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance (OSMEFWC) Portal**

In order to bring-in more transparency and accountability in the process of clearances for environment, forests and wildlife, the MoEF & CC has rolled out an “Online Submission & Monitoring of Environmental, Forests and Wildlife Clearance (OSMEFWC)” web-based portal for online submission and monitoring of proposals submitted by user agencies for seeking environment, forest and wildlife clearances. It automates the entire tracking of proposals which includes online submissions of a new proposal, editing/updating the details of proposals and displays status of the proposals and status of the proposals at each stage of the workflow.

User agencies can register at <http://efclearance.nic.in> and thereafter, project details can be submitted along-with all required documents, such as ToR, form 1, form 1A, etc. After submission, the system sends an email, to the user agency, with an acknowledgement letter containing unique proposal number, project sector, and other details, which may be used for future references.<sup>7</sup> As already mentioned, it should be emphasised again that the proposed Project does not require environmental or forest clearances for its implementation.

#### **8.1.5 Land Acquisition and Involuntarily Resettlement**

GoI and the states had followed the Land Acquisition Act, 1894 (Amendment 1984) for the process of land acquisition, and the National Rehabilitation and Resettlement Policy 2007 for involuntary resettlement until recently. On 26<sup>th</sup> September 2013, after receiving the President of India’s accent, “The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 [No. 30 of 2013]” (RFCTLARR Act 2013), came into force on 1<sup>st</sup> January 2014. This Act have been the legal foundation for all matters related to land acquisition and involuntary resettlement. Following the RFCTLARR Act 2013, many states have promulgated their respective Rules for land acquisition and involuntary resettlement.

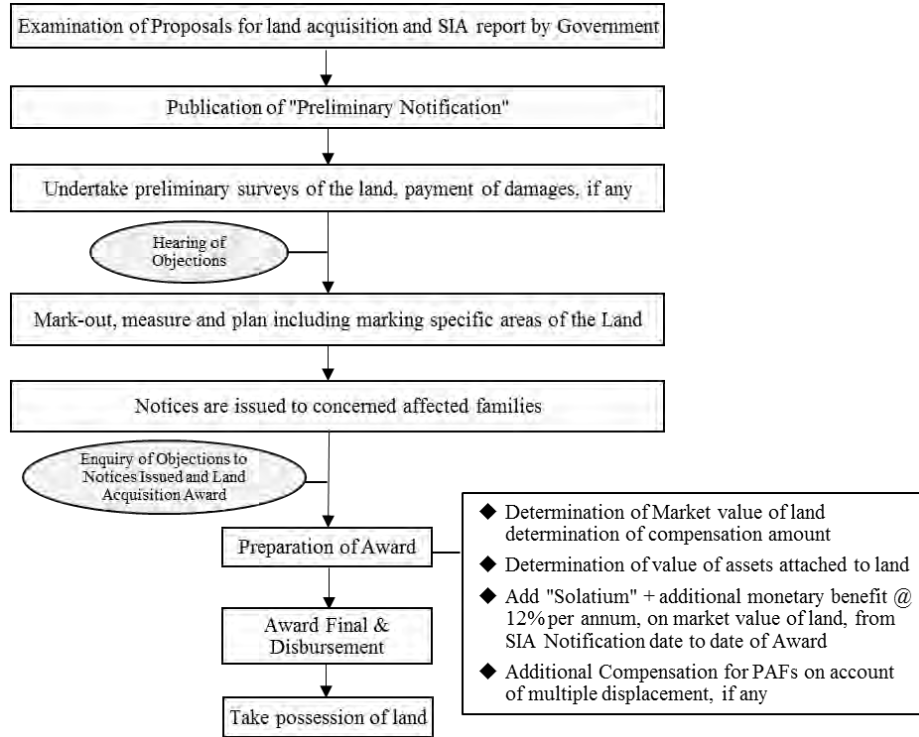
According to the Act, it ensures “a humane, participative, informed and transparent process for land acquisition for the purpose of industrialisation, development of essential infrastructural facilities and urbanisation, which is in consultation with the local self-government institutions and Gram Sabhas established under the Constitution”.

Also, the Act ensures that the negative impacts on the land owners and other affected families shall be minimised with the provision with a just and fair compensation to the affected families, leading to an improvement in their socio-economic status for their rehabilitation and resettlement. The HP state government has notified the HP Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement, Rules 2015, dated 27 Jan 2015. As per this Rule, the state government shall (i) identify, establish and build a database of Social Assessment (SA) resource partners and practitioners, who will be responsible to ensure that SAs are commissioned and conducted with project specific terms of reference, (ii) the state government

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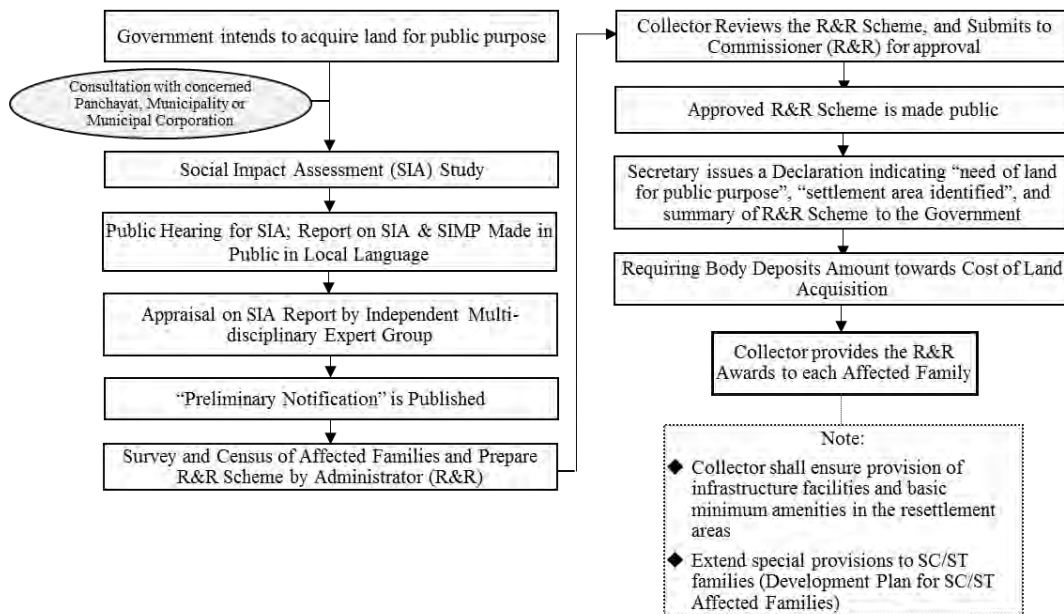
<sup>7</sup> Source: [http://forestsclearance.nic.in/writereaddata/FAC\\_Agenda/User\\_Manual\\_UA.pdf](http://forestsclearance.nic.in/writereaddata/FAC_Agenda/User_Manual_UA.pdf)

will thereafter recommend an area for acquisition depending on the SA report with the bearing that minimal adverse impact is suffered by the people, (iii) written consent will be sought from all individuals who are opposing any project; such persons will be asked to record their objections. The processes involved in land acquisition and involuntary settlement are depicted in **Figure 8.1.4** and **Figure 8.1.5** respectively and **Attachment I.8.1.5** provides details of requirements and systems related to land acquisition and involuntarily resettlement.



Source: Compiled by JICA Study Team (2017) based on information from RFCTLARR Act 2013 and subsequent Rules

**Figure 8.1.4 Flow Diagram for Land Acquisition Process**



Source: Compiled by JICA Study Team (2017) based on information from RFCTLARR Act 2013 and subsequent Rules

**Figure 8.1.5 Flow Diagram for Resettlement and Rehabilitation**

## 8.2 Baseline Information for Environmental and Social Consideration

Prior to commencement of any development projects, whether it requires an EIA or not, it is imperative to understand and identify the baseline levels of environmental and social parameters which might be affected as a result of the proposed Project or its sub-projects or activities. In this regard, social and natural environment as well as environmental pollution baseline data are depicted in the following sections.

### 8.2.1 Social Environment

Please refer to **Part I, Section 3.3** for general information on social environment. In addition to the above-mentioned information, this section describes i) further details of the socio-economic conditions and cultural perspectives of STs in the state, and ii) the remaining villages under the jurisdictional area of National Parks and Wildlife Sanctuaries in the state.

#### (1) Further Details of STs in HP State

The term “Scheduled Tribes” first appeared in the Article 366 (25) of the Constitution of India, which defined scheduled tribes as “such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this constitution”. The criterion followed for specification of a community, as scheduled tribes are indications of primitive traits, distinctive culture, geographical isolation, shyness of contact with the community at large, and backwardness. This criterion is not spelt out in the Constitution but has become well established.

STs account for 5.71% of the total population in the state and The Government of India has notified eight tribal groups of HP state as STs (The Constitution (Scheduled Tribes) Order 1950 (C.O.22), dated 6-9-1950). The STs of HP state live in the most inaccessible places, mountains and jungles, in the districts of Chamba, Kinnaur, Kangra, Mandi, Bilaspur, Mahasu, Sirmaur and Lahaul-Spiti. They are in minority in some districts, such as Mandi, Sirmaur and Bilaspur, whereas they are in majority in the districts of Chamba, Kinnaur and Lahaul-Spiti. According to the Census of India 2011, the tribal population distribution of the state can be divided into three categories as follows:

**a. Scheduled Tribes in Scheduled Areas:** As per the Fifth Schedule of the Constitution of India, the following districts have been declared as Scheduled Areas, district of Kinnaur, Lahaul-Spiti, and two sub-divisions of district Chamba namely Pangi and Bharmour, as majority population comprises of communities declared as ST. These tribal areas are extremely remote and inaccessible with tough mountainous terrain and inhospitable climatic conditions. Out of total geographical area of HP state (55,673 km<sup>2</sup>), 23,655 km<sup>2</sup> area falls in the Scheduled Area, which constitutes 42.49 % of the total area. The total population inhabiting the Scheduled Area is 173,661, of which 123,585 constitute tribal population, which is 71.16 % of the total and density of population in these areas is merely 7 persons per km<sup>2</sup>. In other work, out of the total ST population, 31.52 % is residing in the Scheduled Areas.

**b. Modified Area Development Approach (MADA):** During the Sixth Five Year Plan the ambit of the Tribal Sub-Plan was expanded and the Modified Area Development Approach (MADA) was adopted to cover smaller areas of tribal concentration having a population of 10,000 souls in contiguous areas, in which 50% or more were tribal. In HP state, two such pockets, namely, blocks of Chamba and Bhatiyat in the Chamba district were identified in 1981-82. These two pockets cover an area of 881.47 km<sup>2</sup> and the ST population, as per 2011 Census comprised 29,455 persons i.e., 7.51 % of the total ST population in the state.

**c. Dispersed Tribes Population:** Till February 1987, Special Central Assistance (SCA) to Tribal Sub Plan (TSP) Strategy was in vogue in the Scheduled Areas and MADA only. However, during the Seventh Five Year Plan the strategy of Special Central Assistance to Tribal Sub-Plan was further extended to cover all tribal populations living outside the Scheduled Area and MADA pockets. Thus, a population of 239,086 (60.97%) belonging to STs is residing in Non-Tribal areas of the state.

Furthermore, the cultural characteristics of the STs in the state shall also be elaborated. The tribal society is organised on the basis of kinship and they accept inheritance and authority through the male lineage. The rites of passage comprise birth, puberty, marriage and death, and these stages of life play a very important role in tribal society for which initiation and training are provided carefully. The system of marriage followed by these groups throws light on the evolution of the system and practices like winning of the bride by capture, purchase, service to the parent, elopement and negotiation. Over a period of time, negotiation as a system for marriage has become preferred. With modernisation, the system of dowry has become in-vogue.

Panchayats play an important role in tribal villages. Disputes related to property, namely, fields, pastoral land, and division of property among brothers or other domestic issues, etc. were settled by the Panchayat. Traditionally, a council of elders did this and attempt was made to give unanimous judgments or compel the parties to have mutual agreement. Now these tasks have been taken by the statutory village panchayats.

They are religious and believe in the super-natural; practicing religions like animism, nature-worship, and ancestor-worship. Religion is the resultant of traditions and beliefs that have been passed-down from ancient times. Like the Hindus, the tribal communities are also polytheists; they believe in a supreme deity, who is believed to be the creator of the world and under whom there are a number of gods and goddesses. The major religious population of HP state is Hindu which constitutes more than 95% of the total. Muslim religion occupies second position with nearly 1.7% of the total. Muslims have a little concentration in Sirmur, Chamba and Kangra. Among the tribal communities, Hindu religion and Buddhism is followed. A minuscule proportion follows Islam.

The tribal communities of HP have many socio-economic similarities and they are distinguished from the more complex and advanced societies; they have remained outside the main historical current of civilisation for centuries. Considering the general features of their eco-system, traditional economy, supernatural beliefs and practices, and recent impacts of modernisation, the

tribes of HP state can be classified primarily into two major types: the sedentary, and the semi-nomadic, semi-pastoral and semi agricultural type. Each type has a distinct style of life which can be best understood in the paradigm of nature, man and spirit complex: namely, their relationship with nature, fellow men and the supernatural.

## (2) Remaining Villages Under the Jurisdictional Area of National Parks and Wildlife Sanctuaries in HP State

It should be noted that under the jurisdictional area of national parks and wildlife sanctuaries in HP state, 18 villages remains inside of the area as depicted in **Table 8.2.1**. These villages are located in extremely remote area, therefore cannot be excluded through the rationalisation of boundaries of national park and wildlife sanctuaries which has been conducted since 2014 based on the “Notification on Reorganisation of Territorial and Wildlife Divisions due to Exclusion/Inclusion of Certain Areas of National Parks and Sanctuaries (No. FFE-B-A (1)-1/2013 Dated 31<sup>st</sup> July, 2014).

**Table 8.2.1 List of Villages inside National Parks and Wildlife Sanctuaries**

No.	National Park/ Wildlife Sanctuary	Village inside of the Area
1	Bandli wildlife sanctuary	1 village (Neri)
2	Dhauladhar wildlife sanctuary	1 village (Bara Bhangal)
3	Gangul Siyabehi wildlife sanctuary	1 village (Khadroga)
4	Kalatop Khajjiar wildlife sanctuary	2 village (Kalatop, Khajjiar)
5	Khokhan wildlife sanctuary	1 village (Lot)
6	Majathal wildlife sanctuary	9 village (Jandred, Sohra, Bramana, Neori, Chilla, Mandrech, Kyari, Darwakot, Daud and Johar)
7	Great Himalayan National Park	3 village (Shakti, Maror, Sagwad)

Source: Compiled by JICA Study Team (2017) from HPFD (2017)

Under the proposed Project, however, sub-project indicative exclusion criteria are set up as depicted in Environmental and Social Assessment Framework (ESAF) (**Attachment II.11.2.1**). Among the criteria, “the activities conducted inside of national parks/ wildlife sanctuaries which will not contribute to environmental protection/ conservation of the selected protected areas” and “acquisition of private land and/or resettlement” are identified. Therefore, activities under the Project are not expected to cause any land acquisition/ involuntary resettlement to the above villages and only implemented for the conservation /protection of national parks and wildlife sanctuaries.

### 8.2.2 Natural Environment

Please refer to **Part I, Chapter 3, Section 3.4, 4.3, and 4.4**.

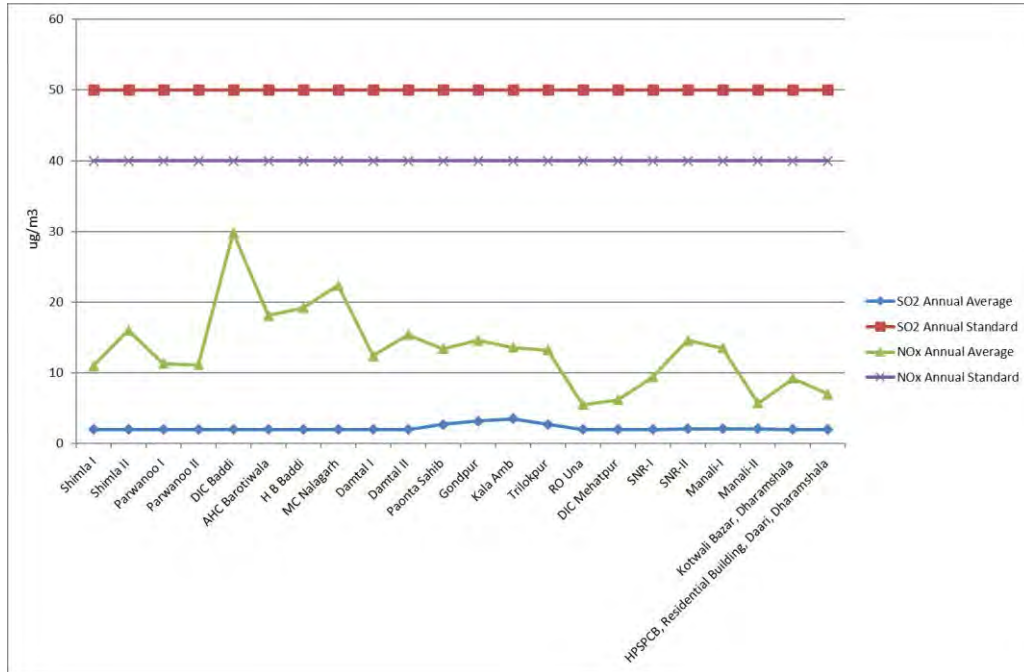
### 8.2.3 Environmental Pollution

#### (1) Ambient Air Quality

In HP state, ambient air quality is being monitored in 11 towns/cities, namely, Shimla, Parwanoo, Jassur, Paonta Sahib, Kala Amb, Baddi, Nalagarh, Sunder Nagar, Manali, Una and Dharamshala, as part of the National Ambient Air Quality Monitoring Programme (NAMP). Air quality standards that have been fixed for 24-hour average include 100 µg/m<sup>3</sup> for Respirable Suspended

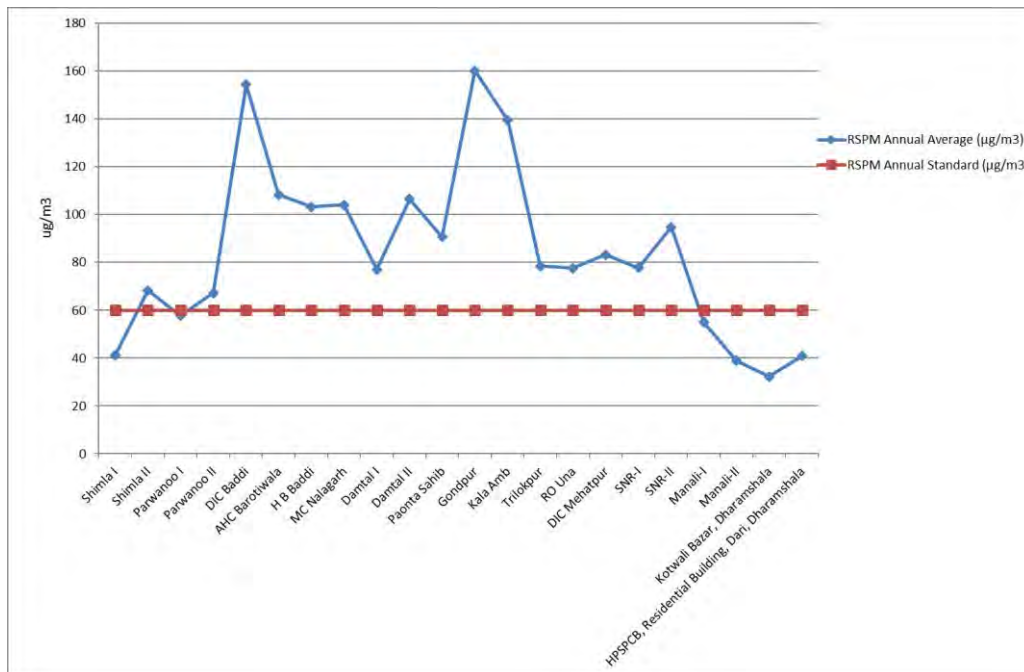
Particulate Matter (RSPM)<sup>8</sup> and 80  $\mu\text{g}/\text{m}^3$  for  $\text{SO}_2$  and  $\text{NO}_2$  while the annual average standard fixed is 60  $\mu\text{g}/\text{m}^3$  for RSPM, 50  $\mu\text{g}/\text{m}^3$  for  $\text{SO}_2$  and 40  $\mu\text{g}/\text{m}^3$  for  $\text{NO}_2$ .

The data collected of all the stations for the year 2012-13 scrutinised for the annual average and peak values for 20 locations and trends of annual average of RSPM and,  $\text{SO}_2$  and  $\text{NO}_2$  are shown **Figure 8.2.1** and **Figure 8.2.2** respectively.



Source: Compiled by JICA Study Team (2017) from HPSPCB Annual Report 2015-16

**Figure 8.2.1 Annual Average of  $\text{SO}_2$  and  $\text{NO}_2$  in HP State During 2015-16**



Source: Compiled by JICA Study Team (2017) from HPSPCB Annual Report 2015-16

**Figure 8.2.2 Annual Averages of RSPM in HP State During 2015-16**

<sup>8</sup> Respirable Suspended Particulate Matter (RSPM) is monitored with the help of Respirable Dust Sampler. Sampling is done on the basis of 3 days per station per week for 24 hours



The annual average values of SO<sub>2</sub> and NO<sub>x</sub> at all the stations were well below the annual average permissible limits. The peak value of SO<sub>2</sub> recorded was as high as 15.0 µg/m<sup>3</sup> at Shimla bus stand while the peak value of NO<sub>x</sub> was observed as 111.0 µg/m<sup>3</sup> at Sector IV, Parwanoo.

On the other hand, the average annual values for RSPM levels recorded were above the permissible limits at monitoring stations, i.e. bus stand Shimla, Sector-I Parwanoo, DIC Baddi, AHC Barotiwala, MC Nalagarh, H.B. Baddi, Damtal-I, Damtal-II, Paonta Sahib, Gondpur, Kala Amb, Trilokpur, Una, Mehatpur, and Sunder Nagar-I & II.

**Attachment I.8.2.1** reflects information on the National Ambient Air Quality Standards (NAAQS) as Notified in 18th November 2009, annual averages of RSPM, SO<sub>2</sub> and NO<sub>x</sub> at all NAMP stations in HP for the year 2015-16.

## (2) Ambient Noise Level

Noise pollution is often misunderstood as sound pollution. Sound is pure tune, harmonic, with fixed frequencies and amplitudes, occurring at regular intervals, producing meaningful communication and pleasure in hearing. “Unwanted sound” is noise, having a complex mix of pure tones of various frequencies and amplitudes. These sound waves fluctuate and repeat themselves in highly haphazard manner. Folks from cities, towns and even villages are increasingly exposed to various sources of noise pollution, namely, loudspeakers, public address system, amplified music especially during social functions, movement of vehicles, blowing of horns, factories and industries, etc.

The State Board had monitored five places namely Shimla, Solan, Baddi-Barotiwala, Nalagarh and Una/Mehatpur areas. Solan and Baddi-Barotiwala recorded high noise pollution than Shimla.

**Table 8.2.2 Noise Level Standards**

Area Code	Category of Area	Limit in dbA	
		Day	Night
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Source: Compiled by JICA Study Team (2017) from HPSPCB Annual Report 2015-16

## (3) Water Quality

One of the most important activities of the Pollution Control Boards is to assess the status of water quality of the natural water bodies. Water quality data reflects level of impacts on water quality, and help in ascertaining the nature and extent of pollution control measures that are required. The Central Pollution Control Board is sponsoring the water quality monitoring of major rivers of the State through its National Programme, namely, “Monitoring of National Aquatic Resources (MINARS)”, which is undertaken on monthly basis. A total of 263 points have been identified on major rivers i.e. Satluj, Beas, Ravi, Yamuna, Parvati, Sirsa, Markanda & Sukhna and their tributaries in the state. **Table 8.2.3** depicts the criteria for primary water quality.

**Attachment I.8.2.2** depicts the water quality of major rivers in the state, monitored under the

MINARS Programme in 2015-16, results of state water quality monitoring points from April 2015 to March 2016, and ground water quality.

**Table 8.2.3 Primary Water Quality Criteria**

Designated Best Use	Class of Water	Criteria
Drinking water source without conventional treatment but after disinfection.	A	1. Total Coliform organism MPN/100ml. shall be 50 or less. 2. pH between 6.5 and 8.5. 3. Dissolved Oxygen 6 mg/l or more. 4. Biochemical Oxygen Demand 5 days 20oC 2 mg/l or less.
Outdoor bathing (Organised)	B	1. Total Coliform organism MPN/100ml. shall be 500 or less. 2. pH between 6.5 and 8.5. 3. Dissolved Oxygen 5 mg/l or more. 4. Biochemical Oxygen Demand 5 days 20oC 3 mg/l or less.
Drinking Water Source after conventional treatment and disinfection	C	1. Total Coliform organism MPN/100ml. shall be 5000 or less 2. pH between 6 and 9. 3. Dissolved Oxygen 4 mg/l or more. 4. Biochemical Oxygen Demand 5 days 20oC 3 mg/l or less.
Propagation of Wild Life & Fisheries	D	1. pH between 6.5 and 8.5. 2. Dissolved Oxygen 4 mg/l or more. 3. Free Ammonia (as N) 1.2 mg/l or less.
Irrigation, Industrial Cooling Controlled Waste Disposal	E	1. pH between 6.5 and 8.5. 2. Electrical Conductivity at 25oC micro mhos /cm max. 2250 3. Sodium absorption ratio Max. 26. 4. Boron Max 2 mg/l.

*Note: If three parameters fall in category 'A' but fourth parameter falls in category C. The overall quality of river will fall under Class 'C'*

*Source: Compiled by JICA Study Team (2017) from HPSPCB Annual Report 2015-16*

## **Part I: Attachment**

### Attachment I.2.2.1 Major Roles and Responsibilities of the Key Institutions related to Forestry Sector

Organization	Major Roles and Responsibilities
Ministry of Environment, Forests and Climate Change (MoEF&CC)	<ul style="list-style-type: none"> <li>- Apex and nodal agency in the administrative structure of the central government for the planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programs.</li> <li>- Concerned with implementation of policies and programs related to:               <ul style="list-style-type: none"> <li>▪ conservation of the country's natural resources, viz., lakes and rivers, biodiversity,</li> <li>▪ conservation of fauna, flora, forests and wildlife,</li> <li>▪ ensuring the welfare of animals,</li> <li>▪ prevention and abatement of pollution,</li> <li>▪ Protection of the environment and</li> <li>▪ sustainable development and enhancement of human well-being</li> </ul> </li> <li>- Nodal Agency in the country for:               <ul style="list-style-type: none"> <li>▪ The United Nations Environment Program (UNEP),</li> <li>▪ South Asia Co-operative Environment Program (SACEP),</li> <li>▪ International Centre for Integrated Mountain Development (ICIMOD)</li> </ul> </li> <li>- Entrusted with issues relating to multilateral bodies:               <ul style="list-style-type: none"> <li>▪ Commission on Sustainable Development (CSD),</li> <li>▪ Global Environment Facility (GEF)</li> <li>▪ Economic and Social Council for Asia and Pacific (ESCAP)</li> <li>▪ South Asian Association for Regional Co-operation (SAARC)</li> </ul> </li> <li>- Besides, the legislative measures, the Ministry's work is also guided by:               <ul style="list-style-type: none"> <li>▪ The National Conservation Strategy and Policy Statement on Environment and Development, 1992;</li> <li>▪ National Forest Policy, 1988;</li> <li>▪ Policy Statement on Abatement of Pollution, 1992;</li> <li>▪ The National Environment Policy, 2006</li> </ul> </li> </ul>
Central Pollution Control Board (CPCB) (under MoEF&CC)	<ul style="list-style-type: none"> <li>- Recommendations and advises the central government on matters related pollution</li> <li>- The Water and Air Acts, and other Acts related to environment are implemented through CPCB, from time to time.</li> </ul>
The National Green Tribunal (under MoEF&CC)	<ul style="list-style-type: none"> <li>- Mandated for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources</li> <li>- Enforces any legal right relating to environment</li> <li>- Provides relief and compensation for damages to persons and property</li> <li>- Specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues.</li> <li>- The NGT is guided by principles of natural justice, and not bounded by the procedures laid under the Code of Civil Procedure, 1908</li> <li>- The Tribunal is comprised of a Chairperson (former/ retired Judge of the Supreme Court of India), 07 Judicial (former/ retired Judges of High Court) and 08 Expert Members (experts in physical and life sciences, engineering and law, persons having practical knowledge and administrative experience in the field of environmental policy and regulation, having a minimum of 15 years of experience).</li> <li>- Empowered to hear all civil cases related to environmental issues and questions linked to the implementation of the following laws listed in Schedule I of the NGT Act: (i) The Water (Prevention and Control of Pollution) Act, 1974; (ii) The Water (Prevention and Control of Pollution) Cess Act, 1977; (iii) The Forest (Conservation) Act, 1980; (iv) The Air (Prevention and Control of Pollution) Act, 1981; (v) The Environment (Protection) Act, 1986; (vi) The Public Liability Insurance Act, 1991; and (vii) The Biological Diversity Act, 2002.</li> </ul>
Ministry of Rural Development <sup>1</sup>	<ul style="list-style-type: none"> <li>- The Department of Rural Development implements schemes for generation of self-employment and wage employment, provision of housing and minor irrigation assets to the rural poor, social assistance to the destitute and rural roads.</li> </ul>

<sup>1</sup>[http://rural.nic.in/netrural/rural/sites/downloads/annual-report/Annual\\_Report\\_2013\\_14\\_English.pdf](http://rural.nic.in/netrural/rural/sites/downloads/annual-report/Annual_Report_2013_14_English.pdf)

Organization	Major Roles and Responsibilities
Ministry of Tribal Affairs <sup>2</sup>	<ul style="list-style-type: none"> <li>- The Department of Land Resources on the other hand is mandated to implement all land based development programs, viz., area development programs on watershed basis”</li> <li>- Provide concerted and focused approach on the integrated socio-economic development of the Scheduled Tribes (STs), in a coordinated and planned manner.</li> <li>- Nodal Ministry for overall policy, planning and coordination of programs for the development of ST’s</li> </ul>
Ministry of Social Justice and Empowerment <sup>3</sup>	<ul style="list-style-type: none"> <li>- Department of Social Justice and Empowerment provides for overall policy, planning and coordination of programs for the development of:               <ul style="list-style-type: none"> <li>▪ Scheduled Castes</li> <li>▪ Socially and Educationally Backward Classes</li> <li>▪ De-notified Tribes and</li> <li>▪ Economically Backward Classes</li> <li>▪ and Welfare of Senior Citizens</li> </ul> </li> <li>- Extends special schemes aimed at social, educational and economic empowerment of the groups, except senior citizens, such as scholarships, hostels, residential schools, skill training, concession loans and subsidy for self-employment, etc.</li> <li>- The Ministry also addresses issues related to and in consonance with:               <ul style="list-style-type: none"> <li>(i) Rehabilitation of Manual Scavengers in alternative occupations,</li> <li>(ii) Programs of care and support to senior citizens,</li> <li>(iii) Prohibition,</li> <li>(iv) Rehabilitation of victims of alcoholism and substance abuse, and their families,</li> <li>(v) Beggary,</li> <li>(vi) International Conventions and Agreements on matters dealt within the Department,</li> <li>(vii) Awareness generation, research, evaluation and training in regard to subjects allocated to the Department,</li> <li>(viii) Charitable and Religious Endowments and promotion and development of Voluntary Effort pertaining to subjects allocated to the Department,</li> <li>(ix) National Commission for the Scheduled Castes,</li> <li>(x) National Commission for Safai Karmacharis,</li> <li>(xi) National Commission for Backward Classes,</li> <li>(xii) National Scheduled Castes Finance and Development Corporation,</li> <li>(xiii) National Safai Karamcharis Finance and Development Corporation,</li> <li>(xiv) National Backward Classes Finance and Development Corporation,</li> <li>(xv) National Institute of Social Defense,</li> <li>(xvi) Babu Jagjivan Ram National Foundation, and</li> <li>(xvii) National Commission for Denotified and Semi-Namadic Tribes</li> </ul> </li> <li>- The Department of Empowerment of Persons with Disabilities, vide Cabinet Secretariat’s Notification dated 9th December 2014, facilitates empowerment of the persons with disabilities, with respect to Seeing, Hearing, Speech, Movement, Mental Retardation, Mental Illness, Multiple Disability and any other disabilities</li> </ul>

Source: Compiled by JICA Study Team (2017) based on relevant ministry webpages

<sup>2</sup><http://www.tribal.nic.in/index.aspx>

<sup>3</sup><http://socialjustice.nic.in/>

### Attachment I.3.2.1 State Revenue Sources

#### (1) State's Own Resources

As the State's share in central taxes and grants-in-aid is determined on the basis of recommendations of the Finance Commission, the State's performance in mobilization of resources was assessed in terms of its own resources comprising own tax and non-tax sources.

The State's actual tax and non-tax receipts for the year 2015-16 vis-à-vis assessment made by XIV<sup>th</sup>FC and MTFPS are given in **Table 1**.

**Table 1 Percentage Variation of Actual Over Projections/Estimates<sup>8</sup>**

(million INR)

	XIV <sup>th</sup> FC projections	Budget estimates/ MTFPS projection	Actual	Percentage variation of actual over	
				XIV <sup>th</sup> FC projections	Budget estimates/ MTFPS projection
Tax revenue	78,200	63,410	66,960	(-) 14.37	5.60
Non-tax revenue	16,980	15,070	18,370	8.19	21.90

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of H.P., Report No. 4 of the year 2016

The actual realisation of tax revenue was less by 11,240 million INR (14.37 %) while Non-tax Revenue (NTR) was 8 % more than the XIV<sup>th</sup> Finance Commission (FC) projections. Both the tax revenue and NTR were also more by 5.60 and 21.90% respectively when compared to the budget estimates/MTFPS for the year 2015-16. It also indicates that MTFPS projections regarding tax revenue and NTR were on lower side.

#### (2) Tax Revenue

The gross collection in respect of major taxes and duties are given in **Table 2**. Tax revenue increased by 25,880 million (63 %) during 2011-16 and 7,560 million (13 %) during 2015-16 over the previous year. All the major taxes and duties recorded increase in the tax revenue mainly under: (a) taxes and duties on electricity by 2,180 million INR (65 %); (b) taxes on vehicles by 970 million INR (44 %); (c) taxes on sales, trades, etc. by 3,320 million INR (9 %) due to increase in tax collection under 'VAT' and (d) state excise by 870 million INR (8 %).

**Table 2 Components of Tax Revenue**

(Unit: million INR)

Revenue Head	2011-12	2012-13	2013-14	2014-15	2015-16
Taxes on sales, trades etc.	24,770	27,280	31,410	36,610	39,930
State excise	7,070	8,100	9,520(18)	10,440	11,310
Taxes on vehicles	1,760	1,960	2,080	2,200	3,170
Stamp duty and registration fees	1,550	1,730	1,880	1,900	2,060
Taxes and duties on electricity	1,850	2,620	1,910	3,330	5,510
Land revenue	180	240	100	170	70
Taxes on goods and passengers	940	1,010	1,050	1,100	1,150
Other taxes	2,960	3,320	3,260	3,650	3,760
Total	41,080	46,260	51,210	59,400	66,960

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of H.P., Report No. 4 of the year 2016

**(3) Non-tax Revenue**

The position of non-tax revenue is given in **Table 3**.

**Table 3 Components of Non-Tax Revenue**

(Unit: million INR)

Revenue Head	2011-12	2012-13	2013-14	2014-15	2015-16
Interest receipts	1,150	700	1,190	1,010	940
Dividends and profits	860	1,000	1,030	1,710	1,120
Other non-tax receipts, of which-	17,140	12,070	15,630	18,090	16,310
Misc. General Services	400	90	60	30	190
Education, Sports, Arts and Culture	1,040	1,120	1,570	1,610	2,060
Forestry and Wild life	1,070	640	3,580	1,160	340
Other Administrative Services	260	460	260	360	330
Non-ferrous mining and metallurgical Industries	1,200	1,480	1,110	1,620	1,550
Power	11,460	6,370	6,960	11,220	9,240
Others	1,710	1,910	2,090	2,090	2,600
<b>Total</b>	<b>19,150</b>	<b>13,770</b>	<b>17,850</b>	<b>20,810</b>	<b>18,370</b>

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of H.P., Report No. 4 of the year 2016

**(4) Transfers from GoI to State**

Total transfers from GoI to the State for the period 2011-12 to 2015-16 shows continuous increase (except 2013-14) as given in **Table 4**

**Table 4 Transfer from GoI**

(Unit: million INR)

Particulars	2011-12	2012-13	2013-14	2014-15	2015-16
Grants-in-Aid from Government of India	65,210	73,130	63,140	71,780	112,960
State's share of Union Taxes and Duties	19,990	220,820	24,910	26,440	36,110
<b>Total Central Transfer to State</b>	<b>85,200</b>	<b>95,950</b>	<b>88,050</b>	<b>98,220</b>	<b>149,070</b>

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of H.P., Report No. 4 of the year 2016

**(5) Grants-in-aid from GoI**

The position of grants-in-aid from GoI is given in **Table 5**.

Total grants-in-aid from GoI increased from 65,210 million INR to 73,130 million INR during the period 2011-13. It decreased by 9,990 million INR to 63,140 million INR during the year 2013-14 mainly due to decrease of 5,540 million INR in The FC grants and 4,140 million INR in grants for State Plan Schemes. During 2014-15 grants-in-aid from GoI increased by 8,640 million INR, recording a growth of 14 % over the previous year. However, in 2015-16 it increased significantly by 41,180 million INR (57 %) due to net increase of 73,250 million INR in XIVthFC Non-plan Grants and decrease of 35,770 million INR in State Plan Schemes over the previous year. Its percentage to revenue receipts ranged between 40-48 % during the period 2011-16. In total grants-in-aid from GoI, the share of Non-plan grants was 75 %, State and Central Plan Schemes was 7 % and Centrally Sponsored Plan schemes was 18 % during the year 2015-16.

**Table 5 Grants-in-aid from Gol**

(Unit: million INR)

Particulars	2011-12	2012-13	2013-14	2014-15	2015-16
Non-Plan Grants	26,470	25,260	20,250	11,990	85,240
Grants for State Plan Schemes	33,420	41,790	37,650	43,330	7,560
Grants for Central Plan Schemes	270	280	170	310	380
Grants for Centrally Sponsored Plan Schemes	5,050	5,800	5,070	16,150	19,780
Total	65,210	73,130	63,140	71,780	112,960
Percentage of increase over previous year	15.25	12.15	(-)13.66	13.68	57.36
Percentage of Revenue Receipts	45	47	40	40	48

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016, Government of H.P., Report No. 4 of the year 2016

**(6) Central Tax Transfers**

Central tax transfers increased by 9,670million (37%) on the recommendations of the XIVth Finance Commission from 26,440 million in 2014-15 to 36,110 million in 2015-16 as given in

**Table 6.****Table 6 Central tax transfers during 2014-15 and 2015-16<sup>1</sup>**

(Unit: million INR)

Name of Tax	Recommendation of XIV <sup>th</sup> FC	Actual for 2014-15	Actual for 2015-16	Variation
Corporation Tax	States' share in the net proceeds of union tax revenues increased to 42 % in 2015-16 from 32 per cent up to 2014-15	9,234.1	11,356.1	2,122.0
Income Tax		6,594.1	7,866.8	1,272.7
Wealth Tax		25.0	03.2	(-) 21.8
Customs		4,276.6	5,791.3	1,514.7
Union Excise Duty		2,414.8	4,845.7	2,430.9
Other Taxes and Duties on Commodities and Services		--	29.3	29.3
Service Tax		3,896.9	6,219.0	2,322.1
Other Taxes on Income and Expenditure		00.2	00.3	00.1
Total		26,441.70	36,111.70	96,700.0

Source: <http://www.cag.gov.in/content/report-no-4-2016-state-finances-himachal-pradesh>

**(7) Capital Receipts**

The trends in growth and composition of capital receipts are presented in **Table 7**.

**Table 7 Trends in growth and composition of capital receipts<sup>2</sup>**

(Unit: million INR)

Sources of State's Receipts	2011-12	2012-13	2013-14	2014-15	2015-16
Capital Receipts (CR)	20,090	33,920	40,670	115,680	61,550
Rate of growth of CR (per cent)	(-) 35.81	68.84	19.89	184.44	(-) 46.79
Miscellaneous Capital Receipts	--	--	--	650	--
Recovery of Loans and Advances	25	21	17	41	26
Rate of growth of non-debt capital receipts (Loans and Advances only)	(-) 65.75	(-) 16.00	(-) 19.05	141.18	(-) 36.83
Public Debt Receipts	19,840	33,710	40,500	108,770	61,290
Rate of growth of debt capital receipts	(-) 17.71	69.91	20.14	168.57	(-) 43.65

Source: Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016

<sup>1</sup><http://www.cag.gov.in/content/report-no-4-2016-state-finances-himachal-pradesh>

<sup>2</sup>Report of the Comptroller and Auditor General of India on State Finances for the Year Ended 31st March 2016



**Table 7** shows that the capital receipts increased from 20,090 million INR in 2011-12 to 61,550 million INR in 2015-16. During 2015-16, capital receipts recorded decrease of 54,130 million INR over the previous year (2014-15) with growth rate declining to 46.79 %. It was due to decrease in public debt receipts by 47,480 million INR (43.65 %) and recovery of loans and advances by 150 million INR during 2015-16.

#### (8) Recoveries of Loans and Advances

The state government had provided loans and advances to various institutions/organizations such as HP SC/ST development Corporation, HP State Co-operative Marketing and Consumer Federation (HIMFED), HP Power Transmission Corporation, HP State Financial Corporations, etc. As on 31 March 2016, the total outstanding loans and advances amounted to 27,840 million INR. Against this, the state government recovered only 260 million during 2015-16. Besides, 530 million was received as interest on loans and advances.

#### (9) Debt Receipts from Internal Sources

Debt receipts from internal sources i.e. market loans/borrowings from different financial institutions and banks over the period 2011-12 to 2015-16 continued to be a source of receipts of the State Government.

**Table 8 Details of Debt Receipts from Internal Sources<sup>3</sup>**

(Unit: million INR)

	2011-12	2012-13	2013-14	2014-15	2015-16
Market Loans	13,250 (70)	23,590 (73)	23,670 (59)	23,450 (22)	24,500 (40)
Special Securities issued to National small Savings fund of the Central Government (NSSF)	2,790 (14)	4,710 (15)	6,170 (15)	11,020 (10)	13,070 (22)
Ways and means advances (including overdrafts) (WMA including OD)	--	--	6,290 (16)	68,600 (64)	17,850 (29)
Loans from National Bank for Agricultural and Rural Development(NABARD)	3,000 (16)	4,000 (12)	3,500 (9)	4,000 (4)	5,000 (8)
Loans from Other Financial Institutions	--	9 (--)	28 (1)	45 (--)	37 (1)
Internal Debt Receipts	19,040	32,390	39,910	107,520	60,790
Internal Debt Repayment	10,340	20,560	16,390	81,930	38,760

Figures in brackets indicate the percentage of internal debt receipts

Source: Finance Accounts for the respective years.

<http://admis.hp.nic.in/himachal/economics/>

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

As is evident from the **Table 8**, during 2015-16, internal debt receipts decreased from the previous year due to less need for Ways and Means Advances and Overdraft. The major components of internal debt over the last five years were market loans, NSSF and NABARD. In 2015-16, market loans increased by 10, 500 million (4 %), loans from NSSF increased by

<sup>3</sup>Finance Accounts for the respective years.

<http://admis.hp.nic.in/himachal/economics/>

<http://www.cag.gov.in/content/report-2016-state-finances-government-himachal-pradesh>

2050 million (19 %) over the previous year. During 2015-16, internal debt receipts decreased by 46,730 million (43 %) from 107,520 million to 60,790 million and internal debt repayments also decreased by 43,170 million from 81,930 million to 38,760 million over the previous year.

#### (10) Loans and Advances from GoI

The position of loans and advances by GoI to State Government for the last five years is given in the **Table 9**. A continuous increase in loans and advances from Government of India is seen from 2011-16. During the year 2015-16, the receipt of loans and advances for State plan schemes from GoI (495.20 million) decreased by 60 per cent which was lowest over the last five years.

**Table 9 Position of Loans and Advances from GoI<sup>9</sup>**

(Unit: million INR)

	2011-12	2012-13	2013-14	2014-15	2015-16
Opening Balance	961	947	1,018	1,012	1,070
Addition during the year	80	132	59	125	50
Discharge during the year	94	61	65	67	71
Closing Balance	947	1,018	1,012	1,070	1,049
Percentage of total expenditure	6	5	5	5	4

Source: <http://www.cag.gov.in/content/report-no-4-2016-state-finances-himachal-pradesh>

#### (11) Public Account Receipts

Receipts and disbursements in respect of certain transactions such as Small Savings, Provident Funds, Reserve Funds, Deposits, Suspense, Remittances, etc. which do not form part of the Consolidated Fund, are kept in the Public Account set up under Article 266 (2) of the Constitution and are not subject to vote by the State Legislature. Here the government acts as a banker. The balance after disbursements is the fund available with the government for use. The trends in public account receipts and disbursements during the year 2014-15 and 2015-16 are given in **Table 10**

**Table 10 Trends in Public Accounts Receipts & Disbursements (2014-15 & 15-16)<sup>4</sup>**

(Unit: million INR)

Resources under various heads	Public Account Receipts		Public Account Disbursements		Excess of Receipts over Disbursements	
	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
Small Savings, Provident Fund etc.	31,530	31,160	19,680	23,970	11,850	7,190
Reserve fund	1,610	2,350	1,590	2,440	020	(-) 90
Deposits and Advances	22,220	24,080	17,180	22,930	5,040	1,150
Suspense and Miscellaneous	4,870	6,170	4,590	6,510	280	(-) 340
Remittances	45,520	51,390	45,400	49,920	120	1,470
Total	105,750	115,150	88,440	105,770	17,310	9,380

Net Public Account Receipts = Public Account Receipts - Public Account Disbursements

Source: Economics and Statistics Department, H.P. and Central Statistics Office.

Net Public Account Receipts = Public Account Receipts - Public Account Disbursements

<http://planningcommission.nic.in/data/datatable/index.php?data=datatab>

<sup>4</sup>Source: Economics and Statistics Department, H.P. and Central Statistics Office.

Net Public Account Receipts = Public Account Receipts - Public Account Disbursements

<http://planningcommission.nic.in/data/datatable/index.php?data=datatab>

As is evident from the **Table 10**, net public account receipts (excess of receipts over disbursements) decreased by 7,930 million from 17,310 million in 2014-15 to 9.380millionin 2015-16. The decrease was mainly under Small Savings, Provident Fund, etc. by 4,660million and under deposits and advances by 3,890million during this period.

### **Attachment I.3.2.2 Details of Government Initiatives for Good Governance**

Some of the other governance initiatives taken successfully by the state are mentioned as below:

i) Telemedicine Project

The objective is to improve the health services of the State by providing access of experts to common man even at Primary Health Centre (PHC) level. The idea is to link IGMC Shimla, PGI Chandigarh and AIIMS, New Delhi with the Telemedicine Project of the State. Fourteen remote locations have been taken up in Phase I.

ii) HMIS (Hospital Management Information System)

Hospital Management system is automation of the routine activities of a hospital. To keep track of patient record right from registration to his discharge (Including OPDs, Labs, OTs, Wards, Bill Payment, Blood Bank etc.). It is being implemented in IGMC on pilot basis and will be executed during the year. Software customization for some of the approved modules of SRS has been done.

iii) Computerisation of Land Records & Registration of Deeds (HIMBHOOMI & HIMRIS)

The system is being implemented in all the District HQs in which data of land records will be entered into computers for future access. The department will ensure completion of data entry and monitor functioning of the system. Out of total 110 tehsils in HP state, 81 have been made online and data entry is about to complete in rest of the Tehsils.

iv) Reference Monitoring System

It has been implemented in HP Secretariat. Separate modules for Chief Minister and Chief Secretary Office have been developed. For successful implementation of this system, training to about 600 officers and officials was provided including Secretaries and ministerial staff. Hon'ble CM has inaugurated the system on 1st December 2004. The system is of its unique kind in the country.

v) Computerisation of Panchyats

All Zila Parishads, DPO offices, blocks and 1185 Panchayats were tested in the first phase. Death and Birth registration, Panchayats accounts, audit, marriage registration and monitoring of works are looked through system.

vi) Certificate Issuance System (e-Praman)

Various kinds of certificates issued in S.D.M./Tehsildar offices. The E-Praman (Certificates Issuance System) software developed by NIC Himachal Pradesh is a system wherein within minutes the applicant visiting Tehsildar/ Sub-Divisional Magistrate can obtain the desired certificate in a neat, structured and standardized form on the submission of the application.

vii) Government to Citizen Touch Screen based Interface (e-Vikas)

Users can get access to information and latest status regarding various works being undertaken Rural Development and PR Department just by touching the screen of computer. Winner of Golden Icon in the 8th eGovernance Conference at Bhubneshwar

Year 2005 in New Entrant Category for Innovative Operations & Best Practices

viii) Online Treasury Information System (OLTIS)

System is based on the work flow methodology followed in the treasuries for passing of bills. All treasuries and sub-treasuries are being computerised and provision for online data-flow has been made.

ix) Pension Disbursement System (HP-ePension)

Web interface for dissemination information to the pensioners and for automatic change in quantum of pension as per Govt. instructions. Winner of Golden Icon in the 9<sup>th</sup> eGovernance Conference at Kochi in the Year 2005.

x) Barrier Information System (BIS)

Increase in revenue generation through issuance of computerised slips. Implemented on 8 main barriers.

xi) Employment Exchanges Management Information System (EEMIS)

Computerised solution to day-to-day activities of the various Employment Exchanges in the state. Operational at Regional Employment Exchange, Shimla and implemented in the Central Employment Exchange, Cell in the Directorate of Labour and Employment for all those candidates who have opted for the private jobs. Being replicated all over the state now. Job portal is also being created.

xii) Welfare Pension Management Information System (e-Kalyan) User Department/ Organisation

The system is also known as Welfare Pension Management Information System (WELPMIS) for the disbursement of pension to more than 2 lakh pensioners of various categories like old age, handicapped, widow, lepers etc. List of pensioners is also now available as a database on the Internet.

xiii) Vigilance Complaints Monitoring System (VCC)

Through this system, it is possible to issue the Vigilance Clearance Certificates in a short time without making a reference to ADGP (Vigilance). This database & software is being used to issue VCCs in respect of about 20 departments.

xiv) HP Vidhan Sabha Computerisation

Modules added are: E-Granthalya: data of around 15,000 books, debates etc, Gate Pass Issuance System, Accounts Management Information System, Payroll Processing, Pension MIS, Loan Recovery Monitoring Software and Assembly Business.

xv) IPH Computerisation

System consists of 13 modules like PMIS, Payroll, scheme monitoring, finance and works, inventory management, water testing labs, mechanical sub-divisional computerization, billing system, tender, grievance redressal etc.

xvi) Photo-Electoral Rolls

Electoral Rolls/ Voters lists with photos.

xvii) e-Registration

Online registration of voter's names in lists through internet.

xviii) Multi-media Labs

30 Multi-media Labs have been developed where training to teachers, students etc. can be provided. Another 20 are under the process of establishing. Hundreds of schools have been provided PCs and computer education.

xix) Online Hotel Reservation system

Tourism Department and all hotels in Himachal Pradesh are a part of it. Online booking after negotiations with the hotels. Web Interface: [http://www.himachalhotels.in/-](http://www.himachalhotels.in/)

xx) Web Interface for Market Prices of Commodities

Online availability of prices in whole-sale market.

xxi) Computerisation of MC, Shimla & Urban Local Bodies

Computerisation of internal working and public services being rendered by these bodies.<sup>1</sup>

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<sup>1</sup> [http://himachal.nic.in/WriteReadData/1892s/15\\_1892s/Cover\\_page-48452123.pdf](http://himachal.nic.in/WriteReadData/1892s/15_1892s/Cover_page-48452123.pdf)  
<http://inclusion.skoch.in/story/696/himachal-pradesh-leads-in-egovernance-among-hill-states-996.html>  
<http://hp.gov.in/dittest/page/e-Governance-Projects.aspx>

### Attachment I.3.3.1 District Wise Population (Census 2011)

District	Area in Km <sup>2</sup>	Total			Rural			Urban			Female/ '000 males
		Person	Male	Female	Person	Male	Female	Person	Male	Female	
Bilaspur	1,167	381,956	192,764	189,192	356,827	179,653	177,174	25,129	13,111	12,018	981
Chamba	6,522	519,080	261,320	257,760	482,972	241,963	241,009	36,108	19,357	16,751	986
Hamirpur	1,118	454,768	217,070	237,698	423,338	200,748	222,590	31,430	16,322	15,108	1,095
Kangra	5,739	1,510,075	750,591	759,484	1,423,794	705,365	718,429	86,281	45,226	41,055	1,012
Kinnaur	6,401	84,121	46,249	37,872	84,121	46,249	37,872	0	0	0	819
Kullu	5,503	437,903	225,452	212,451	396,512	203,269	193,243	41,391	22,183	19,208	942
LahaulSpiti	13,841	31,564	16,588	14,976	31,564	16,588	14,976	0	0	0	903
Mandi	3,950	999,777	498,065	501,712	937,140	466,050	471,090	62,637	32,015	30,622	1,007
Shimla	5,131	814,010	425,039	388,971	612,659	314,295	298,364	201,351	110,744	90,607	915
Sirmaur	2,825	529,855	276,289	253,566	472,690	246,175	226,515	57,165	30,114	27,051	918
Solan	1,936	580,320	308,754	271,566	478,173	249,736	228,437	102,147	59,018	43,129	880
Una	1,540	521,173	263,692	257,481	476,260	240,254	236,006	44,913	23,438	21,475	976
HP	55,673	6,864,602	3,481,873	3,382,729	6,176,050	3,110,345	3,065,705	688,552	371,528	317,024	972

Source: Census of India-2011- HP

### Attachment I.3.3.2 List of Scheduled Tribes of Himachal Pradesh and Their Characteristics

No.	Tribe Name	Distribution	Description
1	Bhot, Bodh	Tehsil Lahaul, district Lahaul & Spiti	The Bodh or Bhot people are an ethnic group of Himachal Pradesh, and concentrated in tehsil Lahaul of district Lahaul & Spiti. Predominantly they live in the Chandra and Bhaga valleys, and to a lesser extent in the Pattani valley, Miyar valley and upper reaches of Pangti valley in Himachal Pradesh. These people mainly follow Buddhism.
2	Gaddi		<p>The Gaddis are a pure Hindu tribe with Aryan features. Compared to other tribes, the Gaddis are the most dominant and populous tribe community living in Himachal Pradesh. The term Gaddi is a generic name and under it are included Brahmins, Rajputs, Khatri, Rathis (belonging to the higher castes) and Kolis, Rihards, Lohars, Badies, Sipis, Halis (belonging to low castes). The language of the Gaddis is Gaddi.</p> <p>The Gaddis lead a semi-nomadic, semi-pastoral and semi-agricultural life; their main occupation is rearing sheep and goats. A few male members of this tribe migrate seasonally together with their herds looking for pastures and fodder for the livestock, halt temporarily and move-on. During the winter months, they are stationed in the relatively plain areas of the state, while during the summer months they travel along-with their herds to higher altitudes in search of pastures.</p> <p>Their occupations include sale of wool, milk products, kids/ lambs, aged livestock for meat; in the plains, they are engaged in agriculture.</p>
3	Gujjar		<p>Gujjar or Gurjar (other spellings include Gurjara, Gurjjar, Gojar and Gūjar.) tribe in Himachal Pradesh is a pastoral agricultural ethnic group, who lead a nomadic life. However, some of them have settled down at one place. Gujjars have their own language, known as GUJARI. They are known to variously follow Hinduism, Islam and Sikhism. Although they are classified as Other Backward Class (OBC) in some states in India, in parts of Himachal Pradesh they are classified as Scheduled Tribe.</p> <p>The main occupation of the Gujjar, like the Gaddis, is rearing cattle, which includes sheep, goats and buffaloes. These semi-nomadic people are in the habit of migrating to upper parts of Himalayas along with their cattle during the summer season and back to the plains with the onset of chilly winters.</p>
4	Jad, Lamba, Khampa.	Kinnaur, Kullu, Chamba, and Lahaul	Notified as Scheduled Tribe, and are known to have come from Tibet. The dialect spoken is called Khampa and their traditional script is Tibetan. Earlier they lead a nomadic life trading pashmina wool, sheep, goats, yaks from Tibet in return for carpets, moonga, etc from India. Now they have settled themselves as agriculturist and as orchardists, running shops and restaurants, as labourers in road building sites, some own land and work on their own fields.
5	Kanaura, Kinnaura.	District Kinnaur, Lahaul & Spiti, Chauhra to Sangla and north along the Satluj River to Morang and several villages of the upper Ropa River Valley.	<p>The Kanaura, also known as Kinnaura are a community of Himachal Pradesh, classified as Scheduled Tribe, speak Kinnauri language.</p> <p>The Kinnaura are the largest ethnic group in district Kinnaur, and typically, they inhabit villages in high altitudes, between 5,000 and 6,770 meters (16,400 to 22,200 ft.) above sea level, in areas that are described as having 'mountainous topography, cold climate, dense forests, low rainfall and heavy snowfall'.</p> <p>The Kinnaura territory forms the border between the Buddhist and Hindu worlds, and accordingly the Kinnaura's religious belief is a fusion of the two.</p> <p>These Kinnaura tribes have the tradition of maintaining herds of cattle in their houses. Women of this Kinnaura tribal community are quite hardworking. Weaving is practiced mainly by the female groups of this community. This Kinnaura tribal community produces exquisite baskets and other utensils, which have got demand not only on the local markets but also in the entire</p>



No.	Tribe Name	Distribution	Description
			nation. The women also work in fields.
6	Lahaula.	District Lahaul & Spiti	The Lahaula people have a close affinity with Ladakhis and Tibetans, and are more akin to the Tibetans in physical appearance. They follow both Hindu and Buddhists religion. Their dialect resembles Tibetan language. The main source of livelihood for the Lahaulas is agriculture and allied activities. Occupations include animal husbandry, daily wage earning as laborers in government programs, regular government service, business (mainly shop-keeping), and crafts like weaving.
7	Pangwala.	Snow-bound areas of Chamba District	The Pangwala are a community that are Hindus and have Aryan features, they are healthy and fit and are known for their charming features. They follow the Hindu religion and worship several Gods and Godesses, such as Shiva, Nag, Devi, etc. The main sources of economy among the Pangwala people include agriculture, animal husbandry and village crafts.
8	Swangla	Pattan region of Lahaul sub-division.	The Swangla are a tribe community residing in the Pattan region of Lahaul sub-division, district Lahaul and Spiti. They are part of the South Himalaya people cluster within the Tibetan/ Himalayan Peoples affinity bloc. Their primary language is Pattani, and practice ethnic religion, which is deeply rooted to their ethnic identity.

Source: Compiled by JICA Study Team (2017) based on:

*Encyclopedic Ethnography of the Himalayan Tribes: A-D*, edited by Narendra S. Bisht, T. S. Bankoti  
<https://books.google.co.in/>

### Attachment I.3.3.3 SC/ ST Population

#### 1) District-wise and Urban and Rural Distribution of Scheduled Caste Population

District	Population									% of SC Pop to total pop
	Rural			Urban			Total			
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
1. Bilaspur	47,550	46,128	93,678	2,721	2,590	5,311	50,271	48,718	98,989	25.92
2. Chamba	53,144	52,491	105,635	3,010	3,045	6,055	56,154	55,536	111,690	21.52
3. Hamirpur	50,806	52,735	103,541	2,921	2,794	5,715	53,727	55,529	109,256	24.02
4. Kangra	152,186	152,616	304,802	7,511	7,072	14,583	159,697	159,688	319,385	21.15
5. Kinnaur	7,433	7,317	14,750	-	-	-	7,433	7,317	14,750	17.53
6. Kullu	58,981	56,533	115,514	3,705	3,440	7,145	62,686	59,973	122,659	28.01
7. Lahaul & Spiti	1,154	1,081	2,235	-	-	-	1,154	1,081	2,235	7.08
8. Mandi	140,605	139,975	280,580	6,645	6,514	13,159	147,250	146,489	293,739	29.38
9. Shimla	91,176	88,059	179,235	19,652	16,890	36,542	110,828	104,949	215,777	26.51
10. Sirmaur	77,367	72,352	149,719	5,650	5,376	11,026	83,017	77,728	160,745	30.34
11. Solan	76,902	71,898	148,800	8,580	7,156	15,736	85,482	79,054	164,536	28.35
12. Una	54,768	53,278	108,046	3,833	3,612	7,445	58,601	56,890	115,491	22.16
H.P.	812,072	794,463	1,606,535	64,228	58,489	122,717	876,300	852,952	1,729,252	25.19

Source: Compiled by JICA Study Team (2017) from Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics

## 2) District-wise and Urban and Rural Distribution of Scheduled Tribe Population

District	Population									% of ST Pop to total pop
	Rural			Urban			Total			
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
1. Bilaspur	5,290	5,044	10,334	195	164	359	5,485	5,208	10,693	2.8
2. Chamba	66,589	66,318	132,907	1,311	1,282	2,593	67,900	67,600	135,500	26.1
3. Hamirpur	1,396	1,405	2,801	135	108	243	1,531	1,513	3,044	0.67
4. Kangra	39,498	40,736	80,234	2,247	2,083	4,330	41,745	42,819	84,564	5.6
5. Kinnaur	23,609	25,137	48,746	-	-	-	23,609	25,137	48,746	57.95
6. Kullu	6,320	6,143	12,463	2,173	2,186	4,359	8,493	8,329	16,822	3.84
7. Lahaul & Spiti	12,748	12,959	25,707	-	-	-	12,748	12,959	25,707	81.44
8. Mandi	6,114	6,245	12,359	231	197	428	6,345	6,442	12,787	1.28
9. Shimla	2,795	2,604	5,399	1,759	1,597	3,356	4,554	4,201	8,755	1.08
10. Sirmaur	5,702	5,213	10,915	210	137	347	5,912	5,350	11,262	2.13
11. Solan	12,469	11,606	24,075	882	688	1,570	13,351	12,294	25,645	4.42
12. Una	4,366	4,086	8,452	79	70	149	4,445	4,156	8,601	1.65
H.P.	186,896	187,496	374,392	9,222	8,512	17,734	196,118	196,008	392,126	5.71

Source: Compiled by JICA Study Team (2017) from Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics

### Attachment I.3.3.4 Block-wise BPL Estimation

No	District	Block	Sub-District	Total HH (Rural+Urban)	No of BPL HH	% of BPL HH
1	Bilaspur	Sadar Bilaspur	Naina Devi, Namhol, Bilaspur	31,293	4,258	20.29847
	Bilaspur	Shri Naina Devi Ji	Covered in Sadar Bilaspur Block	-	2,094	-
2	Bilaspur	Ghumarwin	Ghumarwin, Bharari	24,294	5,784	23.80835
3	Bilaspur	Jhanduta	Jhanduta	24,898	5,201	20.88923
4	Chamba	Chamba	Sub dist covers Chamba, Mehla	19,470	6,917	35.52645
5	Chamba	Mehla	Is part of Chamba Sub Dist	16,430	8,244	50.17651
6	Chamba	Salooni	Salooni, Bhalai	15,051	8,374	55.6375
7	Chamba	Tissa (Chaurah)	Is named as Chaurah	12,680	8,791	69.32965
8	Chamba	Bhatiyat	Bhatiyat, Sinhuta, Dalhousie	26,708	8,221	30.78104
9	Chamba	Pangi	Pangi	3,952	2,162	54.70648
10	Chamba	Bharmour	Brahmour, holi	8,169	3,684	45.09732
32	Kinnaur	Pooh	Pooh, Hangrang, Morang	5,471	1,170	21.38549
33	Kinnaur	Kalpa	Kahlpa, Sangla	7,824	842	10.76176
34	Kinnaur	Nichar	Nichar	6,681	812	12.15387
35	Kullu	Anni	Anni	12,292	1,690	13.74878
36	Kullu	Banjar	Banjar, Sainj	12,343	2,071	16.77874
37	Kullu	Kullu	Kullu	33,208	3,293	9.916285
38	Kullu	Nirmand	Nirmand	12,057	2,423	20.09621
39	Kullu	Naggur	Manali, Part of Kullu	24,907	1,790	7.186735
40	Lahaul & Spiti	Lahaul	Udaipur, keylang(Lahaul)	4,091	1,239	30.28599
41	Lahaul & Spiti	Spiti	Spiti	2,583	1,161	44.94774
42	Mandi	Sadar Mandi	AUT, Mandi	34,080	5,529	16.22359
43	Mandi	Balh (Rawalsar)	Kotli. Mandi	25,152	4,538	18.0423
44	Mandi	Gohar	Chachyot, Nihri	14,792	3,260	22.03894
45	Mandi	Drang	Padhar, Part of Jogindernagar	19,455	3,540	18.19584
46	Mandi	Seraj	Thunag, Bali Chowki	17,216	4,023	23.3678
47	Mandi	Karsog	Karsog, Part of Nihri	20,779	4,759	22.90293
48	Mandi	Sunder Nagar	Sundar Nagar, Part of Nihri	27,299	4,390	16.08118
49	Mandi	Gopalpur	Bhadrota, Sarkaghat, Baldwara	22,918	3,564	15.5511
50	Mandi	Dharampur	Sandhol, Dharampur, Part of Sarkaghat	20,442	4,894	23.94091
51	Mandi	Chautra	Lad Bharol	17,012	2,842	16.70585
52	Shimla	Mashobra	Shimla, Junga, Jutogh	64,777	3,036	4.686849
53	Shimla	Theog	Theog	17,469	4,522	25.88585
54	Shimla	Narkanda	Narkands	10,346	1,528	14.76899
55	Shimla	Rampur	Rampur, Nankhari	18,484	4,260	23.04696
56	Shimla	Nankhari	Part of Rampur	6,075	1,702	28.01646
57	Shimla	Chopal	Chaupal, Nerua, Chetna	16,583	5,302	31.9725
58	Shimla	Jubbhal	Kotkhai, Jubbhal	17,159	2,960	17.25042
59	Shimla	Rohroo	Rohru, Tikar	14,132	2,427	17.17379
60	Shimla	Basantpur	Seoni, Part of Shimla (R )	9,033	1,734	19.19628
61	Shimla	Chirgaon (Chauhara)	Chauhara, Dodra Kwar	10,304	3,660	35.52019
	Shimla	Dodra Kwar	Part of Chirgaon above	0	551	-

Source: Estimation by JICA Study Team (2017) based on the data provided by HP Department of Rural Development

### Attachment I.3.3.5 Travel and Transportation Comparison among Major Cities/ Towns in HP State

**Table 1 Travel and Transportation Comparison from Shimla, Kullu and Rampur to Other Destinations in HP State**

Start	Destination	Distance (km)	Transportation Method	Possible Major Routes	Indicative Travel Time (hr)	Accessible Months
Shimla	Kullu	208	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Barmana, Sundernagar, Ner Chowk, Mandi, Bajaura and Bhuntar	6 - 9 hrs	Throughout the year
Shimla	Rampur	129	Car/Bus	Dhalli, Kufri, Theog, Matiana, Narkanda, Keengal, Rampur	4-5 hrs	In winters closed occasionally
Shimla	Mandi	126	Car/Bus	Ghanahatti, Dhami, Namhol, Barmana, Sundernagar, Mandi	4-5 hrs	Throughout the year
Shimla	Kilar (Pangi, Chamba)	495	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspiur, Ghumarwani, Bhota, Nadaun Jwalamukhi, Ranital, Nurpur, Dunera, Dalhousie, Surangani, Paddar, Killar	18-21 hrs	March to November when snow melts
Shimla	Pangi	518	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspiur, Ghumarwani, Bhota, Nadaun Jwalamukhi, Ranital, Nurpur, Dunera, Dalhousie, Surangani, Paddar, Killar, Sach, Pangi	16-19 hrs	March to November when snow melts
Shimla	Brahmaur (Chamba)	400	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspiur, Ghumarwani, Bhota, Nadaun Jwalamukhi, Ranital, Nurpur, Makwal, Chowari, Chamba, Dharwala, Lahal, Bharmour	13-16 hrs	March to November when snow melts
Shimla	Chamba	342	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspiur, Ghumarwani, Bhota, Nadaun Jwalamukhi, Ranital, Nurpur, Makwal, Chowari, Chamba	10-12 hrs	Throughout the year
Shimla	Manali	247	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Barmana, Sundernagar, Ner Chowk, Mandi, Bajaura, Bhuntar and Kullu	8-10 hrs	February to November when no snow
Shimla	Bilaspur	86	Car/Bus	Ghanatti, Dhami, Namoli, Ghanahatti, Namhol, Brahmukhar, Nauni	3-5 hrs	Throughout the year
Shimla	Reckong Peo, Kinnaur	244	Car/Bus	Mashobra, Kufri, Theog, Matiana, Narkanda, Kotgarh, Rampur Bushair, Sarahan, Sungra, Tapri, Reckong Peo	10-12 hrs	February to October end
Shimla	Yhangran, Kinnaur	272	Car/Bus	Kufri, Rampur, Sarahan, Sangla Kalpa	10-13 hrs	February to October end
Shimla	Keylong, Lahul	363	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Barmana, Sundernagar, Ner Chowk, Mandi, Bajaura, Bhuntar, Kullu, Raison, Patlikul, Manali, Vaishist, Marhi, Rohtang, Khoksar, Sissu, Shipting, Tandi, Keylong	12-15 hrs	February to October end
Shimla	Kaja, Spiti	427	Car/Bus	Dhalli, Kufri, Theog, Matiana, Narkanda, Keengal, Rampur, Jhakri, Jeori, Sungra, Tapri, Kalpa, Ribba, Moorang, Spillo, Pooh, Nako, Chango, Sumdhu, Lapcha, Tabo,	15-20 hrs	February to October end

Start	Destination	Distance (km)	Transportation Method	Possible Major Routes	Indicative Travel Time (hr)	Accessible Months
				Siluk, Dhankar, Kaza		
Shimla	Dharmsala	237	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspiur, Ghumarwani, Bhota, Nadaun, Kangra	8-10 hrs	Throughout the year
Shimla	Una	179	Car/Bus	Ghanatti, Dhami, Namoli, Bilaspur, Kiratpur Sahib, Mehatpur, Nangal, Una	5-6 hrs	Throughout the year
Shimla	Hamirpur	144	Car/Bus	Bilaspur, Barmana, Ghumarwain	4-6 hrs	Throughout the year
Shimla	Solan	46	Car/Bus	Taradevi, Shoghi, Kandaghar	1.5-2.5 hrs	Throughout the year
Shimla	Nahan	133	Car/Bus	Shoghi, Kandaghat, Solan, Barog, Nainatikkar, Sarahan, Nahan	4-6 hrs	Throughout the year
Kullu	Killar (Pangi, Chamba)	475	Car/Bus	Mohal, Bhuntar, Bajaura, Banala, Aut, Mandi, Jogindernagar, Palampur, Dramman, Nurpur, Dunera, Nanikhad, Banikhet, Tissa, Ghanghit, Killar, Dalhousie, Surangani, Paddar, Killar	15-18 hrs	May to September only
Kullu	Killar (Pangi, Chamba)	504	Car/Bus	Mohal, Bhuntar, Bajaura, Banala, Aut, Mandi, Neharchowk, Jahu, Bhota, Hamirpur, Nadaun, Ranital, Harchakian, Nurpur, Duneria, Dalhousie, Surangani, Paddar, Killar	15-18 hrs	May to September only
Kullu	Brahmaur (Chamba)	372	Car/Bus	Bhuntar, Banjar, Mandi, JoginderNagar, Naijnath, Palampur, Kangra, Gaggal, Dharamshala, Chamba, Bharmour	12-15 hrs	February to October end
Kullu	Chamba	314	Car/Bus	Bhuntar, Banjar, Mandi, JoginderNagar, Naijnath, Palampur, Kangra, Gaggal, Dharamshala	10-13 hrs	Throughout the year
Kullu	Manali	40	Car/Bus	Raisan, Patlikul	1.5-2.5 hrs	Throughout the year
Kullu	Bilaspur	133	Car/Bus	Mohal, Bhuntar, Bajaura, Banala, Aut, Mandi, Kanaid, Sundernagar, Barmana	4-5 hrs	Throughout the year
Kullu	Reckong Peo, Kinnaur	273	Car/Bus	Mohal, Bhuntar, Bajaura, Aut, Banjar, Jibhi, Rampur Bushair, Sarahan, Sungra, Tapri, Reckong Peo	9-11 hrs	February to October end
Kullu	Yhangran, Kinnaur	398	Car/Bus	Manali, Kaza, Tabo, Nako	10-12 hrs	February to October end
Kullu	Keylong, Lahul	156	Car/Bus	Raison, Patlikul, Manali, Vaishist, Marhi, Rohtang, Khoksar, Sissu, Shipting, Tandi, Keylong	6-8 hrs	February to October end
Kullu	Kaja, Spiti	242	Car/Bus	Naggat, Manali, Vashisht, Chhatru, Pangmo, Kaza	6-9 hrs	February to October end
Rampur	Killar (Pangi, Chamba)	571	Car/Bus	Nirath, Luri, Tumman, Ani, Khagna, Shoja, Jhibi, Banjar, Bali Chowki, Dhaman, Thuari, Pandoh, Mandi, Maseran, Padhar, Joginder Nagar, Baijnath, Nurpur, Dalhausie, Surangari, Paddar, Killar	18-22 hrs	May to September only
Rampur	Brahmaur (Chamba)	468	Car/Bus	Luhri, Tumman, Anni, Banjar, Mandi, Jogindernagar, Baijnath,	16-19 hrs	Throughout the year

Start	Destination	Distance (km)	Transportation Method	Possible Major Routes	Indicative Travel Time (hr)	Accessible Months
				Palampur, Gaggal, Dramman, Patka, Chamba, Rajera, Dharwal, Lahal		
Rampur	Chamba	409	Car/Bus	Luhri, Tumman, Anni, Banjar, Mandi, Jogindernagar, Baijnath, Palampur, Gaggal, Dramman, Patka, Chamba	16-18 hrs	Throughout the year
Rampur	Bilaspur	178	Car/Bus	Basantpur, Mandri, Galog, Nauni Chowk	6-8 hrs	Throughout the year
Rampur	Reckong Pea, Kinnaur	115	Car/Bus	Sarahan, Sungra, Tapri, Reckong Peo	4-6 hrs	February to October end
Rampur	Keylong, Lahul	312	Car/Bus	Jibhi, Banjar, Aut, Banala, Bajaura, Bhuntar, Mohal, Kullu, Manali, Sissu, Raling, Tandi, Keylong	11-14 hrs	February to October end
Rampur	Kaja, Spiti	298	Car/Bus	Kalpa, Pangi, Pooh, Khab, Nako, Sumdo, Dhankar	9-12 hrs	February to October end

Source: Compiled by JICA Study Team (2017) based on i) interviews with relevant stakeholders for travel time and accessible months, and ii) routes and distance as per following web sites <https://www.google.co.in/maps/dir/Rampur+Bushahr,+Himachal+Pradesh/Bharmour> [www.distancecalculator.globefeed.com/India](http://www.distancecalculator.globefeed.com/India) (page visited on 15/07/2017)

**Attachment I.3.3.6 Security Information Civilians Killed/ Injured**

The state wise details of the civilians killed/injured due to above mentioned reasons during 2015 are illustrated in **Table 1 and 2** below:

**Table 1 Civilians Killed in 2015**

No.	State/UT	Civilians Killed							Total
		By Terrorist / Militants	By Naxalite /LWE	By Bomb Explosion	During Riot	During Commission of Crime Like Dacoity/ Robbery	During Border Cross Fires	Accidental y in Cross Fire during Police Operations	
<b>STATES</b>									
1	Andhra Pradesh	0	0	0	0	0	0	0	0
2	Arunachal Pradesh	0	0	0	0	0	0	0	0
3	Assam	0	0	0	0	0	0	0	0
4	Bihar	0	0	0	0	0	0	0	0
5	Chhattishgarh	0	5	0	0	0	0	0	5
6	Goa	0	0	0	0	0	0	0	0
7	Gujarat	0	0	0	2	0	0	0	2
8	Haryana	0	0	0	0	0	0	1	1
<b>9</b>	<b>Himachal Pradesh</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
10	Jammu & Kashmir	18	0	1	0	0	0	0	19
11	Jharkhand	0	2	0	0	0	0	0	2
12	Karnataka	0	0	0	0	0	0	1	1
13	Kerala	0	0	0	0	0	0	0	0
14	Madhya Pradesh	0	0	0	0	0	0	0	0
15	Maharashtra	0	0	0	1	1	0	0	2
16	Manipur	1	0	3	0	0	0	0	4
17	Meghalaya	0	0	0	0	0	0	0	0
18	Mizoram	0	0	0	0	0	0	0	0
19	Nagaland	0	0	0	0	0	0	0	0
20	Odisha	0	0	0	0	1	0	0	1
21	Punjab	0	3	0	0	0	0	0	3
22	Rajasthan	0	0	0	1	0	0	0	1
23	Sikkim	0	0	0	0	0	0	0	0
24	Tamil Nadu	0	0	0	0	0	0	0	0
25	Telangana	0	1	0	0	0	0	0	1
26	Tripura	0	0	0	0	0	0	0	0
27	Uttar Pradesh	0	0	0	2	0	0	0	2
28	Uttarakhand	0	0	0	0	0	0	0	0
29	West Bengal	0	0	0	0	3	0	0	3
<b>TOTAL STATE(S)</b>		<b>19</b>	<b>11</b>	<b>4</b>	<b>6</b>	<b>5</b>	<b>0</b>	<b>2</b>	<b>47</b>
<b>UNION TERRITORIES:</b>									
30	A & N Islands	0	0	0	0	0	0	0	0
31	Chandigarh	0	0	0	0	0	0	0	0
32	D&N Haveli	0	0	0	0	0	0	0	0
33	Daman & Diu	0	0	0	0	0	0	0	0
34	Delhi UT	0	0	0	0	1	0	0	1
35	Lakshadweep	0	0	0	0	0	0	0	0
36	Puducherry	0	0	0	0	0	0	0	0
<b>TOTAL UT(S)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>TOTAL (ALL INDIA)</b>		<b>19</b>	<b>11</b>	<b>4</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>48</b>

Source: Crime in India Compendium, National Crime Record Bureau, Govt of India



**Table 2 Civilians Injured in 2015**

No.	State/UT	Civilians Injured							Total
		By Terrorist / Militants	By Naxalite /LWE	By Bomb Explosion	During Riot	During Commission of Crime Like Dacoity/ Robbery	During Border Cross Fires	Accidentally in Cross Fire during Police Operations	
STATES									
1	Andhra Pradesh	0	0	0	0	0	0	0	0
2	Arunachal Pradesh	0	0	0	0	0	0	0	0
3	Assam	0	0	0	0	0	0	0	0
4	Bihar	0	0	0	0	0	0	0	0
5	Chhattishgarh	0	23	0	0	0	0	0	23
6	Goa	0	0	0	0	0	0	0	0
7	Gujarat	0	0	0	5	0	0	0	5
8	Haryana	0	0	0	4	0	0	0	4
<b>9</b>	<b>Himachal Pradesh</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
10	Jammu & Kashmir	49	0	0	1	0	0	0	50
11	Jharkhand	0	0	0	1	0	0	0	1
12	Karnataka	0	0	0	21	2	0	0	23
13	Kerala	0	0	0	0	0	0	1	1
14	Madhya Pradesh	0	0	0	3	3	0	0	6
15	Maharashtra	0	0	0	60	26	0	0	86
16	Manipur	4	0	36	0	0	0	0	40
17	Meghalaya	2	0	0	0	0	0	0	2
18	Mizoram	2	0	0	0	0	0	0	2
19	Nagaland	0	0	0	0	0	0	0	0
20	Odisha	0	0	0	0	0	0	0	0
21	Punjab	10	0	0	0	0	0	0	10
22	Rajasthan	0	0	0	0	0	0	0	0
23	Sikkim	0	0	0	0	0	0	0	0
24	Tamil Nadu	0	0	0	10	0	0	0	10
25	Telangana	0	0	0	0	0	0	0	0
26	Tripura	0	0	0	0	0	0	0	0
27	Uttar Pradesh	0	0	0	125	0	0	0	125
28	Uttarakhand	0	0	0	0	0	0	0	0
29	West Bengal	0	0	3	0	5	0	0	8
<b>TOTAL STATE(S)</b>		<b>67</b>	<b>23</b>	<b>39</b>	<b>230</b>	<b>36</b>	<b>0</b>	<b>1</b>	<b>396</b>
UNION TERRITORIES:									
30	A & N Islands	0	0	0	0	0	0	0	0
31	Chandigarh	0	0	0	32	0	0	0	32
32	D&N Haveli	0	0	0	0	0	0	0	0
33	Daman & Diu	0	0	0	0	0	0	0	0
34	Delhi UT	0	0	0	30	0	0	0	30
35	Lakshadweep	0	0	0	0	0	0	0	0
36	Puducherry	0	0	0	0	0	0	0	0
<b>TOTAL UT(S)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>62</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>62</b>
<b>TOTAL (ALL INDIA)</b>		<b>67</b>	<b>23</b>	<b>39</b>	<b>292</b>	<b>36</b>	<b>0</b>	<b>1</b>	<b>458</b>

Source: Crime in India Compendium, National Crime Record Bureau, Govt of India

### Attachment I.3.3.7 PAP Conditions and Procedures

At present, the foreign tourists/foreigners are being permitted to visit the restricted/protected areas by the authorities specified under section 3 of the Foreigners (Protected Areas) Order 1958 by the state government.

Diplomatic & official passport holders who wish to visit, stay or pass through the PAP areas and required to obtain necessary protected areas permits from Ministry of External Affairs. Application (in triplicate) should be submitted to the Northern Division, MDA, South Block, Room No. 235, New Delhi giving a minimum of 8 week notice to process the relevant case. However, application does not imply automatic issue of permits.

Such permits for the foreigners who want to visit such places in connection with their engagement with some UN aided or World Bank projects are required to submit their applications to the Resident Commissioner, HP state government, Himachal Bhavan, Sikandra Road, New Delhi. This officer issues such permits to foreigners required to visit such places in connection with the World Bank or UN Aided projects and the Projects sponsored by the Government of India or any State Government or UT administration. In such cases, the Resident Commissioner would insist upon a letter of requisition from the sponsoring authority.

In this regard following district magistrates and sub-divisional magistrates are authorized to issue PAP in their respective territorial limits.

- District Magistrate, Lahaul&Spiti at Keylong.
- Sub-Divisional Magistrate, Spiti at Kaza
- Sub-Divisional Magistrate, Lahaul at Keylong

#### Purpose and Type of Application<sup>1</sup>

1. For **Registration purpose**, three copies of Form 'A' under the Registration of foreigners Rule, 1939 are required to be filled (The conditions for stay are given on Page 2 of Part-III of the form. The form is to be filled in Triplicate, first copy Part-III, second copy is Part-II and the third copy is Registration Report/Part-I)
2. For foreigners desiring to **extend stay** in India, three copies of form entitled "Application to be filled by Alien desiring to extend stay in India" need to be submitted.
3. For the grant of No objection to foreigners **Return to India** form entitled "Application for the grant of No Objection Return to India" in duplicate copies are required.

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<sup>1</sup>[http://himachal.nic.in/index1.php?lang=1&dpt\\_id=215&level=1&sublinkid=9374&lid=9734](http://himachal.nic.in/index1.php?lang=1&dpt_id=215&level=1&sublinkid=9374&lid=9734)

### Attachment I.3.4.1 Changes of Land Use Pattern in HP State

Land-use Classification	1966-67		1994-95		1999-2000		2009-10		2010-11	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Forests	636,096	21.9	1,049,039	30.8	1,094,209	24.1	1,105,997	24.3	1,125,742	24.6
Barren and Unculturable land	109,383	3.8	149,388	4.4	856,911	18.9	783,404	17.2	778,525	17.0
Land put to non-agricultural uses	117,483	4.0	198,669	5.8	30,219	0.7	348,649	7.6	352,667	7.7
Permanent pastures and other grazing lands	1,163,402	40.0	1,193,602	35.1	1,471,536	32.5	1,503,833	33.0	1,507,522	32.9
Culturable wastelands	39,716	1.4	48,634	1.4	64,161	1.4	128,224	2.8	124,121	2.7
Lands under miscellaneous tree crops and groves	176,760	6.1	118,126	3.5	119,413	2.6	68,391	1.5	64,905	1.4
Current fallow lands	2,630	0.1	20,695	0.6	15,714	0.3	59,991	1.3	57,497	1.3
Other fallow lands	65,759	2.3	55,938	1.6	56,233	1.2	22,109	0.5	21,294	0.5
Net area sown	535,107	18.4	568,338	16.7	551,457	12.2	538,412	11.8	543,365	11.9
Total Area	2,906,336	100.0	3,402,429	100.0	4,531,828	100.0	4,559,010	100.0	4,575,638	100.0

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh and "the Statistical Abstract of Himachal Pradesh 2015-16", Department of Economics and Statistic, Government of Himachal Pradesh

## Attachment I.3.4.2 State-wise Land Holdings

State	Marginal (Below 1.0 ha/holding)			Small (1.0-2.0 ha/holding)			Semi-medium (2.0-4.0 ha/holding)			Medium (4.0-10.0 ha/holding)			Large (more than 10 ha/holding)		
	Operate d Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operate d Area	Area per Holding	Operated Area
ANDHRA PRADESH	84,234	38,886	0.46	29,174	40,893	1.4	13,980	36,602	2.62	3,960	21,444	5.42	346	4,600	13.29
ARUNAC HAL PRADESH	193	121	0.63	190	263	1.38	339	937	2.76	279	1,544	5.54	65	963	14.82
ASSAM	18,299	9,465	0.52	4,961	6,363	1.28	3,031	7,379	2.43	843	3,858	4.57	17	332	19.78
BIHAR	147,245	37,929	0.26	9,447	11,533	1.22	4,126	9,911	2.4	807	3,913	4.85	30	377	12.78
CHATTISG ARH	21,826	9,979	0.46	8,311	11,777	1.42	5,029	13,425	2.67	2,018	11,415	5.66	276	4,195	15.21
GOA	599	278	0.46	98	173	1.77	57	168	2.96	20	124	6.22	6	127	22.56
GUJARAT	18,141	10,306	0.57	14,282	20,936	1.47	10,787	30,203	2.8	5,119	30,002	5.86	477	6,626	13.9
HARYANA	7,723	4,365	0.57	3,124	4,529	1.45	2,815	8,041	2.86	1,916	11,267	5.88	423	6,674	15.8
HIMACHA L PRADESH	6,700	2,544	0.38	1,745	2,397	1.37	848	2,244	2.65	275	1,518	5.52	32	763	23.95
JAMMU & KASHMIR	12,050	4,194	0.35	1,669	2,280	1.37	635	1,667	2.62	113	599	5.29	4	84	21.08
JHARKHA ND	18,457	7,503	0.41	4,280	5,832	1.36	2,820	7,681	2.72	1,281	7,370	5.75	201	3,137	15.58
KARNATA KA	38,429	18,753	0.49	21,360	30,813	1.44	12,651	34,508	2.73	5,092	29,015	5.7	663	9,002	13.58
KERALA	65,312	9,304	0.14	1,759	2,391	1.36	549	1,426	2.6	112	582	5.21	13	238	18.58
MADHYA PRADESH	38,903	20,031	0.51	24,482	34,816	1.42	16,544	44,904	2.71	7,887	45,000	5.71	884	13,732	15.54
MAHARA SHTRA	66,984	33,199	0.5	40,474	57,245	1.41	21,549	57,510	2.67	7,072	39,006	5.52	661	9,635	14.58
MANIPUR	767	387	0.5	488	609	1.25	222	560	2.52	27	139	5.08	Neg	4	10.42
MEGHAL AYA	1,023	606	0.59	576	742	1.29	404	1,026	2.54	83	443	5.34	2	42	18.02

State	Marginal (Below 1.0 ha/holding)			Small (1.0-2.0 ha/holding)			Semi-medium (2.0-4.0 ha/holding)			Medium (4.0-10.0 ha/holding)			Large (more than 10 ha/holding)		
	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Number of Holding	Operated Area	Area per Holding	Operated Area
MIZORAM	501	310	0.62	297	373	1.25	99	241	2.43	17	92	5.35	3	35	13.7
NAGALAND	64	38	0.59	202	257	1.27	483	1,301	2.69	778	4,628	5.95	251	4,502	17.93
ODISHA	33,679	19,190	0.57	9,185	14,517	1.58	3,111	9,264	2.98	635	3,857	6.07	45	807	17.9
PUNJAB	1,644	1,043	0.63	1,954	2,708	1.39	3,244	8,560	2.64	2,981	17,026	5.71	694	10,167	14.65
RAJASTHAN	25,077	13,180	0.53	15,088	21,700	1.44	13,326	37,564	2.82	11,248	68,910	6.13	4,017	65,748	16.37
SIKKIM	397	168	0.42	168	216	1.28	108	282	2.62	58	272	4.69	7	102	14.33
TAMIL NADU	62,556	24,012	0.38	11,786	15,950	1.35	5,000	13,177	2.64	1,489	8,112	5.45	156	2,302	14.71
TRIPURA	4,989	1,389	0.28	550	755	1.37	215	547	2.55	27	137	5.02	1	11	13.86
UTTARAKHAND	6,708	3,058	0.46	1,571	2,140	1.36	646	1,725	2.67	172	936	5.44	10	164	16.79
UTTAR PRADESH	185,187	72,618	0.39	30,308	41,052	1.35	13,309	35,373	2.66	3,962	21,367	5.39	245	2,935	11.97
WEST BENGAL	58,503	29,273	0.5	9,791	15,275	1.56	2,669	7,225	2.71	222	1,089	4.91	Neg	5	11.29
A & N ISLANDS	45	20	0.43	24	35	1.48	31	81	2.63	16	67	4.28	Neg	Neg	18
CHANDIGARH	5	2	0.47	1	2	1.41	1	2	2.81	Neg	3	5.68	Neg	Neg	11
D & N HAVELI	82	46	0.57	39	50	1.27	18	47	2.63	7	43	5.85	1	16	15.51
DAMAN & DIU	77	20	0.26	5	5	1.2	1	3	2.27	Neg	1	4.37	Neg	1	10
DELHI	109	75	0.68	41	52	1.28	29	68	2.35	15	72	4.74	1	18	12.37
LAKSHADWEEP	90	16	0.18	2	3	1.37	1	3	2.5	Neg	1	5.05	Neg	Neg	10
PUDUCHERRY	283	109	0.38	27	37	1.34	14	35	2.49	4	21	5.05	Neg	4	13.69

Source: Prepared by JICA Study Team (2017) based on Agricultural Census (2011-12)

### Attachment I.3.4.3 Major Soil Types in HP State

Soil Type	Description
Alluvial soils	Characterized by the incipient profile development and are found in Una (Una district), Indora (Kangra district) and Poanta (Sirmaur district) areas where floodplain is a dominant physiography. These are generally coarse textured soils comprising loamy sand and sandy loam and occasionally loam to sandy clay loam, low in organic matter and neutral (pH >6.5) in reaction. The soils are somewhat calcareous in nature in which calcium carbonate varies from 2.0 to 4.5 %
Brown hill soils	Sandy loam to clay loam texture found in Nahan (Sirmaur district) and Solan (Solan district) areas. These soils are medium to high in organic matter and neutral to slightly acidic in reaction. According to the soil taxonomy the soils are classified as Hapludolls, Hapludalfs and Udorthents
Non-calcic brown soils	Generally, found in parts of Hamirpur, Bilaspur and Mandi districts besides Dehra Gopipur (Kangra district) areas. Soil reaction is neutral in most cases and rarely acidic. The texture varies from loamy sand to clay loam. Organic matter content varies from low to medium. These soils are equivalent to Eutrochrepts and Hapludalfs according to Soil Taxonomy of USDA.
Brown forest soils	Found in parts of Chamba district where there is forest vegetation. These have moderately deep to deep solum. The soils are sandy loam to clay loam in texture and slightly acidic to neutral in reaction. The soils belong to Hapludalf, Hapludolls and Eutrochrepts groups in order of their occurrence.
Grey wooded or brown podzolic Soils	Commonly developed under varying magnitude of podzolization are found in parts of Shimla and Kullu districts and Karsog (Mandi district). They are generally characterized by darker colours containing high organic matter. Soil reaction ranges from slightly to strongly acidic and the textures are sandy loam to clay loam. The soils belong to Hapludolls and Hapludalfs groups.
Grey brown podzolic soils	Formed by the dominant process of podzolization and are found in parts of Kangra district and Jogindernagar (Mandi district). They are distinctly acidic in reaction, heavy texture of clay loam silt loam and silty clay soils. In soil taxonomy, these soils are classified as Paleudalf, Hapludalf and Haplorthods.
Planosolic soils	Found in Balh valley (Mandi district), Ghumarwin (Bilaspur district), Nagwain (Kullu district) and Saproon valley (Solan district). Soils are medium to fine textured i.e. sandy loam to sandy clay loam and clay loam and neutral in reaction. Organic matter is usually medium to high whereas available phosphorus and potassium are rated under medium categories. These soils are placed in Ochraqualfs, Hapludalfs and Haplaquepts groups under soil taxonomy.
Humus and Iron podzols	Formed under the process of podzolisation. They are mainly confined to parts of Shimla, Dalhousie and Manali regions. These soils have dark coloured A horizon, enriched with organic matter, acidic in reaction, and reddish brown to yellowish brown B2 horizon contains free iron and aluminum accompanied by organic matter. Profiles are marked by distinct spodic horizon underlying Mollic or Umbric epipedon.
Alpine humus mountain skeletal soils	Found in the Himalayan highlands constituting the districts of Kinnaur, Lahaul-Spiti and Pangi tehsil of Chamba district where the precipitation is low and temperature is frigid. Soils are gravelly loamy sand to loam, usually high in organic matter and neutral in reaction. Available phosphorus and potassium are generally medium to high. On the basis of soil taxonomy, these soils can be classified as Hapludolls, Eutrochrepts and Udorthents

Source: Compiled by JICA Study Team (2017) based on information from Verma TS, Tripathi BR (1982) Profile morphology and physico-chemical properties of the soils from hot and dry foot hill zone of Himachal Pradesh. *J Indian Soc Soil Sci* 30:574–576, and Singh K, Singh JP, Bhandari AR (1996) Numerical classification of some soils from upper transect of Satluj river catchment in Himachal Pradesh. *J Indian Soc Soil Sci* 44:122–130

### Attachment I.3.4.4 Major Geological Features in HP State

Zone	Description
Outer Himalaya (Shivalik)	The foothill zone consists predominantly of tertiary formations, comprising of thick detrital rocks, clays and conglomerates. This division consists of low hills of Shivalik zone with an elevation of up to 600 m. Shivalik hills are made of monoclinical hills dipping gently southward, steep scraps facing north and structural valleys called duns to the north of them. The sub-Himalayan zone rocks comprise rocks varying from oldest to youngest, the Subathu, Dagshiai and Kasauli deposits, and the Shiwalik Group. At the base of the sequence are the shallow marine rocks comprises of the Subathu deposits. Rocks found in the Shiwaliks are dominantly limestones, mudstones, Red fine-grained sandstones, conglomerate, siltstones, mudstones, thin sequence of shales capped by a hard white-gray quartz rich sandstone and softer green-colored sandstone etc. This zone is about 50 km wide in the west, becomes about 80 km wide in Kangra valley and tapers to smaller width in Nalagarh and Kyarda Duns in east. Main ranges in this division are Hathi Dhar, Sikandar Dhar, Chaumukhi range, Solasinghi Dhar, Ramgarh Dhar, Naina Devi Dhar and Dharti Dhar.
Lesser Himalaya (Lower)	The zone lies between the Main boundary thrust and Central Himalayan thrust. This zone is mainly composed of early Proterozoic detrital sediments deposited between approximately 1,900 and 1,800 million years ago, and subsequently over thrustured during the Himalayan upliftment onto sub-Himalayan rocks along the Main Boundary Thrust (MBT). The Lesser Himalaya mainly consists of massive quartz intruded by basalts and other crystalline rocks of unfossiliferous sediments. The almost complete Paleozoic sediments in the Lower Himalaya are suddenly interrupted by the transgression of the outstandingly different Gondwana rock sequence. This volcanic activity is well preserved in the Dhauladhar and Pir Panjal range, the formations being known as 'Panjal volcanics' or 'Panjal Traps'. Along the Sutlej section, the Lesser Himalayan Crystalline Sequence crops out within a tectonic window called the Larji-Kullu-Rampur Window. The lower part of this unit is composed of thick mica schist and granitic gneiss. Some minor ranges of lower Himalaya are Dagni Dhar, Mani Mahesh and Dhog Dhar in the Ravi valley; Jalori Dhar and Shikari Dhar in Beas and Satluj basins and Nagtibba range. Mussourie range and Shimla hills are situated in the Yamuna basin east of the Great Himalayan Divide.
Greater Himalaya (Higher)	The zone represents the main metamorphic unit forming the crystalline core zone. The Main Central Thrust (MCT), a major fault that accommodated up to 250 km of shortening during collision, encompasses the zone at its base. The Higher Himalaya range forms the northern watershed of the Chandrabhaga (Chenab) basin and separates it from Spiti basin and further east it forms watershed between Spiti and Beas basins. It is cut across by Satluj before it enters Uttarakhand Himalaya with extension to Badrinath/Kedarnath. The elevation of the higher Himalaya ranges between 5,000 and 6,000 m, and it has several passes having elevations between 4500 m.
Tethys Himalayan zone	The Tethyan Himalaya corresponds to a nearly continuous, Upper Proterozoic to Eocene sedimentary sequence deposited in the Spiti region. These sediments generally underwent only very low-grade metamorphic. It forms the northern watershed of the Spiti and Sangla valleys in Kinnaur and roughly forms the Indo-Tibetan border and Satluj cuts across the Zaskar range forming a deep gorge. The rusty ferrous slates and Kinnaur Kailash Granite that thrust the Lesser Himalaya over the sub-Himalaya is a characteristic landmark in this region. The Himalayas and the associated eastern ranges remain tectonically active due to continue under thrusting of the Indian peninsula against the Eurasian Plate. In the south-eastern part of Kinnaur, one prominent range extends west-northeast in the form of Kinner Kailash range. HP displays extensive areas with present day and past glaciers. Almost whole of the state has been either directly or indirectly affected by glaciers. Modern glaciers are merely the shrunken remnants of the much more extensive alpine glaciers of the Pleistocene ice age. Large part of Zaskar, Great Himalaya and Pir Panjal are currently being glaciated and display features of glacial topography while other areas have features of extensive past glaciations in Kangra valley glaciers came down to as low as 610 m.

Source: Compiled by JICA Study Team (2017) based on information from Jreat M (2006) *Geography of Himachal Pradesh*. Indus Publishing Co, New Delhi Government of Himachal Pradesh (2011) *Economic survey 2010–11*. Himachal Pradesh Finance Department, Shimla

### Attachment I.4.1.1 Legal Framework for Forest Sector at National Level

Law/ Policy	Description	Responsible Ministry/ Agency
The National Green Tribunal Act 2010	The "National Green Tribunal" was established on 8-Oct-2010 under the National Green Tribunal Act 2010. The main objective of the Central Government to establish the NGT was to provide a specialized forum for effective and speedy disposal of cases pertaining to environment protection, conservation of forests and for seeking compensation for damages caused to people or property due to violation of environmental laws or conditions specified while granting permissions. The Principal Bench of the NGT has been established in the National Capital – New Delhi, with regional benches in Pune (Western Zone Bench), Bhopal (Central Zone Bench), Chennai (Southern Bench) and Kolkata (Eastern Bench). Each Bench has a specified geographical jurisdiction covering several States in a region.	National Green Tribunal (NGT: under MoEF&CC)
Indian Forest Act 1927	This Act sought to consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on timber and other forest produce.	MoEF&CC State level Environment and Forest departments Implementing Agency
The National Forest Policy 1988	The policy was prepared with a national goal to have a minimum of 1/3 of the total land area of the country under forest or tree cover. Whilst in the hills and mountainous regions, to maintain 2/3 of the area under forests or tree cover to prevent erosion and land degradation and to ensure stability of the fragile eco-system. The policy provides for maintenance of environmental stability through preservation, restoration of ecological balance impacted by serious depletion of forests, preserving natural forests with vast variety of flora and fauna, check erosions/ degradations, and to minimize pressure to existing forests.	MoEF&CC, State level Environment and Forest departments
Forest Conservation Act 1980 and Amendment 1988	The act provides for conservation of forests and lays emphasis on restriction on de-reservation of forests or use of forest lands for non-forest purposes. It also provides that any reserved forest can be reserved, any forest land may be used for non-forest purposes, any forest land could be assigned by way of lease or otherwise to any private person or to any authority, corporation, agency or any other organization, any forest land may be cleared of trees, which have grown naturally, for the purpose of reforestation.	MoEF&CC, State level Environment and Forest departments
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	The forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in forests for generations, have had a vital and mutually supportive relationship with the forests and they have been dependent on the forests for their livelihoods and existence. However, their rights were rarely recognized by the authorities and due to lack of real ownership of the land, the already marginalized local dwellers suffered. Thus, this Act, commonly known as "Forests Right Act", seeks to recognize and bestow the forest rights and occupation in forest land among these tribal population groups. Two enabling rules namely, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights.) Rules, 2008 & Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), (Amended) Rules, 2012 have been formed to facilitate implementation of the provisions of the act.	Ministry of Tribal Affairs State Government
Wildlife (Protection) Act 1972 and Amendment 1993	This Act was enacted to protect wild animals, birds and plants, and provides for prohibition on hunting any wild animal, prohibition on picking, uprooting, of specified plants, constitution of sanctuaries, national parks and closed areas, prohibition on trade or commerce of wild animals, in trophies, animal articles derived from certain animals, and empowers certain officials to investigate and impose penalties. The Act has six schedules which give varying degrees of protection. Schedule I	MoEF&CC, State Wildlife department



Law/ Policy	Description	Responsible Ministry/ Agency
	and part II of Schedule II provide absolute protection - offences under these are prescribed the highest penalties. The Species listed in Schedule III and Schedule IV is protected as well, however the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting.	
Biological Diversity Act 2002	<p>This is umbrella legislation aimed at preservation and conservation of biological resources and provides a mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. The Act was enacted to meet the obligations under the Convention on Biological Diversity, to which India is a party.</p> <p>The National Biodiversity Authority (NBA) is a statutory autonomous body, established in 2003, with its headquarters in Chennai, under the MoEF&amp;CC was created to implement the provisions under the Act. State Biodiversity Boards have been created in 28 States along-with 31,574 Biological Management Committees (for each local body) across India.</p> <p>Functions include (i) regulation of acts prohibited under the Act, (ii) advise the Government on conservation of biodiversity, (iii) advise the Government on selection of biological heritage sites, (iv) take appropriate steps to oppose grant of intellectual property rights in foreign countries, arising from the use of biological resources or associated traditional knowledge.</p>	National Biodiversity Authority, Chennai State bio-diversity board
Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006	<p>This act recognizes and bestows forest rights and occupation in the forest land to the forest dwelling scheduled tribes and other forest dwellers, who have been living in such forests for generations, but their rights could not be recorded.</p> <p>Thus, the recognized rights include responsibilities and authority for sustainable use and conservation of biodiversity and maintenance of ecological balance, thus strengthening the conservation regimes of the forests while ensuring livelihood and food security to the forest dwelling communities.</p>	Forest Department Ministry of Tribal Affairs

Source: Compiled by JICA Study Team (2017) based on information indicated below:

Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India: <http://envfor.nic.in/>

Department of Land Resources, Government of India: <http://www.dolr.nic.in>

<http://labour.nic.in/sites/default/files/SafetyHealthandEnvironmentatWorkPlace.pdf>

<http://tribal.nic.in/WriteReadData/CMS/Documents/201303131039493105468poaact989E4227472861.pdf>

<http://www.conservationindia.org/resources/ngt> - Praveen Bhargav, Everything you need to know about the National Green Tribunal (NGT)

<http://envfor.nic.in/rules-regulations/national-green-tribunal-ngt>

<http://www.greentribunal.gov.in/>

[http://www.ilo.org/asia/WCMS\\_182422/lang--en/index.htm](http://www.ilo.org/asia/WCMS_182422/lang--en/index.htm)

<http://www.indiaenvironmentportal.org.in/content/305027/national-policy-on-safety-health-and-environment-at-work-place/>

<http://labour.nic.in/policies/safety-health-and-environment-work-place>

[http://cpcb.nic.in/NewItem\\_19\\_PollutionControlLaw.pdf](http://cpcb.nic.in/NewItem_19_PollutionControlLaw.pdf)

<http://hppcb.nic.in/intro.html>

<http://admis.hp.nic.in/sic/rthp/RTIDesc/42-5.pdf>

### Attachment I.4.3.1 Status of Forest Areas in HP State

#### (1) Forest Areas Managed by HPFD

##### 1) Reserve Forest (RF)

All rights are extinguished unless specifically granted (Everything is prohibited except explicitly granted). Forests are declared as reserve under section 4/ 20 of India Forest Act (IFA) 1927. No right shall be acquired in or over the land comprised in such notification, except by succession or under a grant or contract in writing made or entered into by or on behalf of the Government or some person in whom such right was vested when the notification was issued; and no fresh clearings for cultivation or for any other purpose shall be made in such land except in accordance with such rules as may be made by the state government in this behalf. Acts given under section 26 are specifically prohibited. Penalties are stringent for violation of prohibited acts. District-wise position is indicated as follows.

**Table 1 District-wise Reserved Forest in HP State<sup>1</sup>**

No	District	Recorded Reserve Forest (Km2)
1	Bilaspur	0.9
2	Chamba	372.6 (includes 25.6 WL)
3	Hamirpur	--
4	Kangra	76.0
5	Kinnaur	--
6	Kullu	160 (includes 80 of WL)
7	LahaulSpiti	70.6
8	Mandi	--
9	Shimla	53.4 (includes 2 of WL)
10	Sirmour	1,064.7 (89 of WL)
11	Solan	53.5 (includes 9.6 of WL)
12	Una	43.9
	Total	1,897

Source: Forest Statistics, HPFD, 2013

##### 2) Protected Forest (PF)

All rights are allowed unless specifically banned. Nothing shall be deemed to prohibit any act done with the permission in writing of the Forest-officer, or in accordance with rules made under section 32, or, except as regards any portion of a forest closed under section 30. Forests are declared as PF under section 29 of IF

- ◆ Demarcated- PF which are demarcated and recorded in the revenue records as protected forests are DPF.
- ◆ Un-demarcated PF which are notified as forest area but not demarcated not recorded in the revenue records as protected forests are UPF. Legally these are PF for all legal purposes as these are recorded as forests in Forest records (Working Plan).
- ◆ PF (Strip Forest)- Tree planting along canal, railway line, roads etc. are declared as PF for better regulation and protection. Legally these have force as for any PFs.

<sup>1</sup> H.P. Forest Statistics, HPFD, 2005, pp-38-40.

**Table 2 Protected Forest in HP State (Area in Km<sup>2</sup>)**

No	District	Total DPF	Total UPF	DPF under Protected Area	UPF under Protected Area
1	Bilaspur	186	242	53	112
2	Chamba	3,960	685	119	-
3	Hamirpur	99	57	-	-
4	Kangra	558	1,636	-	-
5	Kinnaur	304	4,788	99	362
6	Kullu	3,209	1,582	1,111	460
7	LahaulSpiti	397	9,666		3,996
8	Mandi	1,575	38	118	-
9	Shimla	1,149	2,161	61	-
10	Sirmour	57	-	3	
11	Solan	288	214	51	95
12	Una	48	130	-	-
	Total	11,911	21,198	1,615	5,025

Source: Forest Statistics, HPFD, 2013

Some of key features of protected forests of HP state are described hereunder.

- ◆ Total un-demarcated protected forest is almost double than the demarcated protected forests.
- ◆ The largest un-demarcated protected forests are in Lahul & Spiti District. i.e. 9,666 Km<sup>2</sup>. Even the Pin Valley National Park (PVNP) also awaits demarcation and Wildlife areas of 771 Km<sup>2</sup> have also not yet demarcated.
- ◆ Kinnaur district also consists of 4,788 Km<sup>2</sup> of un-demarcated forests which includes 362 Km<sup>2</sup> of wildlife areas of Sarahan.
- ◆ There is no un-demarcated forest in Sirmour district.

### 3) Village Forest

"Village Forests" have not been constituted in HP state ever since the promulgation of forest laws.

### 4) Road- Strips and Railways Strips

All roadside and mud of the Public Works Department (PWD), and also other PWD lands transferred to HPFD, all land along with the railway track and state on the Northern Railway transferred to HPFD are declared to be the "Protected Forests"<sup>2</sup> and provision of Chapter IV and Section-29 of the IFA have been made applicable to them in the merged area of "Punjab". But no such notification has been issued by HP state government. Similarly, the provisions of Section-30 of the Act<sup>3</sup> have been made applicable reserving the standing trees in or upon these lands. Quarrying or burning of lime or charcoal or the collection or subsection to any manufacturing process or removal of any forest products in such lands and the breaking up or clearing of land for building or for herding cattle or for any other purposes of any lands in such areas have been prohibited by the Punjab Government. These areas are Protected Forests as per Punjab state

<sup>2</sup>Notification No.1 122-Ft.-58/l 195, the 3<sup>rd</sup> May, 1958.

<sup>3</sup> Notification No.1 122-Ft-58/l 196, the 3<sup>rd</sup> May, 1958

government notifications; the same provisions have not been made applicable in other districts of HP state.

**Table 3 Strip Forests in HP**

No.	District	Road Strips	Railway Strips
1	Hamirpur	0.18	-
2	Kangra	4.37	7.46
3	Shimla	0.13	-
4	Una	0.96	-
Total		5.64	7.46

Source: Forest Statistics, HPFD, 2013

#### 5) Un-Classed Forests

These forests are not legally classed. It means these forests do not constitute any category legally classified under the Indian Forest Act but have been legally recognised as forest. It reveals, thus, that the largest area of un-classed forests occurred in Kangra district followed by Mandi and Solan districts. These forests are neither reserved nor protected forests. It is therefore debatable as to whether these can be regulated under the IFA, 1927 in absence of any notification issued under Section 29 of the Act.

**Table 4 Un-classed Forest in HP State**

No	District	Unclassed Forest (Area Sq. Km)
1	Hamirpur	27
2	Kangra	314
3	Mandi	247
4	Sirmour	32
5	Solan	166
Total		886

Source: HPFD Internal Document

## (2) Private Forest Areas Managed by HPFD

### 1) Forests under Section 38 of Indian Forest Act

These forests consists of forests to be dealt with the provisions of Chapter V of the Indian Forests Act which provisions provide for the control over forests and land being the property of the Government. The State Govt, has power to regulate or prohibit in such forest or waste land the following activities namely

- ◆ breaking up or clearing of land for cultivation or
- ◆ pasturing of cattle, or
- ◆ firing or clearing of vegetation when it appears necessary for any of following special purposes:
  - For protection against storms winds, rolling stones, floods, and avalanches.
  - Prevention of soil on the ridges and slopes and in the valleys of hilly tracts, the prevention of and slip or of the formation of ravines and torrents, or protection of land against erosion, or the deposit thereon of sand stones or gravel
  - Maintenance of water supply in springs, rivers and tanks.

- Protection of roads, bridges, railways and other lines of communications.
- Preservation of the public health.

HP state government, is also empowered for any of above purposes to construct any works on such private forests or wasteland. A notice to the land owner to show cause is mandatory and an opportunity of being heard is to be given by the state government before issuing a notification for regulating or prohibiting or constructing any works as mentioned supra in this regard. HP state government has power to assume the management of such private forests in case there is neglect or willful disobedience to the regulation or prohibition or the purpose of work to be constructed. There is further power given to HP state government, for expropriation of such private forests and the state government, can proceed to acquire it in the manner provided by the Land Acquisition Act, 1894 instead of regulating or prohibiting for such forests and even if the HP state government, has notified to regulate or prohibit for such forests still it may be acquired for public purpose under the Land Acquisition Act. HP state government may, by notification and subject to such conditions as may be imposed by the Forest Officer concerned, prohibit the cutting, felling, girdling, lopping, burning, stripping off the bark or leaves or otherwise damaging any tree or counterfeiting order facing marks on trees or timber in such private forest as may be specified.

There is provision under Chapter V of the Indian Forest Act (Section 38) which provides for the protection of forests at the request of owners.

**Table 5 Private Forests Managed by HPFD under Section-38 IFA**

No	District	Area in Km <sup>2</sup>
1	Hamirpur	24.06
2	Kangra (Palampur)	6.51
3	Shimla (Rohroo)	0.66
4	Sirmour (Rajgarh)	20.74
5	Una	56.70
Total		108.67

Source: HPFD Internal Document

2) Forests under HP Private Forest Act

HP state government has enacted the Himachal Pradesh Private Forests Act, 1954<sup>4</sup> and also made rules under this Act<sup>5</sup>. Obviously, this Act is an Act to provide for the conservation of Private Forests in the state. The relevancy of this Act has ceased due to the application of the H.P. Land Preservation Act, 1978. However, as per HPFD, 80 ha of private forests in Chamba district is being managed under the HP Private Forest Act, 1954.

<sup>4</sup> Act No 6 of 1955

<sup>5</sup> The HP Private Forests Rules, 1969 w.e.f. 14-03-1961.

### 3) Forest Areas under Land Preservation Act<sup>6</sup>

HP state government has enacted the HP Land Preservation Act, 1978 and made the HP Land Preservation Rules, 1983. This enactment is to provide for the better preservation and protection of certain portions of the territories of Himachal Pradesh and; the rules made there under to give into the effect of the said Act. The provision of this act are applicable to whole of HP state and whenever it appears to the state Govt, that it is desirable to provide for the conservation of sub-soil water or the prevention of erosion in area subject to erosion or is likely to become subjected to erosion, the state government may by notification published in the Official Gazette make a direction accordingly. It may further temporarily regulate restrict or prohibit by general or special order within notified area certain matters like the clearing or breaking up or cultivating land the quarrying of stone or the burning of lime the cutting of trees or timber etc.

HP state government, has accordingly, therefore, issued a notification to temporarily regulate restrict, prohibit throughout the areas in Himachal Pradesh except the areas falling within the limits of Municipal Corporation, Municipal Councils, Nagar Panchayats and Cantonment Boards for a period of 30 years. As specified in the schedule appended to the notification, Lahaul&Spiti district has been excluded. The regulation restriction and prohibition in the notification relates to the cutting of the certain trees or timber in such areas. The Land Preservation Act, 1978 further empowered the Deputy Commissioner concerned to enter upon survey and demarcate local area notified under Section 3 of that Act. The provision of subsequent chapters of this Act provides for the inquiry into claims and ward of compensation and record of rights to be prepared etc. These areas have not been notified to be managed as such under the HP Land Preservation Act, 1978 and relate to merged areas from Punjab. Obviously notified under the Punjab Preservation Act, 1900 and anything done or any action taken including rules made notification, issued or proceedings commenced or continued under the Punjab Preservation Act, 1900 unless inconsistent with provisions of the HP Land Preservation Act, 1978 are to be deemed to have been done, taken, made, issued, commenced or committed under that Act.

**Table 6 Forest Areas under Land Preservation Act in HP State (Area in Km<sup>2</sup>)**

No	District	LPA Managed Area
1	Hamirpur	11
2	Kangra	42
3	Una	207
Total		260

Source: Annual Administrative Report, HPFD, 2002-03

### (3) Private Forest Areas Not Managed by HPFD

#### 1) Municipal and Cantonment Forests

These forests fall in the urban areas. According to Annual Administrative Report of HPFD, these forests are managed by the concerned municipal authority and Cantonment Boards.

<sup>6</sup> The HP Land Preservation Act, 1978.

**Table 7 Municipal & Cantonment Forests in HP State (Area in Km<sup>2</sup>)**

No.	District (Division)	Municipal Forest	Cantonment Forests
1	Chamba (Dalhousie)	5	6
2	Kangra (Dharamshala)	1	-
3	Shimla (Shimla)	-	-
4	Sirmour (Nahan)	4	-
5	Solan (Solan)	-	7
Total		10	13

Source: HPFD Internal Document

## 2) Forests as Shamlat Areas

The term “Shamlat” refers to common lands where the all inhabitants of that area have share in common in that land area and but it excludes “abadi deh” and includes land described in the revenue records as Shamlatdeh, shamlat tikkas, taraf, patties, pannas and tholas used according to revenue records for the benefit of the village community or part thereof or for common purposes of the village. It includes Shamlat tikkas, land used or reserved for the benefit of village community including streets, lanes, playgrounds, drinking well or ponds within abadideh or gorahdeh. Therefore “Shamlat areas” and “Abadideh” are not the same areas and the Shamlat areas and forests are those forests which areas have tree growth in the Shamlat areas having common rights of the inhabitants. According to HP Govt. Forest Statistics, 2005 these forests have been shown in three districts namely Kangra, Sirmour, and Shimla.

These forests, though legally being recognised, find no mention as to whether these areas have been declared protected forests under Section-28 of the Indian Forests Act, 1878 or Section 29 of the Indian Forest Act, 1927 there is any notification issued under Section-32 regulating the rights on these forest areas.

## 3) Mustarqua Forests

These forests are mainly located in Pachhad Tehsil of Sirmour district and were brought under State Control for proper conservation and protection vide Sirmour Darbar Notification dated 30 Magh Samat 1953 Bikrami (1896 AD) Later on Sirmour Darbar promulgated a code called "Quwaidi Janglaf Mushtraqa on Phalgun 1995 Bikrami (1938 AD). In order to regulate the exercise of rights in these forests. After independence, the HP State Govt. Issued a notification on 25th Feb 1952 to regulate the exercise of rights on these forests under Section 32 of the Indian Forest Act, 1927. According to para 1 of the above mentioned notification the term "Mushtraqa" or "Mushtriqa" forests has been defined to mean such forests as were originally assessed to land revenue which the owners paid but in return of the state control they were absolved from the payment of the assessed land revenue. These, therefore are the forests like those of the “Shamlat forests” belonging to a village as a whole. The distinction between “Shamlat” and “Mushtraqa” forests is very thin as to the assessment of land revenue and its remission in lieu of state control.

## 4) Other Forests

These are the forests which have been accounted for as "other forests" and are mainly in the district of Sirmour relating to Jagirs. The legal status of these forests as to demarcated or reserved

forests has not so far been established and Notification under Indian Forest Act stand issued though the ownership is of the Government.

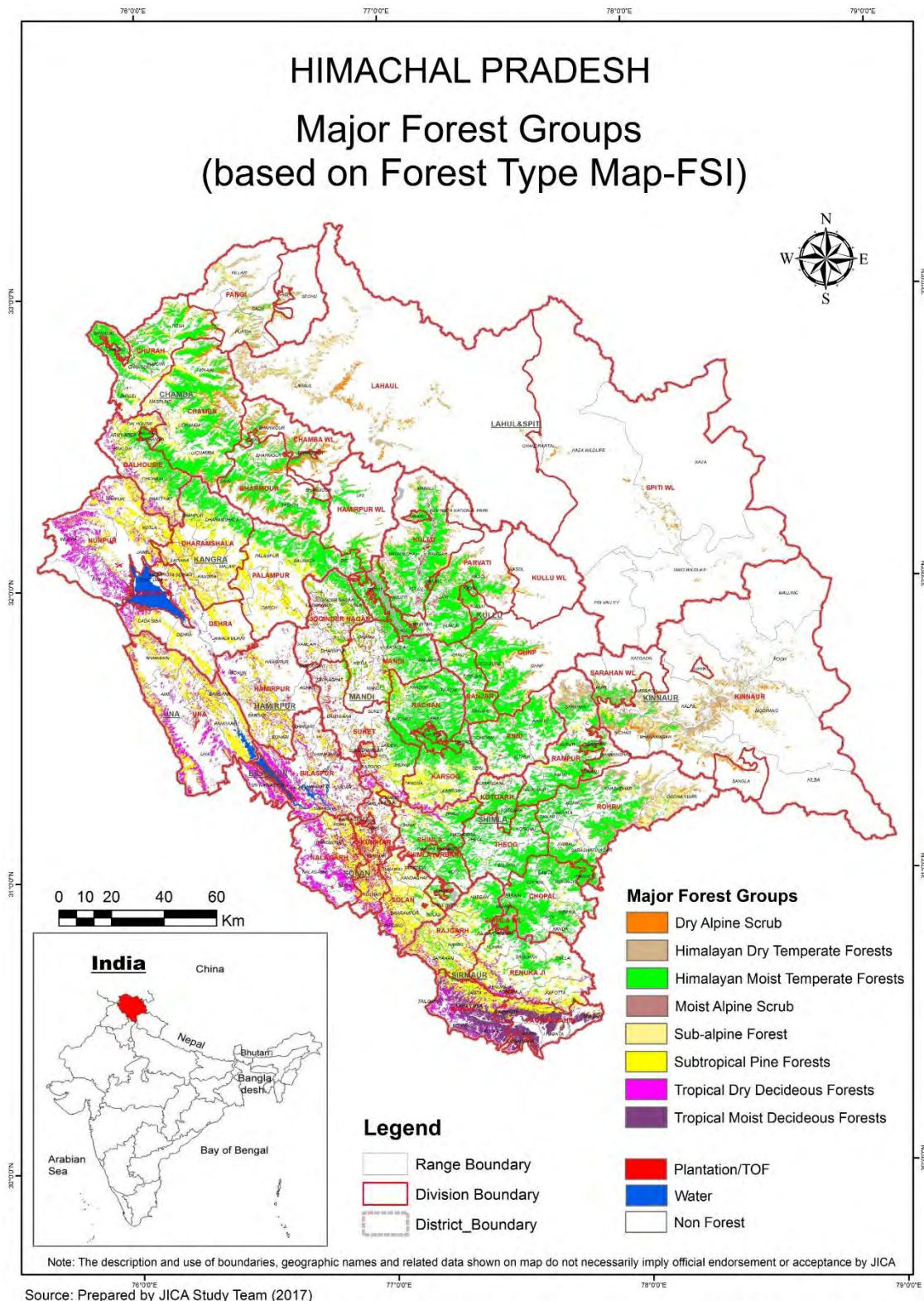
**Table 8 Shamlat, Mushtarqa & Other Forests in HP State (Area in Km<sup>2</sup>)**

No	District	Shamlat Forest	Mushtarqa Forest	Other Forests
1	Kangra	7	-	-
2	Sirmour	82	-	-
3	Shimla	34	-	0.46
4	Sirmour (Rajgarh)	-	26	555.39
5	Sirmour (Renuka)	-	1	-
Total		123	27	555.84

Source: Forest Statistics, HPFD, 2013



**Attachment I.4.3.2 Major Forest Type Groups (Forest Groups) in HP State**



## Attachment I.4.4.1 Data on Vegetation/ Forests in HP State

Table 1 Floral Diversity Available in HP State

No.	Botanical Name	English Name	Local Name
I. SUB-TROPICAL ZONE			
1	<i>Apluda mutica</i>	Apluda	-
2	<i>Arthraxon spp</i>	-	-
3	<i>Arundinella nepalensis</i>	Arundinella	Bhangrola
4	<i>Arundinella setosa</i>	Arundinella	-
5	<i>Atylosia scarabaeoides</i>	-	Ban kulthi
6	<i>Bothriochloa pertusa</i>	-	-
7	<i>Bothriochloa intermedia</i>	-	-
8	<i>Cymbopogon jwarancusa</i>	-	-
9	<i>Cymbopogon martinii</i>	Citronella grass	Makora
10	<i>Cynodon dactylon</i>	Bermuda	Doob
11	<i>Chrysopogon gryllus</i>	-	Chota Dholu
12	<i>Chrysopogon fulvus</i>	-	Bara Dholu
13	<i>Dichanthium annulatum</i>	-	Marval
14	<i>Desmodium sp</i>	-	-
15	<i>Digitaria marginata</i>	-	-
16	<i>Digitaria longi flora</i>	-	-
17	<i>Eulaliopsis binata</i>	-	-
18	<i>Eragrostis curvula</i>	Lane grass	-
19	<i>Heteropogon contortus</i>	Spear grass	Kumbri/ Kumbri/ Lamb
20	<i>Imperata cylindrica</i>	-	Chhiz
21	<i>Medicago polymorpha</i>	-	Khukhani
22	<i>Medicago denticulata</i>	-	-
23	<i>Penniselum orientale</i>	-	Barijhan
24	<i>Paspalum scrobiculatum</i>	-	-
25	<i>Paspalum orbicular</i>	-	Kodri
26	<i>Phaseolus sp</i>	-	-
27	<i>Poa annacra</i>	-	-
28	<i>Sorghum halepense</i>	Johnson grass	Bara Bru
29	<i>Sorghum nitidum</i>	-	Chota Bru
30	<i>Saccharum spontaneum</i>	-	Kash
31	<i>Saccharum bengalensis</i>	-	Munya
32	<i>Setaria glauca</i>	-	Cheti jhan
33	<i>Themeda anathera</i>	-	Lungi
II. HUMID SUB-TEMPERATE ZONE			
1	<i>Arundinella setosa</i>	Arundinella	-
2	<i>Agrostis canina</i>	-	-
3	<i>Agropyron longearistatum</i>	Wheat grass	-
4	<i>Agropyron semicstatum</i>	Wheat grass	-
5	<i>Arthraxon sp</i>	-	-
6	<i>Bothriochloa intermedia</i>	-	-
7	<i>Bromus catharticus</i>	Brome grass	-
8	<i>Cymbopogon gryllus</i>	-	Chota dholu
9	<i>Cymbopogon echinulatus</i>	-	-
10	<i>Cymbopogon jwvarancusa</i>	-	-
11	<i>Chrysopogon martinii</i>	-	Makore
12	<i>Cynodon dactylon</i>	Bermuda grass	Doob
13	<i>Chlris montana</i>	-	-
14	<i>Digitaria sp</i>	-	-
15	<i>Danthonia jacquemontii</i>	-	-

No.	Botanical Name	English Name	Local Name
16	<i>Dactylis glomerata</i>	Cock spoot	Orchard grass
17	<i>Festuca kashmiriana</i>	Feswe grass	-
18	<i>Festuca arundinacea</i>	Feswa grass	-
19	<i>Heteropogon contortus</i>	Spern grass	Lamb/ Kumri
20	<i>Koeleria cristata</i>	-	-
21	<i>Lolium perenne</i>	Rye grass	-
22	<i>Lotus corniculatus</i>	Bridsfoot trefoil	-
23	<i>Microstegium ciliatum</i>	-	-
24	<i>Muhlenbergia duthieana</i>	-	-
25	<i>Medicago falcata</i>	Lucerne (Yellow Flower)	-
26	<i>Medicago denticulata</i>	-	-
27	<i>Onobrychis vicifolia</i>	Sain join	-
28	<i>Phleum pratense</i>	Timothy grass	-
29	<i>Pennisetum orientale</i>	-	Barijhan
30	<i>Poa bulbosa</i>	Blue grass	-
31	<i>Poa pratensis</i>	Kentucky blue grass	-
32	<i>Poa annua</i>	-	-
33	<i>Phaseolus sp</i>	-	-
34	<i>Stipa concinna</i>	-	-
35	<i>Themeda anathera</i>	-	Alungi
36	<i>Trifolium repens</i>	Winter clover	-
37	<i>Trifolium pratense Red clover -</i>		
<b>III. DRY TEMPERATE AND ALPINE ZONE</b>			
1	<i>Agrostis stolonifera</i>	-	-
2	<i>Agrostis canina</i>	-	-
3	<i>Agrostis alba Bant</i>	Grass	-
4	<i>Agrostis myriantha</i>	-	-
5	<i>Agropyron cognatum Wheat</i>	Grass	-
6	<i>Agropyron repens</i>	Grass	-
7	<i>Bromus oxydlon</i>	Broom Grass	-
8	<i>Bromus inermis</i>	Smooth Broom Grass	-
9	<i>Chrysopogon gryllus</i>	-	Chosta Dholu
10	<i>Dactylis glomerata</i>	Cooksfoot	Orchard grass
11	<i>Deyeuxia scabriscens</i>	-	-
12	<i>Deschempsia caespitosa</i>	-	-
13	<i>Festuca valesiaca</i>	-	-
14	<i>Helictotrichon virescens</i>	-	-
15	<i>Trisetum micans - -</i>		
16	<i>Lolium perenne</i>	Perennial Rye Grass	-
17	<i>Phleum alpinum</i>	Timothy grass	
18	<i>Poa bulbosa</i>	Blue grass	
19	<i>Poa sterilis</i>	—do—	
20	<i>Poa alpina</i>	Kentucky Blue Grass	
21	<i>Phalaris minor</i>	-	
22	<i>Themeda anathera</i>	-	Guli danda
23	<i>Trifolium repens</i>	White clover	-
24	<i>Trifolium fragiferum</i>	Strawberry clover	-
25	<i>Trifolium pratense</i>	Red clover	-

Source: Compiled by JICA Study Team (2017) based on information from “Status of Environment Report, Himachal Pradesh”, Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 2 Diversity of Wild Fruit Plants Available in HP State**

No.	Scientific Name	Common/local name	Climatic conditions (Area of occurrence)
1	<i>Aesculus indica</i> Khanor	(Horse chestnut)	High hills
2	<i>Corylus colurna</i>	Wild Hazelnut	High hills
3	<i>Malus spp</i>	Crab apple	High hills
4	<i>Prunus armeniaca</i>	Chuli	High hills
5	<i>Prunus mira</i>	Behmi	High hills
6	<i>Prunus persica</i>	Wild peach	High hills
7	<i>Hippophae rhamnoides</i>	Sea buckthorn	High hills (dry temperate region)
8	<i>Artocarpus lacucha</i>	Dehu	Low hills
9	<i>Mangifera indica</i>	Wild mango	Low hills
10	<i>Terminalia bellirica</i>	Bahera	Low hills
11	<i>Terminalia chebula</i>	Harar	Low hills
12	<i>Zizyphus spp.</i>	Ber	Low hills
13	<i>Morus laevigata</i>	Wild mulberry	Low/ mid hills
14	<i>Aegle marmelos</i>	Bel	Low/mid hills
15	<i>Carissa spinarum</i>	Wild Karonda	Low/mid hills
16	<i>Citrus limon</i>	Hill lemon	Low/mid hills
17	<i>Ficus palmata</i>	Wild Fig (Anjir)	Low/mid hills
18	<i>Ficus roxburghii</i>	Timal	Low/mid hills
19	<i>Musa spp.</i>	Hill banana	Low/mid hills
20	<i>Diospyros lotus</i>	Amlook	Mid hills
21	<i>Punica granatum</i>	Wild pomegranate	Mid hills
22	<i>Berberis aristata</i>	Kashmal (Indian barberry)	Mid hills
23	<i>Cordia obliqua</i>	Lassura	Mid hills
24	<i>Debregeasia hypoleuca</i>	Siarru	Mid hills
25	<i>Embllica officinalis</i>	Wild aonla	Mid hills
26	<i>Flacourtia sapida</i>	Kangu	Mid hills
27	<i>Fragaria indica</i>	Wild strawberry	Mid hills
28	<i>Murraya koenigii</i>	Gandhellu	Mid hills
29	<i>Phoenix sylvestris</i>	Wild date palm	Mid hills
30	<i>Pyrus serotina</i>	Zarenth	Mid hills
31	<i>Rubus ellipticus</i>	Akhae	Mid hills
32	<i>Rubus niveus</i>	Akhae	Mid hills
33	<i>Syzygium spp</i>	Wild jamun	Mid hills
34	<i>Vitis himalayana</i>	Wild grapes	Mid hills
35	<i>Vitis lanata</i>	Wild grapes	Mid hills
36	<i>Elaeagnus umbellata</i>	Ghain	Mid/high hills
37	<i>Myrica nagi</i>	Kaphal	Mid/high hills
38	<i>Pyrus pashia</i>	Kainth	Mid/high hills
39	<i>Olea cuspidata</i>	Wild olive	Mid-high hills

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 3 Diversity in Agricultural Crop - Grass Species available in HP State**

No	Crop Species	English Name	Local Name in H.P.
1	<i>Allium cepa</i>	Onion	Pyaz
2	<i>Amaranthus hypochondriacus</i>	Amaranth	Chaulai
3	<i>A. caudatus</i>	Amaranth	Chuwa/Marcha/ Ramdana
4	<i>A. cruentus</i>	Amaranth	Chaulai
5	<i>Avena sativa</i>	Oat	Jai
6	<i>Brassica campestris</i>	Rape	Toria
7	<i>Brassica juncea</i>	Indian Mustard	Sarson
8	<i>Cajanus cajan</i>	Pigeon Pea	Tur
9	<i>Cannabis sativa</i> Hemp	Bhang	Beej
10	<i>Chenopodium album</i>	Pig-Weed, Goose foot	Bethu, Bathu,
11	<i>Glycine max</i>	Soybean	Bhatt
12	<i>Colocasia esculenta</i>	Taro, Dasheen	Pindalu, Kuchain, Kachalu
13	<i>Echinochloa frumentacea</i>	Barnyard millet	Jhangora
14	<i>Eleusine coracana</i>	Finger millet	Koda
15	<i>Fagopyrum esculentum</i>	Buckwheat	Oggal
16	<i>Fagopyrum tataricum</i>	Buckwheat	Phapher
17	<i>Hibiscus cannabinus</i> Kenaf,	Jute	Buili
18	<i>Hordeum himalayens</i>	Nacked barley	O-wa-jau
19	<i>Hordeum vulgare</i>	Barley	Jau
20	<i>Lens esculenta</i>	Lentil	Masoor
21	<i>Macrotyloma uniflorum</i>	Horsegram	Gahat, Kultha
22	<i>Oryza sativa</i>	Paddy	Chawal, Dhan
23	<i>Panicum miliaceum</i>	Hog-millet	Cheena/Bhangna
24	<i>Perilla frutescens</i>	Perilla	Bhangjeera
25	<i>Phaseolus vulgaris</i>	Kidney bean	Rajmah
26	<i>Pisum sativum</i>	Pea Matar,	Dal Matar
27	<i>Sesamum indicum</i>	Sesame	Til
28	<i>Setaria italica</i>	Foxtail millet	Kauni, Kangni
29	<i>Solanum tuberosum</i>	Potato	Aloo
30	<i>Sorghum vulgare</i>	Pearl millet	Junyali, Jawar
31	<i>Triticum aestivum</i>	Wheat	Gehun
32	<i>Vigna aconitifolia</i>	Mat bean	Bhringa, Moth
33	<i>V. angularis</i>	Adjuki bean	Rains, Riuns
34	<i>Phaseolus mungo</i>	Black gram	Urad, Mah
35	<i>P. radiata</i>	Green gram	Mung
36	<i>V. umbellata</i>	Rice bean	Bhotia
37	<i>Zea mays</i>	Maize	Mungri, Makki, Kukdi
38	<i>Zingiber officinale</i>	Ginger	Adrak

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 4 Important Temperate and Sub-Tropical Fruits and Vegetables found in HP State  
- Fruit Plants**

No	Botanical Name	English/Common Name
1	<i>Malus pumila</i> (Syn. <i>Pyrus malus</i> )	Apple
2	<i>Malus auccata</i> Crab	apple
3	<i>Prunus domestica</i>	Plum
4	<i>P. persica</i>	Peach, Aaru
5	<i>P. armeniaca</i>	Apricot, Khumani, Zardalu
6	<i>P. avium</i>	Cherry (sweet)
7	<i>P. cerasus</i>	Cherry (sour)
8	<i>P. amygdalus</i>	Almond
9	<i>Juglans regia</i>	Walnut
10	<i>Corylus colurna</i>	Hazelnut (wild)
11	<i>Carya pecan</i> (Marsh.)	Engl. and Graebn. Pecan nut (introduced)
12	<i>Castanea vulgaris</i>	Chestnut (wild and cultivated)
13	<i>Pinus gerardiana</i>	Chilgoza, Neoza (wild)
14	<i>Pyrus communis</i>	Pear, Nashpati
15	<i>Cydonia vulgaris</i>	Quince, Beehdana
16	<i>Olea europaea</i>	Olive, Zaitoon (introduced)
17	<i>Citrus reticulata</i>	Orange
18	<i>C. sinensis</i>	Malta
19	<i>C. limon</i> Kagzi	Nimbu
20	<i>C. aurantifolia</i>	Galgal
21	<i>Citrus</i> sp.	Kinnow
22	<i>Litchi chinensis</i>	Litchi
23	<i>Artocarpus heterophyllus</i>	Jackfruit, Kat-hal
24	<i>Punica granatum</i>	Pomegranate (Pomegranate), Daru, Anar
25	<i>Mangifera indica</i>	Mango
26	<i>Psidium guajava</i>	Guava
27	<i>Vitis vinifera</i>	Grapes
28	<i>Carica papaya</i>	Papaya
29	<i>Actinidia deliciosa</i>	Kiwi

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 5 Important Temperate and Sub-Tropical Fruits and Vegetables found in HP State- Vegetables**

No.	Botanical Name	English/Common Name
1	<i>Brassica oleracea var. capitata</i>	Band Gobhi, Cabbage
2	<i>B. oleracea var. botrytis</i>	Phulgobhi, Cauliflower
3	<i>B. campestris var. rapa</i>	Shaljam, Turnip
4	<i>Raphanus sativus</i>	Muli, Radish
5	<i>Cucurbita moschata</i>	Pumpkin
6	<i>C. maxima</i>	Kadu (High Altitude)
7	<i>Cucumis sativus</i>	Cucumber
8	<i>Lagenaria siceraria</i>	Bottle gourd, Ghiya, Lauki
9	<i>Luffa acutangula</i>	Ridge gourd (Tori)
10	<i>Luffa cylindrica</i>	Sponge gourd (Ghiya Tori)
11	<i>Trichosanthes anguina</i>	Snake gourd
12	<i>Momordica charantia</i>	Bitter gourd (Karela)
13	<i>Benincasa hispida</i>	Petha, Ash gourd
14	<i>Beta vulgaris var. bengalensis</i>	Palak
15	<i>Spinacia oleracea</i>	Vilayati Palak
16	<i>Trigonella foenum-graecum</i>	Methi
17	<i>Brassica campestris var. cuneifolia</i>	Lai Patta
18	<i>B. campestris var. rugosa</i>	Lohi patta
19	<i>Chenopodium album</i>	Bathua
20	<i>Amaranthus dubius</i>	Chaulai
1	<i>A. hypochondriacus</i>	Chaulai
2	<i>Phytolacca acinosa</i>	Jalga
3	<i>Perilla frutescens</i>	Banjeera
4	<i>Pisum sativum</i> Pea,	Matar
5	<i>Phaseolus vulgaris</i>	French bean
6	<i>Vicia faba</i>	Bakla
7	<i>Vigna sinensis var. sesquipedalis</i>	Rongi, Asparagus bean or Yard long bean
8	<i>Sechium edule</i>	Cho-cho
9	<i>Solanum tuberosum</i>	Alu
10	<i>Amorphophallus campanulatus</i>	Suran, Zamikand
11	<i>Colocasia esculenta</i>	Arvi
12	<i>Lycopersicon esculentum</i>	Tamatar, Tomato
13	<i>Solanum melongena var. esculentum</i>	Baingan, Aubergine
14	<i>Capsicum annum</i>	Shimla mirch
15	<i>C. frutescens</i>	Chilli, Lal mirch
16	<i>Abelmoschus esculentus</i>	Bhindi, ladies finger
17	<i>Daucus carota</i>	Gajar, Carrot

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 6 Medicinal and Aromatic Plants/ Herbs found in HP State**

No.	Scientific Name	Local/Common Name
1	<i>Abelmoschus moschatus</i>	Kasturi Bhindi
2	<i>Abies spectabilis</i>	Talispatra
3	<i>Abrus precatorius</i>	Gunja, Ratti
4	<i>Abutilon indicum</i>	Kanghi, Atibala
5	<i>Aconitum chasmanthum</i>	Karvi Patish
6	<i>Aconitum deinorrhizum</i>	Mohra, Vatsnabh
7	<i>Aconitum heterophyllum</i>	Milhi Patish
8	<i>Aconitum violaceum</i>	Mitha Telia
9	<i>Acorus calamus</i>	Buch
10	<i>Adhatoda vasica</i>	Baso, Basuti
11	<i>Adiantum lunulatum</i>	Dusgutli
12	<i>Aegle marmelos</i>	Bel, Bilva
13	<i>Ainseliaea aptera</i>	Sath Jalori
14	<i>Albizia lebbek</i>	Siris, Sirin
15	<i>Allium stracheyi</i>	Jangli Piaz
16	<i>Aloe vera</i>	Dhrit Kumari
17	<i>Althaea officinalis</i>	Tukkam Khatmi
18	<i>Amaranthus spinosus</i>	Chulai
19	<i>Angelica glauca</i>	Chora
20	<i>Argemone mexicana</i>	Swaran kshiri
21	<i>Arnebia benthamii</i>	Ratanjot
22	<i>Artemisia absinthium</i>	Afsanthin, charmara
23	<i>Artemisia brevifolia</i>	Seski
24	<i>Asparagus adscendens</i>	Safed musli, Sansavi
25	<i>Atropa acuminata</i>	Belladona, Jharka
26	<i>Bacopa monnieri</i>	Brahmi
27	<i>Baliospermum montanum</i>	Danti
28	<i>Bunium persicum</i>	Kala Zira
29	<i>Barleria cristata</i>	Sairyk, Jhinti
30	<i>Bauhinia vahlii</i>	Tor
31	<i>Bauhinea Variegata</i>	Kachnar
32	<i>Berberis aristata</i>	Daruholdi, kashmal
33	<i>Berberis asiatica</i>	Kashmal
34	<i>Bergenia ligulata</i>	Pashanbhed
35	<i>Boerhavia diffusa</i>	Punanarwa, itsit
36	<i>Caesalpinia crista</i>	Latakaranj, Tarang-ghari
37	<i>Calotropis gigantea</i>	Aak
38	<i>Carissa spinarum</i>	Karonda, Garna
39	<i>Carum carvi</i>	Kala zira
40	<i>Cassia fistula</i>	Amaltas
41	<i>Cedrela spp.</i>	Dariphool
42	<i>Celastrus paniculatus</i>	Malkangni, Sankhiren
43	<i>Centella asiatica</i>	Mandook parni
44	<i>Centipeda orbicularis</i>	Nakchiknu
45	<i>Chenopodium botrys</i>	Bathu, Vaslak
46	<i>Cinnamomum camphora</i>	Kapur, Vriksh
47	<i>Cinnamomum tamala</i>	Tejpatra, Gurpatraj
48	<i>Cissampelos pareira</i>	Bhatindu
49	<i>Citrullus colocynthis</i>	Indrayan
50	<i>Citrus jambhiri</i>	Jhamisi, Ghamardi
51	<i>Citrus medica</i>	Kagzi nimbu
52	<i>Colebrookea luteum</i>	Surangan, Jangli kachalu
53	<i>Colebrookea oppositifolia</i>	Bindi phool



No.	Scientific Name	Local/Common Name
54	<i>Coleus aromaticus</i>	Pathan Bel
55	<i>Cordia myxa</i>	Lassora
56	<i>Costus speciosus</i>	Kayoo
57	<i>Crateva religiosa</i>	Varun
58	<i>Crocus sativus</i>	Kesar
59	<i>Croton tiglium</i>	Jamalghota
60	<i>Cryptolepis buchanani</i>	Krishan saribe
61	<i>Curculigo orchioides</i>	Kali musli
62	<i>Curcuma longa</i>	Haldi
63	<i>Curcuma spp.</i>	Banhaldi
64	<i>Cuscuta reflexa</i>	Akashbel
65	<i>Cymbopogon citratus</i>	Katrin
66	<i>Cynodon dactylon</i>	Doob, Dharm
67	<i>Cyperus rotundus</i>	Nagarmotha
68	<i>Cyperus scariosus</i>	Motha
69	<i>Dactlorhiza hatagirea (Orchis sp)</i>	Salam Panya
70	<i>Datura metel</i>	Dhatura
71	<i>Desmodium gangeticum</i>	Shalparni
72	<i>Didymocarpus pedicellatus</i>	Muskarni
73	<i>Dioscorea bulbifera</i>	Bashokand, Tardi
74	<i>Digitalis purpurea</i>	Harito-patri
75	<i>Dioscorea deltoidea</i>	Shingli mingli
76	<i>Dolichos biflorus</i>	Kulath
77	<i>Eclipta alba</i>	Bhringraj
78	<i>Emblica officinalis</i>	Amla
79	<i>Eclipta erecta</i>	Maha bhringraj
80	<i>Ephedra gerardiana</i>	Soma, Asmania
81	<i>Ephedra spp</i>	Batchur
82	<i>Erythrina indica</i>	Paribhadra, Parair
83	<i>Euphorbia hirta</i>	Doodhli
84	<i>Euphorbia neriifolia</i>	Doodhli
85	<i>Euphorbia royleana</i>	Thor, Chhoo
86	<i>Evolvulus alsinoides</i>	Shankpushpa
87	<i>Ficus glomerata</i>	Udambar, Umre
88	<i>Ficus infectoria</i>	Palaksh, Palakhre
89	<i>Fumaria parviflora</i>	Pitpopra
90	<i>Gentiana Kurroo</i>	Karoo, Kawr
91	<i>Gerardinia heterophylla</i>	Bichubuti
92	<i>Gloriosa superba</i>	Kalihari
93	<i>Glycyrrhiza glabra</i>	Muhlathi
94	<i>Grewia tiliifolia</i>	Nagbala
95	<i>Habenaria edgeworthii</i>	Wridhi
96	<i>Habenaria intermeedia</i>	Sridhi
97	<i>Hedychium acuminatum</i>	Kapper kachri
98	<i>Hedychium spicatum</i>	Karchur, Banhaldi
99	<i>Hemidesmu indicus</i>	Anantwool
100	<i>Heracleum lanatum</i>	Patiahan
101	<i>Holarrhena antidysenterica</i>	Kutaj, Kyore
102	<i>Hypericum patulum</i>	Kharera Basanti
103	<i>Hyoscyamus niger</i>	Kurasni Ajwain
104	<i>Ichnocarpus frutescens</i>	Shwet sariva
105	<i>Inula racemosa</i>	Pushkar wool
106	<i>Jasminum grandiflorum</i>	Chameli, Malti
107	<i>Juniperus recurva</i>	Bether Patta

No.	Scientific Name	Local/Common Name
108	<i>Jurinea macrocephala</i>	Dhoop
109	<i>Kalanchoe spathulata</i>	Lasungharu
110	<i>Lepidium sativum</i>	Iloe
111	<i>Mallotus philippinensis</i>	Kamila, Kamal
112	<i>Malaxis acuminata</i>	Shrishbhak
113	<i>Malaxis mucifera</i>	Jiwak
114	<i>Melia azedarach</i>	Mahanimb, Drek
115	<i>Mentha spicata</i>	Pudina
116	<i>Momordica charantia</i>	Karela
117	<i>Morchella esculenta</i>	Ghichii
118	<i>Mucuna prurita</i>	Konch, Gajalbel
119	<i>Murraya koenigii</i>	Meetha neem, Gandla
120	<i>Nardostachys jatamansi</i>	Jatamansi, Balchora
121	<i>Nerium odorum</i>	Kaner
122	<i>Ocimum basilicum</i>	Barberi, Tulsi, Bhavari
123	<i>Ocimum sanctum</i>	Tulsi
124	<i>Oroxylum indicum</i>	Vyonak, Tatpalanga
125	<i>Oxalis corniculata</i>	Changeri
126	<i>Pueraria tuberosa</i>	Vidarikand, Saloher
127	<i>Phyllanthus niruri</i>	Bhumi Amla
128	<i>Picrorhiza kurrooa</i>	Karoo
129	<i>Piper longum</i>	Magh Papal
130	<i>Pistacia integerrima</i>	Kakarsinghi, Karkat Shringi
131	<i>Plantago ovata</i>	Isbgol
132	<i>Plumbago zeylanica</i>	Chitrak
133	<i>Podophyllum hexandrum</i>	Bankakri
134	<i>Polygonatum verticillatum</i>	Salam mishri
135	<i>Pongamia pinnata</i>	Karanj
136	<i>Potentilla dumatorum</i>	Madanphul, Rada
137	<i>Ranunculus sceleratus</i>	Jaldhaniya
138	<i>Raphanus sativus</i>	Mooli
139	<i>Rauvolfia serpentina</i>	Sarapgandha
140	<i>Rheum australe</i>	Revand chini
141	<i>Rheum emodi</i>	Reward chini
142	<i>Rhododendron arboreum</i>	Brass
143	<i>Rhododendron campanulatum</i>	Kasmiri Patta
144	<i>Ricinus communis</i>	Arand
145	<i>Rosa moschata</i>	Kubbjak gulab
146	<i>Rubia cordifolia</i>	Majeeshth
147	<i>Rumex hastatus</i>	Khatmith
148	<i>Salvia moorcroftiana</i>	Thuth
149	<i>Sapindus mukorossi</i>	Ritha
150	<i>Saussurea costus</i>	Kuth
151	<i>Saussurea obvallata</i>	Brahm Kamal
152	<i>Selinum vaginatum</i>	Butkesh
153	<i>Semecarpus anacardium</i>	Bhilawa
154	<i>Sida cordifolia</i>	Baladaride
155	<i>Sisymbrium irio</i>	Khoobkalan
156	<i>Solanum indicum</i>	Brihad Kantkani
157	<i>Solanum nigrum</i>	Makoe
158	<i>Solanum xanthocarpum</i>	Choti Kantkari
159	<i>Spilanthes acmella</i>	Akarkara
160	<i>Stephania elegans</i>	Rajpatha
161	<i>Swertia chirayita</i>	Chirayta

No.	Scientific Name	Local/Common Name
162	<i>Syzygium cumini</i>	Jamun
163	<i>Skimmia laureola</i>	Kasturipatra
164	<i>Tagetes erecta</i>	Gatakri
165	<i>Tagetes minuta</i>	Gatakri
166	<i>Taraxacum officinale</i>	Doodhli
167	<i>Taxus baccata</i>	Barnii, Talispatra
168	<i>Terminalia arjuna</i>	Arjun
169	<i>Terminalia bellirica</i>	Vibhitka, Bahera
170	<i>Terminalia chebula</i>	Harar
171	<i>Thalictrum foliolosum</i>	Mamiri
172	<i>Thevetia neriiifolia</i>	Pit kaner
173	<i>Thymus serpyllum</i>	Ban Ajwain
174	<i>Tinospora cordifolia</i>	Gloe
175	<i>Tribulus terrestris</i>	Gokshru, Bhakra
176	<i>Tylophora asthmatica</i>	Anantmool
177	<i>Uraria picta Prishn</i>	Parni
178	<i>Urginea indica</i>	Jangli Piaz
179	<i>Valeriana hardwickii</i>	Nihani
180	<i>Valeriana wallichii</i>	Mushakbala, Sugandhbele
181	<i>Vanda roxburghii</i>	Rasana
182	<i>Vernonia cinerea</i>	Sahdevi
183	<i>Viola odorata</i>	Banfsha
184	<i>Vitex negundo</i>	Nirgundi, Bana
185	<i>Withania somnifera</i>	Ashvagandha
187	<i>Zanthoxylum alatum</i>	Tajbal, Tirmir

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

## Attachment I.4.4.2 Details on Fauna in HP State

**Table 1 Distribution of Fauna Species in the Biomes in HP State**

<b>I. Subtropical Biome:</b>	
Animals	Rhesus monkey, Nilgai, Sambar, Spotted deer, Barking deer, Goral, Wild boar, Himalayan black bear, Indian crested porcupine, Jackal, Red fox, Jungle cat, Leopard cat.
Avifauna	Red jungle fowl, Indian peafowl, Pheasants, Chukar partridge, Golden backed woodpecker, Laughing and whistling thrushes, White cheeked bulbul, Black partridge.
Reptiles	Common rat snake, Cobra, Russell's viper, Krait, Python, Monitor lizards.
<b>II. Temperate Biome:</b>	
Animals	Goral, Barking deer, Musk deer, Himalayan tahr, Leopard, Himalayan black bear and Brown bear, Stone marten, Yellow throated marten, Himalayan weasel, Asiatic jackal, Langur, Rhesus monkey.
Avifauna	Thrushes, White whiskered bulbul, Nuthatch, Jays, Monal, Kalij pheasant, Himalayan bearded vulture, Himalayan pied woodpecker.
<b>III. Alpine Biome:</b>	
Animals	Snow leopard, Lynx, Greater blue sheep, Ibex, Musk deer, Mouse hare, Long tailed marmot.
Avifauna	Monal, Snow cock, Snow pigeon, Red billed chough, Lark, Tibetan snow grouse, Tibetan snow finch.
<b>IV. Cold Desert Biome:</b>	
Animals	Greater blue sheep, Ibex, Lynx, Snow leopard, and Marmot.
Avifauna	Monal, Koklas, Chukar partridge

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh

**Table 2 Protected, Endangered and Vulnerable Fauna in HP State**

<b>Protected</b>		
Terrestrial	Avifauna	Vermin
(a) Greater Blue Sheep	(a) Baz	(a) Common Crow
(b) Clawless Otter	(b) Black-necked Crane	(b) Fruit Bat
(c) Caracal	(c) Black Partridge	(c) Mice
(d) Fishing Cat	(d) Cheer Pheasant	(d) Rats
(e) Himalayan Brown Bear	(e) Forest Spotted Owllet	
(f) Himalayan Tahr	(f) Hawks	
(g) Himalayan Ibex	(g) Hornbill	
(h) Tibetan Wolf	(h) Kalij Pheasant	
(i) Kashmir Stag	(i) Koklas Pheasant	
(j) Leopard Cat	(j) Lammergeier (Bearded Vulture)	
(k) Leopard	(k) Large Whistling Teal	
(l) Lynx	(l) Monal Pheasants	
(m) Markhor	(m) Mountain Quail	
(n) Musk Deer	(n) Osprey	
(o) Nayan (Great Tibetan Sheep)	(o) Peafowl	
(p) Pangolin	(p) Western Tragopan	
(q) Serow		
(r) Snow Leopard		
(s) Tibetan Fox		
(t) Tibetan wild Ass		
(v) Wild Yak		
<b>Endangered</b>		
Butterflies: Freak, Scarce Siren, Golden Emperor, Broad-banded Sailor, Banded Apollo, Ladakh Banded Apollo, Pale Jezebel		
Reptiles: Common Indian Monitor, Yellow Monitor, Indian Rock Python		
Birds: Cheer Pheasant, Monal Pheasants, Mountain Quail, Snow Cock, Tragopan, Himalayan Bearded Vulture, Himalayan Golden Eagle, Laggar Falcon		
Animals: Himalayan Brown Bear, Snow Leopard, Himalayan Lynx, Kashmir Stag, Himalayan Ibex, Himalayan Tahr		
<b>Vulnerable</b>		
Reptiles: Indian Flap-Shelled Turtle		
Birds: Fish eating Eagle, Koklash Pheasant, Indian Peafowl		
Animals: Musk Deer, Wild Yak, Serow, Nayan, Tibetan Wolf, Blue Sheep, Indian Pangolin, Small-clawed Otter, Leopard Cat		

Source: Compiled by JICA Study Team (2017) based on information from "Status of Environment Report, Himachal Pradesh", Department of Environment, Science and Technology, Government of Himachal Pradesh; Extracted from HP Forest Statistics 1996 and Red Book on Indian Animals

**Table 3 Mammals Diversity of HP State**

No.	Species Name	Common Name	Status		
			IUCN (Red List Category)	IW(PA) (Schedule)	CITES (Appendix)
<b>Class: Mammalia</b>					
<b>Order : EULIPOTYPHILA</b>					
<b>Family : SORICIDAE</b>					
1	<i>Soriculusnigrescens</i> (Gray,1842)	Himalayan Shrew	LC	-	-
2.	<i>Crociduraaattenuata</i> Mine-Edwards,1872	Grey Shrew	LC	-	-
3.	<i>Suncusmurinus</i> Linnaeus,1766	House Shrew	LC	-	-
4.	<i>Chimarrogalehimalayica</i> Gray,1842	Himalayan Water Shrew	LC	-	-
<b>Family : ERINACEIDAE</b>					
5.	<i>Hemiechinusauritus</i> (Gmelin,1770)	Long-eared Hedgehog	LC	IV	-
6.	<i>Paraechinusmicropus</i> (Blyth,1846)	Indian Hedgehog	LC	-	-
<b>Order : CHIROPTERA</b>					
<b>Family : PTEROPODIDAE</b>					
7.	<i>Rousettusleschenaulti</i> (Desmarest,1820)	Fulvous Fruit Bat	LC	V	-
8.	<i>Pteropusgiganteus</i> Brunnich,1782	Indian Flying Fox	LC	V	II
<b>Family:MEGADERMATIDAE</b>					
9.	<i>Megadermalyra</i> Geoffroy,1810	Indian False Vampire	LC	I	-
<b>Family:RHINOLOPHIDAE</b>					
10.	<i>Rhinolophusferrumequinum</i> (Schreber,1774)	Greater Horseshoe Bat	LC	-	-
11.	<i>Rhinolophusaffinis</i> Horsefield,1823	Intermediate Horseshoe Bat		-	-
12.	<i>Rhinolophuslepidus</i> Blyth,1844	Blyth's Horseshoe Bat	LC	-	-
13.	<i>Rhinolophusluctus</i> Temminck,1835	Woolly Horseshoe Bat	LC	-	-
14.	<i>Rhinolophussinicus</i> (Anderson,1905)	Chinese Horseshoe Bat	NT	-	-
<b>Family:HIPPOSIDERIDAE</b>					
15.	<i>Hipposiderosarmiger</i> Hodgson,1835	Great Himalayan Leaf-nosed Bat	LC	-	-
16.	<i>Barbastellaleucomelas</i> Schmar,1826)	Eastern Barbastella	NT	-	-
17.	<i>Miniopteruschreibersii</i> (Kuhl,1819)	Schreiber's Long Fingered Bat	NT	-	-
18.	<i>Murinatusbinaris</i> (Scully,1881)	Scully Tube Nosed Bat	NT	-	-
19.	<i>Myotisblythi</i> (Tomes,1857)	Lesser Mouse-eared Bat	LC	-	-
20.	<i>Myotisformosus</i> (Hodgson,1835)	Hodgson's Bat	LC	-	-
21.	<i>Myotismuricola</i> (Gray,1846)	Nepalese Whiskered Bat	LC	-	-
22.	<i>Myotisnipalensis</i> (Dobson,1871)	Nepal Nyotis	LC	-	-
23.	<i>Myotissiligorensis</i> (Horsefield,1855)	Himalayan Whiskered Bat	NT	-	-
24.	<i>Nyctalusleisleri</i> (Kuhl,1890)	Leiler's Bat	EN		
25.	<i>Nyctalusmontanus</i> (Barrett-Hamilton,1906)	Mountain Noctule	NT	-	-
26.	<i>Nyctalusnoctula</i> (Schreber,1774)	Noctule	LC	-	-
27.	<i>Nyctalusnoctula</i> (Schreber,1774)	Kellart's Pipistrelle	LC		
28.	<i>Pipistrelluscoromandra</i> (Gray,1838)	Coromandel Pipistrelle	LC	-	-
29.	<i>Pipistrellusdormeri</i> (Dobson,1785)	Dormer's Bat	LC	-	-
30.	<i>Pipistrellusjavanicus</i> (Gray,1838)	Javan Pipistrelle	LC	-	-
31.	<i>Pipistrellustenuis</i> (Temminck,1840)	Indian Pygmy Bat	LC	-	-
32.	<i>Plecotushomochrous</i> Hodgson,1847	Brown Long-eared Bat	NT		
33.	<i>Scotophiluskuhlii</i> Leach,1821	Asiatic Lesser Yellow House Bat	LC	-	-
34.	<i>Scotoecuspallidus</i> Dobson,1876	Desert Yellow Bat	NT	-	-
<b>Order:PRIMATES</b>					
<b>Family:CERCOPITHECIDAE</b>					
35.	<i>Macacamulatta</i> (Zimmermann,1780)	Rhesus macaque	LC	-	-
36.	<i>Semnopithecusentellus</i> (Dufresne,1797)	Common langur	LC	II	I
<b>Order:CARNIVORA</b>					
<b>Family:CANIDAE</b>					
37.	<i>Canisaureus</i> Linnaeus,1758	Jackal	LC	II	III

No.	Species Name	Common Name	Status		
			IUCN (Red List Category)	IW(P)A (Schedule)	CITES (Appendix)
38.	<i>Canis lupus</i> Linnaeus, 1758	Indian Wolf	LC	I	I
39.	<i>Vulpes bengalensis</i> (Shaw, 1800)	Bengal Fox	LC	II	III
40.	<i>Vulpes vulpes</i> (Linnaeus, 1758)	Red Fox	LC	II	III
41.	<i>Cuon alpinus</i> (Pallas, 1811)	Indian Wild Dog	EN	II	-
42.	<i>Herpestes edwardsii</i> (E. Geoffroy Saint-Hilaire, 1818)	Grey Mongoose	LC	IV	III
43.	<i>Herpestes javanicus</i> (E. Geoffroy Saint-Hilaire, 1818)	Small Indian Mongoose	LC	IV	III
<b>Family: VIVERRIDAE</b>					
44.	<i>Paguma larvata</i> (C.E.H. Smith, 1827)	Himalayan Palm Civet	LC	II	III
45.	<i>Viverricula indica</i> (E. Geoffroy Saint-Hilaire, 1803)	Small Indian Civet	LC	II	III
46.	<i>Paradoxurus hermaphroditus</i> (Pallas, 1777)	Common Palm Civet	LC	II	-
<b>Family: MUSTELIDAE</b>					
47.	<i>Lutra lutra</i> (Linnaeus, 1758)	Common Otter	NT	II	I
48.	<i>Lutrogale perspicillata</i> (I. Geoffroy Saint-Hilaire, 1826)	Smooth Indian Otter	VU	II	II
49.	<i>Aonyx cinerea</i> (Illiger, 1815)	Clawless Otter	VU	I	II
50.	<i>Martes foina</i> (Erxleben, 1777)	Stone Marten	LC	II	III
51.	<i>Martes flavigula</i> (Boddaert, 1785)	Yellow-throated Marten	LC	II	III
52.	<i>Mustela sibirica</i> Pallas, 1773	Himalayan Weasel	LC	II	III
53.	<i>Mustela altaica</i> , Pallas, 1811	Pale Weasel	NT	II	III
54.	<i>Mustela kathia</i> Hodgson, 1835	Yellow-bellied Weasel	LC	II	III
55.	<i>Mellivora capensis</i> (Schreber, 1776)	Honey Badger or Ratel	LC	I	-
<b>Family: URSIDAE</b>					
56.	<i>Ursus arctos</i> Linnaeus, 1758	Brown Bear	LC	I	I
57.	<i>Ursus thibetanus</i> G. (Baron) Cuvier, 1823	Asiatic Black Bear	VU	II	I
<b>Family: HYAENIDAE</b>					
58.	<i>Hyaena hyaena</i> (Linnaeus, 1758)	Striped Hyaena	NT	III	-
<b>Family: FELIDAE</b>					
59.	<i>Prionailurus bengalensis</i> (Kerr, 1792)	Leopard Cat	LC	I	I
60.	<i>Felis chaus</i> Schreber, 1777	Jungle Cat	LC	II	II
61.	<i>Panthera pardus</i> (Linnaeus, 1758)	Leopard	NT	I	I
62.	<i>Panthera tigris</i> (Linnaeus, 1758)	Tiger	EN	I	I
63.	<i>Panthera uncia</i> (Schreber, 1775)	Snow Leopard	EN	I	I
64.	<i>Lynx lynx</i> (Linnaeus, 1758)	Lynx	LC	I	II
<b>Order: PHOLIDATA FAMILY: MANIDAE</b>					
65.	<i>Manis crassicaudata</i> E. Geoffroy, 1803	Indian Pangolin	NT	-	II
<b>Order: PERISSODACTYLA</b>					
<b>Family: EQUIDAE</b>					
66.	<i>Equus kiang</i> Moorcroft, 1841	Kiang or Tibetan Wild Ass	LC	-	II
<b>Order: CETARTIODACTYLA</b>					
<b>Family: CERVIDAE</b>					
67.	<i>Cervus elaphus hanglu</i> Linnaeus, 1758	Kashmir Stag	LC	I	I
68.	<i>Rusa unicorn</i> (Kerr, 1792)	Sambar	VU	III	-
69.	<i>Axis axis</i> (Erxleben, 1777)	Spotted Deer	LC	III	-
70.	<i>Muntiacus muntjac</i> (Zimmermann, 1780)	Barking Deer	LC	III	-
<b>Family: MOSCHIDAE</b>					
71.	<i>Moschus chrysogaster</i> (Hodgson, 1839)	Musk Deer	EN	I	I
<b>Family: BOVIDAE</b>					
72.	<i>Capra sibirica</i> (Pallas, 1776)	Siberian Ibex	LC	I	-
73.	<i>Hemitragus jemlahicus</i> (C.H. Smith, 1826)	Himalayan Tahr	NT	I	-
74.	<i>Procapra plecticaudata</i> Hodgson, 1846	Tibetan Gazelle	NT	I	-
75.	<i>Gazella bennettii</i> (Sykes, 1831)	Indian Gazelle or Chinkara	LC	I	-
76.	<i>Capricornis sumatraensis</i> (Bechstein, 1799)	Serow	VU	I	I

No.	Species Name	Common Name	Status		
			IUCN (Red List Category)	IW(P)A (Schedule)	CITES (Appendix)
77.	<i>Naemoredusgoral</i> (Hardwicke,1825)	Goral	NT	III	I
78.	<i>Pseudoisnayaur</i> (Hodgson,1833)	Bharal/Blue Sheep	LC	I	-
79.	<i>Ovisammon</i> (Linnaeus,1758)	Argali or Nayan	NT	I	I
80.	<i>Boselaphustragocamelus</i> (Pallas,1766)	Nilgai	LC	III	-
81.	<i>Bosmutus</i> (Przewalskt,1883)	Wild Yak	VU	I	I
<b>Order:RODENTIA</b>					
<b>Family:SCIURIDAE</b>					
82.	<i>Marmotacaudate</i> (Geoffroy,1844)	Long-tailed Marmot	LC	II	III
83.	<i>Petauristapetaurista</i> (Pallas,1766)	Common Giant Flying Squirrel	LC	II	-
84.	<i>Eupatauruscinereus</i> Thomas,1888	Woolly Flying Squirrel	EN	II	-
85.	<i>Eoglavcomysfimbriatus</i> (Gray,1837)	Smaller Kashmir Flying Squirrel	LC	II	-
86.	<i>Funambuluspennant</i> Wroughton,1905	Northern Palm Squirrel	LC	IV	-
<b>Family:HYSTRICIDAE</b>					
87.	<i>Hystrixindica</i> Kerr,1792	Indian Porcupine	LC	IV	-
88.	<i>Hystrixbrachyuran</i> Linnaeus,1758	Himalayan Crestless Porcupine	LC	II	-
<b>Family:CRICETIDAE</b>					
89.	<i>Alticolaroylei</i> Gray,1842	Royle's High Mountain Vole	NT	-	-
90.	<i>Alticolaroylei</i> Gray,1842	Blyth's Vole	NT	-	-
<b>Family:MURIDAE</b>					
91.	<i>Apodemussylvaticus</i> (Linnaeus,1758)	Wood Mouse	LC	V	-
92.	<i>Bandicotaindica</i> (Bechstein,1800)	Large Bandicoot Rat	LC	V	-
93.	<i>Bandicotabengalensis</i> (Gray,1835)	Lesser Bandicoot Rat	LC	V	-
94.	<i>Nesokiaindica</i> (Gray,1830)	Short-tailed Bandicoot Rat	LC	-	-
95.	<i>Rattusrattus</i> (Linnaeus,1758)	House Rat	LC	V	-
96.	<i>Rattuspyctoris</i> (Hodgson,1845)	Turkestan Rat	LC	V	-
97.	<i>Niviventerfulvescens</i> (Gray,1847)	Chestnut Rat	LC	V	-
98.	<i>Niviventerniviventer</i> (Hodgson,1836)	White-bellied Rat	LC	V	-
99.	<i>Cremnomyscutchicus</i> Wroughton,1912	Cutch Rat	LC	V	-
100.	<i>Millardiameltada</i> (Gray)	Soft-furred Field Rat	LC	V	-
101.	<i>Golundaelliotti</i> Gray,1837	Indian Bush rat	LC	V	-
102.	<i>Vandeleruriaoleracea</i> (Bennett,1832)	Indian-Long tailed Mouse		V	-
103.	<i>Musmusculus</i> Linnaeus,1758	House Mouse	LC	V	-
104.	<i>Muscervicolor</i> Hodgson,1845	Fawn- coloured Mouse	LC	V	-
105.	<i>Musbooduga</i> (Gray,1837)	Little Indian Field Mouse	LC	V	-
106.	<i>Musplatythrix</i> Bennett,1832	Spiny Field Mouse	LC	V	-
107.	<i>Tateraindica</i> (Hardwicke,1807)	Indian Gerbil	LC	-	-
<b>Order:LAGOMORPHA</b>					
<b>Family:LEPORIDAE</b>					
108.	<i>Lepusoiistolus</i> Hodgson,1840	Woolly Hare	LC	IV	-
109.	<i>Lepusnigricollis</i> F.Cuvier,1823	Black-naped Hare	NE	-	-
<b>Family:OCHOTONIDAE</b>					
110.	<i>Ochotonaladacensis</i> (Gunther,1875)	Ladak Pika	LC	IV	-
111.	<i>Ochotonamacrotis</i> (Gunther,1875)	Large-eared Pika	LC	IV	-
112.	<i>Ochotonaroylei</i> (Ogilby,1839)	Royle's Pika	LC	IV	-

Source: Compiled by JICA Study Team (2017) based on information from I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", *Biological Forum- A International journal* 8(1):1-26 (2016)



**Table 4 Reptile Diversity of HP State**

No	Scientific Name	Common Name	Distribution		Status (CAMP)
			State(Districts)	India	
<b>Class: Reptilia Order: Squamata</b>					
<b>Family: Gekkonidae Smith, 1935</b>					
1.	<i>Cyrtodactylus fasciolatus</i> (Blyth, 1860)	Banded Bent-toed Gecko	Solan, Shimla	Garhwal Hills, Almora, Kumaon, Himachal Pradesh	VU
2.	<i>Cyrodactylus lawderanus</i> (Stollczka, 1871)	Lawder's Bent-toed Gecko	Solan, Shimla, Kullu	Kumaon, Himachal Pradesh	VU
3.	<i>Hemidactylus brookii</i> Gray, 1845	Brook's House Gecko	Throughout state except Trans-Himalaya	Assam, Tamil Nadu, Andhra Pradesh, Tamil Nadu, Maharashtra, Gujarat, Mizoram, Himachal Pradesh	LR-Ic
4.	<i>Hemidactylus flaviviridis</i> Ruppel, 1835	Yellow-green House Gecko	Throughout state except Trans-Himalaya	Andhra Pradesh, Assam, West Bengal, Bihar, Uttar Pradesh, Delhi, Punjab, Maharashtra, Gujarat, Rajasthan, Madhya Pradesh, Bihar, Orissa, Mizoram, Himachal Pradesh	LR-Ic
<b>Family: Agamidae Gray, 1827</b>					
5.	<i>Sitanaponticeriana</i> Cuvier, 1829	Fan-throated Lizard	Throughout state Except Trans-Himalaya	Tamil Nadu, Maharashtra, Gujarat, Himachal Pradesh	LR-Ic
6.	<i>Oriotarismajor</i> (Jerdon, 1870)	Large Mountain Lizard	Sirmour, Solan, Shimla, Chamba	Garhwal, Himachal Pradesh	
7.	<i>Calotes versicolor</i> (Daudin, 1802)	Indian Garden Lizard	Throughout India Except Trans-Himalaya	Tamil Nadu, Assam, Maharashtra, Gujarat, Kerala, Mizoram, Himachal Pradesh	LR-nt
8.	<i>Laudakia tuberculata</i> (Hardwickie & Gray, 1827)	Kashmir Agama	Throughout the state including Trans-Himalayan districts of Lahaul & Spiti and Kinnaur	Kashmir, Punjab, Jammu, Uttar Pradesh, Himachal Pradesh	LR-Ic
<b>Family: Scincidae Gray, 1825</b>					
9.	<i>Mabuyacarinata carinata</i> (Schneider)	Common Keeled Grass Skink	Solan	Gujarat, Maharashtra, Kerala, Tamil Nadu, Mizoram, Himachal Pradesh	LR-nt
10.	<i>Mabuyadissimilis</i> (Hallowell, 1857)	Striped Grass Skink	Solan, Shimla	Punjab, Rajasthan, Uttar Pradesh, Bihar, Madhya Pradesh, Himachal Pradesh	DD
11.	<i>Mabuyamacularia</i> (Blyth, 1853)	Bronze Grass Skink	Sirmour	Assam, Mizoram, Himachal Pradesh	LR-Ic
12.	<i>Asymblepharus himalayana</i> (Gunther, 1864)	Himalayan Ground Skink	Throughout the state including Trans-Himalaya	Kashmir, Punjab, Uttar Pradesh, Himachal Pradesh	DD
13.	<i>Asymblepharus ladacensis</i> (Gunther, 1864)	Mountain Ground Skink	Lahaul & Spiti	Kashmir, Uttar Pradesh, Himachal Pradesh	DD
14.	<i>Ablepharus pannonicus</i> (Lichtenstein, 1823)	Mediterranean Dwarf Skink	Mandi, Kullu	Himachal Pradesh	DD
15.	<i>Lygosomopunctata</i> (Gmelin, 1799)	Spotted Supple Skink	Throughout state Except Trans-Himalaya	West Bengal, Gujarat, Tamil Nadu, Maharashtra, Kerala, Mizoram, Himachal Pradesh	LR-Ic
16.	<i>Eurylepistaeniolatus</i> Blyth, 1854	Yellow-bellied Mole Skink	Kangra, Sirmour	Kashmir, Gujarat, Rajasthan, Punjab, Himachal Pradesh	
<b>Family: Lacertidae Gray, 1825</b>					
17.	<i>Ophisops jerdoni</i> Blyth, 1853	Snake-eyed Lacerta	Sirmour	Punjab, Rajasthan, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, Himachal Pradesh	DD
<b>Family: Anguillidae Gray, 1825</b>					
18.	<i>Ophisaurus gracilis</i> (Gray, 1845)	Indian Glass Snake	Shimla	Assam, Arunachal Pradesh, Meghalaya, Mizoram, North Bengal, Sikkim, Himachal Pradesh	LR-nt
<b>Family: Varanidae Gray, 1827</b>					
19.	<i>Varanus bengalensis</i> (Daudin, 1802)	Bengal Monitor	Throughout state Except Trans-Himalaya	Assam, Tamil Nadu, Gujarat, Mizoram, Himachal Pradesh	VU

No	Scientific Name	Common Name	Distribution		Status (CAMP)
			State(Districts)	India	
20.	<i>Varanusflavescens</i> (Gray,1827)	Yellow Monitor	Sirmour	Assam, Bihar, Punjab, Uttar Pradesh, West Bengal, Orissa, Himachal Pradesh	VU
<b>Family: Typhlopidae Merrem,1820</b>					
21.	<i>Ramphotyphlopsbraminus</i> (Daudin,1803)	Brahminy Worm Snake	Solan, Sirmour	Madhya Pradesh, Kerala, Maharashtra, Arunachal Pradesh, Punjab Gujarat, Himachal Pradesh	LR-nt
22.	<i>Typhlops porrectus</i> (Stollczka,1871)	Slender Blind Snake	Throughout state Except Trans-Himalaya	Himachal Pradesh	LR-nt
23.	<i>Typhlopsdiardii</i> Schlegel,1839	Diard's Blind Snake		Assam, Himachal Pradesh	DD
<b>Family: Pythonidae Fitzinger,1826</b>					
24.	<i>Pythonmolurus</i> (Linnaeus,1758)	Indian Rock Python	Shiwalik areas of state	Assam, Madhya Pradesh, Gujarat, Kerala, Tamil Nadu, Karnataka, Maharashtra, Himachal Pradesh	LR-nt
<b>Family: Boidae Gray,1825</b>					
25.	<i>Gongylophis conicus</i> (Schneider,1801)	Common Sand Boa	Shiwalik areas of state	Kerala, Uttar Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu, Madhya Pradesh, Himachal Pradesh	
26.	<i>Eryxjhonii</i> (Russel,1801)	Eastern Red Sand Boa	Shiwalik areas of state	Tamil Nadu, Andhra Pradesh, Rajasthan, Maharashtra, Himachal Pradesh	
<b>Family: Colubridae Opperl,1811</b>					
27.	<i>Coelognathus helena helena</i> (Daudin,1803)	Common Indian Trinket	Solan, Sirmour	Gujarat, Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Orissa, Maharashtra, Himachal Pradesh	VU
28.	<i>Orthriophis hodgsonii</i> (Gunther,1860)	Himalayan Trinket Snake	Throughout the state including Trans-Himalaya	Sikkim, Assam, Kashmir, Himachal Pradesh	
29.	<i>Ptyasmucosa</i> (Linnaeus,1758)	Indian Rat Snake	Throughout the state	Assam, Tamil Nadu, Madhya Pradesh, Maharashtra, Himachal Pradesh	LR-nt
30.	<i>Oligodonarrensii</i> (Shaw,1802)	Banded Kukri Snake	Throughout state except Trans-Himalaya	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Madhya Pradesh, Uttar Pradesh, Maharashtra, Himachal Pradesh	LR-Ic
31.	<i>Lycodonstriatus</i> (Shaw,1802)	Barred Wolf Snake	Shimla	Karnataka, Gujarat, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Maharashtra, Punjab, Himachal Pradesh	LR-nt
32.	<i>Lycodonaulicus</i> (Linnaeus,1758)	Common Wolf Snake	Kangra	Karnataka, Gujarat, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Maharashtra, Punjab, Orissa, Chhattisgarh, Jharkhand, Himachal Pradesh	LR-Ic
33.	<i>Sibynophiscollaris</i> (Gray,1853)	Collared Black-headed	Shimla	Assam, Himachal Pradesh	LR-nt
34.	<i>Sibynophissagittaria</i> (Cantor,1839)	Cantor's Black Headed Snake	Shimla	Madhya Pradesh, Gujarat, Himachal Pradesh	LR-nt
35.	<i>Xenochrophispiscator</i> (Schneider,1799)	Checkered Keelbackwater Snake	Throughout state except Trans-Himalaya	Tamil Nadu, Madhya Pradesh, Maharashtra, Kerala, Arunachal Pradesh, Assam West Bengal, Goa, Uttar Pradesh Meghalaya Orissa, Manipur, Punjab Gujarat, Himachal Pradesh	LR-Ic
36.	<i>Xenochrophissanctijohannis</i> (Boulenger,1890)	St.John's Keel back water Snake	Kullu	Kashmir, Himachal Pradesh	LR-nt
37.	<i>Leopeltisrappii</i> (Gunther,1860)	Himalayan Striped-	Shimla	Sikkim, Darjeeling, Himachal Pradesh	VU

No	Scientific Name	Common Name	Distribution		Status (CAMP)
			State(Districts)	India	
		neckedSnake			
38.	<i>Amphiesma stolatum</i> (Linnaeus,1758)	Buff-stripedKeelback	Throughout state except Trans-Himalaya	Kerala,Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Madhya Pradesh, Chhattisgarh, Orissa, Uttar Pradesh, Assam, Bihar, Maharashtra, Arunachal Pradesh, Punjab, Himachal Pradesh	LR-nt
39.	<i>Amphiesmaplatyceps</i> (Blyth,1854)	Eastern Keelback		Kashmir, Sikkim, Punjab, Assam, Darjeeling, Meghalaya, Arunachal Pradesh, Himachal Pradesh	VU
40.	<i>Spalerosophis atriceps</i> Fischer, 1885	Black Headed Royal Snake	-	Punjab, Himachal Pradesh	
41.	<i>Psammodphis leithii</i> Gunther,1869	Pakistani Ribbon Snake	Solan	Gujarat, Rajasthan, Uttar Pradesh, Punjab, Jammu Kashmir, Maharashtra, Himachal Pradesh	LR-nt
42.	<i>Psammodphis condanarus</i> (Merrem,1820)	Oriental sand Snake	Solan	Punjab, Himachal Pradesh	LR-nt
43.	<i>Boiga trigonata</i> (Schneiderin:Bechstein, 1802)	Common Indian Cat Snake	Solan, Chamba	Gujarat, Sikkim, Maharashtra, West Bengal, Punjab, Himachal Pradesh	LR-Ic
44.	<i>Boigamultifasciata</i> (Blyth,1861)	Many Banded Snake	Cat	Kangra, Solan, Shimla, Sikkim, Arunachal Pradesh, West Bengal, Himachal Pradesh	VU
<b>Family: Elapidae Boie, 1827</b>					
45.	<i>Bungarus caeruleus</i> (Schneider,1801)	Common Indian Krait	Solan	Tamil Nadu, Madhya Pradesh, Gujarat, Maharashtra, Karnataka, Himachal Pradesh	LR-nt
46.	<i>Sinomicreurus maclellandi</i> (Reinhardt,1844)	Maclelland's Coral Snake	Solan	Assam, Sikkim, Darjeeling, Arunachal Pradesh, Himachal Pradesh	
47.	<i>Naja oxiana</i> (Eichwald,1831)	Black Cobra	Throughout except Himalaya	State Trans- Throughout India	CR
<b>Family: Viperidae Bioe, 1827</b>					
48.	<i>Daboia russelii</i> (Shaw&Nodder,1797)	Rassel's Viper	Throughout except Himalaya	Tami Nadu, Madhya Pradesh, Gujarat, Maharashtra, Uttar Pradesh, Bihar, Northern Bengal, Punjab,	Himachal Pradesh LR-nt
49.	<i>Echiscarinatus</i> (Schneider,1801)	Saw-scaled Viper	Solan, Sirmour	Madhya Pradesh, Rajasthan, Gujarat, Punjab, Andhra Pradesh, Tamil Nadu, Maharashtra, Himachal Pradesh	LR-nt
50.	<i>Trimeresurus albolabris</i> Gray,1842	White-lipped pit viper	Solan, Shimla, Mandi, Kullu	Arunachal Pradesh, Himachal Pradesh	
51.	<i>Gloydius himalayanus</i> (Gunther,1864)	Himalayan Pit Viper	Kangra, Solan, Shimla	Kashmir, Haryana, Uttar Pradesh, Himachal Pradesh	
<b>Order: Testudines Family: Emydidae Gray, 1825</b>					
52.	<i>Pangshurasmithii</i> (Gray,1863)	Brown Roofed Turtle	Shiwali ranges state	Assam, Himachal Pradesh	
53.	<i>Kachugakachuga</i> (Gray,1831)	Red-crowned Roofed Turtle	Sirmour	Himachal Pradesh	VU
54.	<i>Melanochelys trijuga</i> (Schweigger,1812)	Indian Black Turtle	Sirmour	Gujarat, Uttarakhand, Himachal Pradesh	LR-nt
<b>Family: Trionychidae Bell, 1828</b>					
55.	<i>Lissemys punctata andersoni</i> Webb,1980	North Indian Flapshell Turtle	Shiwali area of state	Tamil Nadu, Sikkim, Gujarat, Maharashtra, Assam, Himachal Pradesh	LR-nt

Source: Compiled by JICA Study Team (2017) based on information from I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", *Biological Forum- A International journal* 8(1):1-26 (2016)

**Table 5 Amphibian Diversity in HP State**

No	SpeciesName	CommonName	Distribution		Status (IUCN, 2012)	
			State(Districts)	India		
<b>Class: Amphibia Order: Anura Fischervon Waldheim</b>						
<b>Family: Bufonidae Gray</b>						
1.	<i>Duttaphrynusmelanostictus</i> (Schneider1799)	Indian Toad	Bilaspur, Hamirpur, Kullu, Sirmour, Solan, Una	Chamba, Kangra, Mandi, Shimla, Solan	Allover India (Dutta,1997)	Least Concern
2.	<i>Duttaphrynus stomaticus</i> (Lutken,1862)	Marbled Toad	Bilaspur, Hamirpur, Kullu, Sirmour, Solan, Una	Chamba, Kangra, Mandi, Shimla, Solan	Western and Eastern Himalayas, Assam, West Bengal, Uttar Pradesh, Bihar, Rajsthan, Orissa, Maharashtra, Andhra Pradesh and Karnataka (Dutta,1997andChanda,2002)	Least Concern
3.	<i>Duttaphrynus himalayanus</i> (Gunther,1864)	Himalayan Toad	Chamba, Kinnaur, Mandi, Sirmour, Solan	Kangra, Kullu, Shimla, Solan	Himachal-Pradesh, Sikkim, Meghalaya, Arunachal Pradesh and West Bengal(Dutta,1997)	Least Concern
4.	<i>Pseudepidalealatastii</i> (Boulenger,1882)	Ladakh Toad	Kinnaur, Lahaul-spiti		Himachal Pradesh and Kashmir (Dutta,1997)	
5.	<i>Euphlyctis cyanophlyctis</i> (Schneider,1799)	Skittering Frog, Green Stream Frog	Bilaspur, Hamirpur, Kullu, Sirmour, Solan, Una	Chamba, Kangra, Mandi, Solan	Throughout India (Dutta,1997)	Least Concern
6.	<i>Fejervarya syhadrensis</i> (Annandale,1919)	Long-egged Cricket Frog	Bilaspur, Hamirpur, Kullu, Sirmour, Solan, Una	Chamba, Kangra, Mandi, Solan	Maharashtra, Orissa (Biju,2001) and Himachal Pradesh	Least Concern
7.	<i>Fejervarya teraiensis</i> (Dubois,1984)	Terai Cricket Frog	Sirmour		Nagaland (Aoetal., 2003), uttar Pradesh (Hedgeetal.(2009a) and Himachal Pradesh	Least Concern
8.	<i>Hoplobatrachustigerinus</i> (Daudin,1803)	Indian BullFrog	Bilaspur, Hamirpur, Kangra, Solan, Una	Hamirpur, Sirmour, Solan, Una	Throughout India(Dutta,1997)	Least Concern
9.	<i>Nanoranaliebigii</i> (Gunther,1860)	Spiny-armed Frog	Chamba, Kullu, Shimla, Solan	Kangra, Mandi, Sirmour, Solan	Uttar Pradesh, Sikkim, West Bengal, Himachal Pradesh and Jammu Kashmir (Dutta,1997)	Least Concern
10.	<i>Nanoranaminica</i> (Dubois,1975)	Tiny Frog	Bilaspur, Hamirpur, Kullu, Sirmour, Solan	Chmaba, Kangra, Lahaul Spiti, Shimla, Sirmour, Solan	Himachal Pradesh and Uttar Pradesh (Dutta,1997)	Vulnerable
11.	<i>Nanorana vicina</i> (Stoliczka,1872)	Himalayan PaaFrog	Kullu, Sirmour, Solan	Mandi, Solan	Himachal Pradesh, Uttar Pradesh, Jammu and Kashmir(Dutta,1997)	Least Concern
<b>Family: MicrohylidaeGunther</b>						
12.	<i>Sphaerotheca breviceps</i> (Schneider,1799)	Indian Burrowing Frog	Bilaspur, Hamirpur, Kangra, Mandi, Solan, Una	Hamirpur, Kullu, Sirmour, Solan, Una	Punjab, Orissa, West Bengal, Rajstahn, Tamil Nadu, Kerela, Maharashtra, Karnataka (Dutta,1997 and Biju,2001) and Himachal Pradesh	Least Concern
13.	<i>Microhylaornata</i> (DumerialandBibron,1841)	Ornate Narrow-mouthed Frog	Bilaspur, Hamirpur, Sirmour, Solan, Una	Chamba, Kangra, Solan, Una	Throughout India (Dutta, 1997) including Andaman and Nicobar Island (Sarkar,1990)	Least Concern
14.	<i>Uperodonsystema</i> (Schneider,1799)	Marbled Balloon Frog	Kangra, Sirmour, Una		Himachal Pradesh, Uttar Pradesh, West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerela and Karnataka (Dutta,1997)	Least Concern
15.	<i>Amolopshimalayanus</i> (Boulenger,1888)	Himalaya Sucker Frog	Kangra, Kullu, Sirmour,	Kullu, Sirmour,	Himachal Pradesh and Darjeeling	Data deficient
<b>Family:Rhacophoridae Hoffman</b>						
16.	<i>Polypedatesmaculatus</i> (Gray,1833)	Common Indian Tree Frog	Shimla		Throughout India (Dutta,1997)	Least Concern

Source: Compiled by JICA Study Team (2017) based on information from I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", Biological Forum- A International journal 8(1):1-26 (2016)

Table 6 Fish Fauna in HP State

No	Species Name	Common Name	Distribution		Status IUCN, 2012
			State (Districts)	India	
<b>ORDER: OSTEOGLOSSIFORMES</b>					
<b>FAMILY: NOTOPTERIDAE</b>					
1.	<i>Notopterus notopterus</i> (Pallas)	Grey featherback	Kangra, Bilaspur, Sirmour	Punjab, Assam, Karnataka, Kerala, Maharsahtra, Tamil Nadu, Uttar Pradesh, West Bengal and Himachal- Pradesh	LC
2.	<i>Chitala chitala</i> (Hamilton)	Humped featherback	Sirmour	Punjab, Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal and Himachal- Pradesh	NT
<b>ORDER: CYPRINIFORMES</b>					
<b>FAMILY: CYPRINIDAE SUBFAMILY: DANIONINAE</b>					
3.	<i>Bariliusbendelisis</i> (Hamilton)	Hamilton's barila	Bilaspur, Mandi, Kullu,Chamba, Kangra, Solan, Sirmour, Shimla, Hamirpur, Una;	Jammu & Kashmir, Assam, Maghlaya, Bihar, Haryana, Karnataka, Kerala, Orissa, Punjab, Rajasthan, Sikkam, Tamil Nadu, Uttar Pradesh, West Bengal, Maharashtra and Himachal- Pradesh	LC
4.	<i>Barilius barila</i> (Hamilton)	Barred barila	Solan, Shimla, Sirmour, Bilaspur,Kangra,Ma ndi, Hamirpur	Jammu and Kashmir, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Assam, Manipur, Nagaland and Orissa, Burma and Himachal-Pradesh	LC
5.	<i>Barilius barna</i> (Hamilton)	Barna baril	Kangra, Sirmour	Uttarakhand, Assam, Bihar, West Bengal, Karnataka, Meghalaya, Orissa, Rajasthan, Sikkim, Burma and Himachal-Pradesh	LC
6.	<i>Bariliushacra</i> (Hamilton)	Shacra baril	Sirmour	Assam, Bihar, Jammu and Kashmir, Orissa, Punjab, Uttar Pradesh, West Bengal and Himachal-Pradesh	LC
7.	<i>Barilius vagra</i> (Hamilton)	Vagra barila	Kangra, Mandi, Bilaspur, Chamba, Shimla, Sirmour	Assam, Bihar, Delhi, Jammu and Kashmir, Punjab, Sikkim, Uttar Pradesh, West Bengal and Himachal- Pradesh:	LC
8.	<i>Raiamas bola</i> (Hamilton)	Indian Trout	Sirmour	Haryana, Uttar-Pradesh, Uttar Pradesh, Bihar, Assam, Orissa, West Bengal and Himachal-Pradesh	LC
9.	<i>Salmophasiabacaila</i> (Hamilton)	Large razorbelly minnow	Sirmour	Haryana, Uttar-Pradesh, Uttar Pradesh, Bihar, Assam, Orissa Himachal-Pradesh	NE
<b>Genus: Danio Hamilton</b>					
10.	<i>Danio rerio</i> (Hamilton)	Zebra Fish	Solan, Kangra, Sirmour, Solan, Bilaspur	Uttar Pradesh, Andhra Pradesh, Bihar, Karnataka, Orissa, Punjab, Sikkim, Tamil Nadu, West Bengal and Himachal-Pradesh	LC
11.	<i>Devariodevario</i> (Hamilton)	Devario danio	Solan, Sirmour, Kangra, Hamirpur, Una	Jammu and Kashmir, Uttar Pradesh, Assam, Bihar, Gujarat, Punjab, Haryana, Orissa, Rajasthan, West Bengal, Bangladesh, Burma and Himachal- Pradesh:	DD
<b>Genus: Esomus Swainson</b>					
12.	<i>Esomus danricus</i> (Hamilton)	Flying barb	Kangra, Sirmour, Una	Jammu and Kashmir, Punjab, Uttar Pradesh, Assam, Bihar, Delhi, Goa, Daman and Diu, Gujarat, Madhya Pradesh, Orissa, Tamil Nadu, West Bengal and Himachal-Pradesh	LC
13.	<i>Rasboradaniconius</i> (Hamilton)	Blackline rasbora	Kangra, Hamirpur, Bilaspur, Solan, Sirmour	Throughout India	LC
<b>SUBFAMILY: LEUCISCINAE</b>					
14.	<i>Hypophthalmichthys molitrix</i> (Valenciennes)	Silver Carp	Bilaspur, Kangra, Mandi, Solan, Sirmour	Throughout India	INTR
<b>SUBFAMILY: CYPRININAE</b>					

No	Species Name	Common Name	Distribution		Status IUCN, 2012
			State (Districts)	India	
15.	<i>Tor putitora</i> (Hamilton)	Putitor Mahseer	Solan, Sirmour, Kangra, Mandi, Shimla, Bilaspur, Chamba	Throughout Northern States (All along Himalayas)	EN
16.	<i>Tor tor</i> (Hamilton)	Tor Mahseer	Kangra, Shimla, Sirmour	All northern states	NT
17.	<i>Torchelynoides</i> (McClelland)	Black Mahseer	Kangra, Sirmour, Shimla	All along Himalayas	VU
18.	<i>Neolissochilus hexagonoleopis</i> (McClelland)	Katli	Shimla	Assam, Eastern Himalaya and Himachal- Pradesh	NT
19.	<i>Osteobramacotio cotio</i> (Hamilton)	Cotio	Bilaspur, Sirmour	Assam, Bihar, Delhi, Madhya Pradesh, Punjab, Uttar Pradesh, West Bengal and Himachal-Pradesh	LC
20.	<i>Chaguniuschagunio</i> (Hamilton)	Chaguni	Solan, Sirmour	Throughout Indian Sub Continent along the Himalayan foothills and Himachal-Pradesh	LC
21.	<i>Pethia ticto</i> (Hamilton)	Two-spot barb	Bilaspur, Solan, Sirmour, Shimla, Kangra, Mandi, Kullu, Chamba, Hamirpur, Una;	Throughout Indian Subcontinent and Himachal-Pradesh	LC
22.	<i>Pethiaconchoniuis</i> (Hamilton)	Rosy Barb	Kangra, Mandi, Bilaspur, Chamba, Hamirpur, Solan, Sirmour	Throughout Indian Subcontinent and Himachal-Pradesh	LC
23.	<i>Puntius sophero</i> (Hamilton)	Spot fin swamp Barb	Solan, Sirmour, Kangra, Mandi, Kullu, Hamirpur, Chamba, Bilaspur, Una;	Throughout Indian Subcontinent	LC
24.	<i>Puntius chola</i> (Hamilton)	Chola barb	Kangra, Bilaspur, Solan, Sirmour, Una	Throughout India	LC
25.	<i>Systemussarana</i> (Hamilton)	Olive Barb	Bilaspur, Kangra, Solan, Sirmour	Through Indian Subcontinent	LC
26.	<i>Oreinus richardsonii</i> (Gray)	Gugali	Bilaspur, Solan, Sirmour, Kangra, Mandi, Kullu, Shimla, Chamba	Jammu and Kashmir, Punjab, Uttar Pradesh, Assam, Sikkim and Himachal-Pradesh:	VU
27.	<i>Diptychus maculatus</i> Steindachner	Tibetan Snow Trout	Chandra Bhaga River, district Lahaul-Spiti	Ladakh: Indus River, Shyok River, Dumkar Nala, Drass River, (J. & K.) and Himachal- Pradesh	NE
28.	<i>Carassius auratus</i> (Linnaeus)	Golden Carp	Kangra, Bilaspur, Mandi, Kullu, Chamba, Hamirpur, Solan, Shimla, Sirmour, Una	Throughout Indian subcontinent	INTR
29.	<i>Carassius carassius</i> (Linnaeus)	Crucian Carp	Kangra, Mandi, Kullu, Shimla, Solan, Sirmour, Chamba, Hamirpur, Una	Throughout Indian Subcontinent	INTR
30.	<i>Ctenopharyngodon idella</i> (Valenciennes)	Grass Carp	Bilaspur, Kangra, Mandi, Kullu, Shimla, Solan, Sirmour, Chamba, Hamirpur, Una	Introduced in India	INTR
31.	<i>Cyprinus carpio</i>	Scale Carp	Bilaspur,	Throughout India	INTR

No	Species Name	Common Name	Distribution		Status IUCN, 2012
			State (Districts)	India	
	<i>communis</i> Linnaeus		Kangra, Mandi,Kullu, Shimla,Solan, Sirmour, Chamba, Hamirpur, Una		
32.	<i>Cyprinus carpio specularis</i> Lacepede	Mirror Carp	Bilaspur, Kangra, Mandi,Kullu, Shimla,Solan, Sirmour, Chamba, Hamirpur, Una	Throughout India	INTR
33.	<i>Cyprinus carpio nudus</i> Bloch	Mirror Carp	Bilaspur, Kangra, Mandi,Kullu, Shimla,Solan, Sirmour, Chamba, Hamirpur, Una	Throughout India	INTR
34.	<i>Catla catla</i> (Hamilton)	Catla	Bilaspur,Kangra, Sirmour	Throughout India	LC
35.	<i>Cirrhinus mrigala</i> (Hamilton)	Mrigal	Bilaspur,Kangra, Sirmour	Northern India	LC
36.	<i>Cirrhinus reba</i> (Hamilton)	Reba Carp	Bilaspur,Kangra, Sirmour	Throughout India	LC
37.	<i>Labeo rohita</i> (Hamilton)	Rohu	Bilaspur, Hamirpur, Kangra, Mandi, Sirmour, Solan, Una	Punjab, Delhi, Uttar Pradesh, Assam, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Orissa, West Bengal (Introduced) and Himachal-Pradesh	LC
38.	<i>Labeo bata</i> (Hamilton)	Bata labeo	Kangra,Bilaspur, Sirmour	Uttar Pradesh, Madhya Pradesh, Bihar, Orissa, West Bengal, Maharashtra, Andhra Pradesh and Himachal-Pradesh	LC
39.	<i>Labeo boga</i> (Hamilton)	Boga labeo	Sirmour	Uttar Pradesh, Bihar, West Bengal, Assam, Orissa, Andhra Pradesh, Tamil Nadu and Himachal-Pradesh	LC
40.	<i>Labeocalbasu</i> (Hamilton)	Kalabasu	Bilaspur, Kangra	Punjab, Delhi, Assam, Bihar, Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu, Uttar Pradesh and West Bengal and Himachal-Pradesh	LC
41.	<i>Labeodyocheilus</i> (McClelland)	Brahmaputra labeo	Bilaspur,Shimla, Sirmour	Jammu and Kashmir, Punjab, Uttar Pradesh, Assam, Sikkim and Himachal-Pradesh	LC
42.	<i>Bangana dero</i> (Hamilton)	Kalabans	Bilaspur, Kangra, Mandi,Chamba, Sirmour	Jammu and Kashmir, Punjab, Haryana, Delhi, Assam, Bihar, Rajasthan, Uttar Pradesh, West Bengal and Himachal- Pradesh	LC
43.	<i>Crossocheilus latius</i> (Hamilton)	Gangetic latia	Solan, Sirmour,Bilaspur, Mandi,Kangra, Chamba, Hamirpur, Una	Northern states along the Himalayas	LC
44.	<i>Garragotyla gotyla</i> (Gray)	Gotyla	Bilaspur, Kangra, Mandi,Kullu, Chamba, Shimla, Solan, Hamirpur, Sirmour	Jammu and Kashmir, Assam, Bihar, Delhi, Manipur, Nagaland, Punjab, Rajasthan, Sikkim, Uttar Pradesh, Madhya Pradesh, West Bengal, Manipur and Himachal- Pradesh	LC
45.	<i>Garra lamta</i> (Hamilton)	Lamta Garra	Mandi, Sirmour, Solan	Assam, Sikkim, Darjeeling and Kumaon Himalayas and Himachal- Pradesh	LC
46.	<i>Acanthocobitis botia</i>	Botia Loach	Solan, Sirmour,	Uttar Pradesh, Uttarakhand,	LC

No	Species Name	Common Name	Distribution		Status IUCN, 2012
			State (Districts)	India	
	(Hamilton)		Kangra, Mandi	Assam, Bihar and Himachal-Pradesh	
47.	<i>Schisturacorica</i> (Hamilton)	Corica Loach	Bilaspur, Chamba, Mandi	Occurs in Himalayas from Darjeeling through Kumaon to Himachal Pradesh and Punjab in Sutlej basin	LC
48.	<i>Schistura horai</i> (Menon)	Horai Loach	Kangra, Solan, Sirmour	Jammu and Kashmir, Punjab and Himachal- Pradesh	VU
49.	<i>Schisturarupecula</i> (McClelland)	Hill Loach	Solan,Sirmour, Shimla, Kullu	Jammu and Kashmir, Uttarakhand and Uttar Pradesh and Himachal-Pradesh	LC
50.	<i>Paraschistura montana</i> (Hamilton)	Mountain Loach	Kangra, Solan, Shimla, Sirmour	Uttarakhand, Jammu and Kashmir, Bihar and Himachal-Pradesh	NE
51.	<i>Triplophysa microps</i> (Steindachner)	Leh triplophysa-Loach	Lahaul-Spiti	Ladakh (Jammu and Kashmir) and Himachal-Pradesh	LC
52.	<i>Triplophysa stoliczkae</i> (Steindachner)	Stoliczkae triplophysa-Loach	Lahaul-Spiti	Ladakh and Himachal-Pradesh	NE
<b>FAMILY: COBITIDAE SUBFAMILY: BOTIINAE</b>					
53.	<i>Botia dario</i> (Hamilton)	Necktie Loach	Sirmour	Assam, Bihar, West Bengal, Meghalaya, Uttar Pradesh, Punjab, Uttarakhand and Himachal Pradesh	LC
54.	<i>Botia lohachata</i> Chaudhuri	Y-Loach	Kangra, Solan	Uttarakhand, Bihar, Delhi, Rajasthan and Himachal-Pradesh	NE
<b>SUBFAMILY:</b>					
55.	<i>Lepidocephalichthys guntea</i> (Hamilton)	Guntea Loach	Kangra, Chamba and Sirmour	Throughout northern States	LC
<b>ORDER: SILURIFORMS FAMILY: BAGRIDAE SUBFAMILY: RITINAE</b>					
56.	<i>Sperata aor</i> (Hamilton)	Long-whiskered cat fish	Kangra,Bilaspur, Sirmour	Throughout Indian Subcontinent	LC
57.	<i>Sperata seenghala</i> (Sykes)	Seenghari	Kangra, Bilaspur	Throughout Indian subcontinent	LC
58.	<i>Mystus bleekeri</i> (Day)	Day's mustus	Kangra,Bilaspur, Sirmour	All north India states	LC
59.	<i>Mystus vittatus</i> (Bloch)	Striped dwarf catfish	Sirmour	Northern India	LC
<b>FAMILY: SILURIDAE</b>					
60.	<i>Wallago attu</i> (Schneider)	Freshwater Shark	Kangra, Sirmour	Throughout India	NT
<b>FAMILY: SCHILBEIDAE SUBFAMILY: SCHILBINAE</b>					
61.	<i>Chupisoma garua</i> (Hamilton)	Garua Bachaha	Bilaspur	Throughout India except south of Mahanadi	LC
<b>FAMILY: AMBLYCIPITIDAE</b>					
62.	<i>Amblyceps mangois</i> (Hamilton)	Indian Torrent Catfish	Kangra, Mandi	Uttarakhand, Meghalaya, Manipur, Punjab, Uttar Pradesh, West Bengal and Himachal- Pradesh	LC
<b>FAMILY: SISORIDAE SUBFAMILY: SISORINAE</b>					
63.	<i>Bagarius bagarius</i> (Hamilton)	Gangetic goonch	Bilaspur	Throughout India	NT
64.	<i>Glyptothorax conirostrae</i> (Steindachner)	Glyptothorax	Kangra,Mandi, Chamba, Bilaspur, Solan,Shimla, Sirmour	Jammu and Kashmir, Uttarakhand and Himachal-Pradesh	DD
65.	<i>Glyptothorax pectinopterus</i> (McClelland)	Glyptothorax	Kangra, Bilaspur, Chamba, Solan, Sirmour	Jammu and Kashmir, Uttarakhand and Himachal-Pradesh	LC
66.	<i>Glyptothorax brevipinnus</i> Hora	Glyptothorax	Sirmour	Himachal-Pradesh	DD
67.	<i>Glyptosternon reticulatum</i> McClelland	Cat fish	Chamba, Shimla	Ladakh, Jammu and Kashmir and Himachal-Pradesh	NE



No	Species Name	Common Name	Distribution		Status IUCN, 2012
			State (Districts)	India	
68.	<i>Pseudecheneis sulcata</i> (McClelland)	Sulcatus Catfish	Shimla, Sirmour	Uttarakhand, North Bengal, Meghalaya and Himachal-Pradesh	LC
<b>FAMILY: CLARIIDAE SUBFAMILY: CLARIINAE</b>					
69.	<i>Clarias magur</i> (Hamilton)	Magur	Sirmour	Throughout India	EN
<b>FAMILY: HETEROPNEUSTIDAE</b>					
70.	<i>Heteropneustes fossilis</i> (Bloch)	Stinging Catfish	Kangra	Punjab, Bihar, Uttar Pradesh, Uttarakhand, West Bengal, Orissa, Madhya Pradesh and Himachal- Pradesh	LC
<b>ORDER: SALMONIFORMES FAMILY: SALMONIDAE</b>					
71.	<i>Oncorhynchus mykiss</i> (Smith & Stearby)	Rainbow Trout	Kangra, Mandi, Kullu, Shimla, Sirmour	Jammu and Kashmir, Neelgiri Hills and Himachal-Pradesh	INTR
72.	<i>Salmo trutta</i> <i>fario</i> Linnaeus	Brown Trout	Kangra, Chamba, Mandi, Kullu, Shimla, Kinnaur	Jammu and Kashmir, Uttarakhand and Himachal Pradesh	INTR
<b>ORDER: BELONIFORMES</b>					
73.	<i>Xenentodon cancila</i> (Hamilton)	Needle Fish	Kangra, Bilaspur, Sirmour	Throughout Indian Subcontinent	LC
<b>ORDER: SYNBRANCHIFORMES FAMILY: MASTACEMBELIDAE</b>					
74.	<i>Macrornathus pancalus</i> Hamilton	Striped Spiny eel	Solan	Throughout India	LC
75.	<i>Mastacembelus armatus</i> (Lacepede)	Tire-trackspiny eel	Chamba, Solan, Una	Throughout Indian Subcontinent	LC
<b>ORDER: PERCIFORMES FAMILY: CHANDIDAE</b>					
76.	<i>Pseudambassis baculis</i> (Hamilton)	Himalayan glassy perchlet	Kangra, Bilaspur, Sirmour	Bihar, Uttar Pradesh, Punjab, West Bengal, Orissa, Madhya Pradesh, Maharashtra and Himachal- Pradesh	LC
<b>FAMILY: NANDIDAE SUBFAMILY: BADINAE</b>					
77.	<i>Badis badis</i> (Hamilton)	Dwarf Chamelon Fish	Solan, Sirmour	Throughout India	LC
<b>FAMILY: GOBIIDAE SUBFAMILY: GOBIINAE</b>					
78.	<i>Glossogobius giuris</i> (Hamilton)	Tank Goby	Kangra, Sirmour	Throughout India	LC
<b>FAMILY: CHANNIDAE</b>					
79.	<i>Channa gachua</i> (Schneider)	Snake Headed Fish	Kangra, Bilaspur, Solan, Sirmour	Throughout India	LC
80.	<i>Channamarulius</i> (Hamilton)	Snake Headed Fish	Kangra, Bilaspur, Sirmour	Throughout India	LC
81.	<i>Channa punctata</i> (Bloch)	Spotted Snake Headed Fish	Kangra, Sirmour	Throughout India	LC

Source: Compiled by JICA Study Team (2017) based on information from I. Sharma and A.K. Sidhu, "Faunal Diversity of all Vertebrates (excluding Aves) of Himachal Pradesh", Biological Forum- A International journal 8(1):1-26 (2016)

**Table 7 District-wise Major Fauna Species Found in HP State**

District	WLS/NP	Common Name	Species	IUCN Red List Data
Lahaul & Spiti	Kibber, Pin Valley, Chander Tal	Tibetan argali	<i>Ovis ammon</i>	Not threatened
		Ladakh urial	<i>Ovis vignei</i>	Endangered
		Tibetan antelope	<i>Pantholops hodgsonii</i>	Endangered
		Wild yak	<i>Bos grunniens</i>	Vulnerable
		Wild dog	<i>Capra alpinus laniger</i>	Endangered
		Snow Leopard	<i>Panthera uncia</i>	Endangered
		Eurasian otter	<i>Lutra lutra monticola</i>	Near threatened
		Pallas's cat	<i>Otocolobus manul nigripictus</i>	Near threatened

District	WLS/NP	Common Name	Species	IUCN Red List Data		
		Tibetan Wolf	<i>Canis lupus chanko</i>	Least concern		
		Red fox	<i>Vulpes vulpes</i>	Least concern		
Kullu	GHNP, Khirganga National Park, Inderkila NP, Kanawar WLS, Khokan WLS, Nagru WLS, Sainj, Tirthan WLS	Snow leopard	<i>Panthera uncia</i>	Endangered		
		Tibetan Wolf	<i>Canis lupes chanco</i>	Least concern		
		Red fox	<i>Vulpes vulpes</i>	Least Concern		
		Bharal or Blue Sheep	<i>Pseudois nayaur</i>	Least concern		
		Himalayan Thar	<i>Hemitragus jemlahicus</i>	Near threatened		
		Himalayan musk Deer	<i>Moschus leucogaster</i>	Endangered		
		Goral	<i>Naemorhedus goral</i>	Near threatened		
		Western Tragopan	<i>Tagopan melanocephalus</i>	Vulnerable		
		Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern		
		Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern		
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable		
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened		
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern		
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable		
		Himalayan brown bear	<i>Ursus arctos</i>	Least concern		
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable		
		Leopard	<i>Panthera pardus</i>	Vulnerable		
		Barking deer	<i>Muntiacus muntjac</i>	Least concern		
		Kalij pheasant	<i>Lophura leucomelanos</i>	Least concern		
		Kangra	Dhauladhar WLS, Pong Dam WLS	Western Tragopan	<i>Tagopan melanocephalus</i>	Vulnerable
Koklass Pheasant	<i>Pucrasia macrolopha</i>			Least concern		
Himalayan monal	<i>Lophophorus imperjanus</i>			Least concern		
Cheer Pheasant	<i>Catreus wallichii</i>			Vulnerable		
Himalayan Vulture	<i>Gyps himalayensis</i>			Not threatened		
Griffon Vulture	<i>Gyps fulvus</i>			Least concern		
White backed vulture	<i>Gyps africanus</i>			Endangered		
White rumped vulture	<i>Gyps bengalensis</i>			Critically endangered		
Slender billed vulture	<i>Gyps tenuirostris</i>			Critically endangered		
Red fox	<i>Vulpes vulpes</i>			Least Concern		
Himalayan musk Deer	<i>Moschus leucogaster</i>			Endangered		
Goral	<i>Naemorhedus goral</i>			Near threatened		
Himalayan black bear	<i>Ursus thibetanus</i>			Vulnerable		
Himalayan brown bear	<i>Ursus arctos</i>			Least concern		
Sambar deer	<i>Rusa unicolor</i>			Vulnerable		
Leopard	<i>Panthera pardus</i>			Vulnerable		
Barking deer	<i>Muntiacus muntjac</i>			Least concern		
Kalij pheasant	<i>Lophura leucomelanos</i>			Least concern		
Solan	Chail WLS, Darlaghat CR, Majathal WLS, Shilli WLS			Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern
				Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable		
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened		
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern		

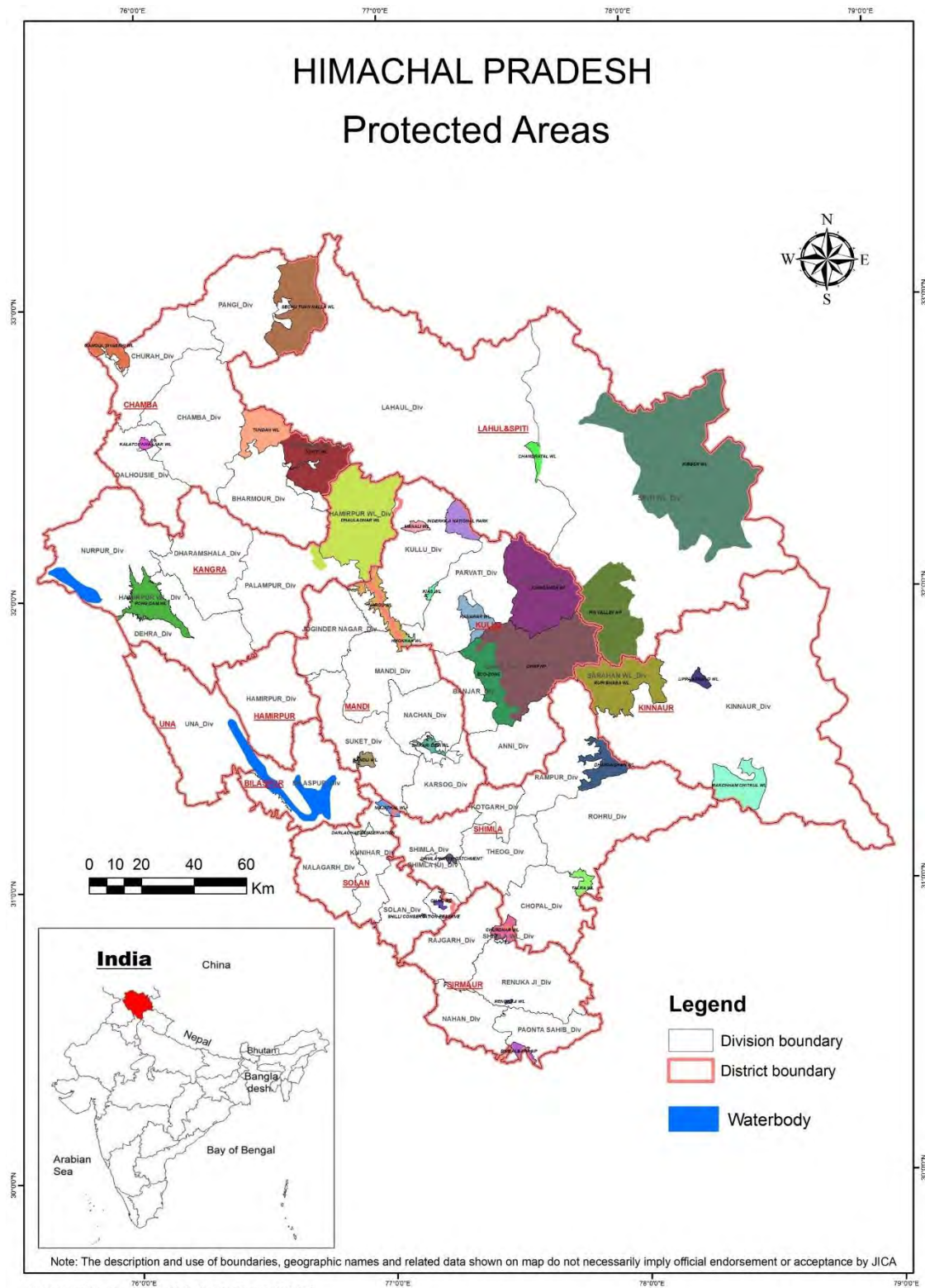
District	WLS/NP	Common Name	Species	IUCN Red List Data
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Red fox	<i>Vulpes vulpes</i>	Least Concern
		Himalayan musk Deer	<i>Moschus leucogaster</i>	Endangered
		Goral	<i>Naemorhedus goral</i>	Near threatened
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Barking deer	<i>Muntiacus muntjac</i>	Least concern
		Kalij pheasant	<i>Lophura leucomelanos</i>	Least concern
		Red jungle fowl	<i>Gallus gallus</i>	Least concern
Shimla	Churdhar WLS, Daranghati, Talra WLS	Western Tragopan	<i>Tagopan melanocephalus</i>	Vulnerable
		Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern
		Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Red fox	<i>Vulpes vulpes</i>	Least Concern
		Himalayan musk Deer	<i>Moschus leucogaster</i>	Endangered
		Goral	<i>Naemorhedus goral</i>	Near threatened
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Barking deer	<i>Muntiacus muntjac</i>	Least concern
Kalij pheasant	<i>Lophura leucomelanos</i>	Least concern		
Red jungle fowl	<i>Gallus gallus</i>	Least concern		
Chamba	Gamgul Siyabehi WLS, Kugti WLS, Sech Tuan Nalla WLS, Kalatop khajjiar WLS, Tundah WLS	Western Tragopan	<i>Tagopan melanocephalus</i>	Vulnerable
		Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern
		Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Red fox	<i>Vulpes vulpes</i>	Least Concern
		Himalayan musk Deer	<i>Moschus leucogaster</i>	Endangered
		Goral	<i>Naemorhedus goral</i>	Near threatened
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable

District	WLS/NP	Common Name	Species	IUCN Red List Data
		Himalayan brown bear	<i>Ursus arctos</i>	Least concern
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Barking deer	<i>Muntiacus muntjac</i>	Least concern
		Chamba sacred langur	<i>Semnopithecus entellus</i>	Endangered
		Kalij pheasant	<i>Lophura leucomelanos</i>	Least concern
Mandi	Shikari Devi WLS	Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern
		Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Goral	<i>Naemorhedus goral</i>	Near threatened
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Barking deer	<i>Muntiacus muntjac</i>	Least concern
		Bilaspur	Gobindsagar lake, Naina Devi Conservation Reserve	Himalayan Vulture
Griffon Vulture	<i>Gyps fulvus</i>			Least concern
White backed vulture	<i>Gyps africanus</i>			Endangered
White rumped vulture	<i>Gyps bengalensis</i>			Critically endangered
Slender billed vulture	<i>Gyps tenuirostris</i>			Critically endangered
Leopard	<i>Panthera pardus</i>			Vulnerable
Sambar deer	<i>Rusa unicolor</i>			Vulnerable
Blue bull	<i>Boselaphus tragocamelus</i>			Least concern
Wild boar	<i>Sus scrofa</i>			Least concern
Barking deer	<i>Muntiacus muntjac</i>			Least concern
Hamirpur		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Blue bull	<i>Boselaphus tragocamelus</i>	Least concern
		Wild boar	<i>Sus scrofa</i>	Least concern
Una		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		White backed vulture	<i>Gyps africanus</i>	Endangered
		White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered

District	WLS/NP	Common Name	Species	IUCN Red List Data
		Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Wild boar	<i>Sus scrofa</i>	Least concern
Kinnaur	Rupi-Bhaba WLS	Snow leopard	<i>Panthera uncia</i>	Endangered
		Tibetan Wolf	<i>Canus lupes chanco</i>	Least concern
		Red fox	<i>Vulpes vulpes</i>	Least Concern
		Bharal or Blue Sheep	<i>Pseudois nayaur</i>	Least concern
		Himalayan Thar	<i>Hemitragus jemlahicus</i>	Near threatened
		Himalayan musk Deer	<i>Moschus leucogaster</i>	Endangered
		Goral	<i>Naemorhedus goral</i>	Near threatened
		Western Tragopan	<i>Tagopan melanocephalus</i>	Vulnerable
		Koklass Pheasant	<i>Pucrasia macrolopha</i>	Least concern
		Himalayan monal	<i>Lophophorus imperjanus</i>	Least concern
		Cheer Pheasant	<i>Catreus wallichii</i>	Vulnerable
		Himalayan Vulture	<i>Gyps himalayensis</i>	Not threatened
		Griffon Vulture	<i>Gyps fulvus</i>	Least concern
		Himalayan black bear	<i>Ursus thibetanus</i>	Vulnerable
		Himalayan brown bear	<i>Ursus arctos</i>	Least concern
		Sambar deer	<i>Rusa unicolor</i>	Vulnerable
		Leopard	<i>Panthera pardus</i>	Vulnerable
		Barking deer	<i>Muntiacus muntjac</i>	Least concern
		Kalij pheasant	<i>Lophura leucomelanos</i>	Least concern
		Sirmaur	Sher Jung NP, Renuka ji WLS	Cheer Pheasant
Himalayan Vulture	<i>Gyps himalayensis</i>			Not threatened
Griffon Vulture	<i>Gyps fulvus</i>			Least concern
White backed vulture	<i>Gyps africanus</i>			Endangered
White rumped vulture	<i>Gyps bengalensis</i>			Critically endangered
Slender billed vulture	<i>Gyps tenuirostris</i>			Critically endangered
Red fox	<i>Vulpes vulpes</i>			Least Concern
Himalayan musk Deer	<i>Moschus leucogaster</i>			Endangered
Goral	<i>Naemorhedus goral</i>			Near threatened
Himalayan black bear	<i>Ursus thibetanus</i>			Vulnerable
Sambar deer	<i>Rusa unicolor</i>			Vulnerable
Leopard	<i>Panthera pardus</i>			Vulnerable
Barking deer	<i>Muntiacus muntjac</i>			Least concern
Kalij pheasant	<i>Lophura leucomelanos</i>			Least concern
Red jungle fowl	<i>Gallus gallus</i>			Least concern

Source: Compiled by JICA Study Team (2017) based on information from HPFD

Attachment I.4.4.3 Protected Area Map of HP State



#### Attachment I.4.4.4 Status of Management Plans for Protected Areas in HP State

No.	Name of Management Plan	Plan Period	Status	In Proposed Project District?
1	Great Himalayan National Park Shamshi*	2010-2020	Approved	Yes
2	Col.Sher Jung National Park Simbalbara	2008-09 to 2012-13	Expired, under preparation	No
3	Pin Valley National Park		Expired, under preparation	Yes
4	Khirganga National Park		Not Prepared/ Status Not Clear	Yes
5	Indekilla National Park		Not Prepared/ Status Not Clear	Yes
6	Bandli Wildlife sanctuary	2011-12 to 2020-21	Approved	Yes
7	Chail Wildlife Sanctuary	2011-12 to 2020-21	Approved	Partially Included
8	Chander Tal Wildlife Sanctuary		Expired, under preparation	Yes
9	Churdhar Wildlife Sanctuary	2008-2009 to 2012-13	Expired, under preparation	No
10	Daranghati Wildlife Sanctuary	1991-2002	Expired, under preparation	Yes
11	Dhauladhar Wildlife Sanctuary	2004-2014	Expired, under preparation	No
12	Gangul Siyabehi Wildlife Sanctuary	2011-12 to 2020-21	Final Approval awaited	No
13	Kias Wildlife Sanctuary	2004-05 to 2013-13	Expired, under preparation	Yes
14	Kalatop Khajjiar Sanctuary	2011-12 to 2020-21	Final Approval awaited	No
15	Kanwar Wildlife Sanctuary	2004-05 to 2012-13	Expired, under preparation	Yes
16	Khokhan Wildlife Sanctuary	2004-05 to 2012-13	Expired, under preparation	Yes
17	Kibber Wildlife Sanctuary	2011-12 to 2015-16	Expired, under preparation	Yes
18	Kugti Wildlife Sanctuary	2011-12 to 2020-21	Final Approval awaited	Yes
19	Lipa Assarang Wildlife Sanctuary		Expired, under preparation	Yes
20	Majathal Wildlife Sanctuary	1999-2000 to 2008-09	Expired, under preparation	Partially Included
21	Manali Wildlife Sanctuary	2004-05 to 2012-13	Expired, under preparation	Yes
22	Nargu Wildlife Sanctuary	2004-05 to 2013-14	Expired, under preparation	Yes
23	Pong Dam Wildlife Sanctuary	2014-15 to 2023-24	Approved	No
24	Rakcham Chitkul Wildlife Sanctuary	2011-12 to 2021-22	Final Approval awaited	Yes
25	Renuka Wildlife Sanctuary	2013-14 to 2022-23	Final Approval awaited	No
26	Rupi Bhawa	2010-2015	Expired, under preparation	Yes
27	Sech Tuan Nallah Wildlife Sanctuary	2011-12 to 2020-21	Approved	Yes
28	Shikari Devi Wildlife Sanctuary	2011-12 to 2020-21	Approved	Yes
29	Shimla Water Catchment Wildlife Sanctuary	2011-12 to 2020-21	Approved	Yes
30	Talra Wildlife Sanctuary	2003-04 to 2012-13	Expired, under preparation	Yes
31	Tundah Wildlife Sanctuary	2011-12 to 2020-21	Final Approval awaited	Yes
32	Naina Devi Conservation Reserve	2004-05 to 2013-14	Expired, under preparation	No
33	Darlaghat Conservation reserve	1999-2000 to 2008-09	Expired, under preparation	No
34	Shilli Conservation Reserve	1999-2000 to 2008-09	Expired, under preparation	No

\* Includes Sainj Wildlife Sanctuary, Tirthan Wildlife Sanctuary

Source: Compiled by JICA Study Team based on information from HPPFD

### Attachment I.4.4.5 Key Biodiversity Areas (KBAs) in HP State

**Table 1 Protected areas of Himachal Pradesh as KBA sites**

No	Name of Biodiversity Area	District	Notification Year	Total Area (km <sup>2</sup> )
1	Bandli Wildlife Sanctuary	Mandi	1974	41.32
2	Chail Wildlife Sanctuary	Solan	1976	108.54
3	Churdhar Wildlife Sanctuary	Shimla	1985	56.15
4	Daranghati Wildlife Sanctuary	Shimla	1974	167.00
5	Dhauludhar Wildlife Sanctuary and McLeod Gunj	Kangra	1994	943.98
6	Gangul Siahbehi Wildlife Sanctuary	Chamba	1974	108.85
7	Gobind Sagar and Naina Devi Wildlife Sanctuaries	Bilaspur	1974	223.34
8	Great Himalayan National Park	Kullu	1994	754.00
9	Kais Wildlife Sanctuary	Kullu	1997	14.19
10	Kalatop Khajjiar Wildlife Sanctuary	Chamba	1989	61.00
11	Kanawar Wildlife Sanctuary	Kullu	1984	54.00
12	Kibber Wildlife Sanctuary	Lahaul & Spiti	1992	1,400.50
13	Kugti Wildlife Sanctuary	Chamba	1974	378.86
14	Lippa Asrang Wildlife Sanctuary	Kinnaur	2001	30.90
15	Majathal Wildlife Sanctuary	Solan	1974	40.00
16	Manali Wildlife Sanctuary	Kullu	1984	31.80
17	Nargu Wildlife Sanctuary	Mandi	1974	278.37
18	Pin Valley National Park	Lahaul & Spiti	1987	675.00
19	Pong Dam Lake Wildlife Sanctuary	Kangra	1998	307.29
20	Rupi Bhaba Wildlife Sanctuary	Kinnaur	2001	269.00
21	Sangla (Raksham Chitkul) Wildlife Sanctuary	Kinnaur	1989	650.00
22	Sarah Valley, Lower Dharamshala	Kangra	N.A.	00.00
23	Sechu Tuan Nala Wildlife Sanctuary	Chamba	1974	102.95
24	Shikari Devi Wildlife Sanctuary	Mandi	1962	72.00
25	Shimla Water Catchment Wildlife Sanctuary	Shimla	1982	10.25
26	Talra Wildlife Sanctuary	Shimla	1974	26.00
27	Tirthan Wildlife Sanctuary	Kullu	1997	61.12
28	Chamba Valley (AZE)	Chamba		

Source: ENVIS Centre on Wildlife Protected Areas ([http://www.wiienvis.nic.in/Database/Key\\_Biodiversity\\_Areas\\_8647.aspx](http://www.wiienvis.nic.in/Database/Key_Biodiversity_Areas_8647.aspx))



**Table 2 State-wise Numbers and Area Size of KBAs**

States/ Union Territories	Number of KBAs	Ranking	Total Area Size (km <sup>2</sup> )	Ranking
Andhra Pradesh	17	12	10489.27	7
Arunachal Pradesh	27	6	25322.44	1
Assam	46	3	11145.85	4
Bihar	11	16	3472.44	16
Chhattisgarh	4	26	2581.9	21
Goa	8	22	2343.68	22
Gujarat	17	12	25219.98	2
Haryana	5	25	307.43	28
Himachal Pradesh	28	5	8366.41	9
Jammu & Kashmir	21	10	6718.75	12
Jharkhand	3	27	2786.23	19
Karnataka	69	1	10877.25	6
Kerala	30	4	7325.22	10
Madhya Pradesh	17	12	5905.5	13
Maharashtra	26	7	13532.06	3
Manipur	9	19	1382.1	23
Meghalaya	9	19	696.01	26
Mizoram	6	24	1000	24
Nagaland	9	19	876.25	25
Odisha (Orissa)	7	23	3149.54	17
Punjab	3	27	104.55	29
Rajasthan	24	9	7069.67	11
Sikkim	11	16	2860.65	18
Tamil Nadu	48	2	10974.74	5
Telangana	0	32	0	32
Tripura	3	27	585.1	27
Uttar Pradesh	26	7	5074.9	14
Uttarakhand	14	15	9005.5	8
West Bengal	10	18	2703.05	20
Andaman & Nicobar Islands	19	11	3570.54	15
Chandigarh	0	32	0	32
Dadra and Nagar Haveli	0	32	0	32
Daman and Diu	0	32	0	32
Lakshadweep	2	30	0.39	31
Delhi - National Capital Territory	0	32	0	32
Puducherry (Pondicherry)	2	30	14.18	30

Source: Protected Area Network in India (<http://www.moef.nic.in/downloads/public-information/protected-area-network.pdf>), and India Longitude and Latitude Map ([https://www.mapsofworld.com/lat\\_long/india-lat-long.html](https://www.mapsofworld.com/lat_long/india-lat-long.html)) to identify the location

**Table 3 Important Bird and Biodiversity Areas (IBAs) in HP State**

No.	Name of IBA site	Year of Notification	Area (sq km)	District
1	Bandli Wildlife Sanctuary	1974	32.11	Mandi
2	Chail Wildlife Sanctuary	1976	16.00	Solan & Shimla
3	Churdhar Wildlife Sanctuary	1985	55.52	Sirmaur & Shimla
4	Daranghati Wildlife Sanctuary	1962	171.50	Shimla
5	Dhauladhar Wildlife Sanctuary	1994	982.86	Kangra
6	Gangul Siyabehi Wildlife Sanctuary	1962	108.40	Chamba
7	Kais Wildlife Sanctuary	1954	12.61	Kullu
8	Kalatop-Khajjjar Wildlife Sanctuary	1958	17.17	Chamba
9	Kanawar Wildlife Sanctuary	1954	107.29	Kullu
10	Kibber Wildlife Sanctuary	1992	2220.12	Lahaul & Spiti
11	Kugti Wildlife Sanctuary	1962	405.49	Chamba
12	Lippa Asrang Wildlife Sanctuary	1962	31.00	Kinnaur
13	Majathal Wildlife Sanctuary	1954	30.86	Solan
14	Manali Wildlife Sanctuary	1954	29.00	Kullu
15	Nargu Wildlife Sanctuary	1962	132.3731	Kullu
16	Pong Dam Lake Wildlife Sanctuary	1982	207.59	Kangra
17	Rupi Bhaba Wildlife Sanctuary	1982	503.00	Kinnaur
18	Rakchham Chitkul (Sangla Valley) Wildlife Sanctuary	1989	304.00	Kinnaur
19	Sech Tuan Nala Wildlife Sanctuary	1962	390.29	Chamba
20	Shikari Devi Wildlife Sanctuary	1962	29.94	Mandi
21	Shimla Water Catchment Wildlife Sanctuary	1958	10.00	Shimla
22	Talra Wildlife Sanctuary	1962	46.48	Shimla
23	Tirthan Wildlife Sanctuary	1992	61.00	Kullu
24	Great Himalayan National Park	1994	754.00	Kullu
25	Pin Valley National Park	1987	675.30	Lahaul & Spiti

Source: Birdlife International and Bombay Natural History Society (from "ENVIS Centre on Wildlife & Protected Areas, [http://wiienvis.nic.in/Database/IBA\\_8463.aspx](http://wiienvis.nic.in/Database/IBA_8463.aspx)")

**Table 4 Potential Important Bird and Biodiversity Areas (IBAs) in HP**

No.	Name of Site	District	Potential of New IBA Codes
1	Lambri Forest	Kullu	IN-HP-30
2	Inderkilla National Park	Kullu	IN-HP-28
3	Khirganga National Park	Kullu	IN-HP-29
4	Naina Devi Community Reserve	Bilaspur	IN-HP-31
5	Simbalbara National Park	Sirmaur	IN-HP-32

Source: Bombay Natural History Society (from "ENVIS Centre on Wildlife & Protected Areas, [http://wiienvis.nic.in/Database/IBA\\_8463.aspx](http://wiienvis.nic.in/Database/IBA_8463.aspx)")

### Attachment I.4.4.6 Compensation Rates for Damages and Losses Caused by Wildlife

HP State Government Notification No. FFE.B-A (10)-1/2009 dated 4 March, 2014 issued by the Principal Secretary (Forests) is the latest notification and effective as of July, 2017 for compensation against damages and losses caused by wildlife in HP. The content of the Notification is described hereunder.

#### NOTIFICATION

Subject: - Rates of relief due to losses caused to human being and domestic livestock by the Wild Animals

In supersession of all previous Notifications on the subject cited above, the governor Himachal Pradesh is pleased to declare the categories of losses caused by the wild animals [as defined in wild life (protection) Act, 1972] and the amount of relief as under: -

**Table 1 Status of Management Plans of in Himachal Pradesh**

No.	Particulars	Rates (In Rupees)
1.	In case of death of human being.	150,000 INR
2.	In case of permanent disability to human being.	100,000 INR
3.	In case of grievous injuries/partial disability to human being.	75,000 INR
4.	In case of simple injury to human being as per actual cost of medical treatment	maximum 10,000 INR
5.	In case of loss of Horse, Mule, Buffalo, Ox, Yak and camel.	10,000 INR
6.	In case of loss of Cow jersey and cross breed.	6,000 INR
7.	In case of loss of cow (local breed), Donkey, Churu, Churi & pashmina Goat	3,000 INR
8.	In case of loss of sheep, Goat, Pig.	1,500 INR
9.	In case of loss of young ones of buffalo, Cow jersey and all other breeds Mule, Yak, Horse, Camel, Churu, Churi, donkey, pashmina goat sheep and goat	1,000 INR

The grant of relief as referred to above will be subject to the following condition:

- I. Production of postmortem report in case of loss of human life, certificate in case of grievous injury, partial & permanent disability and prescription slip as well as verification of actual cost of medical treatment in case of simple injury (including monkey bites) from the medical officer of a Government Institution /Government recognized medical institution, as the case may be.
- II. The verification of loss of cattle that the same was actually caused by wild animal can be done by the pradhan/up pradhan of the panchyat/ president/notified Area Committee Chairman, Municipal Committee/Commissioner, Municipal Corporation of the area/Elected Member of the Cantonment Board area/councilor of the area, Range officer, Deputy range officer, forest guard or any other forest officer higher in rank than a Range officer /Veterinary Officer or Veterinary Pharmacist or officer authorized by Veterinary officer of the area.
- III. All DFOs in HP shall be the final authority to sanction all cases of relief claims on account of losses caused by the wild animals to humans and domestic livestock.
- IV. The DFOs shall release 25% of the amount of relief prescribed for human loss/permanent & partial disability/grievous injury of receipt of report as interim relief immediately to the family of the deceased/affected person after due verification in anticipation of formal sanction without delay. The balance amount will be released after receipt of the complete relief claim
- V. All claims in respect of simple injury to human shall be restricted to actual cost of medical treatment verified by the medical officer of a Government Institution /Government recognized Medical institution subject to maximum of 10,000 INR as prescribed above in the categories of losses.
- VI. All cases of losses caused by the wild animal should be reported by the applicant to the nearest forest office under control of Divisional forest officer (territorial or wildlife).the claim can be filed either at the place where the loss by wild animal has occurred /reported where the applicant resides. All time barred cases shall be send to GoHP relief for approval.
- VII. The relief will be granted in case of loss of livestock to the owner of the livestock.

- |       |   |
|-------|---|
| VIII. | The relief in case of the loss of human being will be granted in the order of preference given below: <ol style="list-style-type: none"><li>1. Wife or husband as the case may be.</li><li>2. Son's unmarried or divorced daughter and children of predeceased son (Equal Shares).</li><li>3. Daughters (Equal Shares)</li><li>4. Grand children being children of his/her sons or daughter who died before him/her (Equal Shares).</li><li>5. Father or Mother.</li><li>6. Brother or sisters or children of the deceased brothers (Equal Shares).</li><li>7. Falling all above any other next of kin entitled to a share in the estate.</li></ol> All prescribed rates shall be effective from 1 <sup>st</sup> April, 2014 onwards. |
|-------|---|

#### Attachment I.4.4.7 Major Invasive Plants in HP State

Following information was compiled based on information from “Global Invasive Species Database (GISD)”, “Floridata Plant Encyclopedia” and “Global Compendium of Weeds”.

##### *Ageratum conyzoides* (herb)

*Ageratum conyzoides* is a perennial weed distributed in many tropical and subtropical countries and is often difficult to control. It is an established weed in the Himalayas where several invasion research studies have been conducted in the Shiwalik Ranges. It has been found that *Ageratum* significantly reduces total biomass and species number, that is, biodiversity. It also changes vegetation community structure and modifies the soil regime.

**Origin:** Tropical America, especially Brazil

**Botany and ecology:** It belongs to Aster family (Asteraceae). It is a 0.5–1 m tall herb with ovate leaves 2–6 cm long, and flowers are white to mauve, and pollinated by insects. It cannot grow in a shade. In cold climate areas, it becomes an annual herb.

**Habitat:** A common weed of cultivated ground, especially in rice paddy environment, having spread from its native range to all areas of the tropics and subtropics.

**Use:** It has been cultivated as an ornamental herb. It has some medicinal values (details should be sought separately).

**Suggested Control:** Removal and burning before flowering.

**Common Names:** billy goatweed, blue *Ageratum*, blue flowered groundsel, blue top, goatweed, kakkoazami, Leberbalsam, maria preta, mentrasto, mother brinkly, pain doux, tekote tea, tropic *ageratum*, tropical whiteweed, white weed, winter weed

##### *Eupatorium cannabinum* (herb)

*Eupatorium cannabinum* is a woody perennial herb that prefers to inhabit and invade moist habitats such as swamps, marshes and stream banks. It forms dense monotypic stands that compete with and eventually crowd out native species. This species also has the ability to alter the nutrient structure of habitats it invades.

**Origin:** Europe

**Botany and ecology:** It belongs to Aster family (Asteraceae). It grows to 1.5 m tall or more and 1.2 m wide. It lives in moist low-lying areas in temperate Eurasia. It is dioecious with racemes of dusty pink flower heads, which are pollinated by various types of insects from July to early September. The fruit is an achene, 2 or 3 mm long, borne by a pappus 3 to 5 mm long, and distributed by wind.

**Habitat:** It grows in a wide range of damp or wet habitats, including ponds and lakes, rivers and canals, fens, marshes, wet meadows, and wet woodland. It can be also occasionally found in drier habitats, such as hedges.

**Use:** Medicine and ornamental.

**Suggested Control:** Removal and burning before flowering

**Common Names:** boneset, common Dutch agrimony, common hemp agrimony, eupatorio, gravel root, hemp agrimony, holy rope, linwe di tchet, St John's herb, water agrimony

***Parthenium hysterophorus*** (herb)

*Parthenium hysterophorus* is an annual herb that aggressively colonises disturbed sites. It was accidentally introduced into several countries, including Australia, India, Taiwan and Ethiopia. It affects the production of crops, animals, human and animal health, and biodiversity. Several characteristics, such as wide adaptability, photo- and thermo-insensitivity, drought tolerance, strong competition and allelopathy, high seed production ability, longevity of seeds in soil seed banks, and small and light seeds that are capable of long distance travel via wind, water, birds, vehicles, farm machinery and other animal traffic, contribute to its rapid introduction world-wide, cutting across national boundaries and climate barriers. In some areas, it has become an extremely serious agricultural and rangeland weed. It is known to be allergenic to some people and consumption by livestock can taint meat.

**Origin:** Mexico, Central and South America

**Botany and ecology:** It belongs to Aster family (Asteraceae). It is an annual (or a short-lived perennial), herbaceous plant with a deep taproot. In its neotropical range, it grows to 30-90 cm in height (Lorenzi, 1982; Kissmann and Groth, 1992), but up to 1.5 m, or even 2.5 m, in exotic situations (Haseler, 1976; Navie et al., 1996). Shortly after germination, the young plant forms a basal rosette of pale green, pubescent, strongly dissected, deeply lobed leaves, 8-20 cm in length and 4-8 cm in width. The rosette stage may persist for considerable periods during unfavourable conditions, such as water or cold stress. As the stem elongates, smaller, narrower and less dissected leaves are produced alternately on the pubescent, rigid, angular, longi-tudinally grooved stem, which becomes woody with age.

**Habitat:** It grows on any type of soil and in a wide range of habitats.

**Toxicity:** Contact with the plant causes dermatitis and respiratory malfunction in humans, and dermatitis in cattle and domestic animals. The main substance responsible is parthenin, which is dangerously toxic.

**Control:** Light infestations in cultivated fields may be hoed or weeded by hand if labour is available at acceptable cost. In general, the application of herbicides is expensive and often harmful, but sometimes chemical control of the weed proves necessary; Paraquat sprays may be applied while the weeds are young. Glyphosate is not effective against this species.

The most satisfactory and promising means of practical long-term control are biological. Several species that feed on the weed are variously in use or on trial in various countries.

**Common Names:** camomille balais, camomille z'oiseaux, congress grass, fausse camomille, herbe blanche, Karottenkraut, parthenium weed, ragweed parthenium, Santa Maria feverfew, whitetop weed

### *Lantana camara* (shrub)

*Lantana camara* is a significant weed of which there are some 650 varieties in over 60 countries. It is established and expanding in many regions of the world, often after clearing of forests for timber or agriculture. It impacts severely on agriculture as well as on natural ecosystems. The plants can grow in clumps or dense thickets, crowding out more desirable species. In disturbed native forests, it can become the dominant understory species, disrupting succession and decreasing biodiversity. At some sites, infestations have been so persistent that they have completely stalled the regeneration of rainforest for three decades. Its allelopathic qualities can reduce vigour of nearby plant species and reduce productivity in orchards. *Lantana camara* has been the focus of biological control attempts for a century, yet still poses major problems in many regions.

**Origin:** Central and South America

**Botany and Ecology:** It belongs to the verbena family (Verbenaceae). It is a perennial shrub growing to around 2 m tall, and forms dense thickets in a variety of environments. The leaves are broadly ovate, opposite, and simple, 5-12 cm long and 2.5-5 cm wide with rounded tooth edges and a textured surface. Stems and leaves are covered with rough hairs and emit an unpleasant odor when crushed. The small flowers are held in clusters of 2.5-5.1 cm across. The fruit is a berry-like drupe which turns from green to dark purple when mature. In the tropics, lantana is a non-stop bloomer, while in frost regions, it blooms in summer and fall only. Flower color ranges from white to yellow, orange to red, pink to rose in unlimited combinations. In addition, they usually change colors in time. A lantana may look orange from a distance, but the flowerhead consists of white, yellow and red.

**Habitat:** It is found in a variety of environments, including 1) agricultural areas; 2) forest margins and gaps; 3) riparian zones; 4) grasslands; 5) secondary forest, and 6) beach fronts.

It is rarely found in natural or semi-natural forests as it cannot compete with taller trees due to its intolerance for shade (thus, it grows at the forest edge). It can survive in a wide range of climatic conditions, e.g. drought, heat, humidity, and soil types, e.g. salinity soils. It is also relatively fire tolerant and can quickly establish itself in recently burnt forests.

**Control:** The most essential principle is not to give the lantana favourable habitats in the field. Biological controls have been tried, but no significant success achieved. Chemical controls have been made and showed some success. But it is expensive and may damage environment. Physical controls, meaning removal of plants, have also been made, but found expensive to engage manpower in larger scale.

**Common Names:** ach man, angel lips, ayam, big sage, blacksage, bunga tayi, cambara de espinto, cuasquito, flowered sage, lantana, lantana wildtype, largeleaf lantana, latora moa, pha-ka-krong, prickly lantana, shrub verbean, supirroza, Wandelroeschen, white sage, wild sage

### Attachment I.4.4.8 Lantana Status in HP State

*Lantana camara*s perhaps one of the most important invasive alien plant species (exotic weed) in forest ecosystems of India as also in Himachal Pradesh. Commonly called as ‘Phulnu’ or ‘Panchphulli’, *Lantana camara* is probably a native of South America which was introduced in India for ornamental purposes. At present, *Lantana* has infested open lands in tropical and sub-tropical regions of the world and is spreading like a wild fire.

*Lantana* weed is a perennial spreading shrub belonging to Verbenaceae family. The plant is in active vegetative growth during March to August (monsoon) and produces flowers and fruits during June to October. It is mostly dormant during November to February. The weed has strong horizontal root system spreading under the surface and moderately deep i.e. 25-30 cm in the soil. The leaves are thick and contain lantandens-A, a toxic substance for cattle. This clever plant stores its food material in roots and crown and is an exceedingly strong coppicer. Its main coppice strength lies in the ‘collar’ portion. It coppices from stem and branches. Besides, it also spreads through seeds and air layering, but does not spread through root suckers.

Information on circle and division wise data on *lantana* infestation in Himachal Pradesh is provided in the **Table 1**, based on 2015 data estimation and comparison with 2011 data.

**Table 1 Circle & Division Wise Data On Lantana Infestation as Per 2015 Estimation & Comparison with 2011 Data**

No	Circle	Division	2015 Estimation(Ha)					As Per 2011 Estimation (Ha)	Treated Upto 2015-16 (Ha)	Variation (Ha)
			25%	25%-50%	50%-75%	>75%	Total			
1	Nahan	Solan	965.40	1,092.40	1,737.90	3,078.90	6,874.60			
		Solan	965.40	1,092.40	1,737.90	3,078.90	6,874.60			
		Nahan	4,536.17	7,098.22	7,716.42	1,896.79	2,1247.60			
		Poanta	1,624.00	2,490.00	1,497.00	195.00	5,806.00			
	Renukaji	149.31	624.40	1,012.45	0.00	1,786.16				
	Total	Rajgarh	1,164.20	959.02	1,095.70	648.50	3,867.42	21,456.99	5,785.00	23,909.79
2	Bilaspur	Bilaspur	15,590.08	2,223.19	2,494.11	397.93	20,705.31			
		Kunihar	1,975.18	3,098.60	4,324.70	2,552.10	11,950.58			
		Nalagarh	1,402.88	1,837.99	2,557.33	1,615.72	7,413.92			
	Total		18,968.14	7,159.78	9,376.14	4,565.75	40,069.81	55,941.55	3,932.00	-11,939.74
3	Mandi	Mandi	0.00	34.00	310.00	265.00	609.00			
		Sundernagar	51.59	581.45	596.66	225.00	1,454.70			
		Nachan	40.00	191.00	0.00	0.00	231.00			
		Jogindernagar	969.60	1,690.00	308.60	33.00	3,001.20			
		Karsog	302.00	225.00	408.00	67.60	1,002.60			
	Total		1,363.19	2,721.45	1,623.26	590.60	6,298.50	7,900.00	2,502.00	900.50
4	Hamirpur	Una	795.45	4,529.99	6,631.63	793.06	12,750.13			
		Dehra	4,600.00	7,017.00	5,897.00	4,053	21,567.00			
		Hamirpur	2,734.25	2,724.36	2,526.50	1,052.84	9,037.94			
	Total		8,129.70	14,271.35	15,055.13	5,898.9	43,355.07	12,680.00	4,219.00	34,894.07
5	Dharamshal	Dharams	6,994.34	9,477.18	7,084.14	3,902.68	27,458.34			



Preparatory Study on Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project

No	Circle	Division	2015 Estimation(Ha)					As Per 2011 Estimation (Ha)	Treated Upto 2015-16 (Ha)	Variation (Ha)
	a	hala								
		Nurpur	4,639.52	7,998.42	18,350.67	16,129.08	47,117.69			
		Palampur	2,517.65	9,094.20	5,661.49	894.61	18,167.95			
	Total	14,151.51	26,569.80	31,096.30	20,926.37	92,743.98	47,403.00	8,460.00	53,800.98	
6	Shimla	Shimla	13.20	115.20	216.50	156.15	501.05	4,060.89	1,082.00	-2,477.84
7	Rampur		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Chamba	Chamba	997.00	672.14	459.74	1,159.57	3,288.45			
		Churah	0.00	92.00	0.00	0.00	92.00			
		Dalhousie	1,142.00	4,358.27	2,891.81	1,169.21	9,561.29			
	Total	2,139.00	5,122.41	3,351.55	2,328.78	12,941.74	4,631.77	4,169.00	12,478.97	
9	Kullu						575.70	0.00	-575.70	
10	WL(S)						475.06	0.00	-475.06	
11	WL(N)						1,160.00	255.00	-905.00	
12	WL(GNHP)						0.00	0.00	0.00	
	Total		53,203.82	68,224.03	73,778.35	40,285.74	235,491.93	156,284.96	30,413.00	109,619.97

Source: Compiled by JICA Study Team (2017) based on information from HPFD

### **Attachment I.4.4.9 Strategy and Methodologies adopted by HPFD for Management of the Invasive Species**

#### **1. HPFD's Strategy to Contain Spread of Invasive Alien/Lantana Species**

HPFD has formulated a strategy for rehabilitation of forests infested with invasive alien species during 2011. The Core Principles of the strategy are as under:<sup>1</sup>

##### **(1) Contain Future Spread:**

A close watch over the spread of exotic weeds will be kept through biennial monitoring mechanism and necessary corrections in the program will be made to remove the recent infestations on priority basis.

##### **(2) Complete Rehabilitation of Infested Areas**

It will involve shift from 'one time removal of weeds' to 'complete rehabilitation' of the treated areas by competing/ shading out exotic weeds. All noxious exotic weeds on any given area will be tackled simultaneously.

##### **(3) Reliance on Only Mechanical/Manual Methods**

In view of their environmental/ ecological concerns, the rehabilitation measures will NOT employ any Chemicals/ Biological methods of exotic weed control.

##### **(4) Natural Resilience of Native Flora to be the Basis of Rehabilitation Action**

The natural regeneration of indigenous plant species on treated sites will be encouraged and facilitated to establish towards better environmental and ecological services, including fodder, fuel, water recharge, etc.

##### **(5) No Exotic Species to be Used to Rehabilitate Treated Sites**

No potentially invasive exotic species – (viz. *leucaena leucocephala*, *prosopis juliflora*, *jatropha curcus*, *tecoma stans*, *tectona grandis*, etc.) - will be used for plantation in the areas under rehabilitation, because of their deleterious effect on the native flora.

Rehabilitation to start from Low intensity Infestation and to move towards Heavy infestation: -  
Rehabilitation activities will start from the fringes of infestation zone with lower intensity infestation and will progress towards the heavily infestation areas. This approach will (i) allow tackling larger areas with the given financial resources and result in creating quick visible impact, and (ii) help in containing further spread of exotic weeds.

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<sup>1</sup> Workshop outcome June, 2011.

## **(6) Selective Priority Rehabilitation of Heavily Infested Critical Habitats**

Rehabilitation of heavily infested areas as starting point will be taken up only in limited number of carefully selected critical habitats like grazing grounds near habitations. Such sites will then act as nucleus from where rehabilitation activity will radiate to adjoining areas of high infestation.

## **(7) Multi-Stakeholder Participation**

Since all landscape elements in the state are already infested with noxious exotic weeds, the departments/agencies dealing with different land use elements would need to join hands to effectively tackle this menace.

## **(8) Working under Campaign Mode**

The problem being enormous, it would need building larger societal consensus and engaging civil society organizations and local people/social groups to effectively tackle this problem. It is possible under a campaign mode for which viable implementation mechanism would be evolved.

### **i) Review of Lantana Eradication Activities<sup>2</sup>**

A review was undertaken by PCCF in November 2016 and it was observed that i) major support for the activity is coming from NPV component of CAMPA.

- ◆ From 2009-10 to 2015-16 around 30,413 Ha area has been treated.
- ◆ Success rate has been around 74% as per ground monitoring.
- ◆ Lantana existing on private lands adjoining forest areas has jeopardised the eradication effort due to spread / re-infestation with seed source from private areas.
- ◆ It was noted that as per Fresh survey carried out in 2015, area under Lantana infestation is 235,491 Ha (156,284 Ha – 2011 survey).
- ◆ Grasslands infested with Lantana will be restored as grasslands
- ◆ Natural Forests having existing native root stock will be allowed to restore to its natural vegetation.
- ◆ Areas without natural root stock will be restocked with Tall planting (200 – 500) seedlings.

## **2. Method for Removal of Lantana**

### **(1) Removal of Adult Clumps using 'Cut Root Stock' (CRS) Method:**

This method involves cutting the main tap root of Lantana plant beneath the 'coppicing zone' (transition zone between stem base and rootstock). This method of removal involves engagement of 2–3 individuals to work in a group for the removal of Lantana if the clumps are too large to be handled by one individual after the rootstock is cut. The steps involved in the cut rootstock method are:

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<sup>2</sup> *Lantana Review - HPFD Internal Document November 2016*

- 1) The person, who engages in removal of Lantana, is positioned in a way that he stands near centre of the Lantana clump with his back facing the clump and holding the handle of digger (kudal).
- 2) Using the specially designed digger, the person cuts the main rootstock of Lantana 3–5 cm below the soil surface by hitting the rootstock 3 or 4 times; while hitting the rootstock the blade of the digger gets lodged into the main tap root, and at this point it is useful to move the handle of the digger in the forward direction away from the body of the person so as to sever the connection of the clump with the main tap root. In case the clumps of Lantana form impenetrable thickets, it is advantageous to cut the rootstocks of 3–4 contiguous clumps to make the removal operation convenient. It may be noted that the branches of Lantana clumps should not be slashed/cut to gain access to the centre of the clump for its removal by cut rootstock method. The branches of Lantana thicket formed by more than one clump should be lifted and tipped over from one end by using a wooden or bamboo pole of about 1.5–2.5 m long and diameter 5–6 cm which is inserted just below the branches from one side and rolled over easily by two workers holding the pole at either end and pressing it so as to reach the centre of the clump.
- 3) Such manual handling of impenetrable thicket makes it possible to reach the centre of clump easily, as otherwise its umbrella type canopy makes it difficult to reach the main stem. Such physical maneuver also minimizes or prevents regeneration from rooted cut branches when they fall on the ground.
- 4) Lift the clump/(s) and place the clump/(s) upside down. If the clump is not placed upside down, the prostrate rooted branches and the aerial old branches having aerial roots at nodes may develop into adult plants when they come in contact with the soil. Therefore, the upside–down orientation of cut clumps is critical in the prevention of regeneration of Lantana from cut clumps. It may be noted that Lantana does not produce root suckers.
- 5) After drying the clumps, the clumps may be used as fuel or burnt at the same site or all the dried clumps may be collected at one place and then burnt. The best time for removal of Lantana is just before rainy season, i.e. when the plants are not in flowering and fruiting.

### Attachment I.4.4.10 Status and Key Achievements of the HP State Biodiversity Board

#### a) Biodiversity Management Committee (BMC)

As a strategy, series of capacity development initiatives are being taken up to sensitize and enable the Gram Panchayats (GPs) to constitute BMC. For creation of BMCs, priority has been set for GPs falling in mid-Himalaya region focusing on following four districts viz., Chamba, Kullu, Shimla and Sirmaur. These districts roughly constitute 1/3 of the local bodies. Recently, two more districts – Kinnaur and Lahul & Spiti have been included.

First round of awareness generation and sensitization started from May 22 – International Biodiversity Day. During first round, in all 1,089 GPs were covered – Chamba (283 nos.), Kullu (204 nos.), Shimla (363 nos.) and Sirmaur (239 nos.). Second round of awareness and sensitization would start shortly. SBB has also created bulk SMS system for communicating with all the GPs, and can offer such services to other department on cost basis. In all, 184 BMCs have been constituted so far.

SBB receives funds from NBA for supporting formation of BMCs. The support fund has been kept as 60,000 INR per BMC that is shared between NBA and SBB in 70:30 ratio. Initial, 10,000 INR are given as Corpus soon after opening of bank account, and balance 50,000 INR is passed-on in three instalments.

#### b) People's Biodiversity Registers (PBRs)

For better comprehension and dissemination, the 32 formats prescribed for creation of PBR have been translated into Hindi language. As per assessment of SBB, GPs require technical support for creation of PBRs, and thus as a strategy specialized institutions/ university/ colleges have been identified from within state and engaged for creation of the PBRs. Following table depicts the work allocations to the institutions for creation of PBRs.

**Table 1 Institutions engaged for creation of PBRs**

No.	District	Responsible Institution
1	Chamba	CSK Himachal Pradesh Agricultural University, Palampur
2	Kullu	G.B. Pant National Institute of Himalayan Environment & Sustainable Development, HP Unit, Mohal, Kullu
3	Shimla	Himachal Pradesh University (HPU), Shimla and Himalayan Forest Research Institute (HFRI), Shimla
4	Sirmaur	Dr Y.S. Parmar University of Horticulture & Forestry (UHF), Nauni, Solan

Source: Compiled by JICA Study Team, (2017) based on information from SBB

To ensure the content quality, an independent 13 members committee/ panel of experts has been constituted to review the PBRs created by the institutions on behalf of the BMC. SBB is receiving funds at a rate of 115,000 INR per BMC for creation of PBR. SBB is utilizing 100,000 INR per BMC for creation of PBR, and 15,000 INR is retained by SBB for facilitating the process. Out of this fund fee is provided to the institutions through the BMC in four stages viz., a) 25% upon signing of tripartite agreement, released as mobilization advance; b) 25% after

creation of draft PBR; c) 25% after the expert committee approves the PBR, and d) final payment of 25% after approval by SBB. The fee to the Expert committee is paid by the SBB for evaluation of the PBRs from its own funds. As of now, creation of 125 PBRs have been funded. PBRs for district Shimla would come first.

Earlier to this, some 12 PBRs in selected Biodiversity Management Committees were also created under the UNEP-GEF-MoEF funded project on “Strengthening the implementation of the Biological Diversity Act and Rules with focus on its Access and Benefit Sharing Provisions” in the state being coordinated by NBA. These PBRs have been finalized after three revisions, based on the feedback and suggestions from the Expert Committee.

#### c) Access and Benefit Sharing (ABS)

As per the section 41(3) of the Biological Act, 2002, BMCs have been entrusted with the authority to take decision on ABS. Further, under section 55(1), penalties are imposed for contravention of provisions of section 3 or section 4 or section 6, while section 57(1) talks about the offence or contravention under the Act committed by a company. In such cases, BMC would receive 95% of the penalties imposed from the users/ companies as benefits realized, while 5% would be retained with the SBB.

As the BMC get strengthened and knowledgeable about their powers and functions under the Act, notices could be served to the users/ companies/ industries who are engaged in extracting or utilizing biological resources without seeking permission from the respective BMCs and SBB. Soon BMCs need to exercise their right to issue various permits, including grazing permits which otherwise are being issued by the forest department.

Recognizing the requirements under the Act, Dabur has already approached SBB for signing MoU and seeking permission for extracting/ utilizing biological resources from Banjar (Kullu) and Lahul & Spiti. To open-up a dialogue, and for awareness generation and sensitization of industries/ companies, SBB is organizing training-cum-workshop involving CII on August 21, 2017 as well.

#### d) Threatened Species (TS)

For identification and confirmation of threatened species in the state two committees of experts/ scientists have been constituted separately for plant and animal species. Each committee would come out with a list of threatened species. The committee for animal species is headed by PCCF (Wildlife)/ Chief Wildlife Warden. The committee would also recommend the species to be prohibited or regulated. Accordingly, the state govt. will bring out the notifications.

#### e) Biodiversity Heritage Sites (BHS)

In the state, no site has been declared as Biodiversity Heritage Sites (BHS) yet, but has number of potential areas that can be recognized as BHS. Such areas include sacred groves/ forests and forests protected through Rakha system. Earlier, some 15 sites were identified.

Under the current regime, the strategy has focused on the ‘sacred groves’ in the state for which no comprehensive documentation is available. Now, SBB has engaged WWF for documentation of some 661 identified sacred groves. First such documentation for districts Shimla and Kullu is planned in 2017-18, whereas for the entire state it is planned sometimes 2018-19.

f) **Other Achievements**

As per the annual report for three financial years viz. 2015-16, 2014-15 and 2013-14, SBB have been taking up following activities:

- International Biodiversity Day celebrated on May 22 every year by state and all district headquarters, and Eco-Clubs;
- Organizing one-day awareness generation events on Biological Diversity Act, 2002 and associated actions e.g. workshops, television talks (Doordarshan), radio talks (AIR);
- Workshops on Eco-Audit with special emphasis on biodiversity;
- Workshops on Biodiversity Assessment and Management with Municipal Corporations;
- One-day capacity building trainings for GPs

The wetlands Chandertal, Pong dam lake and Renuka wetlands in Himachal Pradesh are recognized as Ramsar sites. There are 24 Important Bird Areas (IBAs). These IBAs harbour several threatened, restricted range, biome and congregatory species of birds in HP (BNHS 1999<sup>1</sup>).

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<sup>1</sup> <http://www.hp biodiversity.gov.in>

### Attachment I.4.4.11 Trekking Tours Conducted by HPESOSOC

Trek Name	Altitudinal Range (in feet)	Duration & Dates of Trek	Minimum /Max Participants	Degree of Trek Start Point End Point	Price	Total Cost (incl. travel by vehicles, handling charges etc.)	Trek Route
<b>Across the GHNP Tirthan to Sainj valley (8 days)</b>	5,000 to 15,000	2 Groups - 15th May to 22nd May (8 Days)	5 to 15	Trek Grading – Moderate to Hard Start/ End Point - Aut Market, Kullu (GHNP Shop) 7AM	1,200 INR per day (inclusive of equipment, staff, food & permits)	11,200 INR	Sairopa-Rolla-Shilt-Guntrao-Dhela-Humkani-Shakti-Chenga (stay in alpine tents/sleeping bags/on ground)
		5th June to 12th June 2010 (8 days)					
<b>Tirthan Valley Trek to the Source – Tirath (8 Days)</b>	5,000 to 12,000	2 Groups	5 to 15	Trek Grading Moderate/Hard Start/ End Point Aut Market, Kullu (GHNP Shop) 7 AM	1,200 INR per day (inclusive of equipment, staff, food & permits)	11,200 INR	Sairopa-Rolla-Balu-Majhauni-Tirath-Balu-Rolla-Sairopa (stay in alpine tents/sleeping bags/ on ground)
		15th May to 22nd May & 5th June 12th June 2010 (8 days)					
<b>Churdhar Trek (Sarain to Deya) (5 Days) Shimla Hills</b>	5,000 to 12,500	2 Groups; 22nd May to 26th May & 19th June to 23rd June, 2010 (5 Days)	5 to 15	Trek Grading - Moderate Start Point: 7 AM Tourist Information Centre	1,000 INR per day (inclusive of equipment, staff, food)	5,000 INR	Sarain-Churdhar-Manalag-Deya (stay in FRH/tents/sleeping bags/ sleeping on ground)
				End Point: 1.00 PM Shimla bus stand			
<b>Sainj valley Trek GHNP Ecozone (6 Days)</b>	5,000 to 9,000	2 Groups; 29th May to 3rd June (6 Days) 19th June 24th June 2010 (6 Days)	5 to 20	Trek Grading - Easy Start/ End Point Aut Market, Kullu (GHNP Shop) 7 AM	1,200 INR per day (inclusive of equipment, staff, food & permits)	8,100 INR	Neuli-Chenga-Shakti-Lapah-Shanghar-Neuli (Stay in tents/ huts/ sleeping bags/ on ground)
<b>Shalli Peak trek (Shimla Hills) one day trek</b>	6,000 to 9,000	3 Groups; 22nd May, 29th May & 5th June, 2010 (one day)	5 to 20	Trek Grading - Easy Start Point: Tourism Information Centre 7:00 AM	1,400 INR (inclusive of equipment, staff, food (breakfast, lunch & evening tea), to & fro journey from Shimla)	1,500INR	Khatnol -Shalli peak- Himri
				End Point: Shimla bus stand 8.00 PM			

Source: JICA Study Team (2017) based on the internal information from HPFD



## **Attachment I.4.4.12 Major Wildlife Schemes in HP State**

Brief descriptions of following schemes are provided hereunder.

### 1) STATE SECTOR SCHEME

- i) Wildlife Preservation
- ii) Development of Himalayan Zoological Park
- iii) Improvement and Development of Wildlife Sanctuaries

### 2) CENTRAL SECTOR SCHEME

- i) Assistance for Development of National Parks and Sanctuaries (Re-named as Integrated Development of Wildlife Habitats)
- ii) Development of Pin Valley National Park
- iii) Cold Desert Biosphere Reserve (CDBR):
- iv) Conservation Projects:
  - a) Cheer Pheasant Conservation Breeding Project
  - b) Conservation Breeding Centre for Monal (CBC) at Manali.
  - c) In-situ Vulture Conservation

### (1) STATE SECTOR SCHEME

#### **i) Wildlife Preservation**

After rationalisation of existing schemes, a new scheme namely, “Wildlife Preservation” has been introduced during the year 2001-02 in place of “Wildlife Management and Nature Conservation”, “Improvement and Development of Wildlife Sanctuaries” and “Awareness for Nature and Wildlife Conservation amongst youth”. The main objective of the scheme is payment of relief on account of loss/injury to human life and loss of livestock by the wild animals to reduce the man-wildlife conflict.

#### **ii) Development of Himalayan Zoological Park**

This is a continued scheme from the 7th Five Year Plan, three major zoological parks and 4 pheasantries are being maintained to exhibit fauna for the purpose of conservation in the state under this scheme. The focus of expenditure under this scheme is repair of existing enclosures, to provide small equipment and feeding of animals/birds kept in zoos/pheasantaries.

The major expenditure under this scheme is grant-in-aid to Himachal Pradesh Zoo Conservation Breeding Society constituted by HP state government whose mandate is proper zoo management and conservation/captive breeding of endangered species. Apart from this, feeding for captive animals and treatment of ailing wildlife and monkey sterilization programme is also being undertaken largely under this scheme.

### **iii) Improvement and Development of Wildlife Sanctuaries**

This scheme is continued from the 10<sup>th</sup> Five Year Plan for tribal areas. The focus of expenditure under this scheme is wildlife survey, habitat improvement, fodder and pasture improvement, plantation and soil conservation works, animals/birds census, infrastructure construction, etc.

## **(2) CENTRAL SECTOR SCHEME**

### **i) Assistance for Development of National Parks and Sanctuaries (Re-named as Integrated Development of Wildlife Habitats)**

The scheme envisages intensive management of wildlife sanctuaries and national parks in the state. Till 2014-15, this scheme was being 100% assisted by the Government of India (GoI). But, from 2015-16 it is being shared on 90:10 basis by the GoI and State Government respectively. The scheme envisages intensive management of wildlife sanctuaries and national parks in the state on modern lines. The major activities undertaken under this scheme are:

- ◆ Plantation of fruit and fodder species,
- ◆ Soil and moisture activities: like gully plugging, check dams, water ponds etc,
- ◆ Anti-poaching activities: establishment of patrolling camps, watch tower, deployment of anti-poaching camps,
- ◆ Organising raids to apprehend offenders,
- ◆ Supply of field ration to protection units,
- ◆ Provision of funds to informers,
- ◆ Fire protection measures like: maintenance of fire lines,
- ◆ Census of wildlife,
- ◆ Creation and up-gradation of road network, patrolling roads etc.
- ◆ Procurement of equipment: Camera Traps, GPS, Binoculars etc.
- ◆ Participatory fire management by involving local people,
- ◆ Removal of unwanted species of flora, fauna and invasive alien species etc.
- ◆ Creation of salt licks,
- ◆ Promoting community based eco-tourism programs,
- ◆ Supporting alternate livelihood practices,
- ◆ Conducting seminars and workshops with local people,
- ◆ Strengthen wildlife veterinary care, and
- ◆ Vaccination of livestock etc.

Presently, these activities are being carried out in 26 Sanctuaries and five National Parks.

### **ii) Development of Pin Valley National Park**

Till 2014-15, this scheme was also being 100% assisted by the GOI. But from 2015-16 being shared on 90:10 basis by the GoI and the state government respectively. The Pin Valley National Park is situated in the Pin Valley of Spiti sub-division of Lahaul and Spiti district. The area supports unique flora of cold desert eco-system. The Pin Valley National Park is one of the few

areas where snow leopard, which is a highly endangered species in the world is found along with its prey species. Besides, main birds and animals found in this park area are tibetan wolf, ibex, himalayan brown fox, himalayan blue sheep, wooly hare, marmots, weasels, snow cock, chukor, hill pigeon, yellow billed chough etc.

This is a continued scheme from 7th Five-Year Plan and during this period emphasis has been laid on creating the infrastructure, creation of posts. Efforts are being made to develop this park for providing proper protection to all wildlife specially snow leopard. Works like construction of buildings to all categories of staff, construction of bridle path/inspection paths, construction of water ponds, water harvesting structures, habitat improvement, fire protection measures, study and research works, soil conservation works will be carried out under this scheme.

### **iii) Cold Desert Biosphere Reserve (CDBR)**

CDBR represents the cold desert ecosystem. It represents natural, unique landscapes, culture, glaciers, wetlands, lakes, religious places, people and their traditions.

#### **Goal:**

Primary goal of management is to link the village level development issues (local livelihoods) with conservation of biodiversity at the CDBR. This needs to be done by integrating environmental, social and economic issues into a holistic framework based on the livelihoods of the natural resource dependent community.

#### **Approaches:**

In order to achieve the goal, it is imperative to integrate functions at three fronts: a) Working with local communities to reduce their dependence on CDBR's natural resources, b) Interventions to manage, monitor and protect the natural habitats and resources, c) Set up suitable structures for collaborative conservation planning and action

#### **Boundary:**

- North: State boundary with Jamin and Kashmir State
- East: International boundary with Tibet (China);
- West: Chandra river from Baralacha southward passing Topo Kma and towards south extreme Shingri Pass;
- South: South boundary of Pin Valley National Park.

Total Area: 7,770 Km<sup>2</sup>

Core Zone: 2,665 Km<sup>2</sup>

Buffer Zone: 3,977 Km<sup>2</sup>

Transition Zone: 1,128 Km<sup>2</sup>

Altitudinal Range: 3,300 -6,600 m

Flora:

Of the 985-species recorded from Lahaul & Spiti district, more than 500 species are estimated to exist within notified CDBR. Floristic diversity is utilized by the tribal communities for medicine, food, fuel, fodder, making agriculture tools, religious and other purposes.

Fauna:

Trans Himalayan Cold Desert is home to highly adaptive threatened fauna. Ibex, Blue Sheep, Snow Leopard, Tibetan Wolf, Red Fox are among peculiar species

Activities under CDBR:

1. Awareness and capacity building of local communities and staff about CDBR
2. Habitat restoration and Bio-Diversity conservation (in-situ conservation of endangered species; ex-situ conservation of herbs, shrubs and tree species)
3. Protection of habitat and reducing Human-Animal conflict
4. Enhancing and conservation of Natural Resources and watershed management (repair of existing bauris and wells; Snow and water harvesting by creating artificial glaciers; brush wood check dams; small check dams and check walls; Mulching and bio-engineering)
5. Reducing human dependency on CDBR by socio economic development (Entry point activities; household support; promotion of farm cultivation on arable land; Animal Husbandry)
6. Institutional Strengthening
7. Research and Studies

As a future conservation strategy, CDBR comprises, the protected areas namely Pin Valley National Park, Chandra Tal Sanctuary, Kibber Wildlife Sanctuary and habitations in between these protected areas. A harmonious relationship between conservation and development need to be developed and demonstrated.

**iv) Conservation Projects:**

**a) Cheer Pheasant Conservation Breeding Project**

The conservation breeding project has been approved by the Centre Zoo Authority, GoI at Khariun, Chail. During the last five years (2011-12 to 2016-17) about 17,000,000 INR has been spent to develop the pheasantry.

**b) Conservation Breeding Centre for Monal (CBC) at Manali.**

It has also served as a main center for education, research and conservation of Himalayan Monal.

**c) In-situ Vulture Conservation**

This scheme has activities aimed as follows:

- ◆ To estimate the number of nesting sites and nests of gyps species (*gyps bengalensis*) and Egyptian Vulture in Kangra district,
- ◆ To create better conditions for nesting/roosting and feeding places by arresting the shortcomings,

- ◆ To protect the nesting sites and vulture species by involving local communities,
- ◆ To know the movement, distribution and feeding ecology of vulture species in the state and to take appropriate actions based on research and monitoring, and
- ◆ To educate and generate awareness among local community and public about the vultures and their conservation benefits.

Attachment I.4.5.1 Working Circle Information (2013)

Table 1 Division-Wise Working Circle Area (2013)

Sr.No	Name of Division	Chil	Deodar	Deodar & Kail	Oak	Khair	Fir	Fir & Spruce	Protection	Plantation	Rehabilitation W.C	Bamboo	Subtotal
		Main	Main	Main	Main	Overlapping (O/L)	Main	Main	O/L	O/L	O/L	Main	
1	Mandi & Jogindernagar	11,114	-	4,397	3,913	-	2,029	-	16,005	11,264	-	-	48,723
2	Suket	5,375	-	5,624	-	-	-	-	11,542	5,447	-	-	27,988
3	Nachan	4,939	-	7,614	2,168	-	-	8,034	10,748	1,280	-	-	34,783
4	Karsog	-	-	-	-	-	-	-	12,984	-	20,830	-	33,814
5	Bilaspur	5,648	-	-	-	-	-	-	4,010	17,061	-	-	26,718
6	Nalagarh	2,179	-	-	-	-	-	-	2,366	1,881	-	3,808	10,234
7	Kuhinar	3,585	-	-	-	-	-	-	-	-	-	1,634	5,219
8	Kullu & Parvati	-	-	9,200	-	-	18,577	-	167,040	-	-	-	194,816
9	Seraj	-	-	3,393	-	-	4,666	-	18,986	-	-	-	27,045
10	Lahaul	-	-	-	-	-	-	-	20,796	-	-	-	20,796
11	Hamirpur	10,525	-	-	-	-	-	-	-	3,094	-	-	13,619
12	Dehra	7,125	-	-	-	-	-	-	-	4,933	12,884	342	25,284
13	Una	3,270	-	-	-	-	-	-	572	-	-	-	3,842
14	Palampur	3,977	-	-	3,509	-	-	-	21,839	9,480	-	-	38,805
15	Dharamshala	10,217	-	-	2,110	-	-	-	39,237	8,439	-	-	60,003
16	Nurpur	10,804	-	-	-	-	-	-	8,586	27,938	-	335	47,662
17	Pangi	-	-	-	-	-	-	-	-	-	11,478	-	11,478
18	Bharmour	-	-	4,133	-	-	-	1,143	130,480	-	-	-	135,756
19	Dalhousie	10,014	845	-	-	-	-	637	29,592	7,812	-	-	48,901
20	Chamba	2,511	-	3,958	-	-	-	4,137	56,064	5,390	-	-	72,059
21	Churah	-	3,631	-	-	-	-	6,271	73,496	1,237	-	-	84,634
22	Solan	3,840	-	-	1,501	-	-	-	6,403	-	-	-	11,744
23	Nahan & Poanta Sahib	3,554	-	-	-	1,665	-	-	19,079	-	-	979	25,277
24	Rajgarh	6,143	-	4,174	-	-	-	2,552	2,541	6,470	4,108	-	25,987
25	Ranukaji	1,792	-	-	-	-	-	-	4,340	-	10,829	-	16,961
26	Chopal	7,246	-	27,016	9,944	-	-	7,080	9,851	5,643	-	-	66,779
27	Rohru O Jubbal	1,117	-	12,101	-	-	-	16,451	108,804	4,950	-	-	143,423
28	Shimla & Theog	2,840	-	15,267	5,354	-	-	1,855	-	18,212	-	-	43,529
29	Kinnaur	-	-	3,520	-	-	-	5,101	13,519	-	-	-	22,140
30	Kotgarh & Rampur	7,193	-	15,818	1,356	-	-	16,030	11,808	1,622	-	-	53,827
31	Ani	897	-	2,182	-	-	-	2,635	19,572	-	-	-	25,287
32	Total	-	-	-	-	-	-	-	-	-	-	-	-
	Total	125,906	4,476	118,395	29,856	1,665	25,272	71,927	820,257	142,151	60,128	7,099	1,407,131

Sr.No	Name of Division	The Soil cum Biodiversity Conservation	B/L	Improvement	Selection	Afforestation	Grazing	Coppice	Eucalyptus	Sal	Biosphere Conservation	Neozoa W.C	Grand Total
		O/L	O/L	Main	Main	O/L	O/L	Main	Main	Main	O/L	Main	
1	Mandi & Jogindernagar	-	-	-	-	-	-	-	-	-	-	-	48,723
2	Suket	-	-	-	-	-	-	-	-	-	-	-	27,988
3	Nachan	-	-	-	-	-	-	-	-	-	-	-	34,783
4	Karsog	-	-	-	-	-	-	-	-	-	-	-	33,814
5	Bilaspur	-	-	-	-	-	-	-	-	-	-	-	26,718
6	Nalagarh	-	-	-	-	-	-	-	-	-	-	-	10,234
7	Kuhinar	12,664	-	-	-	-	-	-	-	-	-	-	17,883
8	Kullu & Parvati	-	1,749	-	-	-	106,473	-	-	-	-	-	303,038
9	Seraj	-	-	-	-	-	-	-	-	-	-	-	27,045
10	Lahaul	-	-	-	6,660	112	586,123	-	-	-	-	-	613,691
11	Hamirpur	-	-	-	-	-	-	1,963	-	-	-	-	15,582
12	Dehra	-	-	-	-	-	-	4,749	-	-	-	-	30,033
13	Una	-	-	-	-	-	-	550	-	-	-	-	4,392
14	Palampur	-	-	-	-	-	-	-	-	-	-	-	38,805
15	Dharamshala	-	-	-	-	-	-	1,059	-	-	-	-	61,062
16	Nurpur	-	-	-	-	-	-	5,103	-	-	-	-	52,765
17	Pangi	-	-	-	5,792	104,408	-	-	-	-	-	-	121,678
18	Bharmour	-	-	-	-	-	-	-	-	-	-	-	135,756
19	Dalhousie	-	-	-	-	-	-	-	-	-	-	-	48,901
20	Chamba	-	-	-	-	-	-	-	-	-	-	-	72,059
21	Churah	-	-	-	-	-	-	-	-	-	-	-	84,634
22	Solan	-	-	-	-	-	-	-	-	-	-	-	11,744
23	Nahan & Poanta Sahib	-	-	-	-	-	-	15,113	764	19,046	-	-	60,200
24	Rajgarh	-	-	-	-	-	-	-	-	-	-	-	25,987
25	Ranukaji	-	-	-	-	-	-	10,405	-	-	-	-	27,366
26	Chopal	-	-	-	-	-	3,815	-	-	-	-	-	70,594
27	Rohru O Jubbal	-	-	-	-	-	-	-	-	-	-	-	143,423
28	Shimla & Theog	-	-	-	-	-	-	-	-	-	19,857	-	63,386
29	Kinnaur	438,176	-	-	-	-	-	-	-	-	-	2,845	463,160
30	Kotgarh & Rampur	-	-	-	-	-	-	-	-	-	-	-	53,827
31	Ani	-	-	28,216	-	-	-	-	-	-	-	-	53,502
32	Kullehar	-	-	-	-	-	-	-	-	-	-	-	-
	Total	450,840	1,749	28,216	12,452	104,520	696,411	38,941	764	19,046	19,857	2,845	2,782,771

Source: Compiled by JICA Study Team (2017) based on HP Forest Statistics 2013

**Table 2 Working Circle Wise- Area and Growing Stock**

No..	Working Circle	Growing Stock M <sup>3</sup> (Millions)	Area (Km <sup>2</sup> )
1	Chil	10.21	1,258.85
2	Deodar/ Deodar and Kail	28.53	1,228.70
3	Oak	3.60	298.56
4	Khair	0.214	16.64
5	Fir/ Fir & Spruce	24.40	971.98
6	Protection	42.89	8,202.57
7	Plantation	3.40	1,421.51
8	Rehabilitation W.C	7.92	601.27
9	Bamboo	0.24	70.98
10	Selection	5.04	124.52
11	Sal	4.85	190.45
12	Bio Sphere Conservation/BL (WC)	0.175	198.57
13	Coppice	6.79	389.40
14	Soil cum Biodiversity Conservation	0	4,508.39
15	Broad leaved WC	0	17.48
15	Improvement	0	282.15
16	Afforestation	0	1,045.20
17	Grazing	0	6,964.11
18	Eucalyptus	0	7.63
19	Neozsa	0	28.44
20			
	Total	138.29	27,827.51

Source: Compiled by JICA Study Team (2017) based on HP Forest Statistics 2013

## Attachment I.4.5.2 Descriptions of Working Circles in HP State

Table 1 Working Circle Description

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
1	Chir	Main	To tend the existing crop (pole) properly. Progress properly to obtain normal growing stock and regeneration. Improving the stocking of poor stands through artificial regeneration. Extending the area under chir pine in degraded blanks not suitable for other species. Supplementing the areas with natural and artificial regeneration. Manage the forest in such a way to bring maximum possible timber yield and resin per unit area after meeting the bonafied needs of the local right holders.	All forests bearing a predominantly chil pine ( <i>pinus roxburghii</i> ) crop and located on easy slopes were allotted to this working circle. It also includes the areas where chil plantations have been established. The vegetation of this circle corresponds to 9/c 1(b) sub-tropical Himalayan chil pine forests. chil is dominant species of all the forest allotted to this Working Circle. chil forest generally occurs between 1,200 -1,800m elevation. At lower limits, it occupied northern aspect and restrict itself to cooler locations. Its density and quality on southern and south-western slopes along ridges is rather poor. Chil tree grows to a height of 30–50 m (98–164 ft) with trunk diameter of up to 2 m -3 m. The bark is red-brown, thick and deeply fissured at the base of the trunk, thinner and flaky in the upper crown. The leaves are needle-like, in fascicles of three, very slender, 20–35 cm long, and distinctly yellowish green. Usually, the accumulating carpet of needles on the forest floor under these trees makes it unsuitable for other plants to grow. Rhododendron and Himalayan nettle are often found thriving well under chil trees.	Mandi & JNagar, Suket, Nachan, Bilaspur, Chopal, Rohru & Jubbal, Shimla & Theog, Kotgarh & Rampur, Ani
2	Deodar	Main	Conversion of irregular deodar forests into uniform forests. Progress in the direction of getting a forest of normal age class distribution and normal regeneration. Obtaining the maximum progressive, increased yield of timber, tending regenerations already obtained in the area. Improving plant health by removing overhead shade, reducing fire hazards by increasing deodar in suitable localities. Plantation of trees in areas where less or no regeneration. To meet the needs of local right holders for timber.	Deodar ( <i>cedrus deodara</i> ) is a commercially very important species, the forest areas predominantly under this species are covered under this working circle. Deodar is usually found on more or less easy slopes and well drained loamy soil between elevations of 1,800 to 2,500m. Deodar occurs either pure or mixed with kail trees. Natural regenerations of Deodar are generally found in areas where the soil is well drained and porous. In Himachal, the broad leaved trees associated with Deodar are walnut ( <i>juglans regia</i> ), Bird cherry ( <i>prunus cornuta</i> ) Hazel ( <i>corylus jacquemontii</i> ), Maple (acer species), Horse chestnut ( <i>aesculus indica</i> ), Hum ( <i>fraxinus excelsior</i> ).	Dalhousie, Churah



No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
3	Deodar/Kail	Main	Conversion of irregular deodar and kail forests into uniform forests. Progress in the direction of getting a forest of normal age class distribution and normal regeneration. Obtaining the maximum progressive, increased yield of timber after meeting the legitimate demand of local bartenders and restocking the fire blanks areas as speedily as possible, tending regenerations already obtained in the area. Maintaining the dual objective to maintain ecosystem and beauty of tourist places. Avoid sacrifice of immature stock, by retaining compact well grown groups of poles as part of future crop. Improving plant health by removing overhead shade, reducing fire hazards by increasing deodar in suitable localities/creating green belts of fire resistant trees and crown thinning.	Deodar ( <i>cedrus deodara</i> ) requires a well drained soil and occurs on all types of soils but it prefers comparatively heavy soil formed by the disintegration of granite rocks. Fine quality Deodar stands are found on such soils all over the tract and can be seen at Shangarh. Deodar generally occurs pure but sometimes mixed with kail ( <i>pinus wallichiana</i> ) at the lower extremes and Spruce on the higher reaches	Mandi & J/Nagar, Suket, Nachan, Kullu & Parvati, Seraj, Chopal, Rohru & Jubbal, Shimla & Theog, Kinnaur, Kotgarh & Rampur, Ani
4	Oak	Main	Improve the stocking of these forests so as to obtain maximum possible yields of firewood and charcoal by effective closure and carrying out artificial sowing, regeneration and plantations. Protecting the crop against heavy and indiscriminate lopping and hacking. Regenerate areas with ban oak only wherever possible and prepare for commercial working and obtaining maximum possible yields of firewood and charcoal if and when this is economically feasible. Continue the efforts towards conversion of irregular forests into regular forests. To avoid sacrifice of immature stock by retaining compact well grown poles, as part of future crop.	The working circle includes the entire ban oak ( <i>quercus leucotrichophora</i> ) as well as Mohru and Kharsu forests and other broad-leaved forests. These forests can be worked for meeting the firewood and charcoal supplies and demand for fodder of the area. It occupies the lowest, position on southern aspects and comparatively lower elevations on the northern slope and along nalas. In comparison with other moist temperate types, it occupies drier as well as warmer sites and may be viewed as their least mesophytic form. Geological formation has very little influence on the distribution of the Oak forest which builds up a good soil rich in humus. The ground is naturally well drained and oak occupies all but really wet soils. The ban oak is the common low-level oak of the moist zone and is the major species over considerable area which varies from 1300 to 2100 m. It thus, overlaps the altitudinal zones of all the lower conifer is the common companion of the blue pine, deodar, and spruce. Areas near habitations are generally heavily lopped. Species like rhodendron, lyonia ovalifolia, litsaea are important associate of Ban oak. In higher reached Mohru and Kharsu Oak are also represented in higher reaches. Oak is a moderate to large evergreen tree. It is distributed all along the outer Himalaya. It is capable of growing on the hottest and driest hillsides and in such situations, it is stunted and gnarled. In moist valleys it is a tall straight tree.	Mandi & J/Nagar, Nachan, Chopal, Shimla & Theog, Kotgarh & Rampur

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
5	Khair	Overlapping	To harvest mature & over mature khair trees; Create and regenerate the species, naturally or artificially; improve the quality and density of khair in the forests to sustain and enhance local livelihoods; remove and arrest the spread of lantana below established and growing khair;	This is an Overlapping Working circle; It is common in the sub-Himalayan tract and outer Himalayas ascending from 900 to 1,200 m distribution of khair ( <i>senegalia catechu</i> ) shows various forms, appear representative of another tolerably well-defined areas. Occurs in tropical moist deciduous forests, dry tropical forests and tropical thorn forests. The record distribution of khair shows that the various forms of it, rather than overlapping, appear representative of none or another tolerably well-defined areas. Acacia catechu occurs in tropical moist deciduous forests, dry tropical forests and tropical thorn forests in the following sub-types as given by Champion and Seth (1968).	Nahan & Poanta
6	Fir	Main	Maintain forest cover for soil and water conservation, planting up the areas which carry less growing stock than its capacity. Tending and improving the growing stock by replacing the irregular crop into normal even aged crop. Avoid the sacrifice of immature stock by retaining compact well grown groups of poles, as part of future crop.	As per the Classification based on Champion and Seth the area between coniferous forests and broad -leaved forests have extreme distinct vegetation zones. Fir working circle areas are found in between these two extreme distinct vegetation zones of mixed deciduous forests. Firs can be distinguished from other members of the pine family by the unique attachment of their needle-like leaves to the twig by a base that resembles a small suction cup. The leaves are significantly flattened, sometimes even looking like they are pressed.	Mandi & Jogindernagar, Kullu & Parvati, Seraj
7	Fir & Spruce	Main	To restock the areas deficient in regeneration either naturally or through artificial means. Gradual conversion of irregular stock to normal stock thus to build up growing stock. To improve the existing soil covers for water and soil conservation. Obtain normal forests with normal distribution of age classes as far as possible. Restock all the poorly stocked areas and blank patches by natural and artificial means. Improve the biodiversity of the areas and to achieve progressively increasing sustained yield of fir and spruce timber consistent with the scientific management.	The forests in this Working Circle mainly fall into Champion and Seth type 12 C1d (Western Himalayan moist temperate mixed coniferous forests, and 12 CII b (Western Himalayan upper oak-fir forests) with some patches of 12 Cle on raoist locations and along nallahs. The main species are silver fir and spruce occurring pure or with an admixture of silver fir, spruce, kail and deodar in varying proportions according to the change in locality and climatic and edaphic factors. kail and deodar are found at the lower extremes of this working circle forming a small admixture while fir occupies the highest locations. Spruces and fir are large trees and reach a height of about 20–60 m (spruce) and 10-80m (fir) when mature. Spruce has whorled branches and conical form which distinguishes it from Fir having a unique attachment of their needle like leaves and by their different cones.	Bharmaur, Dalhausie, Nachan, Chamba, Churah, Rajgarh, Chopal, Rohru & Jubbal, Shimla & Theog, Kinnaur, Kotgarh & Rampur, Anni

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
8	Protection	Overlapping	Preserving and protecting forests from denudation and erosion. Following principles of soil conservation to provide grazing requirements of sheep, goats, and buffaloes of local migratory graziers. Prevent indiscriminate and ruthless hacking and lopping of fodder trees especially near habitations. Protecting and preserving valuable forest wealth from indiscriminate felling. Taking measures to improve the stocking and improve the forage and fodder value of these forests. Consistent with the principles of silviculture with a view to meet the demand of local right holders for timber, fuelwood and fodder. To conserve the environment around tourist centres and to maintain and enhance their utility and beauty for tourists.	The forests allotted under this working circle have their scattered distribution throughout the tract. This working circle includes all the forest having precipitous and broken terrain comprising of conifers, Ban or open crop of broad leaved species which was subject to indiscriminate lopping and hacking in the past. The degraded, sparsely stocked subject to heavy erosion requiring adequate effective protection cover, and found unfit for allotment to other working circles have been allotted. This working circle includes all the forests which are located on steep to precipitous slopes, on broken terrain comprising conifers, ban or open crop of broad leaved species are subjected to indiscriminate hacking in the past and requires rest for recuperation. These forests are mainly situated on difficult, precipitous and erodible terrains and form the catchments of rivers and other perennial streams. It also includes such areas of oak working circle of the plan under revision as are situated on difficult terrains and warrant protection from future degradation. In addition, areas having problems like invasive alien species; frequent fires, encroachment, illicit felling etc have also been included in this working circle. These forests are maintained for the preservation of biodiversity and are also required as permanent clothing to the difficult terrain. The overall stalking is not good generally and requires special efforts to preserve existing stock as well as for improving composition as well as density of crops. This working circle contains all the forests which are not included in other working circles described above. These forests are on steep and precipitous slopes where concentrated felling is not advisable due to environmental hazards and regeneration problems. The blanks and other degraded areas are to be rehabilitated by planting species suitable to the area.	Mandi & J/Nagar, Suket, Nachan, Karsog, Bilaspur, Kullu & Parvati, Seraj, Lahaul, Pangi, Chopal, Rohru & Jubbal, Kinnaur, Kotgarh & Rampur, Ani
9	Plantation	Overlapping	Involvement of local people in planning execution and management of plantation areas near habitation so as to have better survival rate and develop sense of ownership and belongingness amongst the villagers. Raise plantation of the economically important and fodder yielding species. Augment forest resources of the area in order meet the demands of the villager for firewood, fodder, NTFP and timber. Replace	These areas situated near habitations of are steep slopes and big blanks. All blanks areas or degraded forest areas or existing plantations are kept in this working circle. This working circle includes all the areas which are poorly stocked and are suitable for raising plantation of valuable and economically important species. Forests allotted to this working circle are mixed and scrub type. Specific areas are	Mandi & J/Nagar, Suket, Nachan, Bilaspur, Lahaul, Pangi, Chopal, Rohru & Jubbal, Shimla & Theog, Kotgarh & Rampur

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
			gradually the inferior weed infested forests with more valuable commercial as well as species most suited to local population. Check denudation and soil erosion by massive vegetative measures. Conserve soil and water through afforestation of blank and degraded forests thereby regulating the flow of water in the streams. To raise compact plantations to make the raw material available for wood based industries. Rehabilitation of degraded, low density areas with suitable species. Raising of energy plantations for fuel-wood production.	included where site factors are favourable for raising plantations. These are used as grazing grounds and encroachment is often seen in these areas. Often these working circles comprise of young crops which need further protection or are devoid of any tree growth. This working circle often consists of 9 Cab Upper or Himalayan chir pine; 9 C1/DS1 Himalayan Sub tropical scrubs; 9C1/DS2 Sub Tropical Euphorbia Scrubs; 10C 1 a <i>olea ferruginea (olea cuspidata)</i> scrub forests.	
10	Rehabilitation	Main	Rehabilitation of degraded forests by affording them rest and restocking with appropriate species. Protect the vulnerable hill slopes against landslides and sinking by taking effective soil conservation measures. Consistent with the principles of sound silviculture and scientific land management, to meet the demand of right holders for timber, fuel-wood, grazing and other non-timber forest products.	This working circle comprises of forest areas which are in precipitous terrain, active landslides and soil erosion or have become degraded under heavy biotic pressures. Regions which have become unfit for further commercial exploitation in their present state.	Karsog, Pangi, Dehra, Rajgarh, Renukaji
11	Bamboo	Main	Carry out operations for the rehabilitation of bamboo forests which are having congested and heavily lopped crop. Improving the stocking of inferior species of bamboos by better species. Preserve and propagate bamboos in suitable areas to meet the bonafied domestic requirements of local population for cottage industries like basket making. Exploitation of bamboos for industrial use on a sustainable basis.	The working circle is non-overlapping; all predominantly bamboo bearing area are mostly found in Nahan range. Commercially exploitable bamboo areas with a minimum 250 clumps of bamboos per hectare. It also includes bamboo growing degraded areas with other broad-leaved species like sain, amaltas, aonla etc are also found in but are in limited extent.	Nahan & Ponta
12	Soil cum Biodiversity Conservation	Overlapping	To manage the forests, grasslands, nallas, streams and rivers as part of the overall landscape for purposes of improved hydrology and to reduce soil erosion. Improve the stocking of forest for climate moderation. Conserve the forest for meeting the genuine demands of the populace of fodder, fuel, timber and non-timber forest produce. Improve the biodiversity of the area through suitable managerial interventions like rehabilitating areas infested with invasive alien species and emphasizing on plantations of native species and species of medicinal value. Prevention of land degradation by adopting multidisciplinary integrated approach; improve the land capability and moisture regime in the watershed by vegetative and mechanical means. Involving local people in the management of watershed. Improve the ecology of the area.	As no exploitation of forests is involved, therefore, no silvicultural systems are prescribed. There is no green felling except to meet the bonafide demand of right holders. The requirements would however, be met with as far as possible from salvage removals. The forests are protected from soil and water conservation, aesthetic and tourist points of view besides maintaining the ecological balances. The forests of this circle represent almost all forest types. The forests which are situated on steep and precipitous slopes, near major streams and nallas, on either side of National/State Highways, railway line, areas susceptible to erosion, near habitations where the biotic interference was high and around places of tourist importance etc. are allotted to this working circle.	Kunihar, Kinnaur

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
13	Broad Leaves	Overlapping	To protect and conserve Oak, Birch and other valuable broad-leaved species in the forest. To improve the stocking of Oaks, Birch forests and also of other valuable species i.e. <i>Acer caesium</i> , <i>prunus padus</i> , <i>juglans regia</i> , <i>carpinus</i> spp, by bringing them under systematic and scientific management. Ensuring that right holders get fuelwood and fodder at sustainable basis, in perpetuity from these broad-leaved stands. Rehabilitation of river banks and its tributaries by planting kosh and poplar for enhancing aesthetic beauty on one hand and for meeting demand of fuelwood particularly for cremation purposes.	It comes under overlapping working circle. Includes low lying scrub forests with broad leaved vegetation, oak forests also come under this category. The other species covered under this working circle are pure kharsu oak, mohru oak, ban oak, birch. Mixed forests of maple, birdcherry, walnut, hill poplar, horse chestnut, hill toon etc. Broad leaved species are found scattered, as also in groups in the deodar-kail and fir forests. The broad-leaved WC conform to Champion and Seth's classification -12/C1e (moist temperate deciduous forest), 12/C1a (ban oak forests), 12/C-2a locations, nala strips, banks of streams and rivers have walnut, <i>acer caesium</i> , <i>prunus padus</i> , <i>aesculus indica</i> , <i>cornus</i> spp, <i>rhus punjabensis</i> , <i>carpinus</i> spp., <i>alnus nitida</i> , <i>ulmus wallichiana</i> etc.	Kullu & Parvati
14	Improvement	Overlapping	To improve the stocking of grasses with better varieties, suitable to the localities. Assess the grazing capacity of grazing areas. Consistent with erosion control, to provide for grazing requirements of local migratory graziers. Protection of hills from denudation and erosion by preserving existing cover and by taking effective soil conservation measures. To raise plantations of timber and fodder species. Encourage stall feeding and making efforts to improve local breeds with improved breed cattle.	Alipne pastures and III Class forest area adjoining the habitations and in the vicinity of villages are covered under this working circle. All degraded forest areas which are either close to habitation or facing biotic pressure due to degradation, overgrazing etc. The main forest types under this working circle are 14/DSI (sub alpine pastures), 15/C-3 (alpine pastures), 9C-1b (Himalayan chir pine), 12/C-1a (ban oak forests), 12/C-1e (moist temperate deciduous forests) and 12/C-1f (Low level blue pine forests).	Karsog, Kullu, Banjar, Anni
15	Selection	Main	Improve the vegetative cover by providing protection to the existing growth. Maintain existing forest cover for aesthetic reasons. Preserving the existing vegetative cover for protection, development and scientific studies of wildlife in the tract in general and game sanctuary area in particular. To carry out plantations of important timber, fodder and fuel species to improve the vegetative cover in open areas and to improve utility of forests to local population. Planting of ornamental plants along the highways towns and industrial areas. To protect and introduce bhabar grass. Conserve soil and water carrying out soil and water conservation measures, meet the demand of local people for timber fodder and fuel.	Comprises of mixed forests on little steeper slopes where selection markings are considered better to prevent soil erosion. Comparatively less steep slopes which are fit to be working under this selection system are selected. Deodar is the main species in this working circle along with spurs, firs, spruce etc. Most of the areas under this circle are situated at high elevation above human habitation and agricultural land. Mainly the objective is to replace the inferior species with more valuable species plantation and to increase the proportion of more valuable species.	Lahaul , Pangi
16	Afforestation	Main	Increase in the area under tree cover thereby checking soil erosion. Improving the existing forests in density and growth. Raising regular plantation of species suitable for plantation in the blanks on the rivers and raise plantations of deodar, kail, fir, willow, poplar, robinia, maple and ash etc in the forest	Some forests where excessive grazing takes place throughout the year are included under this working circle. Basic consideration in constitution of this working circle is to improve the lot of such areas which are subjected to heavy local grazing as well as seasonal migratory grazing	Lahaul, Pangi

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
			areas which have deteriorated and now consists of blanks with a few trees standing scattered all over the area. Manage forests on a sustainable basis so as to reduce the pressure on more valuable traditional forests. Improving the existing density and growth and their extension by natural and artificial means, so as to bring them to their full productive potential. to provide for migratory and local grazing in perpetuity consistent with the principles of soil and water conservation. Bring a qualitative as well as quantitative improvement in degraded forests and pasture lands thereby increasing the availability of fuel, fodder, grasses and small timber from them. Consistent with the above principles to meet the local demand all over the area.	by taking suitable afforestation, soil conservation and pasture improvement measures. Generally varied type of forest areas are included under this working circle.	
17	Grazing	Overlapping	Assessing the grazing capacity of grazing alpine grounds and to assess the extent of pasture lands, available in both grazing grounds on lower slopes, near the habitation and alpine pastures. To improve the stocking of grasses with better varieties, suitable to the localities. Consistent with erosion control, provide for grazing requirement of local and migratory graziers. Protection of hills from denudation and erosion, by preserving existing cover and by taking effective soil conservation measures, raising plantations of timber and fodder species for meeting the requirements of local people in such a way that the primary objective of maintaining grasslands does not get jeopardised. Conversion of un-demarcated forest into demarcated protected forest	All Alpine pastures and areas above tree line are constituted in this working circle; apart from these sub-alpine pastures and the local grazing grounds in low lying areas are also included. Being an overlapping working circle it intrudes upon the other working circles including the locally known as dhars or trackers and local grazing grounds. Some forest areas in the State are allocated exclusively for this working circle. In the lower altitude, regions close to habitations are generally badly denuded and eroded due to over grazing.	Kullu & Parvati, Lahaul, Chopal, Rohru
18	Coppice	Main	To improve the condition of forests qualitatively by replacing uneconomic scrub species with economic species; meet the fodder, firewood and other biomass needs of the people; restock the existing forests by adequate natural and artificial regeneration; sustain supplies of khair for local livelihood opportunities.	All those species which are good coppice and required to be managed for fuelwood and small timber on short rotation are kept in this working circle. For example, khair, eucalyptus, ban oak.	Hamirpur, Dehra, Una, Dharamshala, Nurpur, Nahan & Poanta, Renukaji
19	Eucalyptus	Main	Felling the existing plantations which are stagnating and the area regenerated with the coppice crop of eucalyptus and supplemented by planting important fodder species. Fell eucalyptus to meet the local requirements of fuel wood and small timber. Gradually replace eucalyptus, if found not growing satisfactorily, by other important species of timber, fodder and fuel.	A mature eucalyptus may take the form of a low shrub or a very large tree. As a generalisation "forest trees" are single-stemmed and have a crown forming a minor proportion of the whole tree height. Nearly all eucalyptus is evergreen, but some tropical species lose their leaves at the end of the dry season. As in other members of the myrtle family, eucalyptus leaves are covered with oil glands. Eucalypts draw a tremendous amount of water from the soil	Nahan & Poanta

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
				through the process of transpiration. They have been planted (or re-planted) in some places to lower the water table and reduce soil salination. Eucalypts have also been used as a way of reducing malaria by draining the soil, which provide a habitat for mosquito larvae, but can also destroy ecologically productive areas. This drainage is not limited to the soil surface, because the eucalyptus roots are up to 2.5 m (8.2 ft) in length and can, depending on the location, even reach the phreatic zone. This working circle overlaps the areas of protection and afforestation working circle. Eucalyptus plantations were raised but did not respond favourably in most areas, In patches with good soil depth the response was favourable. All those patches with good eucalyptus plantations have been allotted to this working circle.	
20	Sal	Main	Convert the present irregular crop into more or less uniform crop, conserve and regenerate the present Sal forest with Sal and other broad-leaved fodder and fuel wood species by natural regeneration supplemented by planting. Manage these forests to obtain timber requirements for National use and to meet the requirement of local right-holders. Harvest progressively increasing yield of timber and fuel wood in perpetuity.	Forest with predominant sal crop ( <i>shorea robusta</i> ) are kept in this. The area comprises of foothills and gentle slopes. Main objective is to convert irregular crop into less uniform crop; regeneration of sal crop along with other broad-leaved species for fodder and fuelwood production.	Nahan & Poanta
21	Biosphere Conservation	Overlapping	Protection of hills from denudation and erosion. Conservation of moisture and regulation of flow of water in nallas and streams. Preserve the environment around tourist centres and along the highway to maintain and enhance their utility and beauty for tourist recreations and for wildlife. Prevent indiscriminate lopping of trees. Introduce valuable species especially for the production of fuel and fodder by artificial planting in the blank areas. Consistent with the above, to meet the demands of local right holders entirely on silvicultural principles regarding timber, fuel wood and grazing. Manage the forests of this working circle as a source of water conservation.	Generally the region under this working circle is close to the major streams and nallas on either sides. It covers area close to National/State highways, railway line, erosion prone areas, regions close to habitations where the biotic interference in high and around places of tourist interest. Main interest of working under this working circle is to protect the denudation and erosion, conservation of soil moisture, preserve environment around tourist centres and prevent indiscriminate lopping, and to conserve the overall forest area and ites biodiversity as much as possible.	Shimla & Theog

No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
22	Neoza	Main	To regenerate degraded and poorly stocked neoza pine forest. Reduce unregulated and unrestricted grazing in the pine bearing forests, much beyond the carrying capacity.	Dry cold areas supporting growth of <i>pinus gerardiana</i> (neoza or chalgoza) which is endemic to kinnaur area are kept in this circle. Neoza is a high-quality edible seed and grows in inner dry areas of Himachal Pradesh mainly in Satluj valley. Local people have rights to collect and sell seed without hindrance due to which overexploitation is happening. Rotational closures against grazing and plucking of cones for planting/sowing or for obtaining natural regeneration is generally done.	Kinnaur
23	Wildlife Management	Overlapping	Working with the communities to reduce their dependencies on the forests to minimize human-wildlife conflict. Interventions for habitat management, interventions to manage monitor and protect wildlife. Taking steps to reduce poaching by enhanced interface with local population. Facilitate organizing of community based organisation, user groups develop strong linkages with panchayat level through consultative process. Maintain and protect natural vegetation, providing facilities and opportunities in natural areas for purpose of formal research and study. Protect the cultural, historic sites such as Sacred Groves for research purposes as elements of the cultural heritage.	This working circle is constituted for emphasizing the necessity of conservation of wildlife and collection of information for better management of wild life. Includes faunal as well as floral life or biodiversity as a whole. overlaps with multiple working circles. The wildlife management circle contributes in the form of scientific, aesthetic, economic and recreational points of views. Therefore, adequate protection and scientific management is absolutely necessary.	Mandi & Jogindernagar; Kunihar; Chopal; Kotgarh & Rampur
24	NTFP	Overlapping	Systematic rotational collection of different herbs, restricting heavy grazing to avoid destruction of medicinal herbs as these species do not produce sufficient seeds/vegetative form of regeneration. Raising nurseries and herbal gardens and promoting research through research institutes in the state for medicinal and aromatic plants. Educating medicinal plants collectors on proper information and guidelines for proper regeneration of medicinal plants. Involvement of community based organisations like panchayats, Mahila Mandals, Yuvak Mandals, VFDCs and other rural co-operatives need be involved in the development, protection, propagation and conservation of medicinal plants.	It is constituted to ensure systematic development and exploitation of NTFP like fodder, fuelwood, medicinal plants and resin species that occurs in this division. The area is very rich in medicinal plants but so far not much scientific efforts has been made to preserve and propagate the medicinal plant species. Forest management has undergone change since 1980's (National Forest Policy) from timber management to NTFP. Conservation and propagation of NTFP under in situ conservation of natural eco-systems are the main concern area. This is an overlapping working circle, covering all the working circles ensuring systematic development and exploitation of non-timber produce species occurring in the area.	Mandi & Jogindernagar; Kullu & Parvati; Lahaul; Pang; Chopal; Kotgarh & Rampur
25	JFM	Overlapping	To evolve consensus on the basic issues for the conservation of forest resources including soil and water. Empower the local communities to manage the forest resources with responsibility squarely lying on them for planning, execution and management of natural resources of their areas. Provide an effective treatment for wastelands, degraded forests and	This is an overlapping working circle. Active participation of local people has been taken in the past along with potential new areas. It is an overlapping working circle and fulfills the objectives of National Forest Policy 1988 by involving the rural communities living close to forest ecosystem. In order to manage the forest resources Joint	Mandi & Jogindernagar; Kunihar; Kullu & Parvati; Chopal; Kotgarh & Rampur



No.	Working Circle Name	Type of WC (Main / Overlapping)	Objective of the Working Circle	Description of the Working Circle	Forest Divisions having Working Circle
			forest lands situated near villages through protection, afforestation, pasture development, soil conservation by active participation of local people. To maintain the environmental stability through preservation of natural resources through involvement of local people in management. Augment fuel wood, fodder and small timber production for use by local people.	Forest Management intervention was made to evolve organized and collective thinking on forest management issues like scientific, professional options, social and anthropological dimensions and economic principle are synergies for deriving maximum benefits for the society keeping the sustenance of the resources in mind. This working circle also lays emphasis on man-forest interface and channelizing human resources for conservation of forest and vice versa. The National Forest Policy emphasizes on participatory management of forest and wildlife, creating a people's movement especially women in regeneration, management, protection of forests and conservation of natural resources.	
26	Soil Water Conservation	Overlapping	Objective is to conserve soil and water through biological and engineering measures, so as to regulate flow of water in streams and to stabilize and rehabilitate the existing landslides and erosion prone nullahs and streams.	This working circle overlaps with all other working circles as by and large all areas require soil conservation measures in varied degrees.	Chopal; Kinnaur
27	Soil cum Biodiversity Conservation	Overlapping	Manage the forests, grasslands, nallas, streams and rivers as part of the overall landscapes for purposes of improved hydrology and to reduce soil erosion, improve the stocking of forest for climate moderation, improve and conserve the forest for meeting the genuine demands of the population for fodder, fuel, timber and NTFPs. Improve biodiversity of the area through suitable managerial interventions like rehabilitating areas infested with invasive alien species of medicinal value. Prevent land degradation by adopting multidisciplinary integrated approach to the catchment, improving land capability and moisture regime in the watershed by vegetative and mechanical means, involve the local people in the management of the watershed and improve the ecology of the area.	All areas of interest from wildlife and biodiversity angle and are rich in some special flora or fauna are considered under this overlapping working circle.	Kunihar, Kinnaur

Source: Compiled by JICA Study Team (2017) based on Working Plans

**Attachment I.4.5.3 Labour Supply Situations for HPFD and HPSFDCL based on Respective Working Plans**

No.	Division Name	District	HPFD	HPSFDCL	Woking Plan Year
1	Rampur Forest Division	Shimla	Local labours, Gorkhas labours from Nepal	Local labour and outside labours from Mandi, Kangra, Nepal and Uttar Pradesh	2014-15 to 2028-29
2	Karsog Forest Division	Mandi	Mainly local labours but scarcity of labour sometime	Approximately 40% of laborus are from outside of the divison	2013-14 to 2027-28
3	Kullu Forest Division	Kullu	Local labours, Gorkhas labours from Nepal and outside labours from Mandi	Labours from all over the HP and supplied by contractors	2013-14 to 2027-28
4	Kotgarh Forest Division	Shimla	Mainly local labours but scarcity of labour sometime	Outside labours from Mandi, Kangra, Nepal, and Uttar Pradesh	2012-13 to 2026-27
5	Kunihar Forest Division	Solan	Mainly local labours but scarcity of labour sometime	Outside labours from Mandi, Kangra, and Jammu & Kashmir state	2012-13 to 2026-27
6	Chopal Forest Division	Shimla	Mainly local labours but scarcity of labour sometime	Outside labours from Mandi, Kangra, Bilaspur, Gorkhas, and Garhwali labours.	2003-04 to 2017-18
7	Pangi Forest Division	Chamba	Local labours and Gorkhas labours	Outside labours from Mandi, Kullu and Jammu & Kashmir	2002-03 to 2021-22
8	Kinnaur Forest Division	Kinnaur	Local labours, Gorkhas labours from Nepal	Outside labours	1999-00 to 2014-15
9	Mandi & Joginder nagar Forest Division	Mandi	Mainly local labours but scarcity of labour sometime	Outside labours from Kullu, Kangra, and Una.	1999-2000 to 2013-14
10	Outer Seraj Forest Division	Shimla	Local labours, Gorkhas labours from Nepal	Outside labours from Kullu, Mandi, and Nepal	1996-97 to 2011-12
11	Shimla & Theog forest division	Shimla	Mainly Gorkhas labours from Nepal	No specific information	1996-97 to 2011-12
12	Kullu & Parvati Forest Division	Kullu	Local labours, Gorkhas labours from Nepal	Labours from all over the HP and supplied by contractors	1994-95 to 2009-10
13	Bilaspur Forest division	Bilaspur	Local labours and outside labours from Mandi, Uttar Pradesh	Local labours	1994-95 to 2008-09
14	Rohru Forest Division	Shimla	Local labours, Gorkhas labours from Nepal	Outside labours from Mandi, Bilaspur, Nepal, Gharwal, and Jammu & Kashmir.	1994-95 to 2008-09
15	Lahaul Forest Division	Lahul & Spiti	Most of the skilled labours are from Kullu, Kangra, Mandi, and the unskilled labours are Gorkahs from Nepal	No specific information	1993-94 to 2006-07
16	Suket Forest Division	Mandi	Mostly local labours and outside labours such as Gharwalis	No specific information	1986-87 to 2001-02
17	Nahan Forest Division	Sirmaur	Mostly local labours and in some locations outside labours from Haryana and Uttar Pradesh	Outside Labours from Kangra, Hoshiarpur, Haryana and Uttar Pradesh	1982-83 to 1991-92

Source: Compiled by JICA Study Team (2017) based on Working Plans

### Attachment I.4.5.4 Grasslands and Pastures Definitions Adopted in the Study

Based on the Vegetation and Land Use Type Map (as part of ‘Biodiversity Characterisation at landscape level: National Assessment 2012’, Indian Institute of Remote Sensing (IIRS) for biological richness analysis), the following classification scheme was used for classification of Grasslands in line to Champion and Seth’s classification.

**Table 1 Grassland Classification based on Ecology and Management of Grassland Habitats in India**

Level-I	Level-II	Level-III	Sub-level	Champion and Seth (1968) class with codes	Definition	Re-grouping by the Study Team
<b>Grassland</b>					All Other Types of Grasslands	<b>Other Grassland</b>
	Wet Grassland	Upland Grassland		Southern Montane Wet Grassland (11A/C1/DS2)	Found in waterlogged areas of the sub-Himalayan tracts	<b>Riverine/ Wet/Dry/ Swampy Grass Land</b>
	Dry Grassland			Dry Grassland (5/DS4)		
	Man-made Grassland					
	Riverine Grassland	Lowland Grassland			Along the Riverine alluvium at the banks of major rivers	
	Saline Grassland			Saline/Alkaline Scrub Savannah	Grassland in Saline soils and low moisture regimes	
	Swampy Grassland				Grassland in swampy regions of Terai	
	Dry alpine Pasture			Alpine Pastures (15/C3)	Region covers cold desert areas. Climatic conditions are very dry as region mostly fall in rain shadow of main Himalayan mountain.	<b>Dry alpine Pasture</b>
	Moist alpine Pasture			Alpine Pastures (15/C3)	Mostly temperature remaining below freezing point. Precipitation in the form of snow	<b>Moist alpine Pasture</b>

Source: Compiled by JICA Study Team (2017)

### Attachment I.4.5.5 Existing Classifications of Grasslands and Pastures

Some of existing classifications and definitions of grassland/ pastures relevant to Himachal Pradesh is presented here under.

#### 1) Classifications based on Ecology and Management of Grassland Habitats in India- Environmental Information System (Envis), WII (2016)

**Table 1 Grassland Classification based on Ecology and Management of Grassland Habitats in India**

Type of Grasslands	Altitudinal Range(m)	Distribution	Species/family	Major Characteristics
Himalayan Sub-tropical grasslands	1,000-1,800	Found on southern slopes of the Himalaya usually on steeper rocky slopes with shallow soils. Also, found as lush undergrowth in Pine forests during rainy season	-Dominated by chrysopogon fulvus, arundinella nepalensis, pennisetum orientale, apluda murica, heteropogon contortus, cymbopogonmartini/distans, imperata cylindrical, capillipedium parviflorum, microstegium ciliatum and several other species of grasses, legumes and herbs from other families.	Highly vulnerable to forest fires during dry summer season, as fire hardy, the new shoots soon emerge from the underground rootstock providing valuable fodder wild herbivores and livestock. -These Grasslands used by the communities for fodder collection during winter after seeds have fallen and stored for making hay for future use.
Himalayan Temperate Grasslands	1,800-3,000	Usually found on the rocky slopes with shallow soils having sparse tree growth	-Dominated by chrysopogon gryllus, andropogon tristis, themeda anathera, themeda tremula, erianthus rufipilus, miscanthus nepalensis, brachypodium sylvaticum, bromus unioloides, agropyron longearistatum and several other grasses, sedges.	
Alpine meadows	3,000 -5,200	These Grasslands found above the tree line on the southern slopes. Extend over several square kilometres and are usually under snow during large part of the year	Danthonia cachemyriana is predominant; other species include poa, festuca, bromus, briza, calamagrostis, agrostis and other herbaceous plants.	Danthonia cachemyriana provides nitrogen rich fodder to grazing sheep and other livestock and wild herbivores.
Trans-Himalayan steppes	Above 4,000	Alpine meadows found in the northern slopes. -Located in rain shadow region and are arid and very cold due to very high altitude.	Dominated by short grasses, classified as steppe. Major species include elymus nutans, stipa, agropyron, poa, calamagrostis and festuca along with thorny bushes and several herbs.	In Himachal, mostly found in Lahaul & Spiti and Kinnaur districts of Himachal Pradesh.

Source: Compiled by JICA Study Team (2017) based on Ecology and Management of Grassland Habitats in India- Environmental Information System (Envis), WII (2016)

## 2) Classifications based on Temperate and Alpine Grasslands of the Himalaya: Ecology and Conservation<sup>1</sup>

For conservation and management purposes a broad level classification of Himalayan grasslands is being suggested based on their origin and geographical distribution. Various associations and community types identified by earlier workers can be grouped under these types:

- i) Warm temperate grasslands;
- ii) Cool temperate grassy slopes;
- iii) Sub-alpine meadows;
- iv) Alpine meadows; and
- v) Steppe formations of trans-Himalaya.

### i) Warm Temperate Grasslands

The warm temperate belt (1,500 - 2,500m) in north-western, western and central Himalaya, especially on the south and south-eastern slopes, are characterised by extensive grassy slopes dotted with scattered trees and shrubs. Most of these grasslands or 'hill savannas' have been derived as a result of frequent burning and livestock grazing on gentler slopes. This category also includes the hay fields intensively managed for grass production by local people. Such grasslands are locally known as 'ghansis' in Himachal Pradesh (HP).

### ii) Cool Temperate Grassy Slopes

The steeper (>45°) slopes with thin soil in the cool temperate and sub-alpine zone (2,600–3,300 m) do not favour the tree growth and generally support herbaceous or grassland vegetation. The common species of grasses in such areas in the west are *chrysopogon gryllus*, *dactylis glomerata*, *koeleria cristata*, *andropogon munroii*, *danthonia jacquemontii* and *themedra triandra*. These areas also burn during winter, either accidentally or intentionally.

### iii) Sub-alpine Meadows and 'Thaches'

Forest blanks within the cool temperate and sub-alpine forests have been created by migratory graziers, and in HP are frequently termed 'thaches'. Unlike the above category, these areas are dominated by a large number of herbaceous plants such as *origanum vulgare*, *taraxacum officinale*, *ranunculus hirtellus*, *rumex nepalensis*, *anemone rivularis*, *senecio chrysanthemoides* and *anaphalis cuneifolia*, many of which are unpalatable and weedy. Only a few grasses (e.g. *poa alpina*, *phleum alpinum* and *stipa* sp.) are found in these areas.

### iv) Alpine Meadows

These are the natural herbaceous formations located above the natural limit of forest and scrub vegetation, covering an area of approximately 17,296 km<sup>2</sup>. The meadow vegetation typically

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<sup>1</sup>G.S Rawat, Parks Vol. 8 No.3, October 1998

comprises a large number of herbaceous plants with varying proportions of tussock forming grasses, sedges and matted shrubs. Although grasses form a large proportion in the flora in the alpine region, many herbaceous plants belonging to other families, e.g. rosaceae, leguminosae, asteraceae, lamiaceae and scrophulariaceae, dominate the meadows in terms of cover and abundance). The following communities and associations of grasses have been reported from the alpine regions of the western Himalaya: *deyuxia-deschampsia*, *danthonia cachemyriana* patches, species of *festuca* and *poa*.

#### v) Steppe Formations of Trans-Himalaya

The cold arid regions in the trans-Himalaya are characterised by the Mediterranean type of vegetation, i.e. scattered low shrubs with sparse grasses and forbs. Several communities are reported from the cold arid regions of Ladakh and Spiti regions of north-west Himalaya, e.g. *artemisia-caragana*, *ephedra-juniperus*, *salix-myricaria* and *lonicera-rosa*. Nine associations of herbaceous and shrubby species from Pin Valley National Park in HP which represents typical steppe vegetation of trans-Himalaya have been reported.

### 3) Classifications based on Improvement of Sub-alpine Himalayan Pastures<sup>2</sup>

In Himachal Pradesh, another method of classifying these pastures/ meadows and grazing lands is as follows:

- ◆ Alpine/ Sub-alpine Pastures:
- ◆ Grassy Blanks in Temperate Forests:
- ◆ Ghasnis:
- ◆ Degraded Scrub Lands:
- ◆ Degraded Chir Pine Forests:
- ◆ Sub Temperate Oak Areas

#### i) Alpine/ Sub-alpine Pastures:

These are the high-altitude pastures having a rich mix of grasses and other herbs, including many high value medicinal plant species. As per one FSI estimate, the alpine pastures are spread over an area of 17,296 sq. km in Himachal Pradesh. These pastures form grazing grounds for sheep and goat and also for cattle (buffaloes, cows, horses, mules, yak, etc.) at some places. These pastures also perform a very important ecological function of regulating water flow, enhancing its percolation and checking soil erosion. The rich floral diversity of these pastures is getting degraded on account of (a) excessive grazing i.e. grazing beyond carrying capacity that is causing the indigenous non-palatable species like *rumex nepalensis*, *aconogonum* sp., *phlomis* sp., etc. to proliferate threatening the very texture of these pastures; and (b) excessive removal of medicinal herbs causing depletion in their populations.

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<sup>2</sup>Bimal Misri), Regional Research Centre, Indian Grassland and Fodder Research Institute, HPKV Campus, Palampur–176062, India.

ii) Grassy Blanks in Temperate Forests:

These are the natural grassy blanks amidst fir/spruce and deodar/kail forests that have been formed due to some microclimatic conditions. The floristic composition of these areas comprises primarily of grass that is interspersed with scattered presence of some herbaceous species like *fragaria* sp., *potentilla* sp., *anemone* sp., *geranium* sp., etc. These pastures vary in extent from as small as 0.5 ha to more than 10 ha. each. These grassy blanks form the main grazing grounds for cattle belonging both to the migratory graziers (Gujjars) and the local villagers and also provide habitat for the wildlife. The grazing pressure in these pastures has put these under stress and many of these areas are witnessing an influx of indigenous invasive species like *rumex* and *polygonum* rendering large parts of these pastures non-grazable. Soil erosion is another affect of the grazing pressure. In the past, efforts have been made to plant up these blanks with trees. However, most of these efforts have failed.

iii) Ghasnis:

These are the lower altitude - subtropical to lower temperate – pastures under the ownership of private individuals, village shamlats or government departments, usually located along dry slopes having shallow soils. These ghasnis are maintained primarily for grass that is cut during winters to be used as hay during pinch period and are seldom used to graze cattle. Most of these are subjected to annual burning to suppress the growth of woody perennials and to promote the grass growth. The key management principle for managing these ghasnis is the quantum of grass that becomes available annually. Many scientific studies have been undertaken to study the enhancement in grass production in such areas. The studies and techniques for the purpose range from bringing these areas under planting of high yielding grasses to planting trees to provide lateral shade for better growth of existing grasses.

iv) Degraded Scrub Lands:

The lands represent the dry, degraded seral stages of naturally occurring sub-tropical miscellaneous forests that have experienced heavy biotic interference over the years. These areas, with scattered tree growth, have traditionally been used as grazing lands and have been the source of grass and leaf fodder. Excessive exploitation of these lands over the years has resulted in their infestation with exotic invasive species like *lantana camara* at the cost of poor regeneration of native species. The degradation of natural vegetation has also caused denuding the area of ground cover, with most of the rain water running off resulting in gully formation and soil erosion. In addition, the areas face annual threat of fire, causing further degradation of the site.

These areas, no longer serving as fodder source, however, hold a good potential to develop into grazing lands.

v) Degraded Chir Pine Forests:

These are also the low altitude forests occurring mainly on the southern dry slopes with scattered presence of chir Pine and its associate species. These forests, where there is less infestation of weeds like *lantana*, harbour good grass growth and provide for good grazing land. These forests are under a lot of biotic pressure that is leading to further degradation of native shrubs, herbs (especially *viola canescens*) and grasses in addition to damaging soil cover. These forests suffer from annual fires, mostly triggered by local people to promote better grass growth.

vi) Sub Temperate Oak Areas:

Five species of evergreen oak namely *quercus glauca* (phaliyant/harinj), *q. leucotrichophora* (banj), *q. lanuginosa* (rianj), *q. floribunda* (tilonj/moru) and *q. semecarpifolia* (brown/kharsu) grow naturally in the western Himalaya. In the Western Himalaya, oak species assume considerable conservation significance as they are providers of numerous ecosystem services (conservation of soil, water, native flora and fauna) and serve as lifeline for the local communities. Predominantly three oak species (*quercus leucotrichophora*, *q. floribunda* and *q. semecarpifolia*) are intricately associated not only with agro-ecosystems but also with the life support system of the inhabitants of the hills in this area. The oak forests are source of fuelwood, fodder and can be correlated with natural springs and wildlife).

**4) Classifications based on Indian Grass & Fodder Research Institute<sup>3</sup>**

Another classification done by Indian Grass & Fodder Research Institute, Jhansi is the geo-climatic zones:

**Zone 1:** comprising of low hill subtropical has area 1,026,320.94 ha which includes areas under districts Kangra, Hamirpur, Una Bilaspur, Mandi and Sirmour. The area under grasslands is about 157813.98 ha (15.38%). The grasslands are at various stages of degradation. The dominant species of grasses in this zone are kai (*saccharum spontaneum*), chhiz (*imperata cylindrica*), chhota dhau ( *chrysopogon gryllus*), baroo (*sorghum halepense*), *dichanthium annulatum* and *eragrostis sp.* etc. were some of the dominant grass species of this zone

**Zone 2:** mainly covers mid hills located in Chamba, Kangra, Hamirpur, Mandi, Bilaspur, Shimla, Kullu, Kinnaur and Sirmour districts. The area under grassland in this zone is 12.83% of total grasslands of Himachal Pradesh and dominant grasses in this zone found are bara dhau ( *chrysopogon montanus*), makora (*cymbopogon martini*), doob (*cynodon dactylon*), kodri (*paspalum notatum*), kikyue (*pennisetum clandestinum*) and jhaan (*pennisetum orientale*) etc. Lotus *corniculatus* and *trifolium sp.* are the legume species observed.

**Zone 3:** is spread over Chamba, Kangra, Kullu, Mandi, Shimla, Solan, Sirmour and Kinnaur districts and have 1,220,075.31 ha or 21.98% area of the state. This Zone is characterized by high hills and temperate wet climate. The elevation ranges from 1,500 m-3,250 m. The grasslands in this zone is about 18 % (219,456.72 ha) and is dominated by grasses. The dominant grasses in this

<sup>3</sup>Grasslands of Himachal Pradesh, J P Singh et. al, IGFRI, Jhansi (2009)



zone are angleton grass (*dichanthium aristatum*), bari jhaan grass (*pennisetum orientale*), creeping bent (*andropogon pulmis*), spear grass (*heteropogon contortus*), fescue grass, *festuca* sp. and marvel grass (*dichanthiumannulatum*) etc. are some of the grass species observed in this zone. Lotus *corniculatus*, *trifolium* sp. and *medicago denticulata* are some of the legume species observed in this region.

**Zone 4:** covers about 49.69 % (2,758,139.04ha) area of the state. It is temperate dry and covers north and north-eastern part of Chamba and Kullu district, high hills and valley of Lahul-Spiti, Kinnaur and Shimla districts. The area under grasslands is about 422,652.72 ha (15.32%) of the total area of the zone but contributes about 46.06%of the total grasslands of the state. These temperate grasslands are infested with weeds and unpalatable plant species.

## Attachment I.4.5.6 Proposed Interventions in Grasslands and Pastures

Major potential interventions for grasslands/ pastures improvements, proposed by the planning commission and other institutions are presented hereunder.

### 1. Proposed Strategy by Planning Commission (2011)<sup>1</sup>

**Table 1 Details of the Scheme along with Broad Implementation Strategy**

No.	Scheme	Broad Implementation Strategy
1	Mapping of ecologically sensitive pastures and development of rehabilitation packages	The ecologically sensitive pastures like the alpine/ subalpine, shola, eastern ghats, arid zones are facing the highest threat due to unsustainable biotic interference. These ecologically sensitive pastures will, therefore, be comprehensively mapped using GIS/ remote sensing and their extent worked out for each phyto-geographical zone. Natural floristic composition of these pastures be studied and keystone species/ formations identified. Appropriate rehabilitation packages towards conservation of these grasslands be worked out
2	Rehabilitation and productivity enhancement of degraded grazing lands	<p><b>i)</b> Many of the grazing lands, including scrub forests, unculturable wastes, village commons, etc. have become degraded on account of;</p> <ul style="list-style-type: none"> <li>➤ Heavy biotic pressure, especially over grazing over the years.</li> <li>➤ Attempts at tree plantations – mainly of commercially important exotic trees like Eucalyptus, Teak, gmelina, leucaena, etc.</li> </ul> <p><b>ii)</b> Whereas tree planting does improve the soil and helps check erosion, these intensive plantations have caused reduction of grazing lands and further alienation of local communities from management of CPRs. Many of the tree species used for these plantations have run wild and assumed weedy proportions, further affecting grass and fodder availability.</p> <ul style="list-style-type: none"> <li>➤ Occupation of large extent of grazing lands by invasive alien species</li> <li>➤ Invasive alien plant species - severely affecting their productivity. Appropriate provisions at comprehensive rehabilitation of these degraded grasslands be made under the 12th Plan -</li> <li>➤ The existing Working Plan prescriptions to convert grazing lands classified as forests into woodlands will be reviewed and such practices discouraged.</li> </ul> <p><b>iii)</b> Research shows that judicious integration of woody perennials into grass lands actually results in increase in fodder grass yield and it has been possible to increase land productivity from 0.5-1.5 t/ha/yr to about 10t/ha/yr on a rotation of 10 years through such interventions. It is, therefore, a matter of choosing the correct species mixture and correct planting density. Viable models of judicious species mix and plantation density to improve productivity of grass lands will be worked out for major phyto-geographical zones and implemented during the 12th Plan.</p> <p><b>iv)</b> The grasslands infested with alien weed species will be taken up for priority rehabilitation action. This would need physical removal of weeds followed by rehabilitation of the areas with a mixture of native species – woody perennials and grasses - of multiple use value. Such rehabilitation will not involve the use of (i) any chemical methods of weed control, and (ii) non-native species for productivity enhancement.</p> <p><b>v)</b> Special focus will be laid on developing/ rehabilitating pasture lands around 1 lac of the 1.7 lac Forest Fringe villages in association with village communities.</p>

<sup>1</sup>Sub group report on Fodder & Pasture Management., Planning Commission, 2011

No.	Scheme	Broad Implementation Strategy
3	Promoting fodder species under agro-forestry initiatives	Animal husbandry in the country is intimately woven with the agricultural practices. However, the traditional practice of growing and maintaining fodder trees/ bamboos/ grasses on farm bunds, to meet fodder requirements during winters, has slowly given way to intensive agriculture severely affecting this traditional practice. Leaf fodder is a very useful resource, especially during winter months when all other fodder sources have been exhausted. Suitable models towards integration of fodder species with the intensive agricultural practices will be developed in collaboration with research institutes and promoted on large scale.
4	Developing seed/ germplasm banks/ nurseries of native species for rehabilitation of grazing lands	It is widely believed that the native species have a higher chance of surviving the harsh natural conditions, especially in open conditions such as grasslands. There is, however, an acute shortage of seeds/ germplasm of native species – grass, forbs, woody perennials, and trees - for use in rehabilitation program of grazing lands. At least one such germplasm bank with associated nursery network would be established in each state. Institutes like Indian Grassland and Fodder Research Institute and state agricultural universities would be involved in establishment of such germplasm banks and nursery networks.
5	Developing fodder storage/ value addition facilities	As has been brought out above, there is surplus fodder during monsoons, much of which goes waste. There is a need to handle this surplus fodder in a way so that it could be appropriately stored/ pickled for use in the pinch periods. Towards this end fodder storage banks under the aegis of state animal husbandry departments will be established in each state in close collaboration with Indian Grassland and Fodder Research Institute and state agricultural universities. PPP model of producing, storing green and dry fodder, and supply, especially value-added feed blocks, leaf meals will be worked out on pilot basis under the 12th Plan.
6	Capacity building of Managers/ Community Groups	Rehabilitation and management of the resource that has witnessed neglect for such a long period would need appropriate orientation of the mind sets of the managers and the user communities alike. It would involve development of training material and its delivery. In view of the enormity of the work, it would need steering by a central agency and collaboration with Civil Society Organisations.
7	National Grazing-cum-Fodder and Pasture Management Policy	The Policy would address issues pertaining to diversion of grazing lands for other purposes, conversion of critical grassland habitats into plantations, research on grassland ecology and pasture management, capacity building of managers and resource users, rehabilitation of degraded grazing lands, collaborative management of grazing lands and fodder resources with local communities. The Policy would also look into the issues related to transport of fodder from one area to another without first fulfilling local needs, migration of livestock from one area/ state to another, rotational grazing, stall feeding, regulating the number of livestock, and the problems of stray and feral cattle.
8	National Centre of Excellence (CoE) for Fodder and Pasture Land Management	The issues cutting across various departments and stakeholder groups are best addressed if these are steered under one nodal agency. A Centre of Excellence on Fodder and Pasture Land Management would be established under the 12th Plan.
9	Encourage establishment of Cooperatives for Fodder and Pasture Management	The present approach to utilize the common grazing lands is to maximize the benefits on individual level without any concern for its management. Since the major user of the resource is community, the best bet to ensure the sustenance of the resource is organize the community into user groups with responsibility to manage the resource also entrusted to the group. It would need to settle the tenure issues. Such groups could be formed on the lines of highly successful Milk-Cooperatives. An appropriate incentive scheme to user groups for effective management of grazing lands would also be worked out.

Source: Sub group report on Fodder & Pasture Management., Planning Commission, 2011

## **2. Other Management Strategies<sup>2</sup>**

### **i) Institutional Arrangements for Management of the Rangelands**

There is a need to have convergence among Departments of Animal Husbandry and Livestock Production, Departments of Forests, Departments of Rural Development, and district administration. There is an urgent need to organise and strengthen the local (community-based) institutions, which could then develop comprehensive management plans for these rangelands to sustain the ecosystem services. This would require setting up local rangeland management committees comprising representatives from civil society and community-based organisations, livestock husbandry departments, the district administration, and a rangeland ecologist.

### **ii) Piloting**

Piloting would involve enabling community-based organisations to (i) identify social, economic, and ecological problems related to the rangelands, (ii) prepare management plans to deal with the problems, and (iii) implement the management plans. This would be an important step towards institutionalising a rangeland management programme in the region and scaling up the good practices across the transboundary landscape. The traditional knowledge and practices of rangeland management that was prevalent. It would be worthwhile to document, validate, refine, and replicate these practices at representative pilot sites. Further, in view of the changing gender roles in traditional pastoral societies, bringing a gender perspective into rangeland management and its linkages with livelihoods will make a further important contribution to sustainable pastoralism in the Himalayas.

### **iii) Capacity Building of Community-Based Organisations**

With adequate training, empowerment, and assurance of equitable benefit-sharing mechanisms, particularly by way of exposure to emerging access and benefit sharing (ABS) mechanisms, the local communities would be able to play an active role in the conservation and management of the alpine and sub-alpine landscape.

### **iv) Valuation of Rangeland Ecosystem Services**

The rangeland ecosystem services have not yet been properly inventoried and monitored. These steps would be necessary for valuation and assessment of the impact of various drivers of change. There is a need to generate baseline data on the state and health of the rangeland ecosystems to feed into rangeland ecosystem services accounting and to develop suitable policies including gender mainstreaming, value chain development, especially from high-value medicinal plants, and institutional innovation.

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<sup>2</sup>Strategies for the Management of High altitude rangelands and their Interfaces in the Kailash Sacred Landscape; G. S. Rawat: Special Publication On the occasion of ICIMOD's 30th anniversary (2013)

### 3. Technical Interventions for Grassland Improvement<sup>3</sup>

To achieve optimum levels of herbage production, these pastures need immediate improvement by way of re-sowing of palatable, nutritious and quick growing grass and legume species. Subsequent management interventions like protection, fertilizer application, maintaining proper stocking rates, rotational grazing etc. will have to be imposed for achieving best results. Various methodologies for improvement and management of sub alpine and alpine pastures have been standardised at the Indian Grassland and fodder research Institute. Once the protection of the site is assured, sowing or transplantation needs to be done in supplementation with fertilisation. The first step towards improvement and its subsequent management is the provision of protection to the improved site. Sowing on pits of 30 X 30 cm after uprooting of sward, strip broadcasting of 20cm strip. Transplantation of nursery raised grass seedlings is labour intensive but quick and sure method of resowing pastures.

#### i) Potential Management Interventions in Different Grassland Ecosystems

##### Alpine Pastures:

- ◆ Rotational closure of these pastures through strict enforcement. Such closures can be parallel with four years NTFP extraction cycle notified by the CFs in their jurisdictions.
- ◆ Selective removal of non-palatable invasive species, especially from around the ‘night shelters/ deras’, ensuring minimal disturbance to the soil.
- ◆ Dibbling of seeds/ planting of priority medicinal herbs in such worked areas.
- ◆ Introduction of exotic grasses and herbs to ‘improve the biomass’ in such areas is NOT desirable.

##### Temperate:

- ◆ Rotational closure of these pastures.
- ◆ Selective removal of non-palatable invasive species, especially from around the ‘gujjar deras’.
- ◆ Augmentation of population of indigenous grasses through plantation/ dibbling of seeds and introduction of non-indigenous fast-growing grasses to enhance forage availability.

##### Ghasnis:

- ◆ Forest Department does not have a direct role in managing and developing such ghasnis, most of these being privately owned. However, the following promotional activities are possible:
  - Promoting introduction of light canopied trees @ 200-400 trees per ha to enhance grass biomass production through lateral shade.
  - Augmenting the water regulation regime of these ghasnis through staggered contour trenches. It is very important, especially along the dry south & south west facing slopes. This effort will also contribute to recharging of aquifers.

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<sup>3</sup>IMPROVEMENT OF SUB-ALPINE AND ALPINE HIMALYAN PASTURES (Bimal Misri), Regional Research Centre, Indian Grassland and Fodder Research Institute, HPKV Campus, Palampur-176062, India.

- Introduction of fast growing grasses like Lemon Grass (*cymbopogon citratus*) along the trench berms. Such grasses would also be providing cash income to the owners of ghasnis.

Degraded Scrub lands:

- ◆ Selective removal of invasive species like Lantana camara from around struggling seedlings of native species to free such seedlings from competition.
- ◆ Planting of native broad-leaved species in areas with thin canopy cover.
- ◆ Improving the water regulation regime of these forests through staggered contour trenches. It will help in arresting the run off, in better percolation of water and in conserving the soil.
- ◆ Planting of fast growing grasses like Lemon Grass (*cymbopogon citratus*) and other fodder species along the trench berms. Planting of such grasses would help in further improving the moisture regime of the area.
- ◆ Closure of the treated area for a minimum of three years.
- ◆ Protection from fire.

Chir Forest:

- ◆ Improving the water regime of these forests through staggered contour trenches. It will help in arresting the run off, in better percolation of water and in conserving the soil.
- ◆ Planting of fast growing grasses like Lemon Grass (*cymbopogon citratus*) and fodder tree species along the trench berms. The trees are likely to have good survival along these trenches being able to retain moisture for a longer period. Such tree lines, once established, will also help in checking the spread of fires.
- ◆ Closure of the treated area for a minimum of three years.
- ◆ Protection from fire.

### Attachment I.4.5.7 Reviews and Recommendations of SWC Measures

Listed all SWC measures in the Manual on Soil and Water Conservation with focus on Watershed Management, HPFD, 2012, and reviewed by JICA Study Team. The results of reviews and recommended measures for the Project are shown below.

**Table 1 Recommended SWC Measures by JICA Study Team**

Category		Measures	Recommendation
I. Soil and water conservation measures	(1) Bio-engineering measures	(a) Bamboo crib wall (slope)	-
		(b) Brush layer/Hedge bush Layer (slope)	-
		(c) Fascines (slope)	-
		(d) Vegetative barriers on contour-line (slope)	-
		(e) Contour wattling [live hedge, which is composed with trench, banking, planting on banking] (slope)	++
		(f) Vegetated Palisade Wall (small stream or gully)	+
		(g) Live check dam (small stream)	+
		(h) Brush wood check dam (small stream)	+
	(2) Mechanical measures	(a) Dry stone check dam	++
		(b) Gabion check dam	++
		(c) Gabion structure with ferro-cement impervious barrier	-
		(d) Permanent structures for gully stabilization	-
		(e) Masonry drop structure	+
		(f) Masonry drop structure with apron	+
(g) Silt detention structure (concrete)		+	
(h) Masonry retaining wall (Slope)		-	
II. Landslide control measures	[1] Land slide triggered by weak geology	(a) Retaining wall	+
		(b) Series of staggered retaining walls on the slope	
		(c) Geo-jute	
		(d) Log crib	
		(e) Gunny bag	
	[2] Land slide triggered by road construction	(a) Water diversion	-
(b) Retaining wall at base and all sections on road cut			
(c) Channelizing flow through waterway			
(d) Planting bushes and grasses along waterway			
(f) Cross drainage works along roads			
III. Landslip control measures		(a) Diversion ditch	-
		(b) Main drainage	

Category	Measures	Recommendation
	(c) Sub-drainage (d) Lateral drain (e) Vertical stand pipe (f) Retaining wall	

Note: ++ shows the measure is recommended much, + shows recommended, - shows not recommended.

Source: JICA Study Team (2017)

**Table 2 Summary of Evaluation of Introduced Measures in the Manual by JICA Study Team**

Category I	Category II	Category III	Summary of Actual Achievements of HPFD	Evaluation by JICA Study Team	Most Recommended Measures by JICA Study Team
I. Soil and water conservation measures		(1) Bio-engineering measures	JICA Study Team has not confirmed any achievements of this category. However, all measure in this are considered not difficult for implementation.	<p>(Possibility) The measures in this category are considered not difficult for HPFD to implement, because the measures are easy and simple, and most of materials can be collected at the site.</p> <p>(Effectiveness) Most of the measures in this category are evaluated as effective at the slope and small stream or small gully, where erosion or landslide are not progress much. These are considered effective for improvement of the afforestation/ reforestation area.</p>	<p>++ The most recommended measures: (e) Contour wattling [live hedge, which is composed with trench, banking, planting on banking] (slope) [Reasons] This measure is easy to implement because of simple structure.</p> <p>+ Recommended measures: (f) Vegetated Palisade Wall (small stream or gully) (g) Live check dam (small stream) (h) Brush wood check dam (small stream) [Reasons] -These measures can work for stability and water/soil moisture conservation. -These are recommended to use with plantation work.</p> <p>- Not recommended measures: (a) Bamboo crib wall (slope) (b) Brush layer/Hedge bush Layer (slope) (c) Fascines (slope) (d) Vegetative barriers on contour-line (slope) [Reasons] -These require special material or soft soil layer at the site. -Specific structure is not understood (d).</p>



Category I	Category II	Category III	Summary of Actual Achievements of HPFD	Evaluation by JICA Study Team	Most Recommended Measures by JICA Study Team
		(2) Mechanical measures	<p>Most of the visited Divisions of HPFD have experiences and achievements of some of the measures in this category.</p>	<p>(Possibility) The measures of this category are considered difficult for the offices which don't have experiences. Design work based on the ground topographic survey shall be carried out before implementation.</p> <p>(Effectiveness) Each types of structure shall be considered the appropriate location and condition. They can work well for soil and water conservation if the structures will be planned in appropriate location.</p>	<p>++ The most recommended measures: (a) Dry stone check dam, (b) Gabion check dam</p> <p>+ Recommended measures: (e) Masonry drop structure (f) Masonry drop structure with apron (g) Silt detention structure (concrete)</p> <p>- Not recommended measures: (c) Gabion structures with ferro-cement impervious barrier (d) Permanent structures for gully stabilization</p>
			Some of HPFD offices have experiences and needs for pond in dry area, especially grazing land.	<p>(Possibility) The offices which have experience can implement this. (Effectiveness) The pond can improve soil moisture condition of surrounding area. It also can provide water for animals.</p>	<p>+ In the dray climate region such as, Rampur, Bilaspur, Mandi, and Kullu, this measure is recommended.</p>
II. Landslide control measures	[1] Land slide triggered by weak geology		Some of the visited Divisions of HPFD have experiences and achievements of this category. However, their experiences are almost retaining walls in a landslide only.	<p>(Possibility) The measures of this category are considered difficult for the offices which don't have experiences. Design work based on the ground topographic survey shall be carried out before implementation.</p> <p>(Effectiveness) The listed structures shall be constructed by combination, not singular usage. Detail design work is required for the combination construction.</p>	<p>+ The listed measure shall be constructed with combination. Therefore, the prioritization doesn't have meaning.</p>

Category I	Category II	Category III	Summary of Actual Achievements of HPFD	Evaluation by JICA Study Team	Most Recommended Measures by JICA Study Team
	[2] Land slide triggered by road construction		Some of the visited Divisions of HPFD have experiences and achievements.	This work shall be taken as the road maintenance or road construction work.	- The work in this category is not recommended.
III. Landslip control measures			JICA Study Team has not confirmed any achievements of this category by the HPFD.	(Possibility, Effectiveness) The measure described in the manual is not enough for implementation. The study of the landslip shall be carried out for effective work. However, it cost much and takes long time.	- The work in this category is not recommended.

Source: JICA Study Team (2017)

**Table 3 Details of Evaluation of Introduced Measures in the Manual by JICA Study Team**

List of Measures in the Manual	Achievement of HPFD*	Evaluation by JICA Study Team: Effectiveness	Evaluation by JICA Study Team: Possibility of Implementation	Evaluation by JICA Study Team: Total
I. Soil and water conservation measures				
(1) Bio-engineering measures				
(a) Bamboo crib wall (slope)	None	++ This can work as the retaining wall.	- (1) If bamboo is not available, it is not possible. (2) Not many experience of HPFD is minus factor.	- Not recommended.
(b) Brush layer/Hedge bush Layer (slope)	None	++ This can work to stabilize the slope and to become a basement for the vegetation recovery.	- (1) In case of hard soil layer of the site, it is difficult to implement this. (2) Not many experience of HPFD is minus factor.	- Not recommended.
(c) Fascines (slope)	None	++ This can work as a simple retaining wall and stabilize the slope.	- (1) In case of hard soil layer of the site, it is difficult to implement this. (2) Not many experience of HPFD is minus factor.	- Not recommended.
(d) Vegetative barriers on contour-line (slope)	None	- Specific structure is not imaged by	- Specific structure is not imaged by the	- Not recommended.

List of Measures in the Manual	Achievement of HPFD*	Evaluation by JICA Study Team: Effectiveness	Evaluation by JICA Study Team: Possibility of Implementation	Evaluation by JICA Study Team: Total
		the manual.	manual.	
(e) Contour wattling [live hedge, which is composed with trench, banking, planting on banking] (slope)	None	++ (1) This can work on a not steep slope. (2) It can stabilize the slope and become a vegetation basement. It can improve soil moisture condition.	+ Even if HPFD doesn't have much experiences, this is very simple structure; therefore, none experience is not minus factor.	++ - It can be used for degraded slope. - It can be used with plantation work to improve the survival ratio of the planted seedlings.
(f) Vegetated Palisade Wall (small stream or gully)	None	++ This can work on gentle gradient stream or gully	+ Even if HPFD doesn't have much experiences, this is very simple structure; therefore, none experience is not minus factor.	+ - it can be used for gentle gradient stream/gully only. - It is recommended to be used with plantation work. - Suitable gradient of stream/ gully for three types (f), (g) and (h) are: (f) < (g) < (h)
(g) Live check dam (small stream)	None			
(h) Brush wood check dam (small stream)	None			
I. Soil and water conservation measures				
(2) Mechanical measures				
(a) Dry stone check dam	Most of the Division office of HPFD have experiences of this.	+ This can work on gentle gradient stream or gully.	++ Most of HPFD offices have experiences and are familiar to this.	++ - This is useful for gentle gradient stream/ gully. - The structure shall be installed with deep excavation under-ground. - This type is not recommended at much water/debris are expected in stream/gully or steep gradient location because of not strong construction.
(b) Gabion check dam	Some of HPFD offices have experiences of this.	+ (1) This can work at steep gradient stream/gully if the excavation under-ground will be deep. (2) This is not appropriate at location of much water or debris are expected.	++ (1) Some of HPFD offices have experiences of this and are familiar with this. (2) This type is stronger than dry stone check dam; therefore, can be used at steep gradient location.	++ - This is recommended for the offices which have experience. - Deep excavation under-ground shall be considered in any case. - Certain design and stabilization calculation shall be carried out for construction.
(c) Gabion structure with ferro-	Most of HPFD offices	+	-	-

List of Measures in the Manual	Achievement of HPFD*	Evaluation by JICA Study Team: Effectiveness	Evaluation by JICA Study Team: Possibility of Implementation	Evaluation by JICA Study Team: Total
cement impervious barrier	don't have experiences of this.	(1) This can work at steep stream/gully. (2) This can storage water. In case the behind of the dam will be filled by water, there are doubts about stabilization.	(1) Most of HPFD offices don't have experiences. (2) Sever stabilization calculation will be required but such calculation has not been shown by HPFD.	Not recommended.
(d) Permanent structures for gully stabilization	Most of HPFD offices don't have experiences of this.	- (1) These are used for lower gradient area such as not stream but main river course. (2) These structures main purposes are not forest improvement.	- (1) Most of HPFD offices don't have experiences. (2) Purpose is not appropriate for the Forest Project.	- Not recommended.
(e) Masonry drop structure	Some of HPFD offices have experiences of this.	+ These types are used at gentle gradient location.	+ Some of HPFD offices have experiences of this and are familiar with this.	+ - This is recommended for the offices which have experience. - Deeper excavation under-ground than design in the manual shall be considered in any case.
(f) Masonry drop structure with apron				
(g) Silt detention structure (concrete)	Some of HPFD offices have experiences of this.	+ These types are used at gentle gradient location.	++ (1) Some of HPFD offices have experiences of this and are familiar with this. (2) This type can be used for medium scale of stream. (3) The negative aspect of this is cost.	+ - This is recommended for the offices which have experience. - Certain design and stabilization calculation shall be carried out for construction.
(h) Masonry retaining wall at slope	Most of HPFD office don't have experience.	- (1) This type can work at steep slope with erosion. (2) This also used for recovery of degradation such as landslide.	- (1) Most of HPFD offices don't have experiences. (2) Purpose of this type is mostly for stabilization of slope at landslide. (3) This is not much appropriate for soil and water conservation.	- Not recommended.
II. Measures for landslide control				
[1] Land slide triggered by weak geology				

List of Measures in the Manual	Achievement of HPFD*	Evaluation by JICA Study Team: Effectiveness	Evaluation by JICA Study Team: Possibility of Implementation	Evaluation by JICA Study Team: Total
(a) Retaining wall	Most of HPFD office don't have experience.	<p>+</p> <p>(1) The wall on the lowest location of landslide works to retain debris.</p>	<p>-</p> <p>(1) This type is usually constructed beside a road but it used for road protection, not for forest improvement.</p>	<p>+</p> <p>- In case the lowest or highest location is not road, this is recommended.</p>
(b) Series of staggered retaining walls on the slope	Some of HPFD offices have experiences of this.	<p>+</p> <p>- The functions of this type are:</p> <p>(1) spread run-off,</p> <p>(2) keep soil stability,</p> <p>(3) keep moisture behind the dam, and</p> <p>(4) provide stable area for vegetation recovery.</p> <p>- Negative pints are:</p> <p>(1) this type is appropriate for only shallow landslide only, such depth of slide shall be less than 1 m.</p> <p>(2) this is not appropriate for the location where much run-off or debris is expected area,</p> <p>(3) the area can be stabilized by this is limited; therefore, the slope between wall to wall shall be covered by other light structures.</p> <p>(4) deep excavation shall be designed.</p> <p>(5) currently, no design drawings are prepared for the construction. The design work should be prepared.</p>	<p>++</p> <p>(1) The functions of this type are effective to recover the landslide.</p> <p>(2) This type construction shall be used for shallow slide only.</p> <p>(3) Combination with other structures such as wood-fence, slope covering is expected.</p> <p>(4) This type shall not be used as main work for deep slide and typical type of landslip.</p>	<p>++</p> <p>- This can be used for HPFD office which has experiences.</p> <p>- The negative points the left can be resolved by careful preparation by the civil engineer.</p> <p>- Ground topographic survey and appropriate drawing preparation based on some necessary stabilization calculation shall be carried out before construction.</p>
(c) Geo-jute	Some of HPFD offices have experiences of this.	<p>++</p> <p>This works for:</p> <p>(1) reduce run-off velocity,</p> <p>(2) reduce damage on slope (soil) by rain drops,</p> <p>(3) keep moisture in the soil, then,</p> <p>(4) works for vegetation recovery.</p>	<p>++</p> <p>(1) Implementation of this type is not difficult much for HPFD offices which don't have experience.</p> <p>(2) This can work with some other structures but can't work single usage.</p>	<p>++</p> <p>- This type is effective and possible to implement.</p> <p>- Combination with other structures shall be designed.</p>

List of Measures in the Manual	Achievement of HPFD*	Evaluation by JICA Study Team: Effectiveness	Evaluation by JICA Study Team: Possibility of Implementation	Evaluation by JICA Study Team: Total
(d) Log crib	Most of HPFD office don't have experience.	+ This type can work as supplementary structure for the main structure (retaining walls)	+ (1) This is difficult for the offices which don't have experiences but if the design work will be carried well, construction could be possible.	+ - This type shall be carried out by combination of the other structures.
(e) Gunny bag	Most of HPFD office don't have experience.	+ (1) The design of this work is not clear in the manual. It is necessary to prepare clear design standard and typical drawing.	+ (1) This is not so difficult for the offices which don't have experiences. (2) standard design shall be prepared before design work.	+ - Usually step cutting to put the bags is used. - This work doesn't work as the singular structure. - Combination with the other structures shall be designed.
<p>II. Landslide control measures [2] Land slide triggered by road construction</p> <p>(a) Water diversion, (b) Retaining wall at base and all sections on road cut, (c) Channelizing flow through waterway, (d) Planting bushes and grasses along waterway, (f) Cross drainage works along roads</p> <p>These works are mostly to protect the road. It is recommended not to take these works for the Forest Project due to difference of principle purpose.</p>				
<p>III. Landslip control measures</p> <p>(a) Diversion ditch, (b) Main drainage, (c) Sub-drainage, (d) Lateral drain, (e) Vertical stand pipe, (f) Retaining wall</p> <p>This type of work is not recommended. The manual is considered not be enough for 1) Study, 2) design, and implementation. Usually, countermeasures for landslip requires many study, analysis, design works. And detail instruction with standards shall be prepared. However, the manual has only short description of concept of measures only. Therefore, this type is not recommended to be taken for the JICA forest project.</p>				

Source: JICA Study Team (2017)

### Attachment I.4.5.8 Encroachment

As per the state government data regarding encroachments;

- ◆ **Table 1** provides the details regarding district wise position of encroachment for land more than 10 bighas (*in Himachal Pradesh 1 bigha = 800 m<sup>2</sup>*) with FIRs registered as per Hon'ble High Court order as on 31.03.2017. FIRs lodged 2,526 (area 252.07 ha); demarcation/investigation done for 2,537 cases (area 2,536.069 ha); in Judicial court 2,514 cases (area 2,357.6 ha); filed before DFO 1,815 (area 1,707 ha) cases decided by Judicial Court 471 (494.01 ha) Cases in which encroached land evicted 953 (area 893.785 ha); cases decided by DFO-cum-collector 1, 420 (area 1,236 ha),
- ◆ **Table 2** mentions about the number of cases challaned before DFO cum-collector is 10,588 cases (area 2,004.77 ha) and number of cases decided/eviction orders passed 9,759 cases (area 1931.24 ha) pending cases 829 cases (73.53 ha). Cases with Divisional Commissioner (DC) 628 cases (area 115.01 ha); stay granted by DC for 286 cases (area 64.485 ha). Cases for which appeal filed in High Court (HC) 131 cases (area 14.0987 ha) stay by HC 12 cases (area 1.69 ha), and
- ◆ **Table 3** provides information about position of encroachment cases on forest/gove land less than 10 bighas in Revenue Court under section 163 of H.P. Land Revenue Act, 1954 upto 31.03.2017. Number of cases challaned in Revenue Court 4,319 (area 646.4221 ha), number of cases decide/eviction order passed 1,482 (area 170.738 ha); number of cases in which land actually evicted 1,079 (area 145.128 ha) and number of balanced cases 3,142 (area 493.4513 ha).

**Table 1 District-wise Position of Encroachment Cases on Forest/Govt. Land More Than 10 bighas in which FIRs Registered as per Hon'ble High Court Order as on 31.03.2017**

Sl. No.	District	Circle	Division	FIR lodged		Demarcation/ investigation done		Cases filed in Judicial Court		Cases filed before DFO-cum-Collector		Cases decided by Judicial Courts		Cases in which encroached Forest/Govt. land actually evicted		Cases decided by DFO-cum-Collector		Balance			
				No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No. Col. (7-13)	Area Col. (8-14)	No. Col. (7-15)	Area Col. (8-16)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Bilaspur	Bilaspur	Bilaspur	14	16.1704	14	16.1704	14	16.1704	5	5.4457	0	0	1	0.8833	3	2.6935	14	16.1704	13	15.2871
			Total	14	16.1704	14	16.1704	14	16.1704	5	5.4457	0	0	1	0.8833	3	2.6935	14	16.1704	13	15.2871
2	Chamba	Chamba	Chamba	26	27.815	26	27.815	26	27.815	2	1.6989	0	0	2	1.6989	0	0	26	27.815	24	26.1161
			Churah	34	40.2014	34	40.2014	34	40.2014	7	10.5936	5	5.6489	6	6.187	0	0	29	34.5525	28	34.0144
			Dalhousie	11	12.1201	11	12.1201	11	12.1201	11	12.1201	0	0	0	0	0	0	11	12.1201	11	12.1201
			Bhaormour	3	2.9498	3	2.9498	3	2.9498	3	2.9498	0	0	2	2.1083	0	0	3	2.9498	1	0.8415
			Pangi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total	74	83.0863	74	83.0863	74	83.0863	23	27.3624	5	5.6489	10	9.9942	0	0	69	77.4374	64	73.0921
3	Kangra	D/shala	Palampur	1	0.9109	1	0.9109	1	0.9109	0	0	0	0	0	0	0	0	1	0.9109	1	0.9109
			Nurpur	6	7.7434	6	7.7434	6	7.7434	6	7.7434	0	0	6	7.7434	0	0	6	7.7434	0	0
			D/shala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			H.pur	17	18.4819	17	18.4819	16	17.71	16	17.71	0	0	12	13.9477	11	13.1758	17	18.4819	5	4.5342
			Total	24	27.1362	24	27.1362	23	26.3643	22	25.4534	0	0	18	21.6911	11	13.1758	24	27.1362	6	5.4451
4	Hamirpur	H.pur	Hamirpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Kullu	Kullu	Kullu	354	353.7923	354	353.7923	354	353.7923	164	123.6642	138	127.7193	95	59.7125	155	110.3995	216	226.073	259	294.0798
			Parvati	32	29.68	32	29.68	32	29.68	28	17.8404	0	0	15	8.9856	28	17.8404	32	29.68	17	20.6944
			Seraj	159	68.204	159	68.204	159	68.204	159	68.204	7	3.243	109	40.523	150	59.332	152	64.961	50	27.681
			Ani	459	380.74	459	380.74	459	225.1	139	95.879	0	0	32	28.466	86	60.6263	459	380.74	427	352.274
			Total	1,004	832.4163	1,004	832.4163	1,004	676.7763	490	305.5876	145	130.9623	251	137.6871	419	248.1982	859	701.454	753	694.7292
6	Lahoul	Kullu	Lahoul	5	14.4	5	14.4	5	14.4	5	14.4	0	0	0	0	5	14.4	5	14.4	5	14.4
			Total	5	14.4	5	14.4	5	14.4	5	14.4	0	0	0	0	5	14.4	5	14.4	5	14.4
7	Kinnaur	Rampur	Kinnaur	134	208.2802	134	208.28	134	208.28	105	172.3429	0	0	0	0	6	6.182	134	208.28	134	208.28
		CCF.WL Shimla	WL Sarahan	1	1.2323	1	1.2323	1	1.2323	0	0	0	0	1	1.2323	0	0	1	1.2323	0	0
			Total	135	209.5125	135	209.5123	135	209.5123	105	172.3429	0	0	1	1.2323	6	6.182	135	209.5123	134	208.28
8	Mandi	Mandi	Mandi	74	68.2828	74	68.2828	74	68.2828	54	53.3928	0	0	49	48.5708	0	0	74	68.2828	25	19.712
			Nachan	22	22.67	22	22.67	22	22.67	6	6.681	22	22.67	19	18.873	0	0	0	0	3	3.797
			Suket	7	8.0362	7	8.56	7	8.0362	7	8.0362	0	0	4	5.107	0	0	7	8.56	3	3.453
			Karsog	4	5.331	4	5.331	4	5.331	4	5.331	4	5.331	4	5.331	0	0	0	0	0	0
			J/Nagar	1	0.98	1	0.98	1	0.98	1	0.98	0	0	1	0.98	0	0	1	0.98	0	0
			Total	108	105.3	108	105.8238	108	105.3	72	74.421	26	28.001	77	78.8618	0	0	82	77.8228	31	26.962
9	Sirmour		Nahan	1	0.944	1	0.944	0	0	1	0.944	0	0	1	0.944	0	0	1	0.944	0	0
			Paonta	3	11.546	8	11.546	0	0	8	11.546	8	11.546	1	0.96	0	0	0	0	7	10.586
			Renukaji	7	31.8686	14	31.8686	14	31.8686	14	31.8686	10	25.8248	10	26.1744	0	0	4	6.0438	4	5.6942



Sl. No.	District	Circle	Division	FIR lodged		Demarcation/ investigation done		Cases filed in Judicial Court		Cases filed before DFO- cum-Collector		Cases decided by Judicial Courts		Cases in which encroached Forest/Govt. land actually evicted		Cases decided by DFO-cum- Collector		Balance			
				No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No. Col. (7-13)	Area Col. (8-14)	No. Col. (7-15)	Area Col. (8-16)
			Rajgarh	57	62.24	57	62.24	57	62.24	49	52.184	22	19.824	23	22.912	0	0	35	42.416	34	39.328
			Total	68	106.5986	80	106.5986	71	94.1086	72	96.5426	40	57.1948	35	50.9904	0	0	40	49.4038	45	55.6082
10	Solan	Nahan	Solan	1	3.016	0	0	1	3.016	0	0	0	0	0	0	0	0	0	0	0	0
			Total	1	3.016	0	0	1	3.016	0	0	0	0	0	0	0	0	0	0	0	0
11	Shimla	Rampur	Kotgarh	19	23.5547	19	23.5547	19	23.5547	14	11.7761	0	0	13	10.8624	14	11.7761	19	23.5547	6	12.6923
			Rampur	177	100.5507	177	100.5507	177	100.5507	121	16.0169	0	0	24	1.0855	120	15.3964	177	100.5507	153	99.4652
			Shimla	24	15.8038	24	15.8038	24	15.8038	24	15.8038	0	0	7	5.9853	10	8.906	24	15.8038	17	9.8185
			Theog	131	159.1991	131	168.2291	131	168.2291	118	106.2763	2	1.9857	22	17.7898	88	80.1619	129	166.2434	109	150.4393
			Rohru	418	438.7423	418	438.7423	404	426.6448	420	441.0503	199	201.1916	260	291	420	441.05	219	237.5507	158	147.2793
			Chopal	324	367.1648	324	367.1648	324	367.1648	324	367.1648	54	69.0218	234	265.2588	324	367.1648	270	298.143	90	101.906
			Total	1,093	1,105.015	1,093	1,114.045	1,079	1,101.948	1,021	958.0882	255	272.1991	560	592.4448	976	924.4552	838	841.8463	533	521.6006
			G.Total:	2,526	2,502.652	2,537	2,536.069	2,514	2,357.562	1,815	1,706.524	471	494.0061	953	893.785	1,420	1,235.985	2,066	2,042.063	1,584	1,642.284

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Table 2 District-wise Position of Encroachment Cases on Forest/Govt. Land Less Than 10 bighas under HP Public Premises (Eviction & Rent Recovery) Act, 1971 up to 31.03.2017**

Sl. No	District	Division	No. of cases challaned before DFO-cum-Collector		No. of cases decided/ eviction order passed		No. of cases in which appeal filed with Divisional Commissioner		Stay granted by Divisional Commissioner		No. of cases in which appeal filed in High Court		Stay granted by High Court		No. of cases in which land actually evicted		Balance			
			No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No. Col. (4-6)	Area Col. (5-7)	No. Col. (4-12)	Area Col. (5-13)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Bilaspur	Bilaspur	410	115.3172	410	115.3172	47	9.0233	0	0	0	0	0	0	363	106.2939	0	0	410	115.3172
		Total:	410	115.3172	410	115.3172	47	9.0233	0	0	0	0	0	0	363	106.2939	0	0	410	115.3172
2	Chamba	Chamba	94	16.8237	89	15.0353	0	0	0	0	0	0	0	0	88	15.028	5	1.7884	94	16.8237
		Churah	108	22.9843	108	22.9843	0	0	0	0	0	0	0	0	106	22.9035	0	0	108	22.9843
		Dalhousie	186	25.066	185	25.018	37	0.2474	0	0	0	0	0	0	135	24.692	1	0.048	186	25.066
		Bharmour	167	15.598	167	15.598	20	0.9044	0	0	0	0	0	0	123	9.6728	0	0	167	15.598
		Pangi	66	13.533	66	13.533	0	0	0	0	0	0	0	0	62	12.768	0	0	66	13.533
		WL Chamba	23	0.355	23	0.355	8	0.2024	3	0.0154	1	0.06	0	0	19	0.1524	0	0	22	0.295
		Total:	644	94.36	638	92.5236	65	1.3542	3	0.0154	1	0.06	0	0	533	85.2167	6	1.8364	643	94.3
3	Kangra	Palampur	129	9.7591	129	9.7591	3	0.5454	3	0.5454	0	0	0	0	126	9.2137	0	0	129	9.7591
		Nurpur	583	207.65	576	206.263	3	0.0371	3	0.0371	0	0	0	0	564	205.5339	7	1.387	583	207.65
		D/shala	614	21.2826	421	19.8757	46	1.5564	46	1.5564	0	0	0	0	323	17.0533	193	1.4069	614	21.2826
		Dehra	431	68.0394	431	68.0394	50	2.808	6	0.0437	4	0.2625	3	0.0825	376	64.9175	0	0	427	67.7769
		Total:	1,757	306.7311	1,557	303.9372	102	4.9469	58	2.1826	4	0.2625	3	0.0825	1,389	296.7184	200	2.7939	1,753	306.4686
4	Hamirpur	Hamirpur	40	0.9934	39	0.9866	2	0.0254	0	0	1	0.0161	1	0.0161	34	0.8935	1	0.0068	39	0.9773
		Total:	40	0.9934	39	0.9866	2	0.0254	0	0	1	0.0161	1	0.0161	34	0.8935	1	0.0068	39	0.9773
5	Kullu	Ani	1,169	227.7842	897	216.0158	3	0.801	1	0.012	2	0.1789	1	0.1739	375	114.0917	272	11.7684	1,167	227.6053
		Kullu	611	114.0508	558	99.3706	107	29.9173	10	3.7735	33	8.5832	1	0.4297	293	51.4639	53	14.6802	578	105.4676
		Parvati	139	12.9676	121	12.717	16	2.3852	0	0	8	0.119	0	0	50	6.868	18	0.2506	131	12.8486
		Seraj	431	38.869	424	38.568	10	1.316	0	0	0	0	0	0	301	28.181	7	0.301	431	38.869
		GHNP	40	1.606	38	1.5942	14	0.4548	0	0	0	0	0	0	26	1.3024	2	0.0118	40	1.606
		WL.Kullu	2	0.03	0	0	0	0	0	0	0	0	0	0	0	0	2	0.03	2	0.03
		Total:	2,392	395.3076	2,038	368.2656	150	34.8743	11	3.7855	43	8.8811	2	0.6036	1045	201.907	354	27.042	2,349	386.4265
6	Kinnaur	WL Sarahan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Kinnaur	130	26.6266	86	11.5018	1	0.906	0	0	0	0	0	0	47	7.553	44	15.1248	130	26.6266
		Total:	130	26.6266	86	11.5018	1	0.906	0	0	0	0	0	0	47	7.553	44	15.1248	130	26.6266
7	Lahour	Lahaul	10	0.4265	10	0.4265	0	0	0	0	3	0.0736	0	0	4	0.299	0	0	7	0.3529
		Total:	10	0.4265	10	0.4265	0	0	0	0	3	0.0736	0	0	4	0.299	0	0	7	0.3529
8	Mandi	Mandi	374	68.1824	296	65.7236	0	0	0	0	3	0.0104	0	0	286	64.8136	78	2.4588	371	68.172
		Nachan	486	78.8996	485	78.635	0	0	0	0	0	0	0	0	415	66.243	1	0.2646	486	78.8996
		Suket	110	11.498	110	11.498	6	0.3478	6	0.3478	1	0.0434	1	0.0434	91	9.151	0	0	109	11.4546
		Karsog	148	24.895	146	24.8594	1	0.0048	1	0.0048	2	0.0566	2	0.0566	140	24.4946	2	0.0356	146	24.8384
		J/Ngr.	122	16.9886	106	16.7093	13	0.0765	0	0	6	0.0335	0	0	90	16.5593	16	0.2793	116	16.9551
		Total:	1,240	200.4636	1,143	197.4253	20	0.4291	7	0.3526	12	0.1439	3	0.1	1,022	181.2615	97	3.0383	1,228	200.3197
9	Shimla	Kotgarh	172	37.3245	160	34.1975	0	0	0	0	0	0	0	0	151	30.9768	12	3.127	172	37.3245
		Rampur	724	106.1704	707	103.5464	77	4.6059	0	0	28	1.5386	0	0	333	52.9148	17	2.624	696	104.6318

Sl. No.	District	Division	No. of cases challaned before DFO-cum-Collector		No. of cases decided/ eviction order passed		No. of cases in which appeal filed with Divisional Commissioner		Stay granted by Divisional Commissioner		No. of cases in which appeal filed in High Court		Stay granted by High Court		No. of cases in which land actually evicted		Balance			
			No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No.	Area in ha.	No. Col. (4-6)	Area Col. (5-7)	No. Col. (4-12)	Area Col. (5-13)
		Shimla	133	15.1125	90	9.1909	37	4.2572	37	4.2572	2	0.1091	2	0.1091	27	2.7724	43	5.9216	131	15.0034
		Theog	109	25.641	98	23.1587	4	0.9944	4	0.9944	0	0	0	0	78	18.9716	11	2.4823	109	25.641
		Rohru	1,713	428.9469	1,698	423.5998	72	28.3736	72	28.3736	0	0	0	0	894	198.743	15	5.3471	1,713	428.9469
		Chopal	378	140.7414	378	140.7414	40	11.4409	40	11.4409	0	0	0	0	230	83.4139	0	0	378	140.7414
		Shimla(U)	72	0.2808	57	0.1949	2	0.0112	2	0.0112	0	0	0	0	15	0.02819	15	0.0859	72	0.2808
		Total:	3,301	754.2175	3,188	734.6296	232	49.6832	155	45.0773	30	1.6477	2	0.1091	1728	387.8207	113	19.5879	3,271	752.5698
10	Solan	WL Shimla	9	0.0627	9	0.0627	0	0	0	0	0	0	0	0	2	0.0062	0	0	9	0.0627
		Kunihar	43	5.0538	42	4.5613	0	0	0	0	0	0	0	0	39	4.4451	1	0.4925	43	5.0538
		Nalagarh	14	0.6463	14	0.6463	4	0.528	0	0	6	0.0218	0	0	4	0.09646	0	0	8	0.6245
		Solan	53	6.8612	53	6.8612	0	0	0	0	25	0.0602	0	0	31	6.1128	0	0	28	6.801
		Total:	119	12.624	118	12.1315	4	0.528	0	0	31	0.082	0	0	76	10.66056	1	0.4925	88	12.542
11	Sirmour	Nahan	127	20.426	126	20.362	25	1.087	25	1.087	0	0	0	0	82	17.286	1	0.064	127	20.426
		Paonta	151	23.517	141	20.7	0	0	0	0	0	0	0	0	112	20.365	10	2.817	151	23.517
		Renukaji	221	45.1439	221	45.1439	28	9.2982	21	9.121	5	2.1518	0	0	171	21.9106	0	0	216	42.9921
		Rajgarh	42	8.244	40	7.516	6	2.864	6	2.864	1	0.78	1	0.78	14	2.528	2	0.728	41	7.464
		Total:	541	97.3309	528	93.7219	59	13.2492	52	13.072	6	2.9318	1	0.78	379	62.0896	13	3.609	535	94.3991
12	Una	Una	4	0.374	4	0.374	0	0	0	0	0	0	0	0	4	0.374	0	0	4	0.374
		Total:	4	0.374	4	0.374	0	0	0	0	0	0	0	0	4	0.374	0	0	4	0.374
		G.Total:	10,588	2,004.772	9,759	1,931.241	682	115.0196	286	64.4854	131	14.0987	12	1.6913	6,624	1,341.088	829	73.5316	10,457	1,990.674

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Table 3 District-wise Position of Encroachment Aases on Forest/Govt. Land Less Than 10 bighas in Revenue Court under Section 163 of H.P.Land Revenue Act,1954 up to 31.03.2017**

No	District	Circle	Division	No. of cases challaned in Revenue Court		No. of cases decided/eviction order passed		No. of cases in which land actually evicted		Balance	
				No.	Area (ha.)	No.	Area(ha.)	No.	Area(ha.)	No.	Area(ha.)
1	2	3	4	5	6	7	8	9	10	11	12
1	Bilaspur	Bilaspur	Bilaspur	76	4.3073	0	0	0	0	76	4.3073
			WL Hamirpur	0	0	0	0	0	0	0	0
			Total:	76	4.3073	0	0	0	0	76	4.3073
2	Chamba	Chamba	Chamba	0	0	0	0	0	0	0	0
			Churah	0	0	0	0	0	0	0	0
			Dalhousie	0	0	0	0	0	0	0	0
			Bharmour	0	0	0	0	0	0	0	0
			Pangi	0	0	0	0	0	0	0	0
		WLD/shala	W.Lchamba	0	0	0	0	0	0	0	0
			Total	0	0	0	0	0	0	0	0
3	Hamirpur	Hamirpur	Hamirpur	4	0.535	0	0	0	0	4	0.535
			Total:	4	0.535	0	0	0	0	4	0.535
4	Kangra	D/shala	Nurpur	3	0.3515	0	0	0	0	3	0.3515
			Palampur	182	7.4129	152	6.5316	25	1.1186	30	0.8813
			D/shala	372	30.6772	110	4.8218	8	1.4444	262	25.8554
		Hamirpur	Dehra	353	37.099	353	37.099	353	37.099	0	0
		W.L.D/shala	WL Hpur	0	0	0	0	0	0	0	0
			Total	910	75.5406	615	48.4524	386	39.662	524	35.8786
5	Kullu	Rampur	Ani	4	0.0273	0	0	0	0	4	0.0273
		Kullu	Kullu	0	0	0	0	0	0	0	0
			Parvati	0	0	0	0	0	0	0	0
			Seraj	25	2.979	25	2.979	9	1.032	16	1.947
		GHNP	GHNP	36	0.9364	16	0.8064	12	0.7782	24	0.1582
			WL.Kullu	0	0	0	0	0	0	0	0
			Total:	65	3.9427	41	3.7854	21	1.8102	44	2.1325
6	Kinnaur	WL Shimla	WL Sarahan	0	0	0	0	0	0	0	0
		Rampur	Kinnaur	3	0.7836	0	0	0	0	3	0.7836
			Total:	3	0.7836	0	0	0	0	3	0.7836
7	Lahoul	WL Shimla	WL Spiti	0	0	0	0	0	0	0	0
	Spiti	Kullu	Lahaul	0	0	0	0	0	0	0	0
			Total:	0	0	0	0	0	0	0	0
8	Mandi	Mandi	Mandi	467	114.618	54	20.51	51	17.681	413	94.1076
			Nachan	63	23.539	31	17.0136	29	16.832	32	6.5254
			Suket	20	5.12	3	0.0507	3	0.0507	17	5.0693

No	District	Circle	Division	No. of cases challaned in Revenue Court		No. of cases decided/eviction order passed		No. of cases in which land actually evicted		Balance	
				No.	Area (ha.)	No.	Area(ha.)	No.	Area(ha.)	No.	Area(ha.)
			Karsog	13	0.9596	10	0.9056	6	0.6238	3	0.054
			J/Ngr.	18	0.8851	0	0	0	0	18	0.8851
			Total	581	145.1217	98	38.4799	89	35.1875	483	106.6414
9	Shimla	Rampur	Kotgarh	38	4.75	0	0	0	0	38	4.75
			Rampur	264	117.4246	0	0	0	0	264	117.4246
			Shimla	8	9.786	0	0	0	0	8	9.786
			Theog	483	40.865	469	35.6	380	30.265	14	5.265
			Rohru	1,650	203.1716	31	7.0963	31	7.0963	1619	196.0753
			Chopal	8	2.83	0	0	0	0	8	2.83
			Total:	2,451	378.8272	500	42.6963	411	37.3613	1951	336.1309
10	Solan	WL Shimla	WL Shimla	0	0	0	0	0	0	0	0
			Bilaspur	0	0	0	0	0	0	0	0
			Bilaspur	0	0	0	0	0	0	0	0
			Nahan	0	0	0	0	0	0	0	0
			Total:	0	0	0	0	0	0	0	0
11	Sirmour	Nahan	Nahan	0	0	0	0	0	0	0	0
			Paonta	228	37.324	228	37	172	31.107	56	7.002
			Renukaji	0	0	0	0	0	0	0	0
			Rajgarh	0	0	0	0	0	0	0	0
			Total:	228	37.324	228	37.324	172	31.107	56	7.002
12	Una	Hamirpur	Una	1	0.04	0	0	0	0	1	0.04
			Total:	1	0.04	0	0	0	0	1	0.04
			G.Total:	4,319	646.4221	1,482	170.738	1,079	145.128	3,142	493.4513

Source: Compiled by JICA Study Team (2017) based on information from HPFD

**Attachment I.4.5.9 Division-wise Record of Illicit Tree Felling in HP State****Table 1 Division-Wise Illicit Felling Cases from 2009-10 to 2012-13**

Circle/Division	2009-10	2010-11	2011-12	2012-13
<b>BILASPUR CIRCLE</b>				
Bilaspur	95	185	237	439
Kunihar	12	33	18	25
Nalagarh	126	157	83	252
Total Circle	233	375	338	716
<b>CHAMBA CIRCLE</b>				
Chamba	428	219	116	121
Churah	29	25	33	17
Bharmour	10	8	6	2
Dalhousie	41	16	10	20
Pangi	2	0	0	0
Total Circle	510	268	165	160
<b>DHARAMSHALA CIRCLE</b>				
Dharamshala	196	73	69	121
Nurpur	170	218	184	203
Palampur	83	47	25	12
Total Circle	449	338	278	336
<b>HAMIRPUR CIRCLE</b>				
Dehra	86	109	51	67
Hamirpur	56	54	74	64
Una	40	50	54	58
Total Circle	182	213	179	189
<b>KULLU CIRCLE</b>				
Kullu	125	54	53	50
Parbati	43	114	20	33
Lahaul	25	0	55	0
Seraj	86	33	17	7
Total Circle	279	201	145	90
<b>MANDI CIRCLE</b>				
Mandi	185	25	396	520
Nachan	115	99	102	89
Joginder Nagar	386	273	407	58
Karsog	76	97	77	64
Suket	79	30	40	100
Total Circle	841	524	1,022	831
<b>NAHAN CIRCLE</b>				
Nahan	36	18	22	28
Paonta	81	0	276	278
Rajgarh	102	82	90	52
Renukaji	72	27	48	90
Solan	3	23	27	23
Total Circle	294	150	463	471
<b>RAMPUR CIRCLE</b>				
Ani	73	50	73	51
Rampur	16	33	29	12
Kotgarh	10	20	12	12
Kinnaur	172	146	181	65
Total Circle	271	249	295	140
<b>SHIMLA CIRCLE</b>				
Shimla	50	49	50	81

<b>Circle/Division</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>
Shimla (U)	0	0	Division not exists	
Chopal	18	46	47	28
Theog	141	163	0	67
Rohru	75	70	51	36
Total Circle	284	328	148	212
<b>WILD LIFE CIRCLE DHARAMSHALA</b>				
Chamba WL	11	11	13	10
Hamirpur WL	58	80	27	69
Total Circle	69	91	40	79
<b>WILD LIFE CIRCLE SHIMLA</b>				
Shimla WL	1	1	11	7
Sarahan WL	11	5	18	30
Spiti at Kaza	0	0	0	0
Total Circle	12	6	29	37
<b>GHNP, KULLU</b>				
GHNP	0	0	0	0
Kullu	89	265	25	241
Total Circle	89	265	25	241
Total H.P	3,513	3,008	3,127	3,502

Source: Forest Statistics, HPFD, 2013

### **Attachment I.4.5.10 National Afforestation Programme (NAP): State Forest Development Agency (SFDA) and Forest Development Agency (FDA)**

In the year 2002-03, National Afforestation and Eco-Development Board (NAEB) of the Ministry of Forests and Environment (MOEF), Govt. of India (GOI) initiated the National Afforestation Programme (NAP) with a broad adjective of regeneration and eco-development of degraded forests. Since 2002-03, NAP continues to be the flagship scheme of NAEB, in so much as it provides support, both in physical and capacity building terms, to the Forest Development Agencies (FDAs) which in turn are the main organs to move forward institutionalization of Joint Forest Management (JFM) under participatory mode by involving two tier set up as FDAs (Divisional level) and JFMC (at village level).

Under NAP, FDAs are required to be registered under Societies of Registration Act, 1860 and Joint Forest Management Committees (JFMC) are required to be registered / constituted as per the provision of the JFM orders in the State and in case, there is no JFM orders, the JFMCs are to be registered by CFs/DFOs. State Forest Development Agencies (SFDA) were constituted as per MoEF guidelines in 2010 to act as Apex institution of all the FDAs in the state

Till the year 2009 -10, FDAs were funded directly by the NAEB. However, in November 2009, revised operational guidelines were issued by the NAEB whereby it was enjoined upon the States to constitute State Forest Development Agency (SFDA) which were required to be registered as a society under Societies Registration Act, the chairperson of the SFDA would be Principal Chief Conservator of Forests and Chief Conservator Forests (PFM) would function as its member secretary. The funds from NEAB would be directly transferred to SFDA which, in turn would transfer the funds to FDAs as per their work programme which would be approved by the NAEB. During 2010, SFDA of HP was constituted and got registered under HP Society Registration Act, 2006. From the year 2010-11 onward the NAP is being implemented in HP through SFDA. At present, FDAs have been constituted in 36 territorial forest divisions and wildlife divisions of Chamba and the Great Himalayan National Park (GHNP).

In relation to NAP, details of the funds received from Government of India, working programme approved amount, expenditure incurred, and physical targets and their achievements from 2007-08 to 2014-15 and utilized up to 2016-17 are presented in **Table 1**.



**Table 1 Fund Released and Achievements of NAP from 2007-08 to 2014-15 and Utilized up to 2016-17**

Year	Work Programme Approved (Million INR)	Funds Released (Million INR)	Expenditure Incurred (Million INR)	Physical Targets (Ha)	Physical Targets Achieved (Ha)	Remarks
2007-08	---	74.33	64.43	2,143	1,719	11 FDAs
2008-09	96.22	67.20	44.81	.	2,263	9 FDAs
2009-10	----	35.90	67.53	1,249	2,263	7 FDAs
2010-11	-----	60.36 (25.86+34.50)	57.54	2,245	2,467.10	36 FDAs
2011-12	75.31	34.88	32.54	1,601	1,337.78	36 FDAs
2012-13	36.46	36.19	24.05	3,720	2,126.32	36 FDAs
2013-14	52.21	26.10	24.79	2,310	1,312	36 FDAs
2014-15	52.80	7.25	6.26	3,630	2,248	36 FDAs
2015-16	----	13.90 [un-spent amount release+ interest]	9.29	2,505	2006 [including Maintenance]	36 FDAs
2016-17	---	14.78 [un-spent amount release+ interest]	4.737	969	840 [including Maintenance]	36 FDAs

Source: HPFD

## **Attachment I.4.5.11 Compensatory Afforestation Fund Management and Planning Authority (CAMPA)**

### **1. Constitution**

The HP State CAMPA came into existence during 2009, vide GoHP Notification dated 3 August 2009. The current financial year 2017-18 is ninth year of its operation.

### **2. Functioning of State CAMPA**

The HP State CAMPA functions through a Governing Body; a Steering Committee and an Executive Committee.

#### **1) The Governing Body**

The Governing Body has Chief Minister as Chairperson; Forest Minister as Vice Chairperson; Pr. CCF as Member Secretary and nine other members. It lays down broad policy framework for the functioning of State CAMPA and reviews its working from time to time.

#### **2) The Steering Committee**

Constitutes Chief Secretary as Chairperson, Addl. Pr. CCF (CAT Plans) as Member Secretary and 12 other members. It has to approve APOs, Annual Reports and Audited Accounts, monitor the progress of utilization of funds and to lay down and/or approve rules and procedures for the functioning of the body and its EC.

#### **3) The Executive Committee**

Consists of Pr. CCF as Chairperson, Nodal Officer (CAMPA) as Member Secretary and seven other members. It has mainly to prepare APO for Steering Committee's approval, implement the approved APO, supervise the works being implemented, prepare annual report, and submit report to Steering Committee, to ensure proper auditing of receipt and expenditure and to take all steps to achieve overarching objectives and core principles of state CAMPA.

### **3. Aims and Objectives**

The HP State CAMPA is intended as an instrument to accelerate activities for Compensatory Afforestation, Forest Resource Management, Preservation of Natural Forests, Management of Wildlife, Infrastructure Development in the sector and allied works. It has to provide an integrated framework for utilizing multiple sources of funding and activities relating to protection and management of forests and wildlife. Its prime task is to regenerate natural forests and build up the institution engaged in this work.

The HP State CAMPA has to promote:

- 1) Suitable afforestation and Soil & Water conservation strategies that are suitable for a mountain state like Himachal Pradesh;
- 2) Conservation, protection, regeneration and management of existing natural forests;
- 3) Compensatory Afforestation and Catchment Area Treatment activities;

- 4) Environmental services, including:
  - (a) Provision of goods such as wood, non-timber forest products, fuel, fodder and water, provision of services such as grazing, tourism, wildlife protection and life support;
  - (b) Regulating services such as climate regulation, disease control, detoxification, carbon sequestration and health of soils, air and water regimes;
  - (c) Non-material benefit obtained from eco-systems, spiritual, recreational, aesthetic, inspirational, educational and symbolic and
  - (d) Supporting such other services necessary for the production of eco-system services, bio-diversity, nutrient cycling and primary production.

#### **4. Functions**

The functions of HP State CAMPA include inter-alia:

- (i) Funding, overseeing and promoting Compensatory Afforestation done in lieu of diversion of forest land for non-forestry use under the Forest Conservation Act 1980 (FCA) as also the execution of Catchment Area Treatment Plans (CATPs);
- (ii) Overseeing forest and wildlife conservation and protection works including watershed development works within forest areas undertaken and financed under the fund;
- (iii) Maintaining a separate account in respect of funds received for conservation and protection of Protected Areas;
- (iv) Earmarking up to two percent of the funds for monitoring and evaluation.

#### **5. Fund Flow Mechanism**

All FCA levies to be realised from User Agencies in connection with diversion of forest land under FCA 1980, are deposited in to the account of Ad-Hoc CAMPA (MoEF) at New Delhi where State wise accounts of deposits are maintained. Previously 10% of the total deposits standing at the credit of a particular state at the beginning of financial year, were being released annually subject to an overall cap of 10,000 million for all the states. This ceiling of 10,000 million, in effect had reduced the actual release to about 5%. Recently in March 2014, the Hon'ble Supreme Court of India has modified its order and has removed the ceiling of 10,000 million. It has now been ordered to release an annual amount, equal to 10% of the total accumulation standing at the credit of a state as on 31st March of previous year. Further, this release is not to be made from the principal amount but out of the interest accrued to Ad-Hoc CAMPA on the deposits with it. This system will ensure continued availability of CAMPA funds without depleting the principle amount.

The APO of a particular year framed by State CAMPA is approved by the Steering Committee of HP State CAMPA and is submitted to Ad-Hoc CAMPA for releasing the funds. On receipt of APO, the annual instalment is released by the Ad-Hoc CAMPA directly into the account of State CAMPA from where the funds are further released to various executing agencies of HPFD as per their demand and in consonance with APO approved by the Steering Committee of HP State CAMPA.

## **6. Utilisation of Funds**

The sectors/segments which are being funded by State CAMPA are as under:

- (i) Catchment Area Treatment Plans (CAT Plans)
- (ii) Compensatory Afforestation (CA)
- (iii) Net Present Value (NPV)
- (iv) Rim Plantation Scheme
- (v) Wildlife Management Plans:
- (vi) Conservation of Endangered Species in HP
- (vii) Conservation of Flora & Fauna in and around GHNP
- (viii) Soil Conservation Plan formulated in diversion case of JP Cement Plant
- (ix) Reclamation Plans.
- (x) Protected Area Corpus

In all the above said sectors, the sectors of CAT Plans, CA and NPV are the major sectors; Rim Plantation and Wildlife Management Plans are sub-major and that of Soil Conservation and Reclamation Plans are project specific minor sectors. Under the Sector of Protected Areas, the amount of 2,263.5 million (INR) deposited by NTPC against the stipulation of Koldam project is utilised.

The detail of works to be executed as also the locations under all these sectors except, NPV sector are already specified at the time of formulation of FCA proposal and are executed accordingly. The funds deposited under these sectors, except NPV, are non-transferable and are thus, to be utilised on the site-specific works approved under the same sector. The funds under NPV sector are untied and can be spent anywhere in the State in keeping with the overarching objectives laid down in the CAMPA guidelines.

The CAMPA funds are utilised on the implementation and execution of works under the following broad components:

- (a) Plantations
- (b) Maintenance of Plantations
- (c) Nursery development
- (d) Forest Infrastructure Development
- (e) Soil & Moisture Conservation Works
- (f) Wildlife life management and Habitat improvement
- (g) Conservation and protection of protected areas
- (h) Monkey Sterilization Programme
- (i) Afforestation through School Children
- (j) Funding of ETF
- (k) Training/Awareness/Studies
- (l) Operational Support to field units
- (m) Other Ancillary Works

## 7. Receipt of Funds

The HP State CAMPA, after its coming into being during 08/2009, received 1st release of CAMPA funds from the Adhoc CAMPA, GoI during the year 2009-10. The year-wise detail of CAMPA funds received till date from Adhoc CAMPA is given in **Table 1**.

**Table 1 Fund Received from Adhoc CAMPA**

No.	Year	Funds Received from Adhoc CAMPA (million INR)				
		Funds Receipt from Principal Amount		Total Receipt from Principal Amount	Funds Receipt from Interest Amount	Total Receipt
		General Fund	Protected Area			
1	2009-10	366.8	0.00	366.8	0.00	366.8
2	2010-11	421.7	0.00	421.7	0.00	421.7
3	2011-12	571.3	0.00	571.3	0.00	571.3
4	2012-13	524.0	0.00	524.0	0.00	524.0
5	2013-14	535.0	0.00	535.0	0.00	535.0
6	2014-15	0.0	50.0	50.0	960.0	1,010.0
7	2015-16	0.0	84.9	84.9	956.0	1,040.9
	Total:	2,418.8	134.9	2,553.7	1,916.0	4,469.7

Source: HPFD Internal Report

## 8. Expenditure

The sector-wise detail of funds utilised till Mach.2016, is given in **Table 2**.

**Table 2 Expenditure Incurred for CAMPA**

No.	Name of Sector	Expenditure Incurred During (Millions INR)				
		2009-10 to 2012-13	2013-14	2014-15	2015-16	Total
1	CAT Plans	608.5	372.1	471.5	410.2	1,862.3
2	CA	88.2	181.1	215.5	147.6	632.4
3	NPV	370.3	188.1	430.2	364.9	1,353.5
4	WL Mgmt. Plans	81.4	37.7	37.8	41.4	198.3
5	Rim Plantation	71.9	11.9	0	0	83.8
6	S&WC Plans	4.5	3.2	4.3	2.0	14.0
7	Reclamation Plans	0.0	1.8	0.3	0.4	2.5
8	Refund to GoHP	47.3	0.0	0.0	0	47.3
	Total	1,272.1	795.9	1,159.6	966.5	4,194.1
9	Protected Areas (Koldam Stipulation)	0.0	0.0	35.0	58.8	94.2
	Grand Total	1,272.1	795.9	1,195.0	1,025.3	4,288.3

Source: HPFD Internal Report

## 9. APO for 2016-17

The sector-wise detail of APO for 2016-17, submitted to Ad-hoc CAMPA GoI for funding, is given in **Table 3**.

**Table 3 Breakup of APO for 2016-17**

No.	Name of Sector	Size of APO 2016-17 (10 Million INR)
1	NPV	43.63
2	Compensatory Afforestation (CA)	14.60
3	CAT Plans	38.52
4	WL Mgmt. Plans	1.08
5	S&WC Plans (JP Cement Plant Baga)	0.35
6	Reclamation Plans	0.63
7	Green Belt (Chamera-III Project)	0.09
	Total	98.90
8	Protected Area Corpus	38.83
	Grand Total	137.73

Source: HPFD Internal Report

## Attachment I.4.5.12 Catchment Area Treatment Plans (CAT Plans)

### 1. Catchment Area Treatment Plans

As per MoEF, GoI guidelines, it is mandatory for the User Agencies of all the Hydro Electric Projects in the state, having capacity of more than 10MW, to prepare and submit a Catchment Area Treatment Plan (CATP) along with their case for diversion of forest land for non-forestry purpose. At present, the total outlay of a CAT Plan is determined @ 2.5% of total project cost.

#### (1) Status of Approved & On-going CAT Plans

The status of approved and on-going CAT plans as of March 2017 is described in **Table 1**.

**Table 1 Status of CAT Plans (March 2017)**

No.	Particulars	No./Amount	
<b>I</b>	<b>Status of Implementation of CAT Plans</b>		
1	Total number of approved CAT Plans of different projects	49	No.
2	Total Number of CAT Plans being implemented till date	41	No.
3	Total number of CAT Plans yet to be implemented	08	No.
4	Total Number of new CAT Plans under process of approval	06	No.
<b>II</b>	<b>Position of CAT Plan Funds</b>		
1	Total outlay of approved CAT Plans	7,207.1	Million INR
2	<b>Total Amount deposited by User Agencies till 31.03.2017</b>	<b>5,447.6</b>	Million INR
3	Total Amount spent under State Funding up to 2009-10	1,292.3	Million INR
4	Total Amount spent under CAMPA from 2009-10 to 2016-17	21,58.3	Million INR
5	<b>Total Amount Spent up to 31.03.2017</b>	<b>3,450.6</b>	Million INR
6	Balance amount available out of deposit by User Agencies	1,982.1	Million INR
7	Total Size of CAT Plan APO for 2017-18	290.0	Million INR

Source: HPFD internal Report

#### (2) Objective

Most of the basins in HP are prone to processes, including floods, landslides, soil erosion and debris flows. These areas also experience flash floods caused because of lower water retention capacity of the terrain, cloudbursts, creation of an artificial dam because of landslides and its disruption on accumulation of water, etc. The maximum flow occurs during June-August resulting from combined contribution of rainfall and snowmelt. This leads to damages in the downstream areas and sometimes entire topography gets changed with heavy erosion of the river banks. Also, power generation in Hydroelectric projects suffers. It is in this background that an integrated treatment plan or Catchment Area Treatment Plan (CAT Plan) is required to upgrade the terrain through soil moisture conservation, afforestation the catchment and other measures. The basic approach of treatments under CAT Plan has been to check soil run off, increase moisture retention of the area for improved vegetation and agricultural practices. The accumulated silts wherever found to be with soil depth is to be planted for a permanent vegetative cover to check the silt and also improve forest cover. The approach also aimed at creating community friendly assets to meet fuel wood, fodder and other NTFP demand of the community. Other objective is to address a host of other issues like damage to rural infrastructure, change in drainage pattern, increased pressure on natural resources, impact on wildlife, increased pressure

on natural resources and damage to visual aesthetics of the area. One sampled objective list from BASPA-II is hereunder<sup>1</sup>:

- i. To achieve ecological rehabilitation of the project area leading to all round economics development on a sustainable basis.
- ii. To increase the vegetation cover in the area by Afforestation of area forests threatened either erosion, with due consideration for fodder fuelwood and timber demand of local people.
- iii. Combating erosion in all forms on slopes, wherever possible.
- iv. To promote in sue moisture conservation, ground water recharge and to increase the productivity of all types of land.
- v. To carry out soil conservation measures in water shed of BASPA River to ensure the longevity of the reservoir of Baspa 2 hydroelectric project.
- vi. To improve the carrying capacity of pasture by augmenting grass and fodder availability and to solve the problems of migratory graziers.
- vii. To strengthen productive & protective functions of existing forests.
- viii. To provide employment to the local people by engaging them on afforestation and soil conservation works.
- ix. To improve rural infrastructure in the project area.
- x. To increase productivity of all types of land and sustained use of natural resources.
- xi. To promote community participation by motivation/awareness and training in adopting environmentally sustainable practices and to upgrade their skills in natural resource management.
- xii. To conduct research studies for developing appropriate site specific technological packages with focus on resolving Plan implementation problems.
- xiii. To mitigate the project impacts on wildlife by initiating ameliorating measures and to strengthen wildlife management in the tract.

### **(3) Components/ Activities**

The CAT plans are designed to develop the catchment area in an integrated manner by improving vegetation cover over the degraded and blank areas and to treat the flood prone nallahs, stabilize the river bank and road side slopes by providing suitable bio-engineering structures and various soil conservation measures. Following is broadly the component/ Activity list<sup>2</sup>:

1. Forest establishment and improvement
  - a) Afforestation of degraded forest lands.
  - b) Assisted natural regeneration
  - c) Raising of NTFP plantation

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<sup>1</sup> BASPA II CAT Plan Document

<sup>2</sup> BASPA II CAT Plan Document

- d) Treatment of culturable waste land
- e) Raising of nurseries
2. Improvement of alpine pastures
3. Soil and moisture conservation works
  - a) Treatment of land slips/slides
  - b) Treatment of nallah
  - c) River bank stabilisation
  - d) Road side stabilisation
4. Rural infrastructure development
  - a) Village pond/tank
  - b) Soils and water conservation structures
  - c) Repair of spring, bawries & other water sources
  - d) Repair of village road & path
  - e) Construction of foot bridges
5. Forest infrastructure development
  - f) Construction/repair of operational buildings
  - g) Construction/repair of inspection path/bridle path and roads.
  - h) Construction of bridges.
6. Avenue plantation & landscaping.
7. Treatment of private lands
8. Distribution of seedlings to people
9. Wildlife management
  - A. Intensive management of wildlife sanctuary
    - i. Fire protection
    - ii. Habitat improvement
    - iii. Anti-pouching activities
    - iv. Reward & incentive to informer
    - v. Census operation
    - vi. Demarcation of boundaries & construction of pillars
    - vii. Slogan & sign board
  - B. Eco-developmental activities
    - i. Vaccination domestic cattle
    - ii. Purchase of equipment and medicines
    - iii. Income generation activities
    - iv. Provision for compensation against WL damages.
    - v. Distribution for GI pipe for installation of religious flags.
    - vi. Construction of crematoria
    - vii. Construction of tracker hut
    - viii. Installation of street solar lights.



10. Training awareness, extension & publicity

11. Research and studies

12. Operational support

- a) Establishment cost office expenses
- b) Travelling allowances
- c) Office equipment
- d) Motor vehicle and POL
- e) Office expenses
- f) Amenities t staff & labour

13. Agricultural & horticultural support

14. Animal husbandry support

15. Revenue of state

16. Contingencies

#### (4) Individual CAT Plan Outlay

At present, the total outlay of a CAT Plan is determined @ 2.5% of total project cost. Broad distribution of budgetary outlay may vary among respective CAT Plans. A sample outlay under different components from the Karacham Wangtoo CAT Plan is presented in **Table 2**.

**Table 2 Sample Component-wise Budgetary Outlay of CAT Plan**

No	Item/ Activity/ Component	Outlay Percentage
1	Afforestation, Maintenance, Pasture, Nurseries	20
2	Soil & Water Conservation Measures	25
3	Payment of Environmental Services (PES)	10
4	Research, Capacity Building, Publicity	5
5	Institutional Charges/ Departmental Charges	7
6	Monitoring & Evaluation	3
7	Wildlife related Interventions	5
8	Infrastructure Buid-up (Rural & Forestry)	15
9	Contingencies	10
	Total	100

Source: CAT Plan Document Karacham Wangtoo Hydro Electric Project

#### (5) Monitoring

There is provision of Regular third-party monitoring, besides internal departmental mechanisms for the CAT Plans under implementation in the HPFD. Monitoring report of 4 CAT Plans i.e Kol Dam, Rampur HEP, Nathpa Jhakari HEP, BASPA –II, done by Department of Environmental Sciences, University of Horticulture & Forestry, Nauni, Solan (2009-2010) & Monitoring report of Kol Dam HEP by M/S NH Consulting Pvt. Ltd (2012) is available on the website of CAMPA. Recently, monitoring of Plantation activities from the period 2010 - 14 has been got done through Himalayan Forest Research Institute (HRFI), Shimla. The Survival % of afforestation activities in Kol Dam CAT Plan is described in **Table 3**.

**Table 3 Survival Rate of Afforestation Activities in Kol Dam CAT Plan**

No	Division	Average Survival %
1	Bilaspur	62
2	Karsog	59
3	Kunihar	56
4	Nachan	60
5	Shimla	57
6	Suket	61
7	Theog	56
8	Average Survival	59

Source: Monitoring of Kol Dam by NH Consulting (2012)

#### (6) Outlay and Expenditure of CAT Plans

The CAT Plan-wise outlay and expenditure as of March 2017 is presented in **Table 4**. At state level, there is approximately 48% progress in terms of expenditures against outlays. The progresses vary among CAT Plans and ranging from 0% to 95%.

**Table 4 CAT Plan-wise Funds and Expenditure Status (March 2017)**

No.	Name of CAT Plan	Name of Division	Capacity (MW)	Outlay of CATP	Expenditure up to Mar 2017	Progress (%)
				INR Million		
<b>Satluj River Basin</b>						
1	Baspa-II	Kinnaur & WL Sarahan	300	288.27	216.15	75.0%
2	K/Wangtoo	Kinnaur & WL Sarahan	1,000	319.44	304.61	95.4%
3	Integrated Kashang	Kinnaur & WL Sarahan	243	305.06	91.38	30.0%
4	Kol Dam	Suket, Karsog, Nachan, Bilaspur, Kunihar, Shimla, Theog, WL Shimla	800	652.30	604.50	92.7%
5	Kut HEP	Rampur	24	16.72	8.55	51.1%
6	NJPC	Kinnaur & WL Sarahan	1500	295.72	277.03	93.7%
7	Rampur	Rampur & Ani	434	233.79	196.29	84.0%
8	Sorang	Kinnaur & WL Sarahan	100	64.70	49.61	76.7%
9	Tidong	Kinnaur & WL Sarahan	100	72.48	48.89	67.5%
10	Jongini	Rampur	12	19.82	3.79	19.1%
11	Sumej	Rampur	14	23.00	8.78	38.2%
12	Roura-II	Rampur	20	40.19	18.05	44.9%
13	Upper Nanti	Rampur	12	20.78	8.15	39.2%
14	Shong Tong Karchham	Kinnaur & WL Sarahan	402	604.40	332.25	55.0%
15	Lower Nanti	Rampur	10	16.91	4.30	25.4%
16	Wanger Homte	Kinnaur & WL Sarahan	24.6	41.00	11.64	28.4%
17	Selti Masrang	Kinnaur & WL Sarahan	24	38.60	8.74	22.6%
	<b>Total</b>		<b>5,019.60</b>	<b>3,053.19</b>	<b>2,192.70</b>	<b>71.8%</b>
<b>Beas River Catchment/Basin</b>						
1	Allain Duhangan	Kullu	192	61.57	39.22	63.7%
2	Larji	Parvati, Seraj, Mandi, Nachan	126	128.03	127.58	99.6%
3	Malana-I	Parvati	86	10.15	8.54	84.1%
4	Malana-II	Parvati	100	33.78	19.50	57.7%
5	Neogal	Palampur	15	6.24	6.23	99.8%
6	Parbati-II	Parvati	800	267.02	95.59	35.8%
7	Parbati-III	Seraj & GHNP	520	257.00	94.07	36.6%
8	Patikari	Nachan	16	5.71	4.94	86.5%
9	UHL-III	Jogindernagar	100	100.00	93.33	93.3%
10	Sainj	GHNP	100	111.54	31.97	28.7%
11	Bara Gaon	Kullu	24	42.03	18.93	45.0%
12	Phina Singh	Dalhousie	0	45.30	21.00	46.4%
13	Dhaura Sidh	Hamirpur	66	124.90	-	0.0%
14	Kharnal	Mandi	14	34.30	-	0.0%
15	Medium Irrigation Project, Nadaun	Hamirpur	0	24.51	8.22	33.5%

No.	Name of CAT Plan	Name of Division	Capacity (MW)	Outlay of CATP	Expenditure up to Mar 2017	Progress (%)
				INR Million		
16	Jari Hydel Project	Mandi	12	27.12	-	0.0%
17	Lambadug	Palampur	23	37.85	-	0.0%
	<b>Total</b>		<b>2,194.00</b>	<b>1,317.06</b>	<b>569.11</b>	<b>43.2%</b>
<b>Ravi River Catchment/Basin</b>				-	-	
1	Budhil	Bharmour & WL Chamba	70	49.50	35.73	72.2%
2	Chamera-II	Chamba	300	107.20	105.07	98.0%
3	Chamera-III	Bharmour & WL Chamba	231	298.15	187.75	63.0%
4	Ranjit Sagar Dam	Dalhousie	0	60.07	32.79	54.6%
5	Upper Joiner	Chamba	12	18.08	14.73	81.5%
6	Chanju-I	Chamba	36	73.80	35.41	48.0%
7	Kuther	Bharmour	240	450.00	125.01	27.8%
8	Bajoli Holi	Bharmour	180	430.00	93.28	21.7%
	<b>Total</b>		<b>1,069.00</b>	<b>1,486.81</b>	<b>629.77</b>	<b>42.4%</b>
<b>Yamuna River Catchment</b>				-	-	
1	Renukaji Dam	Renukaji	40	750.00	-	0.0%
2	Sawra Kuddu	Rohru	110	73.10	42.31	57.9%
3	Tangnu Romai	Rohru	44	54.31	11.74	21.6%
4	Dhamwari Sunda	Rohru	70	122.46	-	0.0%
5	Paudital Lassa	Rohru	24	29.60	4.88	16.5%
6	Rupin		45	39.26	-	0.0%
	<b>Total</b>		<b>333.00</b>	<b>1,068.73</b>	<b>58.93</b>	<b>5.5%</b>
<b>Chenab River Catchment</b>				-	-	
1	Miyar	Lahaul	120	281.30	-	0.0%
	<b>Total</b>			<b>281.30</b>	-	<b>0.0%</b>
<b>Grand Total</b>			<b>8,615.60</b>	<b>7,207.09</b>	<b>3,450.51</b>	<b>47.9%</b>

Source: HPFD Internal Report

## 2. Comprehensive CAT Plans

HP has a vast potential of hydro power and has identified more than 23,000 MW of hydro power potential in the state. Being a clean energy source, the HP state government is making efforts to harness this vast potential. However, the promotion of hydro sector should be environmentally sustainable. To address various environmental issues arising out of construction of hydroelectric projects,

In order to have river basin wise approach for treatment of catchment in a holistic manner rather than in a fragmented approach, HPFD had embarked upon preparation of Comprehensive CAT Plans (CCPs) in four major river basins of HP, namely Satluj, Ravi, Beas and Chenab. Out of these four CCPs, the CCPs for Satluj, Ravi, and Chenab have been finalized and that of Beas is under final stage of completion. Although, so far, project specific CAT Plans have been formulated for all the hydro power projects having more than 10 MW capacity, yet, a river basin being one natural, ecological, watershed unit cannot have fragmented prescriptions. Hence adopting a holistic perspective and integrated approach is desirable. The basin level CAT Plan addresses the need of the total catchment area, in a scenario of unconstrained outlay, to make it stable in so far as the soil and moisture retention is concerned, whereas a project level CAT Plan is focused on the immediate catchment of the project.

These comprehensive and basin wide CAT Plans would emphasis on a holistic and integrated treatment of the catchments giving due recognition to different land usages and optimal utilisation of available resources as also for upliftment of livelihoods and socio-economic status

of the basin as a whole. It would prioritize the micro watersheds based on the given set of indicators with erosion intensity and silt production potential having the highest weightage. The brief descriptions of four CCPs are presented hereunder:

1. Comprehensive CAT Plan of Satluj River Basin

The CCP of Satluj River basin covers an area of 20,000 km<sup>2</sup> upstream of Koldam. The treatment plan has been prepared after detailed analysis of the current situation of the catchment. It envisages an expenditure of 14,400 million INR on various treatment measures, over a period of ten years, to reduce the silt load in the streams catering to these projects and bring the ecology of the catchment on a sound footing.

2. Comprehensive CAT Plan of Chenab River Basin

The CCP of Chenab river basin covers an area of 7,879 km<sup>2</sup> from the origin of Chenab River in HP to the confluence of Sansari Nala with Chenab at the border of HP and J&K. The length of river in HP is 260 km. The CCP stands finalized. It covers 172 micro watersheds and its total cost is 4,582.2 million INR.

3. Comprehensive CAT Plan of Ravi River Basin

The CCP of Ravi river basin covers an area of 5,450 km<sup>2</sup> in Himachal Pradesh. The CCP stands finalized. It covers 256 micro watersheds and its total cost is 7,480 million INR.

4. Comprehensive CAT Plan of Beas River Basin

The CCP of Beas river basin covers area from the origin of Beas river in HP up to Pandoh Dam. It covers 222 micro watersheds. The CCP is under the process of finalization and is expected to be finalized shortly.

### Attachment I.4.6.1 Comparative Evaluation of PFM/ JFM Institutions Formed under Different Projects/ Programs in HP State

**Table 1 Comparative Evaluation of PFM/ JFM Institutions Formed under Different Projects/ Programs in HP State (1)**

No	Name of Projects/Scheme	Numbers (Tentative)	Nomenclature	Period (Year)	Area of Operation	Basis of Establishment	Membership	Structure of Executive	Role of FD
1	HP Forestry Project(HPFP)	154	Village Forest Development Committees(VFDCs)	1994-2001	Kullu & Mandi Distt	Project Requirement	Based on Forest rights in the area	Not Fixed, Variable	Dominant, controlling
2	Indo-German Eco-Development Project	294	Village Development Committees (VFCs)	1994-2005	Palampur Subdivison	Project Requirement	Residents of GP	Broad based	Facilitator
3	IWD(Kandi) Project	137	Village Development Committees(VFCs)	1993-2005	Shivalik Area	Project Requirement	Residents of number of villages/ GP	Broad based, representative	Facilitator
4	Sanjhi Van Yojana(SVY)	360	Village Forest Development Societies (VFDS)	1998 Ongoing	HP State	Voluntary Participation	Loose, open to number of CBOs, GP etc	Not Defined	Facilitator
5	Great Himalayan National Park	18	Village Eco-Development Committee(VEDCs)	1993 Ongoing	Kullu, GHNP peripheri	Project Requirement	Land Holder of Ward	11-President, Vice President, Secretary,	Facilitation
6	National Afforestation Project(NAP)	963	Joint Forest Management Committees (JFMC)	2010 Ongoing	HP State	Scheme Guidelines	Land Holder of Revenue Estate or Operational Area	11 Member, 4 Ex-officio	Secretary form FD with Financial powers
7	Swan River [IWM] Project	96	Panchayat Development Committees (PDC)	2006 - 2016	Una District	Project Requirement	All Gram Sabha members	Sub-Committee of Gram Sabha	Facilitation
8	Mid-Himalayan Watershed Development Project	602 + 102	Gram Panchayats	2005 - 2017	Mid Hills, Project District	Project Requirement	All Gram Sabha members	Gram Panchayat	Regulatory only, no Financial role
9	Bio Carbon Project under the Mid-Himalayan Watershed Development Project	242	VFDSs (in 177 Panchayat)	2009-ongoing	Mid Hills, Project District	Project Requirement	Land Holder of Revenue Estate/ Ward	President, Vice President, Secretary, Waed Member & Four Executive	Regulatory only
10	HP Forestry Reforms Project	85	Pilot Panchayats	2003 -2007	HP State	Project Requirement			

Source: Compiled by JICA Study Team

**Table 2 Comparative Evaluation of PFM/ JFM Institutions Formed under Different Projects/ Programs in HP State (2)**

Sr. No	Name of Projects/Scheme	Legal Status	Financial Aspects	Benefit Sharing	Gender Sensitivity	Inclusiveness	Incentive	Tenure	Sustainability
1	HP Forestry Project(HPFP)	Legally Weak	Project Funding	Little	Sensitive	Yes	Not Much	Project Period	Dysfunctional
2	Indo-German Eco-Development Project	No Legal Backing	Project Funding	No	Yes	Yes	Yes	Project period	Dysfunctional
3	IWD(Kandi) Project	No Legal Backing	Supported by IWDP Project	No	Yes	Yes	Yes	Project Period	Dysfunctional
4	Sanjhi Van Yojana(SVY)	Good-Society Act	Grant –in-Aid from Govt.	Yes	Yes	Yes	Yes	Not specified	Dysfunctional
5	Great Himalayan National Park	Good-Society Act	Financial Powers with FD	Yes	Yes	Yes	Yes	2 Yrs	Dysfunctional (Livelihood activities)
6	National Afforestation Project(NAP)	Regd. With DFO, Legal backing partial	Financial powers with FD	Yes	Yes	Yes	Yes	Fixed	Functional
7	Swan River [IWM] Project	Constitutional	Assisted with Project Fund	Yes	Yes	Yes	-	6 Yrs	Partially Functional
8	Mid-Himalayan Watershed Development Project	Constitutional	Assisted by Govt-Grant in Aid (Project)	Yes	Partially	Yes	-	6 Yrs	Functional being Constitutional Bodies
9	Bio Carbon Project under the Mid-Himalayan Watershed Development Project	Under Societies Regd. Act 2006	Carbon Finance Money	Yes Equitable	No	No	Yes	2Yrs	Functional subject to BioCarbon Financial Incentives
10	HP Forestry Reforms Project								Dysfunctional

Source: Compiled by JICA Study Team (2017)

### Attachment I.4.11.1 Organisations Relevant to Livelihood Improvements

Name of Organisation	Type of Organisation	Function	Address	Contact Person and Phone/email	Website/ Reference	Possible Convergence with the Project
National Bank for Agriculture and Rural Development	National bank	Banking service including microfinance and financial inclusion	Block No. 32 S D A Commercial Complex Dev Nagar, Pin Code: 171009, Shimla	01772624373 01772622258	<a href="https://www.nabard.org/">https://www.nabard.org/</a>	SHG-Bank Linkages, training for IGA skills and management
SWAN Women Federation/Multiple purpose cooperatives	Federation/Credit Cooperative	Microfinance cooperative	Una, Himachal Pradesh	Mr. Dogra, CEO • Raj Kumari (President) - +91 9459171194 • Sunita Sharma (Secretary) - +91 9816024014	<a href="http://swanfederation.com/">http://swanfederation.com/</a>	Training for formation of SHG and SHG federation/cooperatives
HP State Rural Livelihood Mission	Government	SHG formation and providing revolving fund and community fund	Near Shimla Public School, Khalini	Dr. B. Sharma Project Director 9418670335 Mr. Sharma (9418493388)/ Ms. Poonam (9418463006)		SHG formation and financial activities of project
Department of Women and Child Development	Govt Dept.	Gender mainstreaming, Rural mother and child welfare	Behind Hotel Himland, Shimla	Mr. Suresh Kumar Sharma Deputy Director 94181-74980	<a href="http://himachal.nic.in/index.php?lang=1&amp;dpt_id=176">http://himachal.nic.in/index.php?lang=1&amp;dpt_id=176</a>	
Department of Rural Development	Govt Dept	Activities of livelihood and SHG formation			<a href="http://hprural.nic.in/">http://hprural.nic.in/</a>	
Department of Cooperatives	Govt Dept.	Registration of cooperatives	Kasumpti, Shimla	Mr. S.P. Sharma 09418021693		Registration and capacity building of cooperatives
ACSTI (Agricultural Cooperative Staff Training Institute)	State Coop Bank	Training college for cooperative	Summer Hill, Shimla	Mr. R. P. Nainta, Principal 9418129833		Training on microfinance and cooperatives
Bankers Institute of Rural Development	under NABARD	Training college for microfinance C-PEC (Centre for Professional Excellence in Cooperatives)	Lucknow	cpecforccs@gmail.com bird@nabard.org	<a href="http://bird-cpec.in">http://bird-cpec.in</a>	Training on microfinance and cooperatives
HP Grameen Bank	Regional Bank	Regional banking	Mandi		<a href="http://himachalgraminbank.org/">http://himachalgraminbank.org/</a>	Conducting Financial inclusion programs
Himachal Pradesh Institute of Public Administration (HIPA)	Govt. Capacity Building Center	Training Institute for government officials - SIRD	Mashobra Road, Shimla	Mr. Virendra Sharma 09805011439	<a href="http://himachal.nic.in/index.php?lang=1&amp;dpt_id=15">http://himachal.nic.in/index.php?lang=1&amp;dpt_id=15</a>	Training on microfinance, SHGs, Gender
Association of Rural Activities and Voluntary Action for Literary Information (ARAVALI)	NGO	Formation of WSHG, JLG FPOs, Farmers' Club with NABARD	ARAVALI SCO-2 III floor IDSMT Complex, Near Delhi Gate Nahan Distt. Sirmour	Dr. Yash Paul Sharma		
Mandi Saksharta Evam Jan Vikas Samiti (MSJVS)	NGO	Formation of SHGs, JLGs, financial literacy, and inclusion	Sauli Khadd, Mandi	Mr. Bhim Singh, 09418073190	<a href="http://www.msjvs.in">http://www.msjvs.in</a>	

Name of Organisation	Type of Organisation	Function	Address	Contact Person and Phone/email	Website/ Reference	Possible Convergence with the Project
HP Mahila Kalyan Mandal	NGO	Formation of SHGs, training of SHGs on IGAs, Assistance to cooperative societies	Kullu	Ms. Madhurveena		
Biodiversity Tourism and Community Advancement (BTCAP) - Great Himalayan National Park	NGO	GHNP - Livelihood and SHG	GHNP, Kullu	Mr. Gopal Thakur	<a href="http://greathimalayannationalpark.com/institutions/">http://greathimalayannationalpark.com/institutions/</a>	
Himachal Pradesh State Co-operative Marketing & Consumers Federation Ltd. (HIMFED)	Apex Cooperative Marketing Federation	Marketing of farm inputs, distribution of fertilisers, pesticides, insecticides, wheat, seed potato Procurement, Distribution, Storage Distribution of P.D.S Items	Across State HQ - Shimla	himfed-hp@gmail.com himfedhoshimla@gmail.com	<a href="http://www.himfed.com/activities.php">http://www.himfed.com/activities.php</a>	Marketing support and linkages for SHG IGAs
HP Horticulture Produce Marketing and Processing Corporation Ltd. (HPMC)	Government Undertaking - Marketing and Processing Corporation	Marketing of fresh fruits and fruits processing	Across State Shimla - Nigam Vihar	Mr. J.C. Sharma (Managing Director) 94180-00066	<a href="http://hpmc.gov.in">http://hpmc.gov.in</a>	Marketing support and linkages for SHG IGAs
HP State Handloom & Handicrafts Development Cooperative Federation Ltd. (HIMBUNKAR)	Apex for Primary cooperative societies	Weavers and Artisans Technical Knowhow, raw material access, marketing avenues to affiliated cooperatives	Across State HQ - Kullu showroom - Shimla Middle Bazar	himbunkar@gmail.com	<a href="http://www.himbunkar.co.in/index.html">http://www.himbunkar.co.in/index.html</a>	Marketing support and linkages for SHG IGAs
Bhutti Weavers Cooperative Society (Buttico)	Cooperative Society	Marketing support to weavers	Across State HQ - Kullu showroom - Shimla Ridge	01902-260079 01902-260549	<a href="http://www.bhutticoshawl.com/index.php">http://www.bhutticoshawl.com/index.php</a>	Marketing support and linkages for SHG IGAs
Institute of Integrated Rural Development	NGO	Capacity building and training, Gram Sabha Mobilisation, PRI Networking	Shimla	director@iirdshimla.org	<a href="http://www.iirdshimla.org/oldwebsite/">http://www.iirdshimla.org/oldwebsite/</a>	Training and Capacity Building
Himachal Pradesh Kaushal Vikas Nigam (HPKVN)	Government	Skill development, catalyzing PPP	Kasumpti, Shimla	0177-2628981, 0177-2628081	<a href="http://hpkvn.nic.in/mission.html#">http://hpkvn.nic.in/mission.html#</a>	Training and Capacity Building
Government Industrial Training Institutes (ITI)	Government	Training of Individuals Sewing Technology - Bilaspur, Bharari, Chamba, Pangi, and more	Across State HQ - Mandi Regional Centers	Mr. Kushal Kumar 9418481460 Shimla ITI (Women)	<a href="http://himachal.nic.in/index.php?lang=1&amp;dpt_id=2&amp;level=1&amp;lid=1354">http://himachal.nic.in/index.php?lang=1&amp;dpt_id=2&amp;level=1&amp;lid=1354</a>	Training and Capacity Building
Rural Self Employment Training Institutes (RSETI)	Training Institute (Government)	Dedicated Institutions for Programmes covering - Agriculture, Product and Process, Skill Development for Women, Orientation on SGSY/NRLM, Micro Enterprise and more	Across State Shimla - Brock Hurst Near Chotta Shimla	Mr. Harsh Bir Singh rsetinird@gmail.com 094590 84742 0177- 2629896 rsetishimla@gmail.com ucorsetishimla@gmail.com, rseti.shimla@ucobank.co.in	<a href="http://www.nird.org.in/rseti/index.aspx">http://www.nird.org.in/rseti/index.aspx</a> <a href="http://www.nacer.in/docs/Complete%20List%20of%20RSETIs.pdf">http://www.nacer.in/docs/Complete%20List%20of%20RSETIs.pdf</a>	Training and Capacity Building

Source: JICA Study Team (2017)



## Attachment I.4.11.2 National Rural Livelihood Mission (NRLM)

### (1) Introduction

In June 2011, NRLM was launched as a countrywide livelihood mission with a mandate designed to include the poor populace of the country into a broader growth agenda by linking them with livelihoods opportunities leading to a respectable and sustainable lifestyle. It is a restructured successor to the Swarnajayanti Gram Swarojgar Yojana (SGSY) under the Ministry of Rural Development, Government of India. NRLM brought with it a resolute tiered structure dedicated to facilitate the development of rural poor through women centric community mobilisations into SHGs and financial inclusion. Across India, NRLM is being implemented in a Mission Mode where in states are required to design their respective livelihood centric action plans on poverty alleviation, thus, replacing the funds allocation based strategy with the demand driven strategy.

### (2) NRLM in Himachal Pradesh – HPSRLM

The HP State Rural Livelihood Mission (HPSRLM), a Himachal Pradesh society, was established in April 2013, to spearhead and supervise the implementation of NRLM in the state. Initially, HPSRLM was launched with the strategy of selecting two ‘Intensive Blocks’ in the state, i.e., Haroli block in Una district, and Basantpur block in Shimla district in the first phase. Subsequently, during 2016-17, three Development Blocks – Kandaghat in Solan district, Mandi Sadar in Mandi district, and Nurpur in district Kangra were also added under the Intensive block approach. Now the mission covers one Development block in each of the 12 districts in the state. The Mission is expected to gradually spread out to all 78 blocks in 12 districts including “non-intensive blocks” by the end of 2020-21. The criteria and the provisions for intensive blocks and non-intensive blocked are described in the **Table 1** below.

**Table 1 Criteria and Provision for Intensive Blocks**

Criteria for Intensive Blocks	Key Provisions for Intensive Blocks
<ul style="list-style-type: none"> <li>• Requires urgent and utmost attention on socio economic parameters</li> <li>• Existing Social Capital (including institutions for poor other than SHGs and their federations)</li> <li>• Existing Best Practices for upscaling</li> </ul>	<ul style="list-style-type: none"> <li>➤ Create a baseline for the mission</li> <li>➤ Institution and capacity building</li> <li>➤ Intensive social mobilisation through CRPS</li> <li>➤ Formation of Federations of new and existing groups</li> <li>➤ Financing Mechanisms – Revolving Fund (RF) and Community Investment Fund (CIF)</li> <li>➤ Microcredit Plan by SHGs for Livelihood, Food Security, Education and Health</li> <li>➤ Interest Subvention for bank linkage</li> <li>➤ Setting up of DMMU, BMMU</li> <li>➤ Formation of livelihood collectives and producer groups</li> <li>➤ Creation of Resource Blocks for ICRP development</li> <li>➤ Intensive training of CRPs on SHG/Federation management</li> </ul>
<p><b>Key Provisions for Non-Intensive Blocks</b></p> <ul style="list-style-type: none"> <li>➤ Capacity Building of DRDAs, blocks, and other stakeholders</li> <li>➤ Social mobilisation and community development</li> <li>➤ Institutions for Poor including SHG formation</li> <li>➤ Training of existing SHGs to form federation under intensive mode</li> <li>➤ Training of Active Women through ICRPs from Intensive blocks</li> <li>➤ Skill Development on entrepreneurship and enterprise formation</li> <li>➤ Identification and upscaling of best practices</li> </ul>	

To sum up, the structure and provision of HPSRLM at different levels are explained in the following **Table 2**.

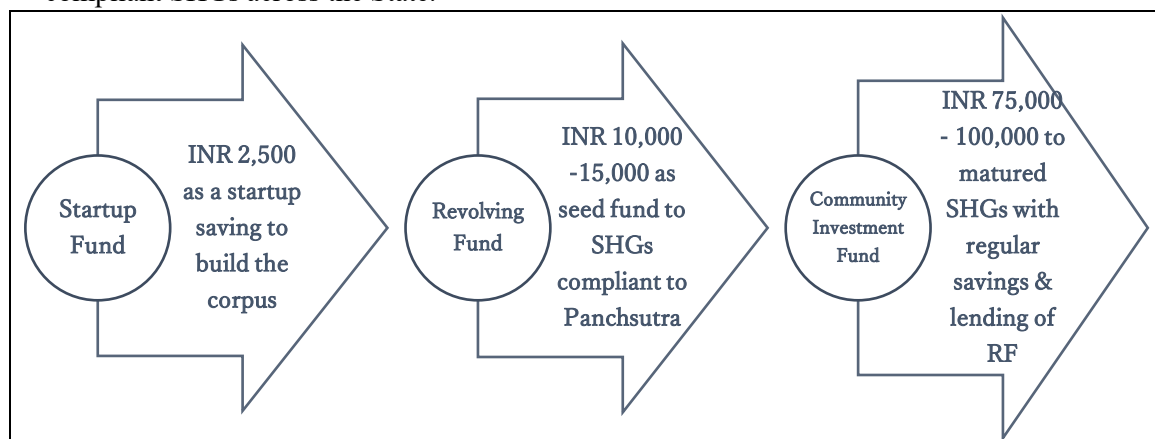
**Table 2 Structure and Provision of HPSRLM**

Admin. Level	Organisation	Staff/Resource persons	NRLM support
<b>National:</b> NMMU (National Mission Management Unit)		Advisory Committee Co-ordination Committee Empowered Committee (to approve state action plans)	Policy Regulation and Guidelines
<b>State: SMMU (State Mission Management Unit)</b> Action Planning & Regulating		CEO COO/PD	Policy Regulation and Guidelines
District: DMMU Regulating Monitoring	& Apex Federation	District Mission Manager	Policy Regulation and Guidelines
Block: BMMU Supervising, Monitoring Formation	and Block Federation Credit facilities for VOs Registered by Society's Registration Act 2006	LSEO: Lady Social Education Organizer* LVDC: Lady Village Dev. Coordinator*	Bank linkage, livelihood (IGA) support including technical training and, market linkages
Gram Panchayat	Village Organisation By 8-20 SHGs Facilitate committees (social, education, bank- linkage, verifying poor) Registered by Society's Registration Act 2006	Internal Community Resource Persons (ICRPs) • Supervision of SHGs and VOs • Attend SHG VO meeting	CIF: INR:75-100,000 to mature SHGs submitting micro credit plan
Ward/Village	SHG 8-20 Women Internal loaning by saving and RF	Active Women (3-5 women from 1 SHG identified by external CRP)	RF: INR10-15,000/SHG  Start-up: INR 2,500/SHG

\*Regular government employees

### (3) Financial Assistance to SHGs under NRLM

Implementation of NRML in HP builds on the existing network of SHGs to move towards formation of bigger community level organisation with financial empowerment. NRLM's prescribed model works from SHG formation at village level, Village Organisation (VO), Cluster or Block level Federation. Interest Subvention (IS), Start-up Fund, Revolving Fund (RF), Community Investment Fund (CIF), and Vulnerability Reduction Fund (VRF) are extended to compliant SHGs across the State.



**Figure 1 Financial Assistance to SHG under NRLM**

To facilitate the process, districts have been categorised into two sects, Category I with District Shimla, Mandi (under first phase), Kangra, and Una (approved in 2016-17), and Category II with remaining eight districts. All the Women SHGs (WSHG) in Category I districts can avail bank credit at seven per cent (up to loan amount INR 3,00,000) with an interest subvention of three per cent upon regular re-payment (reimbursed at the end of term period). Meanwhile, the NRLM compliant WSHGs in Category II districts are eligible for Interest Subvention equating to the difference between the normal lending rate and seven per cent (up to loan amount INR 3,00,000). **Table 3** below shows the progress of the NRLM in the intensive blocks in HP State.

**Table 3 Intensive Blocks and their Progress of SHG Formation and Disbursement of RF and CIF, June 2017**

No.	District	Block (intensive)	No. of SHG	SHG with RF	No. VO	No. CIF
1	Bilaspur	Gumarwin	213	109	3	0
2	Chamba	Tissa	286	48	2	0
3	Hamirpur	Bhoranj	282	44	6	0
4	Kangra	Nurpur	311	157	8	17
5	Kinnaur	Nichar	83	16	0	0
6	Kullu	Kullu	216	40	0	0
7	Lahul & Spiti	Lahaul at Keylong	74	33	0	0
8	Mandi	Mandi Sadar	667	238	44	59
9	Shimla	Basantpur	313	205	17	31
10	Sirmaur	Ponta Sahib	305	72	1	0
11	Solan	Kandaghat	403	118	23	25
12	Una	Haroli	485	222	29	44
	<b>TOTAL</b>	-	3,638	1302	127	176

Source: MIS-NRLM on line

#### (4) NRLM – Community Cadre Training and Capacity Building

Success of NRLM is highly dependent on support from field level staff – Community Cadre, selected from the target community. These individuals are selected as book keeper, active women, leaders, volunteers, CRPs, trainers, facilitators at the SHG, CLF, BLF level. In Himachal Pradesh, there are 204 Cadres, 47 Master Trainers, 168 Institution Building and Capacity Building Cadre.

- ◆ SHG Bookkeepers – Basic Read, Write, Arithmetic Skills; Selected by SHG consensus
- ◆ Active Women / Community Facilitator/Mobilisers – SHG member with articulation/communication skills, and mobility
- ◆ Further different individuals are selected under IB&CB, SI&SD, Financial Inclusion, Livelihood, CBO Professional, Master Trainer

The Mission has developed training protocols for the basic training and capacity building of the SHGs all the way up to the Cluster Level Federation (CLF), though none exist in HP till date. It starts with the basic knowledge transfer on key issues such as Panchsutra<sup>1</sup>, social mobilisation, and transact walk for the groups. The focus is on building an understanding on Institutional Concept and Management along with ongoing capacity enhancement on Micro Credit Plan Drafting and Appraisal, Leadership and Planning, and Exposure trips to states/districts in advance

<sup>1</sup> Panchsutra are the 5 cardinal principles of an SHG – weekly meetings, weekly savings, regular internal lending, regular repayment, and good book keeping practices.

stages of SHG/VO/CLF formation.

During the field observation at Neen GP in Basantpur Block, Shimla, it was explained that Community Resource Persons (CRPs) were hired from outside HP such as Ajeevika, Bihar and Raebareli, UP to initiate basic training and development of the groups through community mobilisation. During that process, they were directed to identify “Active Women”, motivated and driven individuals willing to take up a bigger role in the entire process. These Active Women are trained on a pre-defined training framework undertaking a 15-days one-on-one interaction with CRPs from other States, followed by 8 days training at Himachal Pradesh Institute of Public Administration (HIPA), and finally 10 days intensive course at a National Resource Organisation (NRO) or a Capacity Building Agency (CBA). An Active Women eventually graduate to become a CRP either at the SHG / VO/ CLF level. Based on their intent and capabilities they are directed to handle responsibilities such as bookkeeping, auditing, community leadership, administration etc. In Himachal Pradesh, where average education level of women is higher than other states, the chances of being CRPs are also higher. Field visit’s observations highlighted the SHG’s general aptitude and motivation to engage in IGA that can help them work from home or from the VO center, at present operational through the village Mahila Mandal centre. However, the scope of IGA that can be undertaken remains uncertain.

#### **(5) Observation**

Field observation in Neen GP at Basantpur Block revealed that the future direction of the VO and SHGs are still ambiguous. Their initial plan of forming a cluster federation is no longer realistic due to some restructuring issues of local government. Alternative is to form a block level Federation, which needs further elaboration for its structures and functions. As far as the livelihood component is concerned, HPSRLM plans to introduce only after the establishment of block level federations. But the delay in funding from the central government further derailed the process. With the absence of full SHG coverage and no ongoing or potential IGA in the near horizon, the SHG and VO members are solely utilizing the funds for loan to build homes, agriculture purchases, marriage, and children education.

### **Attachment I.4.11.3 National Bank for Agriculture and Rural Development (NABARD)**

NABARD remains the nodal agency to spearhead access to finance for the unbanked and under-banked rural population through its participative developmental programmes. In HP, NABARD's presence is felt in all the 12 districts by means of its wide network of channel partners, grass root workers, and banking outlets. Following are the key interventions initiated by the organisation to facilitate microfinance and financial inclusion in the state.

#### **(1) SHG-Bank Linkage Program (SHG-BLP)**

NABARD achieved a landmark development in the field of banking for poor by launching the SHG-Bank Linkages programme in 1992. SHG-BLP is essentially a women-centric financial inclusion programme designed to bring the uninitiated and unbanked rural population within the mainstream banking system while enabling them to gain financial acumen. It brings with it the flexibility and accessibility of informal lending mechanism (money-lenders, landlords) along with the transparency and accountability of institutionalised bank credit delivery. The NGO sector along with other rural financial institutions has played a pivotal role as SHG Promoting Institutions (SHPI) in mobilising SHGs in gaining bank linkages.

As per NABARD, the SHG-BLP intervention was earlier conceived as an 'outreach programme' to facilitate banking inclusion in the country. However, the current results point toward its acceptance as support 'livelihood and poverty alleviation'.

In Himachal Pradesh, NABARD is present in all 12 districts to propagate and facilitate the formation of SHGs and their linkages to the banking system. The social collateral based savings and credit linkages mechanism is supported by ground level agencies such as NGOs, RRBs, Farmers' Clubs, Individual Rural Volunteers, Farmers' Clubs – SHPIs. NABARD extends grant assistance to the aforementioned organisations for promotion, nurturing, and credit linkages of SHGs. All rural villages and small towns with population not more than 50,000 individuals are covered under the scheme in all the 12 districts.

As on March 2017, 45,735 SHGs have been savings linked with commercial, cooperative, and regional rural banks with a total savings of INR 506.175 million. However, the penetration of bank credit remains low with only 8.12% of SHGs availing bank credit during 2016-17, representing 3,715 SHGs with INR 501.441 million of loan amount. As on March 2016, total of 56,600 SHGs were reported to be credit linked under the bank linkages scheme. **Table 1** gives details on the bank wise SHG savings with specific information on Women SHGs and savings linked SHGs under NRLM schemes.

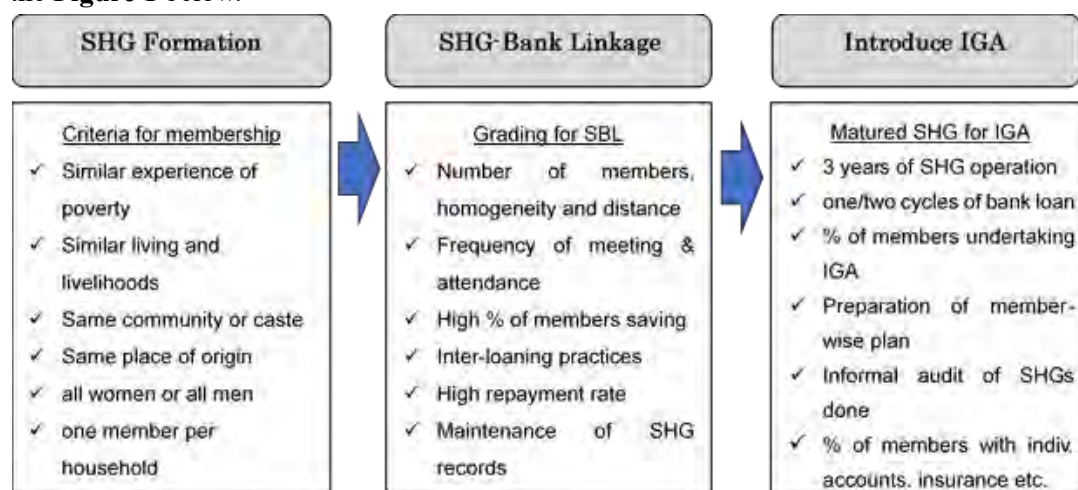
**Table 1 Information on Saving Linked SHGs as on 31st March 2017**

Savings of SHGs with Banks	No. of SHGs	Savings Amount (INR million)	No. of Exclusive WSHG	Savings Amount (INR million)	% of WHGs	No. of SHGs under NRLM/SGSY	Savings Amount (INR million)
Commercial Banks	16,913	163.518	10,588	108.933	62.60	6,649	69.445
Regional Rural Banks	9,941	160	9,555	152.6	96.11	4,687	116.7
Cooperative Banks	18,881	182.639	10,709	86.669	56.72	4,602	46.244
<i>Total</i>	<i>45,735</i>	<i>506.157</i>	<i>30,852</i>	<i>348.202</i>	<i>71.81 (avg)</i>	<i>15,938</i>	<i>232.389</i>

Source: Status of Microfinance in India, 2016-17, NABARD

The above figures corroborate the heightened focus on women centric SHGs (average 72 per cent) under the bank linkage programme - the backbone of this intervention. As per insights from DGM NABARD, it is through financial engagement and independence of women that absolute penetration of micro finance in Himachal Pradesh can ever be achieved.

Bank linkages is the first step toward bringing the SHG into the mainstream banking system, the end agenda is to empower these groups to take up sustainable livelihood opportunities that can create inclusivity in the society at large. SHG-BLP has incorporated this vision whereby with every step of financial inclusion, SHGs develop to be become ‘matured SHGs’, as described in the **Figure 1** below.



**Figure 1 Development of SHGs in NABARD Programs**

As highlighted earlier, NABARD enables the handholding approach to SHG development by sponsoring and supporting various training programmes from basic group management skills such as bookkeeping, maintaining meeting records to advanced modules on nurturing group’s and individual’s entrepreneurial skills, livelihood training on farm and off farm sectors. **Table 2** gives a brief overview of short-term skill development trainings facilitating members of matured SHGs that have availed credit facilities under the programme.

**Table 2 Capacity Building for IGA by NABARD**

Program	Activities	Progress as of Today
Microenterprise Development Program (MEDPs)	<ul style="list-style-type: none"> <li>• Short-term training course 5-13 days for producer's specific to the product.</li> <li>• Cover intensive training and hand holding on market understanding and potential assessment, development of entrepreneurial skills to manage their enterprise.</li> </ul>	15 programs were organized and 440 SHG members were trained for IGA in 2016/2017
Livelihood Enterprise Development Program (LEDPs)	<ul style="list-style-type: none"> <li>• 1 year elaborate intensive training on skill building, refresher workshops, backward-forward supply chain linkages, and escort support.</li> <li>• Provide end to end solution to SHG members on project basis covering 15-30 SHGs in a cluster of villages. Currently, this approach is in its nascent stage and being tested as a pilot intervention</li> </ul>	240 SHGs trained in 2016/17

Source: Economic Survey 2016-17, Economics and Statistics Department, Himachal Pradesh

MEDPs and LEDEPs are extended both to individual and groups depending on their discretion. Often a Hub and Spoke model is also adopted where in support with NGOs and producers work in individual capacities while integrating at a village/block level hub.

## (2) NABARD's Eshakti – Digitisation of SHG Programme

NABARD's Micro Credit and Innovation Department launched the project for digitisation of all SHGs in the country. The key features of the programme are:

- ◆ Mapping of existing SHGs in the all districts (bank wise, branch wise),
- ◆ Capacity building of volunteers and Animators to collect SHG data (for individual members),
- ◆ Capturing and feeding the data on software that can be installed on any android device, and
- ◆ Data storage and recovery centre management

The digital platform is designed to capture SHGs and member' information to the minute details covering – SHG's name, address, date of formation, name of NGO, support programme, savings habit, inter-lending, bank linkage details, savings collected and credit utilisation, along with members' name, address, gender, marital status, ID details (Aadhar, Voter ID), mobile number, BPL/ALP status, membership to groups (SHG, JLG, Users), house type (with/without toilet), electricity connection, and financial information on savings A/C number, savings, loans and credits (amount, source, repayment), insurance (life/medical) .

In Himachal Pradesh, the digitisation project is launched as a pilot in district Mandi enabling the mapping of existing SHGs (bank wise, branch wise) on an App based system on Android Tablets and Mobiles linked to the dedicated website <https://eshakti.nabard.org/>. The data is accessible to bankers, NGOs, SHGs, Government Agencies, and the field functionaries.

SHGs
<ul style="list-style-type: none"> <li>• Technology integration for managing activities - bookkeeping, meeting records, and demographic information</li> <li>• Flexibility of online and offline data upload</li> <li>• Instant loan application with auto sharing of requisite documents to the bank</li> <li>• SMS to all SHG members for every financial transaction</li> <li>• Animators to support data collection and upload; 1 Animator for 30 SHGs</li> <li>• Future strategy - Active Women from SHG to become Animator</li> </ul>
BANKS
<ul style="list-style-type: none"> <li>• Transparency and visibility on SHGs financial capacity i.e. transaction history, account balance, repayment history to make an informed credit decision</li> <li>• SHG Grading for loan sanction (new and matured)</li> </ul>

Source: Prepared by JICA Study Team from the statement of NABARD officials.

**Figure2 Benefits of E-Shakti to SHGs and Banks**

### (3) NABARD as Microfinance Facilitator

As highlighted earlier, NABARD does not directly fund SHGs, but extends financial support to the SHPIs to facilitate the SHG-BLP programme. The interventions include:

- ◆ Grant and promotion support to SHPIs – NGOs, RRBs, Cooperative Banks, Farmers' Clubs and Individual Rural Volunteers to augment their activities at the ground level.
- ◆ 100 % refinance to Banks in lieu of their banking services under the SHG-BLP implementation mechanism. The above comes in the form of grant assistance as a supplement to Bank's resources.

**Table 3** exhibits details of grant assistance extended to NGOs, RRBS, IRVs, and Farmers' Clubs operating as SHPI.

**Table 3 Grant Support Assistance to SHPIs by NABARD**

As on 31st March 2017

Grant Support to NGOs as SHPI		Grant Support to NGOs under WSHG Scheme		Grant Support to RRBs as SHPI		Grant Support to Individual Rural Volunteers as SHPI		Grant Support to Farmers' Clubs as SHPI	
NGOs	43	Districts Covered	2	RRBs	1	IRVs	300	Farmers' Clubs	15
Proposals	43	Grant Sanctioned (INR million)	29.55	Proposals	2	Proposals	1	Proposals	15
SHGs to be promoted /Credit Linked	3,075	Promotional Grant Released (INR million)	18.288	SHGs to be promoted / Credit Linked	500	SHGs to be promoted /Credit Linked	3,000	SHGs to be promoted / Credit Linked	320
Grant Sanctioned (INR million)	23.148	SHGs to be promoted / Credit Linked	2,955	Grant Sanctioned (INR million)	0.425	Grant Sanctioned (INR million)	4.2	Grant Sanctioned (INR million)	0.391
Grant Released (INR million)	5.921	SHGs promoted and Savings Linked	2,752	Grant Released (INR million)	0.261	Grant Released (INR million)	1.005	Grant Released (INR million)	0.284
SHGs Promoted	4,898	SHGs Credit Linked	2,378	SHGs Promoted	1,259	SHGs Promoted	3,000	SHGs Promoted	299
SHGs Savings Linked	4,872			SHGs Savings Linked	1,259	SHGs Savings Linked	3,000	SHGs Savings Linked	299



Grant Support to NGOs as SHPI		Grant Support to NGOs under WSHG Scheme	Grant Support to RRBs as SHPI		Grant Support to Individual Rural Volunteers as SHPI		Grant Support to Farmers' Clubs as SHPI	
SHGs Credit Linked	3,667		SHGs Credit Linked	749	SHGs Credit Linked	180	SHGs Credit Linked	284

Source: Status of Microfinance in India, 2016-17, NABARD

Support for training and capacity building of microfinance clients such as Bankers, NGOs, Government Officials, SHGs, and trainers. During 2016-17, 3405 stakeholders received training taking the cumulative number to 54,900 as shown in **Table 4**.

**Table 4 Training and Capacity Building by NABARD**

Training and Capacity Building Support	During 2016-17	Cumulative
<b>Bankers</b>	699	3,957
<b>Trainers</b>	0	0
<b>NGOs</b>	0	4,504
<b>Govt. Officials</b>	0	4,364
<b>SHG Leaders/Members</b>	868	23,645
<b>Exposure Visits</b>	1,170	5,164
<b>Field Visit of BLBCs to SHGs</b>	0	2,074
<b>Elected Members of PRI</b>	0	0
<b>Other Trainings</b>	0	91
<b>MEDPs</b>	480	5,751
<b>LEDP</b>	90	90
<b>MEPA</b>	0	0
<b>Bankers' Meet</b>	0	788
<b>NGOs Meet</b>	82	231
<b>SLRCCDI</b>	0	187
<b>Other Meets</b>	16	4,054
<b>Total</b>	<b>3,405</b>	<b>54,900</b>

Source: Status of Microfinance in India, 2016-17, NABARD

BLBC – Block Level Bankers Committee; MEPA – Micro Enterprise Promotion Agencies; SLRCCDI – State Level Review and Coordination Committee

NABARD partners with NRLM to expand the reach and effectiveness of SHG Bank Linkage Programme, creating a platform for livelihood improvement. Regional offices of NABARD in Himachal Pradesh coordinate with SRLM to increase credit linkages by means of training of bank branch officials, SHPI, NGOs, and SHGs. It administers Interest Subvention for Cooperative Banks and RRBs of Category I districts (Shimla, Mandi, Kangra, Una) on loans extended to SHGs at upfront 7 per cent (up to 3 lacs), and a further 3 per cent subvention subject to prompt repayment. In Category II districts, NRLM compliant SHGs are eligible for credit at 7 per cent on regular repayment.

#### (4) Joint Liability Group (JLGs) Program

JLG provides credit with landless, tenant or small farmers who have no conventional collateral to offer. JLGs are essentially credit groups with 4-10 members engaged in similar economic activities with a mutual agreement to make loan repayments to the Bank. The mid-segment credit product is essentially focused on small/marginal farmers, tenant farmers, oral lessees, sharecroppers, landless farmers, and micro entrepreneurs. In 2004-05, JLGs were launched as a pilot project, which was eventually mainstreamed within the wider banking operations. By March

2017, NABARD had financed total INR 392 million to 3,692 JLGs, representing an addition of 451 JLGs during 2016-17.

JLG loan is channeled either through individual members or the group, while the maximum of INR 50,000 per member is extended on group's guarantee. Bank has the flexibility to offer credit terms based on the purpose as cited by the group under the priority-lending category. Since the JLG programme is directed to enable landless or marginalized farmers, banks are also advised to wave off collateral security requirement and loan is extended against the JLG's guarantee. Nevertheless, groups are liable to pay the margin money as per the existing lending regulations. Formation of JLGs is facilitated by a wide array of organisations and societies (JLGPIs) such as Business Facilitators, NGOs, Farmers' Club, Farmers Associations, PRIs, Krishi Vikas Kendras, State Agriculture Universities, Agriculture Technology Management Agency (ATMA), Bank branches, Primary Agricultural Credit Society, Cooperatives, MFIs, and other government departments. Similar to SHG-BLP, NABARD organizes training and exposure trips for JLGPIs, bank officials, and other programme associated functionaries as shown in **Table 5**.

**Table 5 Status of JLGs in Himachal Pradesh as of March 2017**

Promotional Grant Support to JLGPIs as on 31st March, 2017		Training and Capacity Building	2016-17	Cumulative
JLGs to be Promoted/Credit Linked	4,799	Commercial Banks/RRBs	105	868
Grant Sanctioned (INR million)	9.598	Cooperative Banks (DCCBs/PACs)	0	30
Grant Released (INR million)	4.066	NGOs/KVKs/FCs/BCs and other agencies	0	371
JLGs Credit Linked	3,338	JLG Exposure Visits	0	148
		<b>Total</b>	105	1,417

Source: Status of Microfinance in India, 2016-17, NABARD

#### (5) Kisan Credit Card Scheme

Kisan Credit Card Scheme (KCC) has been one of the most innovative and evolving credit delivery mechanism since its launch in 1998 by the Government of India. Initially designed to finance crop production credit requirements, in 2012 the scheme underwent an expansion to cover other credit demands covering consumption expenditure, maintenance of farm assets, agriculture & allied activities term loans, coverage under Personal Accidental Insurance Scheme (PAIS), and Atal Pension Yojana (APY). Also under the revised rules, KCC were directed to be issued in form of interoperable RuPay Cards/ATM cum Debit cards.

Eligibility of Beneficiary Farmers:

- ◆ Individual/Joint Borrowers (owner cultivators)
- ◆ Tenant farmers, Oral Lessees, and Share Croppers
- ◆ SHGs or JLGs

Beneficiary farmers are issued a credit card and a passbook with details on name, address, land holding particulars, borrowing limit, validity period, and card holder's photo. KCC can be issued for short term, medium term, and long-term credit needs covering cultivation of crop, post harvests expenses (storage, transport, marketing), household consumption, working capital for farm and allied services maintenance. It offers a revolving credit facility thus removing the need for annual loan application and the repayment is accepted post the harvest with withdrawal service from any bank branch.

Limits on KCC are set in accordance with the use of cropping patterns (Kharif and Rabi Crops) and Scale of Finance (SOF) that is fixed finance for raising a crop per unit cultivation area (hectare), decided every year by a District Level Technical Committee. KCC loans are extended at 7 per cent interest rate for an amount up to 300,000 INR.

In Fiscal year 2016-17, banks in Himachal Pradesh had extended credit amount to 1,928 billion INR covering around 130,324 farmers. The cumulative numbers, since the launch of KCC stood at 98.59 billion INR to 806,639 farmers.

#### **(6) Farmers' Producer Organisations**

In the Union Budget 2014-15, a Producers Organisation Development and Upliftment Corpus (PRODUCE) Fund of 2 billion INR was setup to be utilized by NABARD to organize Farmers' Producer Organisations i.e. a bigger structure of 200-500 members consolidating activities both at the input and output stages of the value chain. The broader objective is to support 2,000 FPOs by extending required financial and non-financial assistance during the initial stages of operations. NABARD in HP has identified 19 Producers Organisation Promoting Institutions (POPIs) to facilitate the formation of 57 FPOs with a total grant sanction of 51.642 million INR.

FPOs can undertake any of the activities linked to production, harvesting, procurement, grading, handling, and selling of produce. Department of Agriculture and the Cooperation of the Ministry of Agriculture have taken up the initiative to expand the uptake of FPO in the state. Farmers groups engaged in production of any agricultural product are eligible to register themselves under the Indian Companies Act or State Cooperative Societies Act at the State, District, Block, and village levels. As per the NABARD's State Focus Paper, three such producers organisations such as Kamdhenu Hitkari Manch, in Bilaspur (for palletized cattle feed unit), Indira Mahila Milk Coop. Society (procurement and marketing of milk), and Bhutti Weavers' Coop Society, Kullu (design improvement, marketing, and working capital) have received financial support.

However, these groups would tend to be male dominated. Only example till date of a women FPO has been formed by NABARD as part of their collaboration with Ambuja Cement Foundation in Dharlaghat, District Solan. While FPO functioning seems similar to existing Agriculture Cooperatives, they differ in the conditions of their membership that is restricted only to producers and no nominal membership is allowed.

## (7) NABARD and Financial Inclusion

The State government has been actively involved in achieving banking saturation through several initiatives such as appointment of Business Correspondent Agents (BCA), Ultra Small Branches (USBs), Aadhaar Enabled Payment System (AEPS), KCC as RuPay cards, setting up of Financial Literacy Centers (FLCs). NABARD helps in facilitating the above and more through its well-defined agenda of financial inclusion to expand the scope and reach through literacy and capacity building.

Within the scope of Financial Inclusion Fund (FIF), NABARD supports Financial Inclusion & Literacy Centres, running of Business and Skill Development Centres including R-SETI, and IT interventions in enabling digitization of banks on Core Banking Solution network. The benefits of FIF through banks are extended to support NGOs, SHGs, Farmers' Club, Cooperatives, Panchayats, Rural Multipurpose Kiosks, Village Knowledge Centres, Primary Agricultural Societies (PACs), and more. FIF is also used to extended technology support to RRBs and Cooperative Banks to empower their operational potential. In HP, NABARD is supporting installation of solar powered V SAT connectivity in Sub-Service Areas (SSA) to ensure uninterrupted access to financial services in the rural and remote branches.

NABARD has been extending grant support for Financial Inclusion to cooperative banks and RRB including for meeting cost of smart card, micro ATMs, technology providers and capacity building of the staff of banks. Further, in 2016-17, NABARD sanctioned 128,713,000 INR to banks and NGOs as financial literacy support and strengthening of banking infrastructure in the State. Some of the key programs are listed in the **Table 6** as below:

**Table 6 Financial Inclusion Programs by NABARD**

Name of Program	Program contents target and achievement
Financial Literacy Awareness Programme (FLAP)	With the motto of spreading financial awareness, NABARD sanctioned in 1,013 FLAP to Cooperative Banks, RRB, and NGOs.
Digital Financial Literacy Awareness Program (dFLAP)	So-called "Go Digital" campaign focus on helping demonstrate the usage of cards, internet banking and various other modes of cashless transactions to the citizens. NABARD undertake this program through Grameen Bank, H.P. State Cooperative Bank, Kangra Central Cooperative Bank and
Bachat ki Paathshala	Targeting senior secondary and higher secondary school children through <i>nukkad melas</i> (street corner). NABARD supported HP Gramin Bank and cooperative banks to setting 12 Financial Literacy Center under Financial Inclusion Fund.
Bank Sakhi Model	SHG/SHG members aware of banking and record keeping activities, operate as Bank Sakhi/Agents to provide a range of financial services to their group and the community. NABARD provides the financial support for the training and development by RRB, SHG Federation. She is paid a commission by the bank in return of her services.

Source: JICA Study Team (2017) based in NABARD

Efficacy of interventions aimed at financial inclusion largely depends on financial literacy level of the target group. Thereby, NABARD supports the development of Financial Literacy Centres (FLCs), a physical location set up by banks in each district, managed by HP Gramin Bank and Cooperative Banks. These centres are required to facilitate organisation of financial literacy

camps to educate rural and urban population on range of financial products and services offered by the formal banking and financial system. NABARD funds the broadcasting of awareness jingles on radio, animation films, booklets and brochures, and street plays engaging school children. As on March 2016, NABARD had released FIF funds to the tune of 35.9 million INR in grant assistance to support abovementioned interventions.

## **Attachment I.5.1.1 Guiding Principles, M&E System and MIS of Mid-Himalayan Watershed Management Project**

### **1) Guiding Principles**

Guiding Principles of the Mid-Himalayan Watershed Management Project (MHWDP) funded by World Bank are indicated as follows;

- ✓ An integrated watershed management framework as a strategy,
- ✓ Conservation planning, while using water as the nucleus for a community-based programme of rural development,
- ✓ Decentralisation of PRIs and making them sustainable instrument of natural resource management,
- ✓ Cost sharing for promoting ownership,
- ✓ Transparency in decision making and resource allocation,
- ✓ Targeting vulnerable groups such as women, landless and nomads with special programmes,
- ✓ Value addition to agricultural production,
- ✓ Improving accessibility, and
- ✓ Communities being empowered through capacity building, partnership and accountability mechanism.

### **2) Monitoring and Evaluation System**

Monitoring and Evaluation (M&E) System for the MHWDP has been framed on results based systems in accordance with the World Bank's M&E requirements. The focus of M&E in the project has shifted from monitoring implementation to tracking results. Results-based systems build upon and add to traditional implementation-focused system emphasising project outcomes.

The following types of M&E are conducted;

- ✓ **Baseline** for assessing the pre-project conditions,
- ✓ **Progress Monitoring**, for tracking progress against planned activities,
- ✓ **Performance Monitoring**-for periodic measurement of progress on quantitative and qualitative outputs, particularly key performance indicators, using project MIS,
- ✓ **Institutional Performance Monitoring**-for tracking processes by incorporating primary stakeholders in a participatory monitoring system, aimed at enhancing accountability and efficacy of project institutions.
- ✓ **Internal Learning**-for purpose of Internal management review and learning (monthly, Annual) reporting by the project staff at various levels, particularly at district, block, cluster and village level.
- ✓ **Impact Evaluation** at mid-term review and project closing by an independent external agency. In order to further enhance the project objectives, a participatory monitoring and evaluation process will be developed shortly by the project. This process will strengthen community engagement in project implementation and effectively contribute to the result based monitoring system in the project. The project objective is to achieve effective PME in at least 50% of the Gram Panchayats in the next three years.

### **3) Management Information System**

The objective of Management Information System (MIS) is to fulfil the needs of information flow and communication right from Gram Panchayats, Watershed Development Coordinator (WDC), Regional Project Director (RPD), Chief Project Director (CPD), State Govt. Govt. of India and World Bank. It will generate various reports for internal and external stakeholders. The following reports will be generated from the MIS;

- ✓ Village and GP wise basic information,
- ✓ Base line information,
- ✓ Year wise Information on each component, sub-component, activity sub activity carried out in the GP,
- ✓ Information on beneficiary participation in execution of works including beneficiary contribution in cash or in kind,
- ✓ Performance of each DDO office including his sub-disbursers both physical and financial against planned targets,
- ✓ Monitoring of performance on Project key performance indicators,
- ✓ Status and progress of training efforts,
- ✓ Progress report on the various activities-both physical and financial against planned targets, at GP, WDC, WDO, RPD and CPD level, and
- ✓ Project Management Reports to be sent to World Bank, State Government, Government of India and other authorities.

The MIS is also required to integration with Financial Management System and the Consultant M/s Price Waterhouse cooper has been engaged to design and develop the MIS in the Project.

## **Attachment I.5.3.1. Green India Mission (GIM)**

### **1 Overview**

The Green India Mission (GIM) as one of the eight Missions under the National Action Plan on Climate Change (NAPCC), recognises that climate change phenomena will seriously affect and alter the distribution, type and quality of natural biological resources of the country and the associated livelihoods of the people. GIM puts “greening” in the context of climate change adaptation and mitigation. “Greening” means the enhancement ecosystem services such as carbon sequestration and storage (in forests and other ecosystems), hydrological services and biodiversity; as well as other provisioning services, such as fuel, fodder, small timber and non-timber forest products (NTFPs).

#### **1.1 Objectives**

The GIM aims at responding to climate change by a combination of adaptation and mitigation measures, which would help i) enhancing carbon sinks in sustainably managed forests and other ecosystems, ii) adaptation of vulnerable species/ecosystems to the changing climate; and iii) adaptation of forest-dependent communities. In order to achieve the above goals, the following specific objectives are identified;

- a) To increase forest/tree cover on five million ha of forest/non-forest lands and improve the quality of forest cover on another five million ha (ten million ha in total),
- b) To improve ecosystem services including biodiversity, hydrological services and carbon sequestration as a result of treatment of above targeted ten million ha,
- c) To increase the forest-based livelihood income for about three million households living in and around the forests, and
- d) To enhance annual CO<sub>2</sub> sequestration by 50 to 60 million tonnes in 2020.

Following the identified specific goals, five sub-missions are identified, viz, i) Enhancing quality of forest cover and improving ecosystem services; ii) Ecosystem restoration and increase in forest cover; iii) Enhancing tree cover in urban & peri-urban areas (including institutional lands); iv) Agro-forestry and social forestry (increasing biomass & creating carbon sink), and v) Restoration of wetlands.

#### **1.2 Landscape Planning and Watershed Approach**

GIM emerges to address key concerns related to climate change in the forest sector, namely: Adaptation, Mitigation, Vulnerability, and Ecosystem Services. In order to fully deal with such multi-sectoral concerns, a broader landscape approach, which address the drivers of forest degradation as well as support the communities to meet their basic necessities of fodder, fuel-wood, livelihood, shall be required to be taken. Landscape approach is an integral part of the



planning process. The first stage of planning is totally devoted to identifying landscapes vulnerable to climate change. Thus, it should be focused on landscape analysis and site selection to provide inputs on key components/ themes including: preparatory activities under sub-missions and cross-cutting interventions; planning at the level of local bodies, cluster and sub-landscape level for selected areas; initiating action for institutional strengthening and reforms, review and improvement of the regulatory systems to enhance ecosystem services from non-forest and forest areas; developing baselines, protocols for data management and monitoring of the GIM interventions; charting out the capacity building plan for different actors and levels etc.

## **2 Implementation of GIM in HP State**

### **2.1 Classifications of Landscapes and Budget Estimation under GIM**

Landscape approach under GIM are required to classify the entire geographical area into three tiers of landscapes namely L1, L2 and L3;

- ◆ L1: Landscape: At state level – to identify broad landscapes of interest/importance.
- ◆ L2: Operational Unit: Based broadly on watersheds as well catchment areas for local needs within the prioritised landscape. It should be noted that operational units of 5,000 to 10,000 ha are likely to cover multiple sub-missions with their sub-categories, and cross-cutting interventions.
- ◆ L3: Working Units: Soil and water conservation areas, plantations, etc. within the selected watershed/villages/hamlets in the operational unit. (Approx. 500-1,000 ha)

Through an elaborate exercise, 8,000 micro watersheds of Himachal Pradesh were tested for climate vulnerability in the Geographical Information System (GIS) Laboratory of HPFD.

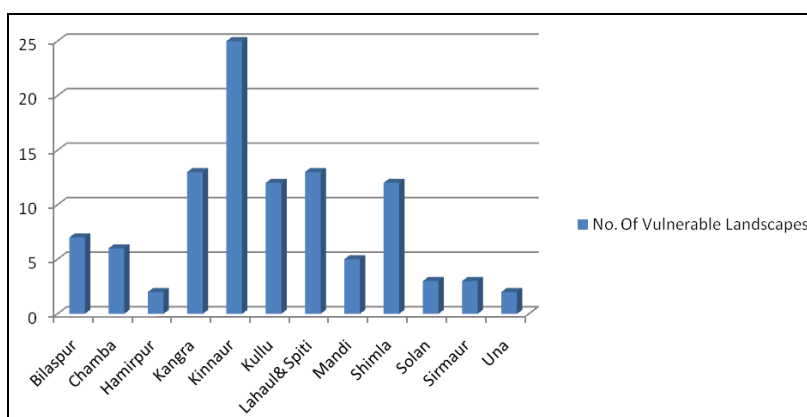
The criteria for identification/ prioritisation of the landscapes may include projected vulnerability of forests to climate change, status of forest cover, significant biodiversity and other ecosystem values, critical habitats, corridors, and potential of area for carbon sink. Overlays of socio economic criteria like poverty and ethnicity (tribal /non-tribal) will further help prioritisation of project areas within the candidate landscapes<sup>1</sup>. After the prioritisation of about 458 L2 level landscapes in the state, 34 L2 landscapes have been selected as pilot sites based on their climate vulnerability and workability within HPFD.

**Figure 1** below indicates district-wise vulnerable landscapes and Kinnaur is the most vulnerable district with 25 vulnerable landscapes followed by Lahaul & Spiti (13) and Kangra (13). Una and Hamirpur with two vulnerable landscapes each are the least vulnerable districts followed by Sirmaur (3) and Solan (3). Low vulnerability of Sirmaur is due to relatively higher vulnerability of Landscapes in Kinnaur and Shimla districts in the Western Himalayan Zone. It is also

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<sup>1</sup> *Implementation Guidelines, Nation Mission for Green India, Nov 2014 (MoEF)*

attributed to lower levels of decadal degradation observed in Sirmaur compared to other areas. However, 7 more landscapes have been identified from Sirmaur district which require special attention and have been included in GIM. Una, Hamirpur and Solan Districts have low vulnerability which may be attributed to lower disturbance levels and better social conditions existing in the districts. Also, summary of the forest division-wise budget estimates in perspective plan under GIM are described in **Table 1**.



Source: GIM Perspective Plan of Himachal Pradesh

**Figure 1 District-wise Vulnerable Landscapes of HP State**

**Table 1 Forest Division-wise Budget Estimates in Perspective Plan under GIM**

No.	Name of Division	No. of L2 landscapes as prioritized during Climate Vulnerability exercise in GIS Cell, HPFD	Area (ha)	Total Proposed Cost (INR)
1	Nurpur	Jwali-122	14,255.23	108,732,675
2	Dharamshala	Malan-I-118	11,088.02	17,370,770
		Malan-II-119	13,521.55	17,546,374
		Kangra-128	20,258.34	37,387,476
		Shahpur-129	6,229.91	87,104,099
3	Chopal	Kanda-I-358	4,824.07	56,324,484
		Kanda-II-367	20,185.32	158,243,699
4	Kullu	Naggar-217	20,531.07	127,630,654
5	Mandi	Panarsa-347	6,012.92	90,611,480
		Kataula-I-328	14,657.27	5,485,275
		Kataula-II-346	12,918.34	23,838,966
		Kataula-III-348	6,534.12	17,595,199
6	Pangi	Killar-57	7,635.84	132,520,388
7	Bharmour	Swai-43	15,234.79	194,240,554
8	Nalagarh	Kohu-3	11,411.88	25,770,467
		Nalagarh-438	14,664.00	104,411,268
		Ramshehar-II-440	6,665.26	62,095,629
		Ramshehar-I-436	12,414.76	28,050,939
	Una	Ramgarh-I-441	8,618.80	11,009,338
		Ramgarh-II-446	17,126.67	<b>25,787,601</b>
9	Nachan	Seraj-349	12,872.11	<b>97,105,667</b>
10	Renuka Ji	Renuka Ji-413	10,658.08	<b>78,686,259</b>
		Nohra-416	15,114.45	<b>111,485,151</b>
11	Dehra	Dehra-90	15,700.33	<b>140,352,176</b>
		Jwalamukhi-93	13,101.53	<b>104,348,313</b>
12	Kinnour	Moorang-I-177	19,577.14	<b>48,598,696</b>
		Moorang-II-180	23,246.10	<b>144,858,561</b>

No.	Name of Division	No. of L2 landscapes as prioritized during Climate Vulnerability exercise in GIS Cell, HPFD	Area (ha)	Total Proposed Cost (INR)
13	Spiti W.L.	Poh-269	9,447.02	33,511,050
		Sheog-276	11,591.48	53,154,900
		Rangrik-282	13,041.91	37,674,450
		Tabo-312	21,486.97	60,412,500
		Sichling-313	23,003.62	64,324,800
14	Una	Bangana-443	12,089.27	11,632,594
		Bangana-II-447	6,200.86	15,740,602
<b>Total 34</b>				<b>2,333,643,055</b>

Source: GIM Perspective Plan HP

## 2.2 Status on GIM Implementation

Although 458 Landscapes (L2) have been prioritised for the GIM in HP, the list of 34 landscapes (L2) has been sent to GoI in the perspective plan, contained in 20 forest divisions, 46 forest ranges as shown in Table 2. The perspective plans have not been approved yet and implementation will start immediately after the approval. Landscapes (L2) (which vary in size from 10,000 – 20,000 ha), are to be divided into smaller landscapes (L3), mini-micro watersheds, which have area varying from 500 – 1,000 ha.

**Table 2 List of Prioritized 34 Landscapes (L2) in Himachal Pradesh**

No	L2 Code	L2 Name	Area of L2 (Km <sup>2</sup> )	Divisions	Range	Majority Area falling in Ranges (Km <sup>2</sup> )	Ratio of L2 area in Range
1	3	KOHU	114.12	NALAGARH	KOHU	46.108	40%
	3		114.12	BILASPUR	SWARGHAT	59.799	52%
2	43	SWAI	152.35	BHARMOUR	SWAI	107.827	71%
	43		152.35	CHAMBA	U/CHAMBA	44.514	29%
3	57	KILLAR	76.36	PANGI	SACH	39.594	52%
	57		76.36	PANGI	KILLAR	36.759	48%
4	90	DEHRA	157.00	HAMIRPUR	NADAUN	13.798	9%
	90		157.00	DEHRA	DEHRA	135.030	86%
5	93	JAWALA MUKHI	131.02	DEHRA	JAWALA MUKHI	116.310	89%
	93		131.02	DEHRA	DEHRA	14.246	11%
6	118	MALAN - I	110.88	DHARAMSHALA	KANGRA	34.894	31%
	118		110.88	DHARAMSHALA	MALAN	66.583	60%
	118		110.88	PALAMPUR	PALAMPUR	9.402	8%
7	119	MALAN - II	135.22	DHARAMSHALA	KANGRA	23.619	17%
	119		135.22	DHARAMSHALA	MALAN	84.491	62%
	119		135.22	PALAMPUR	PALAMPUR	27.106	20%
8	122	JAWALI	142.55	DEHRA	NAGRROTA SURIAN	12.603	9%
	122		142.55	NURPUR	KOTLA	28.937	20%
	122		142.55	NURPUR	JAWALI	87.837	62%
9	128	KANGRA	202.58	DHARAMSHALA	LAPIANA	14.836	7%
	128		202.58	DHARAMSHALA	KANGRA	102.808	51%
	128		202.58	DHARAMSHALA	MALAN	15.893	8%
	128		202.58	DHARAMSHALA	DHARAMSHALA	66.852	33%
10	129	SHAHPUR	65.38	DHARAMSHALA	LAPIANA	11.560	18%
	129		65.38	DHARAMSHALA	SHAHPUR	49.655	76%
11	177	MOORANG - I	195.77	KINNAUR	POOH	72.251	37%
	177		195.77	KINNAUR	MOORANG	123.520	63%
12	180	MOORANG - II	232.46	KINNAUR	MOORANG	225.779	97%
13	217	NAGGAR	205.31	KULLU	NAGGAR	195.732	95%
14	269	POH	94.47	SPITI WL	TABO WILDLIFE SANCTUARY	93.025	98%
15	276	SHEOG	115.92	SPITI WL	KAZA	8.757	8%
	276		115.92	SPITI WL	KAZA WILDLIFE	103.163	89%

No	L2 Code	L2 Name	Area of L2 (Km <sup>2</sup> )	Divisions	Range	Majority Area falling in Ranges (Km <sup>2</sup> )	Ratio of L2 area in Range
16	282	RANGRIK	130.42	SPITI WL	KAZA	28.870	22%
	282		130.42	SPITI WL	KAZA WILDLIFE	101.549	78%
17	312	TABO	214.87	SPITI WL	TABO WILDLIFE SANCTUARY	178.700	83%
	312		214.87	SPITI WL	KAZA	29.690	14%
18	313	SICHLING	230.04	SPITI WL	TABO WILDLIFE SANCTUARY	140.640	61%
	313		230.04	SPITI WL	KAZA	86.668	38%
19	328	KATAULA - I	146.57	KULLU WL	BAROT	33.844	23%
	328		146.57	KULLU WL	NARGU WL	35.289	24%
	328		146.57	MANDI	DRANG	11.093	8%
	328		146.57	MANDI	KATAULA	58.922	40%
20	346	KATAULA - II	129.18	NACHAN	PANDOH	19.068	15%
	346		129.18	MANDI	KATAULA	35.892	28%
	346		129.18	MANDI	PANARSA	17.105	13%
	346		129.18	MANDI	MANDI	57.118	44%
21	347	PANARSA	60.13	MANDI	PANARSA	52.291	87%
22	348	KATAULA - III	65.341	MANDI	KATAULA	58.373	89%
23	349	SERAJ	128.721	NACHAN	PANDOH	38.707	30%
	349		128.721	NACHAN	THACHI	9.122	7%
	349		128.721	NACHAN	SERAJ	78.37	61%
24	358	KANDA - I	48.241	CHOPAL	NERWA	22.38	46%
	358		48.241	CHOPAL	KANDA	25.742	53%
25	367	KANDA - II	201.853	CHOPAL	DEYA	64.348	32%
	367		201.853	CHOPAL	NERWA	26.09	13%
	367		201.853	CHOPAL	KANDA	104.331	52%
26	413	RENUKA JI	106.581	RENUKA JI	SANGRAH	21.443	20%
	413		106.581	RENUKA JI	RENUKA JI	85.107	80%
27	416	NOHRA	151.144	RENUKA JI	NOHRA	54.012	36%
	416		151.144	RENUKA JI	SANGRAH	34.105	23%
	416		151.144	RENUKA JI	RENUKA JI	58.017	38%
28	436	RAMSHEHAR - I	124.148	NALAGARH	KOHU	18.102	15%
	436		124.148	KUNIHAR	KUNIHAR	26.993	22%
	436		124.148	NALAGARH	RAMSHEHAR	77.642	63%
29	438	NALAGARH	146.64	NALAGARH	BADDI	14.081	10%
	438		146.64	NALAGARH	RAMSHEHAR	45.911	31%
	438		146.64	NALAGARH	NALAGARH	86.649	59%
30	440	RAMSHEHAR - II	66.653	NALAGARH	RAMSHEHAR	40.088	60%
	440		66.653	NALAGARH	NALAGARH	26.283	39%
31	441	RAMGARH - I	86.188	UNA	RAMGARH	49.932	58%
	441		86.188	UNA	AMB	8.452	10%
	441		86.188	UNA	UNA	27.805	32%
32	443	BANGANA - I	120.893	UNA	BANGANA	36.083	30%
	443		120.893	UNA	RAMGARH	12.09	10%
	443		120.893	UNA	AMB	69.283	57%
33	446	RAMGARH - II	171.267	UNA	BANGANA	21.053	12%
	446		171.267	UNA	RAMGARH	83.093	49%
	446		171.267	UNA	UNA	67.12	39%
34	447	BANGANA - II	62.009	UNA	BANGANA	59.041	95%
TOTAL		34		20	46		

Source: GIM Perspective Plan HP

For each landscape (L3), detailed micro-plan is to be prepared with bottom up participatory planning (with the involvement of members of JFMC), who will be implementing the activities proposed in the micro-plan. Implementation period is generally five years with one year or so for preparatory phase and winding up. Since a lot of emphasis is being given on convergence, it is expected that resources will be mobilised from Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), Compensatory Afforestation Fund Management and Planning

Authority (CAMPA) and other central and state sector schemes. For example, in a micro-plan prepared for JFMC Chatra (Dharamshala Division/ cover 479 ha), GIM workplan schedule gives outlay of 1.52 million INR from GIM budget and 3.49 million INR outlay from MNREGA budget. Activity details for Chatra JFMC (as a Sample) are given in **Table 3**.

**Table 3. Component-wise Budget Estimation JFMC Chatra (Dharamshala Division)**

No	Component	Amount (INR)
1	Strengthening of JFMC	5,000
2	2 Awareness generation	5,898
3	3 Micro planning	57,500
4	4 Planting /Regeneration	589,800
5	5 Fencing	29,490
6	6 Soil and Moisture Conservation & Treatments of Problem Lands	237,900
7	Entry Point Activity (per ha)	76,000
8	Training and Capacity Building	100,000
9	Value Addition and Marketing of Produce	200,000
10	Monitoring and Evaluation (M&E)	11,796
11	Overheads	58,980
12	Use of Improved Technology	147,450
	Total	<b>15,19,814</b>

Source: Micro Plan JFMC Chatra, (Dharamshala Division), HPFD Document

So far 40 micro-plans have been prepared as pilots with the help of Regional Centre of National Afforestation and Eco-Development Board (NAEB), University of Horticulture and Forestry, Nauni, Solan. Once the plan is approved by GoI, work can start on these micro plans and further new micro plans will be prepared by the HPFD in participatory mode with respective JFMCs. There is no fixed number of L3 landscapes in a given L2 landscape. Quantum of L3 and its outlay will depend upon number of habitations in the L2 and quality and density of Forests (as per FSI density classification). Higher the forest area with Very Dense and Moderately dense forest, lesser will be number of L3 and their outlay. Also, there is no limit on budget per micro plan as emphasis is on convergence. In pilot micro plans, JFMC Kaswara (Dharamshala Division) has micro plan outlay of 12.46 million INR (convergence component 1.78 million INR), while Chatara JFMC has outlay of 1.51 million INR (convergence component 3.49 million INR).

### Attachment I.6.2.1 Area Variation of Protected Area in HP State

Data Source:			State at a Glance: HP, Vol. 1, 2014	Area as per GIS shape file of HPFD	
Details of PA's:			NP=5 (2,407.28 km <sup>2</sup> ) WLS=26 (5,964.97 km <sup>2</sup> ) CR=3 (19.17 km <sup>2</sup> )	NP=5 (2,469.07 km <sup>2</sup> ) WLS=26 (6,295.81 km <sup>2</sup> ) CR=2 (2.17 km <sup>2</sup> )	Area Diff. (Reported area v/s GIS area)
<b>National Parks (NP)</b>					
No.	Name	District	Area (Km <sup>2</sup> )	GIS Area (Km <sup>2</sup> )	Area (Km <sup>2</sup> )
1	Great Himalayan NP	Kullu	905.40	980.82	75.42
2	Pin Valley NP	Lahaul & Spiti	675.00	614.62	(-) 60.38
3	Inderkila NP	Kullu	94.00	117.97	23.97
4	Khirganga NP	Kullu	705.00	727.13	22.13
5	Simbalbara NP	Sirmour	27.88	28.53	0.65
Total Area			<b>2,407.28</b>	<b>2,469.07</b>	<b>61.79</b>
<b>Wildlife Sanctuaries</b>					
1	Bandli	Mandi	32.11	32.11	-
2	Chail	Solan/ Shimla	16.00	15.71	(-) 0.29
3	Chandra Tal	Lahaul & Spiti	38.56	38.56	-
4	Churdhar	Sirmour	55.52	55.52	-
5	Daranghati	Shimla	171.50	171.05	(-) 0.45
6	Dhauladhar	Kangra	982.86	906.57	(-) 76.29
7	Gangul-Siyabehi	Chamba	108.40	109.36	0.96
8	Kais	Kullu	12.61	12.62	0.01
9	Kalatop-Khajjar	Chamba	17.17	17.02	(-) 0.15
10	Kanawar	Kullu	107.29	110.22	2.93
11	Khokhan	Kullu	14.94	16.46	1.52
12	Kibber	Lahaul & Spiti	2,220.12	2,305.56	85.44
13	Kugti	Chamba	405.49	407.31	1.82
14	Lipa Asrang	Kinnaur	31.00	29.35	(-) 1.65
15	Majathal	Solan/ Shimla	30.86	25.17	(-) 5.69
16	Manali	Kullu	29.00	29.46	0.46
17	Nargu	Mandi/ Kullu	132.37	155.82	23.45
18	Pong Dam Lake	Kangra	207.59	230.64	23.05
19	Rakchham-Chitkul	Kinnaur	304.00	258.45	(-) 45.55
20	Renuka	Sirmour	3.87	3.77	(-) 0.10
21	Rupi-Bhaba	Kinnaur	503.00	503.80	0.80
22	Sechu-Tuan Nalla	Chamba	390.29	533.13	142.84
23	Shikari Devi	Mandi	29.94	28.89	(-) 1.05
24	Shimla Water Catch.	Shimla	10.00	9.97	(-) 0.03
25	Talra	Shimla	46.48	46.44	(-) 0.04
26	Tundah	Chamba	64.00	242.85	178.85
Total Area			<b>5,964.97</b>	<b>6,295.81</b>	<b>330.84</b>
<b>Conservation Reserve</b>					
1	Darlaghat	Solan	0.67	0.68	0.01
2	Shilli	Solan	1.49	1.49	0
3	Naina Devi	Bilaspur	17.01	De-notified recently	-
Total Area			19.17	2.17	(-) 17.00
<b>GRAND TOTAL</b>			<b>8,391.42</b>	<b>8,767.05</b>	

Source: Prepared by JICA Study Team (2017)



### Attachment I.8.1.1 Labour Laws Pertinent to the Proposed Project

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
a. Article 24 of the Constitution of India	Article 24 of the Constitution of India mandates that no child below the age of 14 years will be employed in any factory or mine or any other hazardous working environment.	Executing agency (EA) / Implementation agency (IA), contractors
b. The Indian Penal Code (IPC), the Juvenile Justice (Care and Protection) of Children Act 2000	The IPC provides a basis in law to identify, prosecute and stop child labour in India and the Juvenile Justice (Care and Protection of Children) Act, 2000 is the primary legal framework for juvenile justice in the country. The act provides for a special approach towards the prevention and treatment of juvenile delinquency and provides a framework for the protection, treatment and rehabilitation of children in the purview of the juvenile justice system.	EA/ IA, Contractors
c. Child Labour (Abolition and Regulation) Act 1988	This Act on the one hand prohibits employment of children below the age of 14/15 years, in certain occupations and processes. No child shall be permitted to work or be employed in any of the occupations set forth in Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule of this Act. Secondly, the Act regulates the working conditions of such children (i) No child shall be required or permitted to work in any establishment in excess of such number of hours as may be prescribed for such establishment or class of establishments, (ii) the period of work on each day shall be so fixed that no period shall exceed three hours and that no child shall work for more than three hours before he has had an interval for rest for at least one hour, (iii) the period of work of a child shall be so arranged that inclusive of his interval for rest, under sub-section (2), it shall not be spread over more than six hours, including the time spent in waiting for work on any day, and (iv) No child shall be permitted or required to work between 7 p.m. and 8 a.m., (v) No child shall be required or permitted to work overtime, (vi) No child shall be required or permitted to work in any establishment on any day on which he has already been working in another establishment.	EA/ IA, Contractors
d. Labour Laws (Exemption from Furnishing Returns and Maintaining Registers by Certain Establishments) Act, 1988.	The Act has been passed to give relief to Small Establishments (10-19 persons) and Very Small Establishments ( $\leq 9$ persons) are employed or were employed during past 12 months [section 2(f)], from furnishing returns and maintaining registers under certain labour laws. Such establishments are expected to submit only a 'core return' in prescribed form as on 31st December every year. In addition, employer is required to issue wage slips to workmen. Returns relating to accidents are required under Factories Act and Plantation Labour Act are required to be submitted. Once such annual return is filed and registers are maintained, no further return or records are required under any of following laws (i) Payment of Wages Act (ii) Weekly Holidays Act, (iii) Minimum Wages Act (iv) Factories Act (v) Plantations Labour Act (vi) Working Journalists and Other Newspaper Employees Act (vii) Contract Labour (Regulation and Abolition) Act (viii) Sales Promotion Employees (Conditions of Service) Act (ix) Equal Remuneration Act.	EA/ IA, Contractors
e. The Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987)	This Act deals with various problems concerning safety, health, efficiency and well-being of the persons at work places, and serves to assist in formulating national policies in India with respect to occupational safety and health in factories and docks in India. . The Act is administered by the Ministry of Labour and Employment in India through its Unit General Factory Advice Service & Labour Institutes (DGFASLI) and by the State Governments through their factory inspectorates. The Act is applicable to any factory where (i) $\geq 10$ workers are working/ were working in the last 12 months, and in a manufacturing process is being carried on ordinarily with the aid of power, (ii) where $\geq 20$ workers are working/ were working in the preceding 12 months, and in which a manufacturing process is being ordinarily carried on without the aid of power. This does not include a mine, or a mobile unit belonging to the armed forces of the union, a railway running shed or a hotel, restaurant or eating place.	EA/ IA, Contractors



Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
f. Contract Labour (Regulation and Abolition) Act 1970	<p>The act ensures that the employers provide the basic welfare measures are made available to the contract workers engaged by them</p> <p>The Main objective of this Act is to prevent exploitation of contract labour and ensure better working conditions. A workman is considered as Contract Labour when he is hired in connection with the work of an establishment by or through a Contractor. The Contract Workmen are hired, supervised and remunerated by the Contractor, who in turn, is remunerated by the Establishment hiring the services of the Contractor.</p> <p>The Act enjoins Joint and Several responsibilities on the Principal Employer and the Contractor. The Principal Employer should ensure that the Contractor does the following: (a) Pays wages to the contract labour as determined by the Government, or as fixed by the Commissioner of Labour, (b) Maintains various registers and records, displays notices, abstracts of the Acts, Rules etc., (c) Issues employment card to his workmen, etc. (d) Provides the following facilities: (i) Canteen (if employing 100 or more workmen in one place) and if the work is likely to last for 6 months or more, (ii) Rest rooms where the workmen are required to halt at night and the work is likely to last for 3 months or more, (iii) Requisite number of latrines and urinals - separate for men and women, (iv) Drinking water, (v) Washing, (vi) First Aid, and (vii) Crèche</p>	EA/IA, Contractors
g. The Building and other Construction Workers Act 1996	<p>It is estimated that more than 8 million workers throughout the country are engaged in the building and other construction works, which is one of the most vulnerable segments of the unorganised labour in India. These workers are characterised with temporary employment, impermanent relationship with employer, uncertain working hours, inadequate or lack of basic amenities and welfare facilities, risk to life and limb is integral, etc.</p> <p>Thus, this Act was promulgated to ensure the safety of these workers at the construction work site and other welfare measures to be provided to the construction workers near their work place, such as canteen, first-aid facilities, ambulance, housing accommodation etc.</p>	EA/IA, Contractors
h. Workmen's Compensation Act 1923	<p>This Act provides for payment of compensation to workmen and their dependents, in case of injury and accident (including certain occupational disease) arising out of and in the course of employment and resulting in disablement or death. The Act applies to railway servants and persons employed in any such capacity as is specified in Schedule II of the Act. The Schedule II includes persons employed in factories, mines, plantations, mechanically propelled vehicles, construction works and certain other hazardous occupations. The amount of compensation to be paid depends on the nature of the injury and the average monthly wages and age of workmen. The minimum and maximum rates of compensation payable for death (in such cases it is paid to the dependents of workmen) and for disability have been fixed and is subject to revision from time to time.</p>	EA/IA, Contractors
i. Maternity Benefit Act of 1961	<p>The act ensures that any woman employee, who has worked in any establishment for at least 80 days during the 12 months immediately preceding the date of her expected delivery, is entitled to receive maternity benefits under the Act, that gives her the assurance that her rights will be looked after while she is at home to care for her child.</p> <p>The Act mandates, that the woman on her part, (i) should intimate the employer Seven Weeks before her delivery date about the leave period (ii) Ten weeks before the expected delivery date she may ask employer to give her light work, (iii) name the person to whom the payment will be made in case she cannot take herself.</p> <p>The expectant woman will be entitled to:</p> <p>Cash Benefits: * 84 Days Leave with pay before/after delivery, * A medical bonus of Rs. 1,000/-, *Take the pay for 6 weeks after/before child birth within 48 hrs of request, *An additional leave with pay up to one month [Proof of illness], *In case of miscarriage: Six weeks leave with average pay, *In case of Tubectomy operation: Leave with wages @ of maternity benefit for a period of 2 weeks</p> <p>Non Cash Benefits: *Light work for 10 weeks (6 weeks plus 1 month) before delivery, *2 Nursing breaks of 15 Minutes until the child is 15 months old, *No discharge or dismissal while on maternity leave, *No charge to her disadvantage in any conditions of her employment while on maternity leave, *Pregnant women discharged or dismissed may still claim maternity benefit from employer.</p>	EA/IA, Contractors

Law/ Policy	Description/ Outline	Responsible Ministry/ Agency
j. Payment of Wages Act 1936	This Act regulates the payment of wages to certain classes of persons employed in industry and guarantees payment of wages on time and without any deductions except those authorised under the Act. The Act provides for (i) the responsibility for payment of wages, fixation of wage period, time and mode of payment of wages, permissible deduction as also casts upon the employer, a duty to seek the approval of the Government for the acts and permission for which fines may be imposed by him and also sealing of the fines, and (ii) a machinery to hear and decide complaints regarding the deduction from wages or in delay in payment of wages, penalty for malicious and vexatious claims. The Act does not apply to persons whose wage is Rs. 10,000 or more per month.	EA/IA, Contractors
k. Minimum Wages Act 1948	The Minimum Wages Act ensures minimum wages in all enterprises and in some cases those working at home. Under the law, wage rates in scheduled employments differ across states, sectors, skills, regions and occupations owing to difference in costs of living, regional industries' capacity to pay, consumption patterns, etc. Hence, there is no single uniform minimum wage rate across the country and the structure has become overly complex. Central and State Governments can and do revise minimum wages at their discretion. Minimum wages are further classified by nature of work, location and numerous other factors at the discretion of the government.	EA/IA, Contractors
l. Employees Provident Fund and Miscellaneous Provisions Act of 1952	This act seeks to ensure the financial security of the employees in an establishment by providing for a system of compulsory savings. Minimum contribution by the employees shall be 10-12% of the wages, while the employee's share will be equivalent to employer's share. This amount is payable to the employee after retirement and could also be withdrawn partly for certain specified purposes.	EA/IA, Contractors
m. Payment of Bonus Act of 1965	This act, applies to an enterprise employing 20 or more persons, wherein the employer is required to pay a bonus to persons on the basis of profits or on the basis of production or productivity. The act was modified to include that a minimum bonus is paid by employer, despite suffering losses during the accounting year, which is currently 8.33% of the salary.	EA/IA, Contractors
n. Payment of Gratuity Act of 1972	This act applies to all establishments employing 10 or more workers. Gratuity is payable to the employee if he or she resigns or retires. The Indian government mandates that this payment be at the rate of 15 days' salary of the employee for each completed year of service subject to a maximum of Rs. 1,000,000. Extends payment of gratuity to employees engaged in factories, mines, oilfields, ports, plantations, shops or other establishments and for matters connected therewith or incidental thereto.	EA/IA, Contractors

Source: Compiled by JICA Study Team (2017) based on information from the respective Acts



### Attachment I.8.1.2 Analysis of Indian Environmental and Social Consideration Framework against JICA Guidelines as well as the World Bank's Safeguard Policies

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
<b>Principle</b>		
<ul style="list-style-type: none"> <li>- Ensure transparency, predictability, and accountability in its support for an examination of environmental (air, water, soil, ecosystem, waste, water usage, flora, and fauna) and social considerations (involuntary resettlement, employment and local livelihoods, with focused on vulnerable social groups including poor and indigenous people, women, children, and so on).</li> <li>- Examine appropriate environmental and social considerations undertaken by project proponents to avoid or minimise development projects' impacts on the environment and local communities, and to prevent the occurrence of unacceptable adverse impacts.</li> </ul>	<p>The most prominent Indian legal regulations related to ECS, viz., "The Environment (Protection) Act, 1986" and "The EIA Notification, 2006" for environment, and "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013" for social consideration aim to avoid or minimise the negative impacts on environment and local communities, and to prevent the occurrence of unacceptable adverse impacts.</p>	<p>No significant gaps are identified between JICA Guidelines and Indian EIA</p>
<b>Compliance with Laws, Policies, Standards</b>		
<ul style="list-style-type: none"> <li>- Projects must comply with the laws or standards related to the environment and social consideration established by the central and local governments of host countries which have jurisdiction over project sites.</li> <li>- Projects do not deviate significantly from the World Bank's Safeguard Policies, and refers as a benchmark to the standards of international financial organisations; to internationally recognised standards, or international standards, treaties, and declarations, etc. and to the good practices of developed nations including Japan, when appropriate.</li> </ul>	<p>All projects must comply with the union and state level relevant legal laws, policies, standards that are depicted in <b>Table 3.5.1</b> to <b>Table 3.5.4</b> in Chapter 3 for union level and <b>Table 8.1.1</b> in Chapter 8 to addresses different aspects of the environment and social considerations.</p>	<p>There is no significant gap. The project must comply Indian national and state regulations as well as international standards.</p>
<b>Screening for Project Categorisation</b>		
<p>JICA conducts an environmental review in accordance with the project category, and refers to the corresponding environmental checklists for each sector when conducting that review as appropriate.</p> <ul style="list-style-type: none"> <li>- Category A: JICA discloses the following: (1) EIA reports and environmental permit certifications, (2) RAPs for projects, and (3) IPPs for projects that will require measures for indigenous people, when these documents are submitted by project proponents etc.</li> <li>- Category B: The scope of environmental reviews for Category B projects may vary from project to project, but it is narrower than that</li> </ul>	<p>"The EIA Notification 2006 and Amendments 2007, 2008, 2009, 2011 and 2012" provides categorisation of project requiring and EIA and/or Public consultations and Hearing.</p> <ul style="list-style-type: none"> <li>- Projects are categorised into A, B (B1 and B2) during the screening process for (i) new projects/ activities, and (ii) expansion or modernisation of existing projects/ activities entailing capacity addition with change in process and or technology, undertaken in any part of India, based on their potential environmental impacts as indicated in the Schedule to the notification.</li> <li>- Screening involves the project proponents while taking decisions about the applicability of the environment clearance process. The screening process</li> </ul>	<p>There is no significant gap identified from the comparisons.</p>

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
<p>of category A</p> <ul style="list-style-type: none"> <li>- Category C: For projects in this category, environmental review is not required.</li> <li>- Category FI: JICA examines the related financial intermediary or executing agency to see whether appropriate environmental and social considerations as stated in the guidelines are ensured for projects in this category.</li> </ul>	<p>provides clear understanding and assistance on whether a proposed project requires environmental clearance from MoEF&amp;CC or from State department, or whether to approach the State Pollution Control Board to obtain Consent to establish.</p> <ul style="list-style-type: none"> <li>- For Category 'B' projects involve scrutiny of an application made vide Form 1 to determine whether or not the project/ activity requires further environmental studies (preparation of EIA) for its appraisal, before environmental clearance is granted, depending upon the nature and location specificity of the project. If EIA report is required, they are categorised as Category 'B1', if not then classified as Category 'B2'.</li> </ul>	
<b>Consultation</b>		
<ul style="list-style-type: none"> <li>- Consultation with local stakeholders is required in order to i) take into consideration the environmental and social factors in a way that is most suitable to local situations, and ii) reach an appropriate consensus.</li> <li>- JICA encourages project proponents and information on ESC are to be publicized/disclosed in advance through the consultation with local stakeholders, with particular attention to directly affected people. On these occasions, JICA supports project proponents etc. in the preparation of documents in an official or widely used language and in a form understandable by local people. (2.1/1, 6,7).</li> <li>- In the case of Category A projects, JICA encourages project proponents to consult with local stakeholders about their understanding of development needs, the likely adverse impacts on the environment and society, and the analysis of alternatives at an early stage of the project, and assists project proponents as needed. In the case of Category B projects, JICA encourages project proponents to consult with local stakeholders when necessary. (2.4)</li> <li>- Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared (Appendix 2).</li> </ul>	<p>According to "EIA Notification 2006 and Amendments 2007, 2008, 2009, 2011 and 2012";</p> <ul style="list-style-type: none"> <li>- After the EIA-EMP Draft Report is submitted to MoEF&amp;CC or SEIAA, the executing agency will approach to CPCB/ SPCB to conduct and undertake Public Hearing and Consultations. The views and concerns from relevant stakeholders have to be addressed by executing agency and incorporated in the Final EIA-EMP Report, before submitting it to MoEF&amp;CC or SEIAA, for consideration of prior EC</li> <li>- As per the Office Memoranda dated 6-Jun-2014, the process of submission of ToR/ EC proposal has gone online at MoEF&amp;CC. Like-wise, submission of proposals for Forest and Wildlife clearances are also online. Thus, all stages are undertaken online and dates of meetings and other milestones are displayed online. Before the system went online, major milestones were displayed online and the reports were uploaded for review by anyone.</li> </ul> <p>According to "the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013";</p> <ul style="list-style-type: none"> <li>- Consultations with the affected people and other stakeholders are held at least 4 times during the course of land acquisition and R&amp;R process. Public Hearings are conducted after completion of SIA and the findings are shared with the affected families, and after the draft Rehabilitation and Resettlement Scheme has been prepared by the Administrator (R&amp;R), to share the draft scheme with the affected families and invite claims and objects.</li> <li>- All the notifications are published to invite participate, share comments &amp; suggestions, raise objections, etc., which are posted at prominent places and uploaded on the official website.</li> </ul>	<p>Indian framework on consultation fully responds to the requirement of JICA Guidelines.</p>

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
<b>Involuntary Resettlement</b>		
<ul style="list-style-type: none"> <li>- Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.</li> <li>- When population displacement is unavoidable, effective measures to minimise impact and to compensate for losses should be taken</li> <li>- People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.</li> <li>- Compensation must be based on the full replacement cost as much as possible and the compensation and other kinds of assistance must be provided prior to displacement.</li> <li>- For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public.</li> </ul>	<p>According to RTFCTLARR Act 2013;</p> <ul style="list-style-type: none"> <li>- Once it is confirmed land is to be acquired, a <b><i>Social Impact Assessment (SIA) shall be conducted</i></b> to estimate numbers of affected and displaced families, impacts on social infrastructure, determine whether land is being acquired for a public purpose and examine whether the required land is the barest minimum, and that possibility to find alternative lands. The SIA also assesses impacts on livelihoods of affected families among others. Thus, through this process, <b><i>the Act ensures to avoid or minimise of the negative impact of resettlement.</i></b></li> <li>- An Expert Group, comprising of independent multi-disciplinary sectors is put-together, to review the SIA, and thereafter submits its recommendations to the Government.</li> <li>- The recommendations of the expert group are reviewed by the Government and ensures the land acquisition is for public purpose, potential benefits outweigh social cost and adverse social impacts, minimum area is being acquired, no unutilised area is available.</li> <li>- PAFs are compensated for their acquired lands, homestead, assets and immovable properties on the land and house, etc. The targeted market value of compensation shall be extended to standing crops, trees and plantations.</li> <li>- Displaced PAFs are provided constructed homesteads in relocated sites with infrastructure facilities and amenities. They are also provided other monetary benefits, cost towards shifting, construction of cattle shed, subsistence allowance for a period of 1 year.</li> <li>- For the purpose of livelihood support, the Act makes provision to provide suitable training and skill development in case jobs are created through the project, and preference is given to PAFs</li> </ul>	<p>The Project will not have involuntary resettlement and land acquisition, but the Study Team has carefully reviewed the legal framework and concluded that no significant gap is identified.</p>
<ul style="list-style-type: none"> <li>- In preparing a resettlement action plan, <b><i>consultations</i></b> must be held with the affected people and their communities based on sufficient information made available to them in advance.</li> <li>- When <b><i>consultations</i></b> are held, explanations must be given in a form, manner, and language that are understandable to the affected people.</li> <li>- Appropriate participation of affected people must be promoted in planning, implementation and monitoring of resettlement action plans.</li> </ul>	<ul style="list-style-type: none"> <li>- <b><i>Consultations with the affected people shall be held at least 4 times during the course of land acquisition process.</i></b> A notification in local language shall be published and posted at prominent places.</li> <li>- Ample scope is provided, to the affected people to participate in planning, implementation and monitoring of resettlement action plans, by providing their views, suggestions, grievances, objections, etc.</li> </ul>	
<ul style="list-style-type: none"> <li>- Appropriate and accessible <b><i>grievance mechanisms</i></b> must be established for the affected people and their communities.</li> </ul>	<ul style="list-style-type: none"> <li>- There are stages during the consultation process, as mentioned above, wherein <b><i>PAFs and other stakeholders can communicate their grievances</i></b> related to (i) justification of public purpose for which land is being acquired, (ii) findings of the SIA report, (iii) area and suitability of land proposed, (iv) compensation</li> </ul>	

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
	<p>amounts, (v) R&amp;R Awards, (vi) apportionment of compensation amount among other shareholders, etc.</p> <ul style="list-style-type: none"> <li>- The Directorate of Public Grievances was set-up in 1988 to look into individual complaints pertaining to various Central Government Organisations, as an appellate body investigating grievances selectively and particularly those in which the complainant had failed to get redress at the hands of internal machinery and the hierarchical authorities.</li> <li>- Further, as per Sections (5) Public Hearing for SIA, (15) Hearing of Objects, (21) Notice to persons interested, are means to call the affected persons/ families to hear objects, suggestions, grievances and to redress such issues.</li> </ul>	
<ul style="list-style-type: none"> <li>- Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an <b>initial baseline survey</b> (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferable at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (World Bank OP4.12 Para 6)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>A SIA is conducted in a very early stage of the project</b>; as soon as land acquisition is intended.</li> <li>- The SIA assesses, identifies, records and prepares inventories of: (i) nature and justification of public purpose, (ii) estimates number of PAFs and PAFs to be displaced, and livelihoods (iii) land area and its classification (private, government, forest, others), houses, settlements, other common properties, (iv) land requirement is the barest minimum needed, (v) considered land acquisition at alternative place but not feasible, (vi) social impacts, nature and cost for addressing them, (vii) government assets and infrastructure, and (viii) community assets and infrastructure [RTFCTLARR Act 2013, Section 4].</li> </ul>	
<ul style="list-style-type: none"> <li>- <b>Eligibility of benefits</b> includes, <b>the PAFs who have formal legal rights to land</b> (including customary and traditional land rights recognised under law), <b>the PAFs who don't have formal legal rights to land</b> at the time of census but have a claim to such lands or assets and the PAFs who have no recognisable legal right to the land they are occupying. (World Bank OP4.12 Para 11)</li> </ul>	<ul style="list-style-type: none"> <li>- "Affected family" include; (i) <b>families whose land and immovable properties has been acquired</b>, (ii) <b>family does not own land, but member(s) of the family are agricultural laborer, tenant</b> (any form or having usufruct right), share-cropper, artisan, (iii) <b>Scheduled Tribe and Other Forest Dwellers who have lost any forest rights under STOTFD Act 2006</b>, (iv) <b>family whose primary source of livelihood is dependent on forests or water bodies</b> (forest produce gatherer, hunter, fisher-folk, boatman, and their livelihood is affected due to land acquisition, (v) acquisition of such lands that belongs to <b>a member of a family who was assigned it through any state or central government scheme</b>, (vi) <b>family that has been residing on any land, for the last 3 years or more</b>, in urban areas, livelihood of that family is affected due to acquisition of the said land [RTFCTLARR Act 2013, Section 3].</li> </ul>	
<ul style="list-style-type: none"> <li>- Preference should be given to <b>land-based resettlement strategies</b> for displaced persons whose livelihoods are land-based. (World Bank OP4.12 Para 11)</li> </ul>	<ul style="list-style-type: none"> <li>- In case of Irrigation Project, as far as possible, any PAF whose land has been acquired, has been reduced to a marginal farmer or landless due to the process of land acquisition, will be allotted a minimum of 1 acre land in the command area. The SC and/or ST will be provided land equal to the land acquired, or equal to 2.5 acres (whichever is lower), in every project.</li> <li>- In Urbanisation projects, about 20% developed lands will be reserved and offered <b>to the land owning families</b> at a price equal to cost of acquisition and</li> </ul>	

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
<p>- <i>Provide support for the transition period</i> (between displacement and livelihood restoration). (World Bank OP4.12 Para 6)</p> <p>- Particular attention must be paid to <i>the needs of the vulnerable groups</i> among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (World Bank OP4.12 Para 8)</p> <p>- For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (World Bank OP4.12 Para 25)</p>	<p>development. The cost would be adjusted against compensation for acquisition of land [RTFCTLARR Act 2013, Section 3].</p> <p><i>Support during the period of Transition is offered</i> in terms of:</p> <ul style="list-style-type: none"> <li>◆ Subsistence Allowance @ ₹3000/month to all displaced families for a period of 1 year from date of award.</li> <li>◆ SC and ST families displaced from Scheduled Areas will receive ₹50,000/- in addition to subsistence allowance.</li> <li>◆ Artisans, small traders, self-employed, owning non-agricultural lands, commercial, institutional or industrial structure, will be provided one-time grant @ ₹25,000/- lump-sum.</li> </ul> <p>- <i>Vulnerable groups who are affected due to land acquisition</i>, including landless, agricultural laborer, tenant (any form or having usufruct right), share-cropper, artisan, SCs and STs, Other Forest Dwellers, and others whose livelihoods heavily depend on forest resources, widows, divorcees, deserted women, adults of either gender with or without spouse, children or dependents will be considered as separate family (Order XXXII of the First Schedule to the Code of Civil Procedure, 1908).</p> <p>- The RTFCTLARR Act 2013 is applicable for any size of PAFs, as <i>it does not specify any number of PAFs that it will cater to.</i></p>	
<b>Indigenous Peoples (Scheduled Tribes)</b>		
<p>- No relevant terms for “Indigenous People (IP)” were identified in the JICA Guidelines. However, it makes use of, relies on and adopts the World Bank definition of IP as mentioned in the WB OP 4.10</p> <p>- <i>Any adverse impacts that a project may have on indigenous peoples are to be avoided</i> when feasible by exploring all viable alternatives. When, after such an examination, avoidance is provided unfeasible, effective measures must be taken to minimise impacts and to compensate indigenous peoples for their losses.</p>	<p>- Article 366 (25) of the Constitution of India uses the term “Scheduled Tribes (ST)” for the Indigenous Peoples of India.</p> <p><i>Scheduled Tribe: Primitive traits, distinctive culture, geographical isolation, shyness of contact with the community at large, and backwardness are the criteria followed for specifying a community as scheduled tribes. Although these criteria are not spelt out in the Constitution but it has become well established. It subsumes the definitions contained in 1931 Census, the reports of first Backward Classes Commission 1955, the Advisory Committee (Kalelkar), on Revision of SC/ST lists (Lokur Committee)</i></p> <p>- As per the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, <i>SIA is conducted to enumerate affected families and assesses impacts on livelihoods of affected families, including ST.</i></p> <p>- <i>The following regulations protect the right of ST</i> occupying and usage of forests, protection of their rights against atrocities and civil rights.</p> <ul style="list-style-type: none"> <li>◆ The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006</li> </ul>	<p>Indian framework is basically in line with JICA Guidelines as well as World Bank's safeguard policies. However, current SIA is not specifically paid attention to STs, rather it targeted to all affected families.</p>



JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
	<ul style="list-style-type: none"> <li>◆ The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act, 1989 [No. 33 of 1989]</li> <li>◆ The Protection of Civil Rights Act, 1955 (Act No.22 Of 1955)</li> </ul>	
<ul style="list-style-type: none"> <li>- Early in project preparation, the Bank undertakes a screening to <i>determine whether Indigenous Peoples are present in, or have collective attachment to, the project area. The Bank may follow the borrower's framework for identification of Indigenous Peoples</i> during project screening, when that framework is consistent with this policy. WB OP4.10</li> </ul>	<ul style="list-style-type: none"> <li>- As per the RFCTLARR Act, precursory SIA is conducted to estimate number of PAFs, which is done for all categories of affected population and families. <i>While the Scheduled Areas give a clear comprehension on presence of ST population, there is no separate procedure to focus on ST affected families.</i></li> </ul>	
<ul style="list-style-type: none"> <li>- If the project includes <i>Sensitive Areas inhabited by ethnic minorities, indigenous peoples, or nomadic peoples with traditional ways of life, and other areas with special social value</i>, classified as Category B with the condition that potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.</li> </ul>	<ul style="list-style-type: none"> <li>- <i>“Scheduled Area” is deemed to have preponderance of tribal population</i>, compactness and reasonable size of the area, under-developed nature of the area, and marked disparity in economic standard of the people; these criteria though not spelt out in the Constitution of India but have become well established to denote areas where tribal population is significant.</li> <li>- The RFCTLARR Act, 2013 also classifies tribal or sensitive areas on the basis of areas classified by the Constitution of India, viz., Scheduled Areas.</li> </ul>	
<ul style="list-style-type: none"> <li>- For some Category A projects that will require the measures for indigenous people, an IPP must be submitted. It is desirable that the IPP include the elements laid out in the World Bank Safeguard Policy, OP4.10, Annex B.</li> <li>- The selection and appraisal of the sub-projects is substantially undertaken by a financial intermediary or executing agency only after JICA's approval of the funding. In such cases, JICA examines the related financial intermediary to see whether appropriate ESC as stated in the guidelines are ensured for projects in the category.</li> </ul>	<ul style="list-style-type: none"> <li>- During the prior EC Appraisal by the EAC or the SEAC at the SEIAA level it may recommend preparation of a Tribal Development Plan, get it vetted by the Ministry of Tribal Affairs</li> <li>- The RFCTLARR Act, 2013 on the other hand also states that in case where Projects involving acquisition of land and in which involves displacement of SC and ST families, a Development Plan shall be prepared, as per details as stipulated (Refer Section 41).</li> </ul>	
<ul style="list-style-type: none"> <li>- <i>The borrower undertakes a social assessment to evaluate the project's potential positive and adverse effect on the Indigenous Peoples, and to examine project alternatives</i> where adverse effects may be significant.</li> <li>- To carry out the social assessment and prepare the IPP/IPPF, the borrower pays particular attention to: (a) The customary rights of the Indigenous Peoples, both individual and collective; (b) The need to protect such lands and resources against illegal intrusion or encroachment; (c) The cultural and spiritual values; and (d) Indigenous Peoples' natural resources management practices and the long-term sustainability if such practices. WB P4.10</li> </ul>	<p>A SIA is undertaken at the very on-set of the Project, when it intends to acquire land for execution of the project. <i>The SIA enumerates affected families for all categories, assesses the impacts of the project, and SIMP is also prepared to ameliorate the adverse impacts as well</i> (RFCTLARR Act, 2013).</p> <p>Article 41 of the Act stipulates particular attention to IPs, (i) no land would be acquired in Scheduled Areas, (ii) in case of acquisition/ alienation of land in Scheduled Areas Prior Consent will be obtained from Gram Sabha/ Panchayat/ autonomous district councils (iii) Development Plan to be devised by Requiring agency for SC/ ST displaced families – includes alternate sources of fuel, fodder, non-timber forest produce, (iv) 1/3<sup>rd</sup> of the compensation amount paid as first instalment and the remaining after taking possession of lands, (v) ST affected families to be relocated in the same Scheduled Area to so that they can retain their</p>	

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
	ethnic, linguistic and cultural identity, (vi) SC and ST predominant resettlement areas to get free of cost land for community and social gatherings, (vii) alienation of any tribal lands or lands belonging to SCs shall be disregard of the law and treated as null and void, fishing rights conferred to ST, other forest dwellers, and SCs in rivers, ponds, lakes, reservoirs, etc, (viii) 25% additional R&R benefits in monetary terms + one-time entitlement of ₹50,000/-, and (ix) reservation benefits to SC and ST to continue in the resettlement areas.	
<p>- When the projects may have adverse impacts on indigenous peoples, <i>efforts must be made to obtain the consent of indigenous peoples in a process of Free, Prior, and Informed Consultation (FPIC).</i></p>	<p>The RFCTLARR Act, 2013 stipulates that;</p> <ul style="list-style-type: none"> <li>- <i>Prior consent will be obtained from the concerned Gram Sabha or Panchayat or the Autonomous District Councils</i>, in case of acquisition or alienation of any land in the Scheduled Areas, in all cases of land acquisition, including case of urgency.</li> <li>- Informed consultations, interactions, meetings, call for raising objects, etc., are incorporated at various stages of the procedures under this Act.</li> </ul>	
<p>- Prior to its environmental review, JICA disclose IPPs for projects that address issues of indigenous people. Measures for the affected indigenous peoples must be prepared as an IPP and must be made public in compliance with the relevant laws and ordinances of the host country.</p>	<p>The RFCTLARR Act, 2013;</p> <ul style="list-style-type: none"> <li>- Prior consent will be obtained from the concerned Gram Sabha or Panchayat or the Autonomous District Councils, in case of acquisition or alienation of any land in the Scheduled Areas, in all cases of land acquisition, including case of urgency.</li> <li>- <i>All consultations, interactions, meetings</i>, call for raising objects, including the intension to undertake SIA, findings of the SIA and SIMP, R&amp;R Plan prepared by Administrator (R&amp;R), Compensation Award and disbursement, process of Resettlement, Development Plans for SC and ST, etc., <i>are informed, publicised and published, shared and disclosed, to the affected communities, including STs</i>, and uploaded on the official website, at various stages of the procedures under this Act.</li> </ul>	
<p>- If the project involves the commercial development of natural resources, the borrower includes in the IPP arrangements to enable the Indigenous Peoples to share equitably in the benefits to be derived from such commercial development. The project of the commercial development of Indigenous Peoples' cultural resources and knowledge is conditional upon their prior agreement to such development WB OP 4.10</p>	<p>Irrespective of the nature of development project, Section 41 of the RFCTLARR-2013, provides special provisions for SCs and STs, which includes:</p> <ul style="list-style-type: none"> <li>◆ No acquisition of land in scheduled areas</li> <li>◆ Prior consent is required from concerned Gram Sabha or Panchayat, if acquisition of land in Scheduled areas</li> <li>◆ Development Plan shall be prepared in case of land acquisition involving displacement of SC and ST families, which will include development of alternate fuel, fodder, non-timber produce for a period of 5 years</li> <li>◆ 1/3 compensation shall be paid initially as first instalment, and remaining after taking possession of land</li> <li>◆ ST families to be relocated within the same scheduled areas</li> </ul>	

JICA Guidelines/ World Bank's Safeguard Policies	Indian Framework	Measure to fill the gap
	<ul style="list-style-type: none"> <li>◆ Resettlement areas predominant with SC and ST families to get land, free of cost, for community and social gatherings</li> <li>◆ Fishing rights to STs, other traditional forest dwellers and SCs in rivers, ponds and dam in the affected area</li> <li>◆ SC and ST families if relocated outside the district will be extended 25% additional R&amp;R benefits (in monetary terms) and 1 time entitlement of @ ₹50,000/-</li> <li>◆ All reservation benefits to continue in resettlement sites for SC and ST families</li> </ul>	
<b>Monitoring</b>		
<ul style="list-style-type: none"> <li>- Project proponents etc. should make effort to make the results of monitoring available to relevant stakeholders by appropriate means. When necessary, JICA may also conduct its own investigations.</li> <li>- JICA discloses the results of monitoring conducted by project proponents etc. on its website to the extent that they are made public in project proponents etc. (3.2.2/1,2, 7)</li> <li>- After projects begin, project proponents etc. monitor whether any unforeseeable situations occur and whether the performance and effectiveness of mitigation measures are consistent with the assessment's prediction. They then take appropriate measures based on the results of such monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>- After the EC is granted, it is mandated that Executing Agency to submit Compliance Reports (hard and soft copies), with respect to the terms and conditions along-with prior EC, to the regulatory authority concerned, on 6 months basis. These compliance reports shall be public documents and also be displayed on the web site of the concerned regulatory authority ("EIA Notification 2006 and Amendments 2007, 2008, 2009, 2011 and 2012", and "Environment (Protection) Act, 1986 and Amendment 1991")</li> <li>- The laws pertaining to environment and social consideration (land acquisition and involuntary resettlement) have specified the institutional arrangements required for implementation, monitoring and evaluation.</li> </ul>	<p>Indian legal framework mandates to submit the compliance Report to the concerned authority in regular basis and also mentions the requirement of institutional arrangement for ESC implementation and M&amp;E. Thus, no significant gap is identified from the comparisons.</p>

Source: Prepared by JICA Study Team based on JICA Guidelines for Environmental and Social Considerations (2010), World Bank Environmental and Social Safeguards Policies (2016), Operational Policies and different Indian legislations on environment and social considerations

### Attachment I.8.1.3 Projects or Activities Requiring Prior Environmental Clearance

As per the EIA related laws and regulations, all projects and activities which are listed in the table below shall require prior Environmental Clearance (EC) from the concerned government authorities. Prior to any construction work, or preparation of land, except for securing the land.

**Table 1 List of Projects or Activities Requiring Prior Environmental Clearance**

Activity/Project		Category with Threshold Limit		Remark
		A	B	
<b>1 Mining, extraction of natural resources and power generation (for a specified production capacity)</b>				
1(a)	(i) Mining of minerals	≥ 50 ha. of mining lease area in respect of non-coal mine area > 150 ha of mining lease area in respect of coal mine lease.  Asbestos mining irrespective of mining area	<50 ha ≥ 5 ha. of mining lease area in respect of non-coal mine lease. ≤150 ha ≥5 ha of mining lease area in respect of coal mine lease	General Conditions <sup>1</sup> shall apply  Note: Mineral prospecting is exempted
1(a)	(ii) Slurry pipelines (coal lignite and other ores) passing through national parks/sanctuaries/ coral reefs, ecologically sensitive areas.	All projects.	-	
1 (b)	Offshore and onshore oil and gas exploration, development & production	All projects	-	
1 (c)	River Valley projects	(i) ≥ 50 MW hydroelectric power generation (ii) ≥ 10,000 ha. of cultivatable land area)	(i) < 50 MW ≥ 25 MW hydroelectric power generation (ii) < 10,000 ha. of cultivatable land area)	General Conditions shall apply  Note: Irrigation projects not involving submergence or inter-state domain shall be appraised by the SEIAA as Category 'B' Projects
1(d)	Thermal Power Plants	≥ 500 MW (coal/lignite/naphtha & gas based) ≥ 50 MW (Pet coke, diesel and all other fuels including refinery residue oil waste except biomass) ≥ 20 MW (based on biomass or non-hazardous municipal solid waste as fuel	< 500 MW (coal/lignite/naphtha & gas based); <50 MW ≥ 5MW (Pet coke, diesel and all other fuels including refinery residue oil waste except biomass); <20 MW >15 MW (based on biomass or non-hazardous municipal solid waste as fuel.	General Conditions shall apply  Note: (i) Power plants up to 15MW, based on biomass and using auxiliary fuel such as coal/ lignite/ petroleum products up to 15% are exempt. (ii) Power plants up to 15MW, based on non-hazardous municipal waste and using auxiliary fuel such as coal/ lignite/ petroleum products up to 15% are exempt. (iii) Power plants using waste

<sup>1</sup> General Conditions: Category 'B' projects which applicable the following conditions in whole or in part within 10 km from the boundary will be treated as Category 'A'; (i) Protected Areas notified under the Wild Life (Protection) Act, 1972; (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas, as notified under section 3 of the Environment (Protection) Act, 1986, and (iv) inter-State boundaries and international boundaries (Source: <https://ec.maharashtra.gov.in/files/ecproc.pdf>).

Activity/Project	Category with Threshold Limit		Remark
	A	B	
			heat boiler without any auxiliary fuel are exempt.
1(e)	Nuclear power projects and processing of nuclear fuel	All projects	-
<b>2 Primary Processing</b>			
2 (a)	Coal washeries	≥ 1 million ton/annum throughout of coal	<1million ton/annum throughout of coal
2 (b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	< 0.1million ton/annum mineral throughput
<b>3 Material Production</b>			
3(a)	Metallurgical industries (ferrous and non-ferrous)	a) Primary metallurgical industry All projects b) Sponge iron manufacturing ≥ 200TPD (Tons Per Day) c) Secondary metallurgical processing industry All toxic and heavy metal producing units ≥ 20,000 ton/annum	Sponge iron manufacturing <200TPD Secondary metallurgical processing industry i) All toxic and heavy metal producing units <20,000 ton /annum ii) All other non-toxic secondary metallurgical processing industries >5,000 ton/annum
			General Conditions shall apply. Note: (i) The recycling industrial units registered under the HSM Rules, are exempted. (ii) In case of secondary metallurgical processing industrial units, those projects involving operations of furnaces only such as induction and electric arc furnace, submerged arc furnace, and cupola with capacity more than 30,000 tonnes per annum (TPA) would require environmental clearance. (iii) Plants/ units other than power plants (given against entry no. 1(d) of the schedule), based on municipal solid waste (non-hazardous) are exempted
3(b)	Cement Plants	≥ 1.0 million ton/annum production capacity	<1.0 million ton/annum production capacity. All Stand-alone grinding units
<b>4 Material Processing</b>			
4 (a)	Petroleum refining industry	All projects	-
4(b)	Coke oven plants	≥250,000 ton/annum	<250,000 & ≥25,000 ton/annum
4(c)	Asbestos milling and asbestos based products	All projects	-
4(d)	Chlor-alkali industry	≥300 TPD production capacity or a unit located outside the notified industrial area/ estate	(i) All projects irrespective of the size, if it is located in a Notified Industrial Area/ Estate. (ii) <300 TPD and located outside a Notified Industrial Area/Estate
			General as well as specific conditions shall apply. No new Mercury based plant will be permitted and existing units converting to membrane cell technology are exempted from the notification.

Activity/Project		Category with Threshold Limit		Remark
		A	B	
4(e)	Soda ash Industry	All projects	-	
4(f)	Leather/skin/hide processing industry	New projects outside the industrial area or expansion of existing units outside the industrial area	All new or expansion of projects located within a notified industrial area/estate	General as well as specific conditions shall apply.
<b>5 Manufacturing/Fabrication</b>				
5(a)	Chemical fertilisers	All projects except Single Super Phosphate	Single Super Phosphate	
5(b)	Pesticides industry and pesticide specific intermediates	All units producing technical grade pesticides	-	
5(c)	Petrochemical complexes	All projects	-	
5(d)	Manmade fibers manufacturing	Rayon	Others	
5(e)	Petrochemical based processing	Located outside the notified industrial area/estate	Located in a notified industrial area/estate	General as well as specific conditions shall apply
5(f)	Synthetic organic chemicals industry	Located outside the notified industrial area/estate	Located in a notified industrial/estate	General as well as specific conditions shall apply
5(g)	Distilleries	(i) All Molasses based distilleries (ii) All Cane juice/non-molasses based distilleries $\geq 30$ KLD (Kilo Litres per Day)	All Cane juice/non-molasses based distilleries $< 30$ KLD	
5(h)	Integrated paint industry	-	All projects	
5(i)	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp without bleaching	Pulp manufacturing and Pulp and paper manufacturing industry	Paper manufacturing industry without pulp manufacturing	
5(j)	Sugar industry	-	$\geq 5,000$ TCD (Ton of Cane per Day) cane crushing capacity	
<b>6. Service Sectors</b>				
6(a)	Oil & gas transportation pipe line	All projects	-	
6(b)	Isolated storage & handling of hazardous chemicals	-	All projects	
<b>7 Physical Infrastructure including Environmental Services</b>				
7(a)	Air Ports	All projects including airstrips, which are for commercial use	-	Note: Air strips, which do not involve bunkering/ refueling facility and or Air Traffic Control, are exempted.
7(b)	All ship breaking yards including ship breaking units	All projects	-	
7(c)	Industrial estates/parks/complexes/areas, export processing zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.	If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha and	Industrial estates housing at least one Category B industry and area $< 500$ ha Industrial estates of area $> 500$ ha and not housing any industry belonging to Category A or B.	General as well as specific conditions shall apply.  Note: 1. Industrial Estate of area below 500ha and not housing any industry of Category 'A' or 'B' does not require clearance.

Activity/Project		Category with Threshold Limit		Remark
		A	B	
		housing at least one Category B industry.		2. If the area is less than 500 ha but contains building and construction projects > 20,000 sq.mt and or development area more than 50 ha it will be treated as activity listed at serial no. 8(a) or 8(b) in the Schedule, as the case may be.
7(d)	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	All integrated facilities having incineration & landfill or incineration alone	All facilities having land fill only	
7(e)	Ports, Harbors, Breakwaters, dredging	≥ 5 million TPA (Tonnes Per Annum) of cargo handling capacity (excluding fishing harbors)	< 5 million TPA of cargo handling capacity and/or ports/ harbors ≥10,000 TP A of fish handling capacity	General Conditions shall apply  Note: 1. Capital dredging inside and outside the ports or harbours and channels are included. 2. Maintenance dredging is exempt provided it forms part of the original proposal for which Environmental Management Plan (EMP) was prepared and environmental clearance obtained.
7(f)	Highways	i) New National Highways; and ii) Expansion of National Highways greater than 30km, involving additional right of way greater than 20m involving land acquisition and passing through more than one State	i) All State Highway Projects; and ii) State Highway expansion projects in hilly terrain (above 1000m AMSL) and or ecologically sensitive areas	General Conditions shall apply.  Note: Highways include Expressways
7(g)	Aerial ropeways	(i) All projects located at altitude of 1000mt and above (ii) All projects located in notified ecologically sensitive areas	All projects except those covered in Column 3	
7(h)	Common Effluent Treatment Plants (CETPs)	-	All projects	
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)	-	All projects	
<b>8 Building/Construction projects/Area Development projects and Townships</b>				
8(a)	Building and Construction projects	-	≥50,000 m <sup>2</sup> and <150,000 m <sup>2</sup> . Of built-up area	
8(b)	Townships and Area Development projects	-	Covering an area ≥ 100 ha and built up area ≥150,000 m <sup>2</sup>	

Source: Based on EIA Notification (No. S.O.1533 dated 14/09/2006) of MoEF&CC, modified by the JICA Study Team (2017)

### Attachment I.8.1.4 Details of Stages in the Environmental Clearance as per the EIA Notification, 2006

Stage	Description
<b>1. Screening</b>	<p>Screening involves the project proponents while taking decisions about the applicability of the environment clearance process. The screening process provides clear understanding and assistance on whether a proposed project requires environmental clearance from MoEF&amp;CC or from State department, or whether to approach the State Pollution Control Board to obtain Consent to Establish.</p> <p>For <b>Category 'B'</b> projects or activities, this stage involves scrutiny of an application made vide Form 1 to determine whether or not the project/ activity requires further environmental studies (preparation of EIA) for its appraisal, before environmental clearance is granted, depending upon the nature and location specificity of the project. In case projects require an EIA report, they are categorised as <b>Category 'B1'</b> while in cases where projects/activities that do not require an EIA report are classified as <b>Category 'B2'</b>. For categorisation of projects into B1 or B2, except for projects/activities related to "Townships and Area Development" [Item 8 (b) in Schedule], the MoEF&amp;CC shall issue appropriate guidelines from time to time.</p>
<b>2. Scoping</b>	<p>This stage of Scoping refers to the process by which the <b>EAC (for Category 'A' projects/ activities) and SEAC (for Category 'B1' projects/ activities)</b> determines the detailed and comprehensive Terms of Reference (ToR), which addresses all relevant environmental concerns for the preparation of an EIA Report, based on the information furnished in Form-1/ Form-1A including ToR proposed by the applicant. The process of Scoping is also undertaken for projects/ activities involving 'Expansion and/or Modernisation and/or Change in product mix of existing projects/ activities'. During this Stage, a sub-group of the EAC/ SEAC may undertake a site visit, if they considered necessary, if ToR suggested by applicant and other information is available with the EAC or SEAC concerned. <b>All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.</b></p> <p>The TOR shall be communicated, to the Applicant, within a period of 60 days from the date of receipt of Form-1 by the EAC/ SEAC. The approved ToR will be uploaded on the website of MoEF&amp;CC and/or the concerned SEIAA. During the Scoping stage, applications for prior environmental clearance could be rejected by the regulatory authority on the recommendations of the EAC or SEAC; the decision together with reasons for rejection shall be communicated to the applicant in writing within 60 days of the receipt of the application.</p>
<b>3. EIA Study</b>	<p>On the basis of the result of the scoping, the project proponent can commence the actual EIA surveys and studies and prepare the EIA reports. The project developer shall hire the services of an independent EIA consultant, who is accredited by the National Accreditation Board for Education and Training (NABET)<sup>1</sup> for carrying-out EIA Studies, which will appraise the nature, size and location of the project and its operations and its importance to the country/ region. Through field based investigations, the EIA would look for alternatives, and assess the significance of impacts to various aspects of the environment. The consultant will address the concerns of the local people during the Public Hearing, which will be conducted by CPCB, and thereafter updated EIA reports incorporating the concerns of peoples and mitigation measures, shall be prepared and finalised. <b>The Consultant will prepare an Environmental Management Plan to ameliorate all potential deleterious impacts. The Study report will also include an Environmental Monitoring Program, for effective monitoring of environmental mitigation measures.</b></p>
<b>4. Public Consultations</b>	<p>During this stage, <b>all Category 'A' and Category 'B' projects/ activities shall undertake Public Consultations</b>, the process by which the concerns of local affected community and others who are possible stakeholders in the environmental impacts of the project/ activity are ascertained with a view to taking into account all the material concerns in the project/ activity design. Public consultations are not required for projects/activities related to:</p>

<sup>1</sup> NABET is a constituent Board of the Quality Council of India (QCI). QCI was established in 1997, and is part of the Department of Industrial Policy & Promotion, Ministry of Commerce & Industry. NABET developed the Environment Impact Assessment (EIA) Consultant Accreditation Scheme, which was launched in August 2007. The MoEF&CC reviewed the scheme in 2009 and preferred the scheme to be updated from learning since its incorporation. NABET is the first organisation in the world to offer accreditation of consulting organisations in various conformity assessment areas, and this scheme has been adapted as minimum requirement by the MoEF&CC, and made mandatory vide MOEF Office Memorandum dated December 2, 2009 & Gazette Notification dated March 3, 2016.



Stage	Description
	<ul style="list-style-type: none"> <li>- Modernisation of irrigation projects (item 1(c) (ii) of the Schedule).</li> <li>- All projects or activities located within Industrial Estates or Parks (item 7(c) of the Schedule)</li> <li>- Expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.</li> <li>- All Building/ Construction projects/ Area Development projects and Townships (item 8).</li> <li>- All Category 'B2' projects and activities.</li> <li>- All projects/ activities concerning National Defense and Security or involving other strategic considerations as determined by the Central Government.</li> </ul> <p>The process of Public Consultations ordinarily includes conducting <b>Public Hearing</b> and <b>obtaining written responses from other concerned persons</b> as below;</p> <ul style="list-style-type: none"> <li>- <b>Public Hearing:</b> is conducted at the site or in its close vicinity, by the State Pollution Control Board (SPCB) or the Union Territory Pollution Control Committee (UTPCC), within 45 days after requested by applicant, as per the prescribed manner given in Appendix-IV of the Notification 2006, in order to ascertain the concerns of local affected persons. The proceedings of the Public Hearing are documented (videography &amp; Photography) and the minutes of the proceedings are prepared, and sent to the concerned regulatory authority.</li> <li>- <b>Obtain Responses in Writing:</b> from other concerned persons having a plausible stake in the environmental aspects of the project or activity. For this purpose, the regulatory authority and the SPCB/ UTPCC, invites stakeholders to respond in writing, after it uploads on their website, the Executive Summary of EIA report and Application of project proponent, within 7 days of the receipt of written request to conduct public hearing.</li> </ul> <p>All the above responses received from affected persons and other stakeholders, as part of the public consultations process, is conveyed to the applicant, who will address all material environmental concerns and make appropriate changes in the Draft EIA and EMP report before submitting it to the concerned regulatory authority for appraisal.</p>
<p><b>5. Appraisal</b></p>	<p>Detailed scrutiny by the EAC/SEAC is conducted on the application and other documents like the Final EIA Report, outcome of the public consultations including public hearing proceedings, which were submitted by the applicant to the regulatory authority for grant of environmental clearance. This EAC/SEAC appraisal is transparent in nature, in which the applicant is invited to furnish necessary clarifications in person or through an authorised representative. After this proceeding, the EAC/SEAC submits categorical recommendations to the regulatory authority for 'grant of prior environmental clearance' with/ without stipulated terms and conditions, or it may reject the application for prior environmental clearance, with reasons and justifications.</p> <ul style="list-style-type: none"> <li>- <b>Grant or Rejection of Prior Environmental Clearance (EC):</b> The regulatory authority normally accepts the recommendations of the EAC/ SEAC. However, in case of disagreement, the regulatory authority may by stating the reasons for disagreement, request the EAC/ SEAC for reconsideration. After reconsideration, the EAC/ SEAC submit its views. Thereafter, the decision of the regulatory authority, after considering the views of the EAC/ SEAC, is final and conveyed to the applicant.</li> <li>- <b>Validity and transferability of EC:</b> The validity of the EC commences from the date the EC has been granted to the start of production operations or completion of all construction operations (in case of construction projects (item 8 of the Schedule)) by the project. Thus, the validity of the prior EC granted varies from project to project; it is valid for a period of 10 years in the case of River Valley projects (item 1(c) of the Schedule), a maximum of 30 years for mining projects and 5 years in the case of all other projects and activities.</li> </ul> <p>The EC granted for a specific project to a specific applicant can be transferred during its validity to another legal person entitled to undertake the project. An application (by the Original or Second party) along-with a NOC from the original developer/ applicant will be submitted to the regulatory authority, on the same terms and conditions, and for the same period of validity, EC was granted. No reference to EAC/ SEAC is necessary in such cases.</p>
<p><b>6. Monitoring</b></p>	<p>After the grant of environmental clearance, the project developer is mandated to submit half yearly compliance reports to the regulatory authority, on every 1st of June and December of each calendar year, on the terms and conditions that were put-up at the time of EC. These compliance reports will be public documents, and shared with any person and displayed on the website of the regulatory authority.</p>

Source: Prepared by JICA Study Team (2017) based on Environmental Clearance as per the EIA Notification, 2006

## Attachment I.8.1.5 Details of Requirements and Systems related to Land Acquisition and Involuntary Resettlement

The requirements and systems related to land acquisition and involuntary resettlement are described as follows. The information is based on the “Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013” and the relevant rules, regulations, amendments that published subsequently.

### 1. Land Acquisition System and Requirements

Procedures	Description
<b>1. Submission of Proposal for land acquisition</b>	The proposal together with Social Impact Assessment (SIA) report conducted by the Government submitted by the executing agency/ implementing agency (EA/IA), requesting the District Magistrate/ Collector initiating the process for land acquisition. Scrutiny by Government: The Government examines the proposal and reviews the SIA report submitted by the expert group. While examining the proposal, the Government ensures that (i) there is a legitimate and bona fide public purpose involved, (ii) potential benefits and bona fide public purpose out-weighs the social impacts and social costs, (iii) only minimum land is being acquired, (iv) there is minimum displacement of people, (v) minimum adverse impacts on individuals affected, (vi) minimum disturbance to infrastructure, ecology, and (vii) no unutilised, previously acquired lands exist in the area.
<b>2. Government’s recommendation to proceed</b>	Subsequent to assurance that afore-mentioned criteria are fulfilled, and after reviewing the district collector’s report (if any) and the report of expert group on SIA, the Government recommends the proposed area for acquisition. But, before the Government makes its recommendation, it will also ascertain whether “prior consent” has been obtained from the affected families. Thereafter, the government’s decision will be made public, in local language and posted at places as specified in the Act.
<b>3. Issue of Preliminary Notification</b>	Giving the details of land to be acquired, a Preliminary Notification is published in the Official Gazette, two daily newspapers circulating in the locality, one of which is in the regional language, and displayed in the affected areas, in the Panchayat/ Municipality/ Municipal Corporation, in the offices of the District Collector (DC), the Sub-Divisional Magistrate (SDM) and the Tehsil, and uploaded on the website. After the preliminary notification is published, a meeting will be specially organised by the DC, in which the concerned Gram Sabha(s) at the village level, municipalities in case of municipal areas and the Autonomous Councils in case of the areas referred to in the Sixth Schedule of the Constitution, will be informed about the contents of the notification in all cases related to land acquisition; the nature of the public purpose, reasons necessitating displacement of affected persons. The summary of the SIA Report will be shared and particulars of the Administrator to be appointed for the purposes of devising the R&R scheme will also be shared with the public. Thereafter, it becomes mandatory that “no person” can make any transaction or create any encumbrances on such lands that have been specified in the preliminary notification.
<b>4. Assessment of Notified Lands</b>	After the publication of the Preliminary Notification, the Government will lawfully authorise an officer and his servants and workmen, and assign the responsibility to enter and conduct surveys in the notified lands, which will include (i) determination of the extent of land to be acquired, (ii) take levels, (iii) dig or bore into sub-soil, etc., to ascertain whether land is adapted for the required purpose, and (iv) mark levels and boundaries. It is mandated that the authorised officer and his staff will not enter any property (building, enclosed court, garden, dwelling-house, etc.) without the consent of the occupier. The authorised officer will give a written notice, stating the intention to the occupier, at least 7 days prior to conducting survey work. The authorised person may also carry-out surveys in the absence of the occupier, by giving occupier a notice of at least 60 days prior to such survey. During the course of conducting the survey works, if the authorised officer and his staff cause any damage to the property, the occupier will be paid for such damages.
<b>5. Hearing of Objections</b>	After the publication of preliminary notification, should any person who is interested in any land that has been notified as being/ likely to be acquired for public purpose, may raise his/ her objection in writing, within a period of 60 days from the date of publication of preliminary notification. The objections could be related to area and suitability of land proposed, justification offered for public

Procedures	Description
	purpose and findings of the SIA report. The objector(s) will be given the opportunity of being heard. After this process, the DC will submit his/her recommendations on the objection(s) to the Government for its decision; decision of the Government will be final on such matters related to these objection(s).
<b>6. Intentions of taking possession of proposed lands</b>	On the orders of the Collector, land shall be marked out, measured and planned including marking of specific areas, in case it has not been done already. On the orders of the DC, a public notice will be published and issued on the web-site, and placed at convenient places on or near that said land(s), stating the Government's intension of taking possession of the notified land, and that claims to compensation, resettlement and rehabilitation of all interested parties will be made to him. A similar notice will be sent to the occupiers and person who reside elsewhere.
<b>7. Enquiry into Objections</b>	After the notice issued that indicates the government's decision to take possession of the proposed lands, the DC will pre-determine a day, and will enquire into objections (if any) raised by any interested person, related to the measurements made and value of the land, and into the respective interests of the persons claiming the compensation and rehabilitation and resettlement.
<b>8. Preparation of Award</b>	The DC will prepare the award with respect to the true area of the land, the compensation (as determined under Section 28) along with Rehabilitation and Resettlement award (as determined under Section 32), and apportionment of the compensation among all the persons known or believed to be interested in the land, irrespective of whether they have appeared before him or not.
<b>9. Calculation of Award</b>	The DC will make an award within a period of 12 months from the date of publication of the declaration. He will adopt the criteria provided in the Act to determine the market value of the land to be acquired. Thereafter, the total compensation will be calculated and determined which will also include all the assets attached to the land that has to be paid to the land owners. After the total compensation has been worked-out, the DC will impose a "Solatium" amount, payable to every person whose land is acquired. The solatium amount will be equivalent to 100% of the compensation amount; thus, the final award will be determined. Apart from the final award, the DC will grant an amount calculated @ 12% per annum on the market value of land, for the period commencing from the date of publication of notification of Social Impact Assessment study till the date of the award. The DC, to the extent possible, will not displace any family that has already been displaced by another project and relocated in the proposed project area. In such as case, the Government will pay an additional compensation that is equivalent to the compensation determined under this Act for the second or successive displacements. The Awards will be final and conclusive and will be filed in the DC's office, after the true area of land, market value of land, assets attached to the land, and solatium have been determined, and the apportionment of compensation has been prepared.
<b>10. Review and Corrections in Award:</b>	The DC can order for incorporating corrections, within a period of 6 months from the date of award, in case he feel that there is a requirement for correcting clerical errors or arithmetic mistakes, either in the award or errors arising due to his own action or on the application of any person interested or local authority; such corrections will be made and immediately conveyed to the interested persons.
<b>11. Issue of Final Award</b>	The DC finally issues Individual Awards, detailing the particulars of compensation payable and the details of payment of the compensation as specified in the First Schedule.
<b>12. Possession of land</b>	Finally, the DC takes possession of the land after ensuring that the entitled persons have received (i) full payment of compensation (within a period of 3 months from the date of award) and (ii) monetary part of rehabilitation and resettlement entitlements (within a period of 6 months from the date of the award). The DC is responsible for ensuring that the rehabilitation and resettlement process is completed in all respects before displacing the affected families.

Source: Prepared by JICA Study Team (2017) based on Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

## 2. Involuntary Resettlement System and Requirements

Procedures	Description
<b>1. Intention to acquire land</b>	Whenever the Government intends to acquire land for a public purpose; it consults with the Panchayat, Municipality or Municipal Corporation, at the Village or Ward level, in the affected area.
<b>2. Notification to conduct SIA</b>	A Notification is issued by the Government, for commencement of the SIA study, which is published in the Panchayat, Municipality or Municipal Corporation, in the affected areas, and offices of DC, the Sub-Divisional Magistrate, and the Tehsil. Subsequently, the SIA study is carried-out in consultation with Panchayat, Municipality or Municipal Corporation. The SIA study will be completed within a period of 6 months from the date of commencement of SIA study, and thereafter the report will be made available to the public for review. The authority preparing the SIA report will also prepare a Social Impact Management Plan (SIMP), suggesting ameliorative measures to address specific impacts in the affected area.
<b>3. Formation of an Expert Group (EG)</b>	An independent multi-disciplinary expert group is constituted to evaluate the SIA/ SIMP report. In case the expert group finds that the project does not serve any public purpose, that the social costs and adverse social impacts of the project outweigh the potential benefits; it will recommend abandoning the project immediately and no further steps to acquire the land will be initiated in respect of the same. Contrarily, the expert group shall make specific recommendations, within a period of two months from the date of its constitution, that the extent of land proposed to be acquired is the absolute bare-minimum requirement of land for the project and that there are no other less displacing options available. The recommendations of the expert group are recorded in writing, in local language, which gives the details and reasons for such decision, which is published in the Panchayat, Municipality or Municipal Corporation, in the offices of the DC, the Sub-Divisional Magistrate and the Tehsil, and in the affected areas, and uploaded on the website of the appropriate Government.
<b>4. Public Hearing for SIA</b>	Once the SIA and SIMP report has been prepared, the Government conducts a Public Hearing for the SIA study in the affected area, after giving adequate publicity about the date, time and venue. The purpose of this public hearing is to ascertain the views of the affected families, which is recorded and the views are included in the final SIA Report. Thereafter, the SIA and SIMP is made available in the local language in the Panchayat, Municipality, or Municipal Corporation, in the offices of DC, SDM, and Tehsil, in the affected area and uploaded in the official website.
<b>5. Issuance of Preliminary Notification</b>	Meanwhile, a Preliminary Notification is published as part of the land acquisition process. The 'preliminary notification' has to be issued within 12 months from the date of appraisal of the SIA report submitted by the expert Ggroup, other-wise the so-prepared SIA report will be regarded to have lapsed and a fresh SIA will be required to be undertaken prior to acquisition proceedings. Conduct Public Meeting: After the preliminary notification is issued, the concerned Gram Sabha or Sabhas at the village level, Municipalities in case of municipal areas and the Autonomous Councils in case of the areas referred to in the Sixth Schedule to the Constitution, will be informed about the contents of the notification in all cases of land acquisition at a meeting called especially for this purpose.
<b>6. Appointment of Administrator (Rehabilitation and Resettlement: R&amp;R)</b>	After the publication of the 'preliminary notification' the Administrator for R&R is appointed, who undertakes a survey and carries out a census of the affected families, and prepares inventories of (i) lands and immovable properties being acquired of each affected family, (ii) livelihoods lost in respect of land losers and landless, (iii) public utilities and Government buildings (in affected area and resettlement area), (iv) details of the amenities and infrastructural facilities (in affected area and resettlement area), (v) details of any common property resources being acquired, among other details as mentioned in the Act.
<b>7. Preparation of R&amp;R Scheme by Administrator (R&amp;R)</b>	The Administrator, based on the survey and census, prepares a draft Rehabilitation and Resettlement Scheme, including rehabilitation and resettlement entitlements for each land owner and landless. The details of the public amenities and infrastructural facilities which need to be provided in the resettlement areas are also prepared by the Administrator. The R&R Scheme will be publicised in the affected area and discussed in the concerned Gram Sabhas or Municipalities. A public hearing is to be conducted thereafter in the affected area(s).
<b>8. Constitution of R&amp;R Committee and Review of R&amp;R Scheme</b>	The Collector along-with the Rehabilitation and Resettlement Committee at the Project level, reviews the draft R&R Scheme submitted by the Administrator (R&R), and thereafter his suggestions are submitted to the Commissioner (R&R) for approval.

Procedures	Description
<b>9. Approval of R&amp;R Scheme by Commissioner (R&amp;R)</b>	The approved R&R Scheme will be made available in the local language to the Panchayat, Municipality or Municipal Corporation, the offices of the DC, the Sub-Divisional Magistrate and the Tehsil, published in the affected areas, and uploaded on the official website.
<b>10. Identification of resettlement area</b>	A declaration is issued by the Secretary to such Government indicating any particular land is needed for a public purpose, and that an area has been identified as the “resettlement area” for the purposes of rehabilitation and resettlement of the affected families. At this stage, the Project Proponent will deposit an amount, in full or part, towards the cost of acquisition of land.
<b>11. Disbursement of R&amp;R Scheme</b>	The DC passes the “Rehabilitation and Resettlement Awards” for each affected family in terms of the entitlements, as provided in the Second Schedule, and which include (i) rehabilitation and resettlement amount payable to the family, (ii) bank account number of the person to which the rehabilitation and resettlement award amount is to be transferred, (iii) particulars of house site and house to be allotted, in case of displaced families, (iv) particulars of land allotted to the displaced families, (v) particulars of one time subsistence allowance and transportation allowance in case of displaced families, (vi) particulars of payment for cattle shed and petty shops, (vii) particulars of one-time amount to artisans and small traders, (viii) details of mandatory employment to be provided to the members of the affected families, (ix) particulars of any fishing rights that may be involved, (x) particulars of annuity and other entitlements to be provided, and (xi) particulars of special provisions for the Scheduled Castes and the Scheduled Tribes to be provided. The Government, by a notification, may increase the rate of rehabilitation and resettlement amount payable to the affected families, taking into account the rise in the price index.
<b>12. Ensure delivery of R&amp;R package</b>	The DC ensures that all infrastructural facilities and basic minimum amenities, as specified in the Third Schedule, are extended to the relocated community in every resettlement area. The Rehabilitation and Resettlement Package (Second and Third Schedules) relating to Infrastructural Entitlements will be provided within 18 months from the date of the award. In the case of Irrigation or Hydro Projects, the rehabilitation and resettlement activities are to be completed 6 months before submergence of the acquired lands.

Source: Prepared by JICA Study Team (2017) based on Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

**Attachment I.8.2.1 National Ambient Air Quality Standards (NAAQS) as Notified in 18th November 2009, Annual averages of RSPM, SO<sub>2</sub> and NO<sub>x</sub> at all NAMP stations in HP for the year 2015-16.**

**Table 1 National Ambient Air Quality Standards (NAAQS) as Notified in 18th November 2009**

No.	Pollutant	Time Weighted Average	Concentration of Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (Notified by Central Government)	Method of Measurement
1	Sulphur Dioxide	Annual*	50 µg/m <sup>3</sup>	20 µg/m <sup>3</sup>	- Improved West and Gaeke - Ultra-violet florescence
		24 hours**	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	
2	Nitrogen Dioxide	Annual*	40 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	- Modified Jacob and Hochheiser (Na-Arsenite) - Chemiluminescence
		24 hours**	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	
3	Particulate Matter (PM10)	Annual*	60 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	- Gravimetric - TOEM - Beta attenuation
		24 hours**	100 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	
4	Particulate Matter (PM2.5)	Annual*	40 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	- Gravimetric - TOEM - Beta attenuation
		24 hours**	60 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	
5	Ozone (O <sub>3</sub> )	8 hours**	100 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	- UV photometric - Chemiluminescence - Chemical method
6	Lead (Pb)	Annual*	0.50 µg/m <sup>3</sup>	0.50 µg/m <sup>3</sup>	- AAS/ ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0 µg/m <sup>3</sup>	1.0 µg/m <sup>3</sup>	
7	Carbon Monoxide (CO)	8 hours	2.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup>	- Non Dispersive Infra Red (NDIR) - Spectroscopy
		1 hour	4.0 mg/m <sup>3</sup>	4.0 mg/m <sup>3</sup>	
8	Ammonia (NH <sub>3</sub> )	Annual*	100 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	- Chemiluminescence - Indophenol blue method
		24 hours**	400 µg/m <sup>3</sup>	400 µg/m <sup>3</sup>	
9	Benzene (C <sub>6</sub> H <sub>6</sub> )	Annual*	5.0 µg/m <sup>3</sup>	5.0 µg/m <sup>3</sup>	- Gas Chromatography based continuous analyzer - Adsorption and desorption followed by GC analyzer
10	Benzo (a) Pyrene (BaP) Particulate phase only	Annual*	1.0 ng/m <sup>3</sup>	1.0 ng/m <sup>3</sup>	- Solvent extraction followed by HPLC/ GC analyzer - Adsorption and desorption followed by GC analysis
11	Arsenic (As)	Annual*	6.0 ng/m <sup>3</sup>	6.0 ng/m <sup>3</sup>	- AAS/ ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni)	Annual*	20.0 ng/m <sup>3</sup>	20.0 ng/m <sup>3</sup>	- AAS/ ICP method after sampling on EPM 2000 or equivalent filter paper

Source: Compiled by JICA Study Team (2017) based on information from HSPSCB Annual Report 2015-16

\* Annual arithmetic mean of minimum of 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals

\*\* 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be compiled with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

**Table 2 Annual average of RSPM, SO<sub>2</sub> and NO<sub>x</sub> of all the NAMP Stations, H.P for the year 2015-16**

(Unit: µg/m<sup>3</sup>)

Stations	RSPM Annual Average	SO <sub>2</sub> Annual Average	NO <sub>x</sub> Annual Average
Shimla I	41.2	2.0	11.0
Shimla II	68.3	2.0	16.0
Parwanoo I	57.8	2.0	11.3
Parwanoo II	67.2	2.0	11.1
DIC Baddi	154.4	2.0	29.8
AHC Barotiwala	108.3	2.0	18.1
H B Baddi	103.3	2.0	19.2
MC Nalagarh	104.1	2.0	22.4
Damtal I	77.0	2.0	12.4
Damtal II	106.5	2.0	15.4
Paonta Sahib	90.7	2.7	13.4
Gondpur	160.1	3.2	14.6
Kala Amb	139.4	3.5	13.6
Trilokpur	78.5	2.7	13.2
RO Una	77.6	2.0	5.5
DIC Mehatpur	83.3	2.0	6.2
SNR-I	77.7	2.0	9.4
SNR-II	94.8	2.1	14.6
Manali-I	54.9	2.1	13.5
Manali-II	38.9	2.1	5.7
Kotwali Bazar, Dharamshala	32.3	2.0	9.2
HPSPCB, Residential Building, Dari, Dharamshala	40.9	2.0	7.0

Source: Compiled by JICA Study Team (2017) based on information from HPSPCB Annual Report 2015-16

## Attachment I.8.2.2: Water Quality Data in HP State

**Table 1 Water Quality of Major Rivers in Himachal Pradesh Monitored under MINARS Program, 2015-16 Results of Major Rivers (MINARS) Points from April 2015 to March 2016**

(Unit: pH; N/A, DO.; mg/l, BOD; mg/l, TC; mpn/100ml)

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
River Pabbar U/s Dhambari	pH	7.16	7.93	7.06	7.96	7.60	7.83	7.76	7.26	7.08	7.22	8.35	8.68	7.66	A
	D.O.	8.9	9.0	9.0	9.5	8.7	8.8	8.5	8.6	--	8.7	8.6	8.4	8.8	
	BOD	0.1	0.1	0.4	0.4	0.1	0.5	0.2	0.2	0.4	0.1	0.1	0.4	0.3	
	TC	8	18	14	16	2	16	<1.8	<1.8	<1.8	39	10	2	10.9	
River Pabbar U/s Rohru	pH	7.96	7.24	7.11	8.35	7.36	7.65	7.39	7.35	7.20	7.21	7.65	8.50	7.58	A
	D.O.	9.5	8.8	8.8	9.4	8.9	8.7	8.3	8.5	--	8.5	8.0	8.5	8.7	
	BOD	0.2	0.1	0.1	0.1	0.1	0.2	0.7	0.1	0.1	0.1	0.2	0.4	0.2	
	TC	10	24	10	12	20	21	<1.8	<1.8	<1.8	10	14	6	11.0	
River Pabbar at Snail D/s of TRT of Swara	pH	7.54	7.02	7.69	7.22	7.39	7.45	7.41	7.54	7.17	7.13	8.09	8.37	7.50	A
	D.O.	9.5	8.5	9.9	8.5	9.4	8.8	8.4	8.3	--	8.8	8.9	9.1	8.9	
	BOD	0.1	0.2	0.3	0.5	0.9	0.2	0.7	0.1	0.2	0.2	0.1	0.2	0.3	
	TC	12	22	12	8	Nil	10	<1.8	<1.8	<1.8	9.3	17	8	9.4	
River Tons at H.P. Boundary	pH	7.49	7.08	7.41	7.93	7.26	7.44	7.14	7.37	7.23	7.21	8.17	8.21	7.50	A
	D.O.	9.6	8.7	9.5	8.8	9.2	8.5	8.5	8.4	--	9.0	9.1	9.2	9.0	
	BOD	0.2	0.2	0.4	0.2	0.1	0.4	0.8	0.1	0.1	0.2	0.1	0.2	0.3	
	TC	22	12	12	16	5	18	<1.8	2	2	24	4	4	10.2	
Ashwani khad U/s Yashwant Nagar	pH	7.54	7.27	7.81	7.73	7.44	7.67	7.95	--	7.24	7.30	8.56	8.91	7.77	A
	D.O.	8.0	9.0	7.2	8.2	7.0	8.1	8.0	--	7.9	7.8	8.7	8.2	8.0	
	BOD	0.2	0.1	0.8	0.1	1.2	0.6	0.4	--	1.2	0.4	1.2	0.8	0.6	
	TC	12	8	12	32	8	28	<1.8	--	<1.8	13	17	10	13.1	
Giri river D/s Yashwant Nagar	pH	7.64	8.25	7.80	7.79	7.73	7.55	7.86	--	7.70	7.63	8.30	8.69	7.90	A
	D.O.	8.6	8.2	7.5	8.9	7.3	8.4	8.3	--	8.2	8.1	9.2	8.6	8.3	
	BOD	0.1	0.3	1.1	0.4	0.8	0.4	0.1	--	0.8	0.4	0.8	0.1	0.5	
	TC	22	12	6	8	12	36	<1.8	--	2	6	13	9	11.6	
River Sukhna at Parwanoo	pH	8.17	8.82	7.72	8.36	7.84	7.60	7.53	--	6.97	7.33	8.16	7.95	7.86	N/A
	D.O.	1.9	3.1	2.4	7.4	6.2	5.9	4.9	--	5.5	2.5	3.2	3.0	4.2	
	BOD	18.0	22.0	4.0	2.0	12.0	10.0	1.5	--	2.8	54.0	8.0	14.0	13.5	
	TC	280	310	460	540	240	344	500	--	120	>1600	540	540	497.6	



Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
Lift Nala D/s MSW Processing Site, Shimla	pH	7.36	6.79	7.88	8.05	7.83	7.62	7.94	6.90	7.26	7.07	8.15	7.55	7.53	N/A
	D.O.	4.8	4.5	3.1	4.3	4.4	4.5	5.1	4.1	--	6.8	5.5	4.6	4.7	
	BOD	10.0	16.0	7.6	4.0	8.0	8.0	3.2	3.2	3.0	4.5	4.0	6.0	6.5	
	TC	38	120	124	62	68	168	14	22	22	150	110	48	78.8	
River Sirsa U/s Sitomajri Nallah	pH	7.31	7.08	7.21	7.32	7.96	7.32	7.74	7.39	6.97	6.95	8.25	8.37	7.49	N/A
	D.O.	7.7	8.1	7.2	5.6	5.0	5.6	8.1	7.1	5.8	6.9	8.7	9.2	7.1	
	BOD	2.2	1.8	1.6	18	10	18	1.0	0.8	1.6	0.8	1.2	0.8	4.8	
	TC	28	48	--	170	130	170	26	17	17	20	12	8	58.7	
River Sirsa D/s Nalagarh Bridge	pH	7.37	7.34	7.69	7.93	7.95	7.93	7.98	7.68	7.99	7.60	8.82	7.62	7.83	N/A
	D.O.	8.2	4.7	6.2	4.5	4.9	4.5	6.4	5.9	4.7	5.2	4.8	8.3	5.7	
	BOD	2.0	2.2	1.8	10.0	10.0	10.0	2.0	1.4	1.2	0.3	4.0	1.2	3.8	
	TC	62	32	--	220	140	220	60	50	50	170	26	25	95.9	
River Sirsa D/s Nalaga	pH	7.20	6.90	7.06	7.82	7.92	7.82	8.30	7.56	7.16	7.77	8.55	7.89	7.66	N/A
	D.O.	8.8	5.3	5.8	5.1	5.2	5.1	6.1	6.5	5.2	4.9	5.0	8.7	6.0	
	BOD	2.4	1.8	3.6	12.0	12.0	12.0	1.0	1.0	1.0	0.6	6.0	2.0	4.6	
	TC	65	24	--	350	280	350	50	60	60	58	48	40	125.9	
IPH Water Intake point below MSW dump site at Salogra	pH	8.01	7.74	7.78	7.49	7.8	7.54	7.84	--	7.03	7.51	8.25	8.72	7.79	A
	D.O.	7.5	7.8	6.8	8.3	7.9	7.8	8.1	--	7.5	8.9	8.1	8.3	7.9	
	BOD	0.8	0.1	1.6	0.9	2.0	0.2	1.2	--	1.0	0.1	0.1	1.2	0.8	
	TC	4	5	20	4	12	48	<1.8	--	<1.8	<1.8	2	2	9.3	
River Yamuna U/s Paonta Sahib	pH	8.22	8.32	7.94	7.67	7.54	7.19	7.47	8.09	B	8.60	8.35	7.93	7.94	A
	DO	8.1	7.9	7.0	6.2	7.0	8.8	8.3	8.3	8.1	8.4	7.9	8.0	7.8	
	BOD	1.0	0.8	1.2	1.2	2.4	1.2	1.2	1.0	1.2	1.2	1.2	1.0	1.2	
	TC	26	21	18	20	18	22	18	16	14	17	15	20	18.8	
River Yamuna D/s Paonta Sahib	pH	8.25	8.34	7.58	7.81	7.65	7.63	7.62	8.27	7.52	8.57	8.49	8.08	7.98	A
	DO	7.6	7.7	6.8	5.8	6.8	8.6	7.9	8.0	7.9	8.2	7.8	7.8	7.6	
	BOD	1.2	1.2	1.6	1.4	1.6	1.4	1.6	1.2	1.6	1.6	1.4	1.6	1.5	
	TC	25	22	21	22	20	18	20	18	16	21	21	24	20.7	
River Bata U/s Kala Amb	pH	8.27	8.25	7.37	7.52	7.77	7.71	7.80	8.30	7.30	8.35	8.32	8.00	7.91	A
	DO	7.8	7.8	6.8	6.8	7.8	8.9	8.6	8.4	8.2	8.8	9.0	8.6	8.1	
	BOD	1.2	1.0	1.4	1.2	1.0	1.4	1.2	0.8	1.2	0.8	0.8	1.2	1.1	
	TC	16	26	26	22	16	19	16	18	18	21	21	24	20.3	
River Bata	pH	7.92	7.01	7.31	7.68	7.63	7.34	7.82	8.42	7.64	8.46	8.48	8.23	7.83	A

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
at D/s of Kala Amb	DO	7.7	7.6	6.6	6.1	7.6	8.7	8.4	8.2	8.0	8.6	8.9	8.3	7.9	
	BOD	1.4	1.4	1.6	1.6	1.2	1.6	1.4	1.0	1.6	1.2	1.0	1.6	1.4	
	TC	20	28	30	24	14	20	13	20	20	17	24	27	21.4	
River markand at Paonta Sahib	pH	8.20	7.89	7.69	7.99	7.82	7.14	7.42	8.12	7.45	8.46	8.39	8.06	7.89	A
	DO	7.4	7.7	7.0	5.8	8.0	8.4	7.9	8.2	8.2	8.2	7.5	7.7	7.7	
	BOD	1.2	1.2	1.2	1.4	1.2	1.4	1.6	1.0	1.2	1.4	1.6	1.6	1.3	
	TC	20	22	20	24	14	20	16	20	20	34	24	32	22.2	
River Markanda U/s Kala Amb	pH	8.22	8.07	7.94	7.76	7.72	8.12	7.44	7.39	7.58	8.44	8.32	8.14	7.93	A
	DO	6.8	7.8	7.5	6.4	8.2	8.0	7.6	8.0	8.0	8.4	8.4	7.9	7.8	
	BOD	1.6	1.2	1.2	1.0	1.0	1.6	1.8	1.2	1.6	1.2	1.2	1.2	1.3	
	TC	24	26	22	20	20	18	20	20	18	26	25	34	22.8	
River Markanda D/s Kala amb	pH	8.27	8.30	7.93	7.68	7.74	7.37	7.87	8.20	7.69	8.46	8.44	8.09	8.00	A
	DO	6.6	7.5	7.3	6.3	8.8	7.8	7.5	7.9	7.8	8.4	8.2	7.5	7.6	
	BOD	1.8	1.6	1.6	1.2	1.2	1.8	2.0	1.6	1.8	1.6	1.6	1.6	1.6	
	TC	31	28	28	24	16	20	20	26	28	26	31	38	26.3	
River Giri U/s of CCI Mines	pH	8.17	7.98	7.72	7.63	7.86	7.25	7.59	8.47	7.89	8.41	8.39	7.88	7.94	A
	DO	7.6	8.0	6.9	6.6	8.1	8.6	8.3	8.5	8.4	8.5	8.5	8.4	8.0	
	BOD	1.4	1.2	1.4	0.8	0.8	1.2	1.2	0.8	1.2	1.2	1.2	1.2	1.1	
	TC	15	19	24	16	16	20	18	18	16	26	10	31	19.1	
River Giri D/s of Sataun	pH	7.86	8.15	7.18	7.89	7.95	7.46	7.66	8.30	7.96	8.43	8.33	8.06	7.94	A
	DO	7.4	5.8	6.8	6.5	8.0	8.3	8.0	8.3	8.2	8.2	8.2	8.1	7.7	
	BOD	1.6	2.0	1.6	1.0	1.0	1.4	1.6	1.2	1.4	1.6	1.6	1.6	1.5	
	TC	16	38	28	18	18	22	18	20	18	27	12	32	22.3	
Renuka Lake	pH	8.18	8.15	8.00	7.97	7.29	8.14	7.81	7.11	7.92	8.34	8.34	7.96	7.93	B
	DO	6.4	5.8	5.2	5.6	7.0	6.9	6.2	4.0	4.4	5.9	6.2	6.4	5.8	
	BOD	1.4	2.0	2.2	2.0	1.6	1.8	2.0	3.6	3.2	2.4	2.2	2.2	2.2	
	TC	26	38	36	22	20	38	24	45	20	43	49	48	34.1	
U/S Slapper, River Satluj	pH	7.65	7.60	7.46	7.81	7.71	8.14	8.06	7.85	7.80	7.75	8.65	7.44	7.83	B
	DO	9.1	8.5	8.9	8.7	6.0	8.0	9.0	--	--	9.1	8.8	9.7	8.6	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	140	280	240	240	210	280	170	280	170	94	110	150	197.0	
D/S Slapper, Satluj	pH	7.98	7.76	7.50	7.89	7.53	7.85	7.88	7.88	7.69	7.69	8.48	7.68	7.82	B
	DO	9.3	8.6	8.9	9.0	8.0	8.7	9.0	--	--	8.7	8.9	9.5	8.9	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
River after Conf. with River Beas	TC	220	350	350	350	220	350	350	350	430	170	210	220	297.5	
Exit of Dehar Power House, Beas River	pH	7.76	7.84	7.46	7.37	7.69	7.98	7.87	7.86	7.76	7.83	8.35	7.59	7.78	B
	DO	8.3	9.2	9.1	8.9	8.0	8.0	9.2	--	--	8.9	9.0	8.6	8.7	
	BOD	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	94	180	280	220	240	210	280	240	350	210	170	170	220.3	
D/s Bilaspur at Govindsagar	pH	8.04	7.81	7.44	7.91	7.66	8.45	7.95	7.95	7.54	7.57	8.70	7.75	7.90	C
	DO	8.9	8.8	8.7	8.9	7.9	8.2	8.9	--	--	9.1	8.7...	9.3	8.7	
	BOD	0.3	0.2	0.3	0.4	0.3	0.2	0.3	0.3	0.2	0.3	0.1	0.2	0.3	
	TC	280	540	540	920	430	540	540	540	350	920	540	430	350	
U/s Mandi, Beas River)	pH	7.54	7.09	7.04	7.52	7.23	7.57	7.51	7.77	8.03	8.06	7.68	7.77	7.57	B
	DO	7.1	9.7	8.6	9.2	9.0	8.4	9.7	8.1	10.0	8.7	11.5	9.3	9.1	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	280	49	920	350	540	1600	220	170	210	110	120	140	392.4	
D/s Mandi, Beas River	pH	7.46	7.30	7.07	8.00	7.26	7.74	7.72	8.07	7.92	7.88	7.54	7.63	7.63	C
	DO	7.7	9.3	8.8	8.6	8.8	10.5	10.3	8.3	13.0	11.5	11.6	9.2	9.8	
	BOD	0.1	0.3	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	
	TC	540	350	280	>1600	1600	>1600	540	≥1600	>1600	280	350	430	897.5	
Rewalsar Lake	pH	7.40	7.07	6.84	7.42	7.20	7.07	7.36	7.35	7.56	7.82	7.20	7.82	7.34	N/A
	DO	2.0	1.7	2.0	1.2	3.5	108	4.5	5.4	6.3	2.1	4.9	2.0	12.0	
	BOD	1.2	2.8	2.2	2.7	4.8	2.4	0.5	0.2	2.0	5.5	7.0	6.0	3.1	
	TC	920	280	≥2,400	430	33	>1,600	1,600	140	920	1,600	1,600	1,600	1093.6	
D/s Mandi, Suketi Khudd (2607)	pH	8.35	7.48	7.55	7.63	7.50	7.74	7.75	7.88	7.99	8.06	7.88	7.98	7.82	C
	DO	9.1	9.8	9.3	6.2	8.0	8.8	8.5	7.1	11.3	11.7	10.5	9.4	9.1	
	BOD	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	
	TC	350	240	≥2,400	430	920	>1,600	1,600	≥1,600	>1,600	920	540	350	1,045.8	
R.Beas, U/s Pandoh Dam	pH	7.39	7.18	7.00	7.45	7.30	7.59	7.25	8.01	8.02	7.78	7.56	7.62	7.51	C
	DO	9.3	9.7	9.8	9.8	9.4	9.6	9.1	8.2	10.7	10.2	10.7	9.4	9.7	
	BOD	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	240	170	≥2,400	210	920	1,600	280	540	>1,600	280	240	170	720.8	
R.Beas, D/s	pH	7.70	7.22	7.09	7.39	7.20	7.60	7.23	7.81	7.76	7.91	7.36	7.64	7.49	B

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
Pandoh Dam	DO	8.6	9.2	10.3	8.3	9.0	8.9	9.9	7.9	10.9	12.8	10.1	9.8	9.6	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	280	180	280	430	13	>1,600	430	920	540	350	280	240	461.9	
R.Beas, D/s Aut	pH	7.52	7.03	7.53	7.36	7.33	7.30	7.36	7.74	7.58	7.68	8.04	7.42	7.49	B
	DO	9.2	10.8	10.5	9.5	8.8	8.6	9.6	9.0	8.8	9.4	9.0	9.0	9.4	
	BOD	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	170	140	220	170	150	280	150	240	280	170	120	170	188.3	
R.Sainj, D/s Largi	pH	7.72	7.00	7.49	7.19	7.29	7.29	7.78	7.75	7.55	7.65	4.24	7.10	7.17	B
	DO	9.7	11.0	11.0	9.7	8.9	8.8	9.7	8.9	9.0	9.6	8.7	8.7	9.5	
	BOD	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	180	180	280	220	210	170	140	170	240	130	140	220	190.0	
River Parvati, U/s Manikaran	pH	7.86	7.52	7.41	7.06	8.03	7.34	6.73	8.19	7.89	7.08	8.37	7.26	7.56	B
	DO	11.2	11.5	9.5	9.5	9.5	9.3	9.5	9.3	10.3	8.9	9.4	10.5	9.9	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	110	79	63	21	70	84	84	33	47	63	79	84	68.1	
River Parvati, D/s Manikaran	pH	7.70	7.47	7.11	7.27	7.68	7.16	6.90	7.86	7.76	7.18	8.18	7.32	7.47	B
	DO	11.1	11.4	9.4	9.4	9.4	9.2	9.4	9.2	10.2	8.8	9.3	10.4	9.8	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	140	140	94	79	110	130	130	70	58	84	130	140	108.8	
River Beas, U/s Manali	pH	7.52	7.78	7.49	7.68	7.64	7.38	8.35	7.54	7.56	7.44	8.16	7.46	7.67	B
	DO	10.3	10.3	10.2	9.9	9.9	9.2	9.8	9.6	9.9	9.8	9.9	9.8	9.9	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	79	170	110	34	120	140	79	31	39	47	46	79	81.2	
River Beas, D/s Manali	pH	7.72	7.35	7.23	7.74	7.40	7.61	8.04	7.59	7.48	7.49	7.94	7.13	7.56	B
	DO	10.2	9.0	9.9	9.9	9.6	8.9	9.8	9.5	9.8	9.8	9.8	9.7	9.7	
	BOD	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	180	350	350	220	350	430	220	70	84	94	84	120	212.7	
River Beas, U/s Kullu	pH	8.14	7.21	7.36	7.36	7.25	7.38	7.68	7.59	7.86	7.22	7.78	7.79	7.55	B
	DO	9.4	11.2	9.8	8.9	9.1	9.2	9.3	9.3	10.2	8.9	9.6	9.4	9.5	
	BOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	240	280	280	170	170	350	280	180	170	150	140	220	219.2	
River Beas, D/s Kullu	pH	7.40	7.11	7.48	7.35	7.26	7.28	7.67	7.71	7.72	7.24	8.17	7.78	7.51	B
	DO	9.3	11.2	9.6	8.8	9.0	8.9	9.2	9.0	10.2	8.8	9.3	9.3	9.4	
	BOD	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
	TC	540	540	350	280	350	540	430	280	210	170	350	350	365.8	
Parvati River, before confluence to R. Beas at Bhunter	pH	7.77	7.18	7.08	7.20	7.44	7.05	7.65	7.86	7.65	7.09	8.38	7.34	7.47	B
	DO	11.1	11.0	9.2	9.1	8.9	8.9	9.2	8.9	9.0	8.5	9.2	9.2	9.4	
	BOD	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	280	240	240	240	240	430	170	130	140	120	220	170	218.3	
River Satluj U/s Tattapani	pH	7.60	7.76	7.29	7.79	7.71	7.79	7.76	7.96	7.08	6.74	8.51	8.11	7.68	N/A
	DO	9.1	9.2	9.0	9.1	9.1	9.8	9.2	9.3	9.2	8.8	9.1	8.8	9.1	
	BOD	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Satluj U/s Rampur	pH	7.68	7.80	7.30	7.84	7.81	7.74	7.91	7.89	7.22	7.36	7.52	7.36	--	N/A
	DO	9.2	9.4	9.3	9.2	9.2	9.3	9.4	9.5	9.6	9.0	9.1	9.2	--	
	BOD	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	--	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Satluj D/s Rampur	pH	7.69	7.78	7.35	7.91	7.79	7.70	7.95	7.91	7.35	7.87	7.59	7.58	--	N/A
	DO	9.2	9.3	9.1	9.2	9.2	9.2	9.2	9.4	9.6	9.1	9.3	9.0	--	
	BOD	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	--	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
Wangtu Bridge (Satluj at Nathpa Jhakri)	pH	7.64	7.79	7.29	7.66	7.57	7.67	7.77	7.87	7.43	8.00	8.13	7.71	--	N/A
	DO	9.6	9.6	9.4	9.6	9.4	9.5	9.7	9.6	9.7	9.5	9.6	9.4	9.6	
	BOD	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Baspa U/s reservoir at Kuppa	pH	7.58	8.13	7.33	7.87	8.40	7.70	7.71	7.87	7.54	8.02	7.93	7.38	7.79	N/A
	DO	9.5	9.6	9.4	9.5	9.5	9.6	9.7	9.7	9.8	9.7	9.6	9.6	9.6	
	BOD	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Satluj before conf. with River Spiti at Khab	pH	7.61	7.75	7.32	7.83	7.90	7.41	7.64	8.06	7.76	7.96	8.01	7.69	7.75	N/A
	DO	10.0	9.9	9.7	9.8	9.7	9.7	9.9	10.0	10.0	10.1	10.0	9.8	9.9	
	BOD	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Spiti before conf. with	pH	7.59	7.83	7.35	7.83	7.88	7.68	7.38	8.14	6.59	7.96	8.07	7.79	7.67	N/A
	DO	9.9	10.0	9.6	9.6	9.8	9.8	9.8	9.9	9.8	9.7	9.7	9.6	9.8	
	BOD	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
River Satluj at Khab	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Satluj after conf. with River Spiti at Khab	pH	7.62	7.77	7.38	7.98	7.92	7.70	7.28	8.13	7.28	7.90	8.06	8.04	7.76	N/A
	DO	10.1	9.9	9.6	9.8	9.6	9.7	9.9	10.1	10.0	10.1	9.9	9.8	9.9	
	BOD	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	--	--	--	--	--	--	--	--	
River Ravi D/S Chamba	pH	8.02	8.00	7.81	6.78	7.59	6.75	7.98	7.03	7.86	7.31	7.64	7.22	7.50	B
	DO	8.7	8.7	8.6	8.6	8.5	8.5	8.6	8.8	8.7	8.2	8.6	8.6	8.6	
	BOD	0.4	0.2	0.2	0.5	1.6	0.3	0.3	0.6	0.5	0.5	0.1	0.3	0.5	
	TC	--	--	--	--	--	--	--	--	80	140	210	240	167.5	
River Ravi U/S Chamba	pH	7.80	8.24	7.48	6.82	8.02	7.50	8.00	6.77	8.04	7.32	7.58	7.12	7.56	B
	DO	8.7	8.8	8.7	8.7	8.6	8.6	8.8	8.7	8.8	8.6	8.7	8.7	8.7	
	BOD	0.6	0.4	0.3	0.4	0.7	0.2	0.2	0.4	0.6	1.4	0.2	0.3	0.5	
	TC	--	--	--	--	--	--	--	--	60	110	170	210	137.5	
River Siul D/S Surgani	pH	8.13	7.96	8.57	7.81	7.49	7.23	7.35	7.02	8.16	7.29	8.02	7.38	7.70	B
	DO	8.8	8.7	8.6	8.5	8.7	8.7	8.6	8.7	8.6	8.7	8.8	8.7	8.7	
	BOD	0.2	0.3	0.3	1.6	0.7	0.2	0.2	0.2	0.4	0.1	0.3	0.5	0.4	
	TC	--	--	--	--	--	--	--	--	80	110	220	220	157.5	
River Ravi at Chamera Reservoir (2614)	pH	8.10	8.35	8.29	7.39	7.51	8.08	8.04	7.08	8.14	7.18	8.23	7.29	7.81	B
	DO	8.6	8.6	8.4	8.7	8.5	8.5	8.8	8.8	8.7	8.6	8.7	8.6	8.6	
	BOD	0.3	0.4	0.3	0.5	0.5	0.2	0.8	0.3	0.2	0.2	0.2	0.4	0.4	
	TC	--	--	--	--	--	--	--	--	110	90	280	240	180.0	
Madhopur Head Works River Ravi	pH	8.01	7.91	8.24	6.28	7.09	7.47	7.55	7.01	8.12	8.17	7.45	6.98	7.52	B
	DO	7.9	7.9	8.3	8.1	8.0	8.6	7.9	8.5	8.1	8.6	8.2	8.1	8.2	
	BOD	0.7	0.5	0.5	0.5	0.4	0.8	0.7	0.4	0.4	0.2	0.5	0.4	0.5	
	TC	--	--	--	--	--	--	--	--	--	240	430	350	340.0	
Khajiar Lake	pH	7.17	6.75	7.78	6.60	7.36	7.05	7.76	6.46	7.84	6.72	7.96	7.19	7.22	N/A
	DO	6.6	5.8	6.2	6.3	6.1	6.3	6.6	6.1	6.3	6.1	7.0	5.8	6.2	
	BOD	5.8	65.0	34.0	7.5	21.0	18.0	7.5	18.0	3.0	60.0	14.0	1.0	21.2	
	TC	--	--	--	--	--	--	--	--	240	500	1,600	920	815.0	
Pong Dam at Lake Pong	pH	8.32	8.12	7.05	8.33	7.27	8.04	7.58	7.31	8.03	8.03	8.20	7.46	7.81	B
	DO	8.1	8.5	7.2	8.5	8.7	8.5	7.9	8.4	7.4	7.1	7.6	8.3	8.0	
	BOD	0.6	0.6	0.8	0.4	1.6	0.5	0.4	1.4	0.5	0.4	0.3	0.4	0.7	

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
Village	TC	--	--	--	--	--	--	--	--	--	110	--	280	195.0	
D/S Pong Dam R. Beas	pH	8.32	8.42	7.16	7.96	7.44	8.04	7.20	7.36	8.10	7.82	7.51	7.35	7.72	B
	DO	8.2	8.6	6.9	8.7	8.9	8.6	8.1	8.5	6.9	7.3	8.3	8.6	8.1	
	BOD	0.2	0.4	0.4	0.2	0.8	0.3	0.5	0.1	0.2	0.2	0.5	0.3	0.3	
	TC	--	--	--	--	--	--	--	--	--	--	130	--	170	
D/S Dehra River Beas	pH	7.37	7.97	8.27	7.71	7.62	7.34	8.39	7.44	8.16	7.61	8.12	7.68	7.81	B
	DO	8.4	7.4	8.8	7.9	7.9	8.2	8.6	8.0	7.3	6.8	8.5	8.2	8.0	
	BOD	0.3	0.8	0.3	0.8	0.4	0.7	0.5	1.8	0.4	0.6	0.4	0.2	0.6	
	TC	--	--	--	--	--	--	--	--	--	--	130	--	280	
D/S Jaisinghpur River Beas	pH	7.83	7.64	6.98	7.38	7.62	7.24	7.81	7.54	7.21	7.42	7.68	6.98	7.44	B
	DO	8.5	8.9	7.6	6.8	7.9	7.9	7.9	8.3	7.9	8.7	7.9	8.2	8.0	
	BOD	1.0	1.2	0.8	0.9	1.0	0.6	0.7	0.6	2.0	2.0	0.5	0.5	1.0	
	TC	--	--	--	--	--	--	--	--	--	--	170	--	280	
D/S Alampur River Beas	pH	7.86	7.51	6.88	7.41	7.38	7.07	7.10	7.69	7.35	7.31	8.02	6.72	7.36	B
	DO	8.4	9.1	7.8	6.5	8.2	8.1	7.6	8.1	8.2	8.2	7.8	7.9	8.0	
	BOD	1.0	1.2	0.8	0.5	1.4	0.6	0.9	0.7	1.6	0.5	0.5	0.5	0.9	
	TC	--	--	--	--	--	--	--	--	--	--	140	--	220	
D/S Thural Neugal Khad	pH	8.41	7.32	7.71	7.29	7.03	7.62	7.08	7.45	7.72	7.05	7.21	7.59	7.46	B
	DO	8.1	8.6	7.3	8.1	8.2	7.7	8.4	8.1	7.6	8.6	8.1	8.6	8.1	
	BOD	0.4	0.4	1.8	0.3	0.2	0.3	0.3	0.6	0.2	0.4	0.3	0.3	0.5	
	TC	--	--	--	--	--	--	--	--	--	--	110	--	350	
D/S Binwa Baijnath Paprola	pH	7.51	7.35	7.67	7.12	7.05	7.67	7.14	7.52	8.07	7.09	7.79	6.84	7.40	B
	DO	8.5	8.2	8.2	8.4	9.1	8.6	7.6	7.5	7.2	8.4	7.3	8.0	8.1	
	BOD	0.8	0.5	0.5	0.2	0.2	0.3	0.2	0.5	0.2	0.2	0.4	0.2	0.4	
	TC	--	--	--	--	--	--	--	--	--	--	170	--	240	
River Satluj D/s Bhakhra	pH	8.14	8.09	7.74	7.02	7.48	7.17	8.18	7.17	8.06	8.06	7.37	7.14	7.64	B
	DO	7.0	5.4	7.5	6.3	6.3	8.0	6.8	7.1	7.0	7.2	6.5	5.9	6.8	
	BOD	0.3	0.2	0.2	0.4	0.3	0.2	0.3	0.5	0.3	0.3	0.3	0.2	0.3	
	TC	--	--	--	--	--	--	33	--	130	280	540	350	266.6	
River Swan D/s Santokhgarh	pH	7.99	7.69	7.42	6.78	7.88	7.38	7.68	7.26	8.27	8.31	7.50	7.38	7.63	N/A
	DO	5.5	5.2	7.8	5.8	5.8	6.0	5.6	6.5	5.6	6.5	5.0	5.6	5.9	
	BOD	1.6	1.6	60.0	0.7	1.6	2.0	0.9	5.4	0.6	0.5	2.0	0.4	6.4	
	TC	--	--	--	--	--	--	49	70	170	280	920	430	319.8	
River Ravi	pH	8.08	8.03	7.78	6.99	7.44	6.44	7.26	6.96	8.07	7.43	7.79	7.27	7.46	B

Name of location	Parameters	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Average	Water Class*
D/S proposed dam of Chamera-III HEP	DO	8.6	8.6	8.7	8.5	8.6	8.6	8.7	8.9	8.8	8.6	8.8	8.8	8.7	
	BOD	0.5	0.4	0.2	0.2	0.3	0.5	0.3	0.8	0.2	0.3	0.2	0.3	0.4	
	TC	--	--	--	--	--	--	--	--	110	90	220	170	147.5	

Note: DO: Dissolved Oxygen, BOD: Biochemical Oxygen Demand, TC: Total Coliform, N/A: Not Applicable

\*Please be noted that the categorized water classes are just for reference as some sampling numbers are limited.

Source: Compiled by JICA Study Team (2017) from the Statistical Abstract of Himachal Pradesh 2015-16, Department of Economics and Statistics



**Table 2 Results of State Water Quality Monitoring Points from April 2015 to March 2016**

(Unit: pH; N/A, D.O.; mg/l, BOD; mg/l, TC; mpn/100ml)

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
Lift Nallah D/s Hotel Combermere, Shimla	pH	7.19	8.09	7.92	7.20	7.60	N/A
	DO	5.3	4.6	4.5	7.9	5.6	
	BOD	6.0	4.0	4.0	9.6	5.9	
	TC	12	110	14	350	121.5	
Lift Nallah U/s Bridge at Bye Pass Road Near MC Waste Processing Site	pH	8.26	7.10	7.95	7.01	7.58	N/A
	DO	5.0	4.2	5.0	6.6	5.2	
	BOD	1.8	6.0	4.8	8.2	5.2	
	TC	14	82	17	120	58.3	
U/s Lift Nallah before conf. to Ashwani Khad	pH	7.54	8.73	7.68	7.26	7.80	A
	DO	8.5	8.2	8.5	8.6	8.5	
	BOD	0.3	1.0	0.4	0.2	0.5	
	TC	18	28	17	22	21.3	
D/s Ashwani Khad	pH	7.91	7.85	7.66	7.32	7.69	A
	DO	7.3	7.5	8.1	8.3	7.8	
	BOD	0.1	0.2	0.8	0.1	0.3	
	TC	27	24	11	48	27.5	
River Pabbar D/s Chirgaon	pH	8.46	7.74	7.43	6.74	7.59	A
	DO	9.2	9.4	8.6	8.5	8.9	
	BOD	0.1	0.3	0.1	0.2	0.2	
	TC	15	9	<1.8	41	16.7	
River Pabbar D/s Rohroo	pH	7.79	6.97	7.41	7.19	7.34	A
	DO	8.5	8.4	9.2	8.3	8.6	
	BOD	0.2	0.1	0.8	0.1	0.3	
	TC	13	16	4	25	14.5	
River Pabbar U/s Hatkoti	pH	8.21	7.90	7.16	7.33	7.65	A
	DO	8.6	8.6	9.1	8.6	8.7	
	BOD	0.4	0.3	0.8	0.1	0.4	
	TC	11	8	<1.8	8	7.2	
River Pabbar D/s Hatkoti	pH	7.76	7.76	7.39	7.35	7.57	A
	DO	9.3	8.5	9.1	8.4	8.8	
	BOD	1.8	4.0	1.0	0.1	1.7	
	TC	20	18	<1.8	15	13.7	
River Pabbar U/s Chailla	pH	--	7.72	7.65	7.21	7.53	A
	DO	--	8.7	8.1	9.1	8.6	
	BOD	--	3.0	0.6	0.1	1.2	
	TC	--	14	<1.8	20	11.9	
River Sirsa D/s Sitomajri Nallah	pH	7.24	7.10	7.48	6.89	7.18	A
	DO	6.2	5.3	6.8	5.5	6.0	
	BOD	1.2	5.2	1.0	0.4	2.0	
	TC	41	66	40	40	46.8	
River Sirsa U/s Sandholi Nallah pH	8.14	6.82	8.01	6.96		7.26	N/A
	DO	5.8	4.6	5.7	4.4	5.1	
	BOD	12.0	10.0	1.0	1.2	6.1	
	TC	58	50	40	140	72.0	
Sandholi Nallah	pH	8.35	6.16	7.78	6.11	7.10	N/A
	DO	0.0	2.0	0.0	0.0	0.5	
	BOD	450.0	16.0	18.0	460.0	236.0	
	TC	512	380	350	>1,600	710.5	
River Sirsa D/s Sandholi Nallah	pH	8.43	7.06	7.85	7.56	7.73	N/A
	DO	4.4	4.9	5.9	4.6	5.0	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
	BOD	2.8	14.0	8.0	3.2	7.0	
	TC	112	72	110	40	83.5	
River Sirsa U/s Housing Board Nalla	pH	8.32	6.84	8.14	7.43	7.68	N/A
	DO	5.5	4.8	3.2	1.9	3.9	
	BOD	3.6	12.5	4.0	2.8	5.7	
	TC	62	86	40	120	77.0	
Housing Board Nallah	pH	6.30	7.50	8.42	7.40	7.41	N/A
	DO	1.6	0.5	0.2	0.2	0.6	
	BOD	12.0	10.5	14.0	15.0	12.9	
	TC	110	420	60	>1,600	547.5	
River Sirsa D/s Housing Board Nalla	pH	8.39	7.01	7.15	5.91	7.12	N/A
	DO	6.4	4.8	4.5	3.2	4.7	
	BOD	2.2	12.0	10.0	10.0	8.6	
	TC	58	112	40	350	140.0	
River Sirsa U/s River Ratta	pH	8.45	6.77	6.87	6.59	7.17	N/A
	DO	8.1	5.0	6.5	5.2	6.2	
	BOD	2.0	6.5	1.0	8.0	4.4	
	TC	24	32	22	41	29.8	
River Ratta Before Conf. to River Sirsa	pH	7.62	6.94	6.70	7.29	7.14	N/A
	DO	7.2	5.2	7.2	5.9	6.4	
	BOD	2.8	10.0	4.0	18.0	8.7	
	TC	56	88	30	150	81.0	
River Sirsa D/s River Ratta	pH	7.08	7.18	7.77	7.41	7.36	N/A
	DO	8.8	4.9	6.2	4.9	6.2	
	BOD	8.0	15.0	2.0	12.0	9.3	
	TC	40	32	33	280	96.3	
River Bald U/s Land fill site at Baddi	pH	7.25	7.03	8.20	6.95	7.36	B
	DO	6.6	5.0	5.2	3.9	5.2	
	BOD	1.0	7.5	1.2	1.8	2.9	
	TC	52	68	50	32	50.5	
River Bald D/s Landfill site at Baddi	pH	8.41	6.80	8.28	7.64	7.78	N/A
	DO	7.8	5.1	7.1	5.8	6.5	
	BOD	1.8	12.0	4.0	2.2	5.0	
	TC	68	72	50	79	67.3	
Gullerwala Nallah	pH	--	6.89	8.17	7.00	7.35	N/A
	DO	--	5.0	5.5	4.2	4.9	
	BOD	--	5.0	1.0	4.0	3.3	
	TC	--	90	21	47	52.7	
River Sirsa U/s Khera Nallah	pH	7.12	8.17	7.90	--	7.73	B
	DO	6.2	4.8	8.6	--	6.5	
	BOD	0.2	4.5	2.0	--	2.2	
	TC	.58	38	40	--	45.3	
Khera Nallah	pH	7.49	8.39	--	--	7.94	N/A
	DO	7.2	4.0	--	--	5.6	
	BOD	1.8	6.0	--	--	3.9	
	TC	38	58	--	--	48.0	
.River Sirsa D/s Khera Nallah	pH	7.34	8.04	8.14	--	7.84	B
	DO	7.8	4.8	5.9	--	6.2	
	BOD	1.6	4.0	1.0	--	1.3	
	TC	65	72	22	--	53.0	
U/S Manpura Nallah	pH	7.98	6.55	7.94	7.55	7.51	N/A
	DO	6.4	4.5	6.1	4.8	5.5	
	BOD	1.2	14.0	10.0	2.2	6.9	
	TC	32	56	50	38	44.0	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
Manpura Nallah	pH	7.35	7.03	7.88	7.00	7.32	N/A
	DO	7.4	5.0	8.6	7.3	7.1	
	BOD	0.2	7.0	10.0	14.0	7.8	
	TC	34	68	34	120	64.0	
River Sirsa D/s Manpura Nallah	pH	7.01	8.09	8.17	7.14	7.60	N/A
	DO	7.8	4.0	7.6	6.3	6.4	
	BOD	2.2	8.0	8.0	4.8	5.8	
	TC	44	110	22	150	81.5	
Kaushlya River U/s Parwanoo Town	pH	8.52	8.29	8.11	6.90	7.96	A
	DO	7.4	7.0	7.4	7.2	7.3	
	BOD	0.8	0.3	0.6	0.1	0.5	
	TC	14	8	9	<1.8	8.2	
Kaushlya River D/s Intake Channel of WSS	pH	8.58	8.12	8.13	7.47	8.08	A
	DO	8.9	6.8	6.4	6.8	7.2	
	BOD	1.0	4.0	0.5	0.2	1.4	
	TC	12	7	4	120	35.8	
Sukhana Nallah U/s WSS Sector -4, Parwanoo pH	pH	8.44	8.23	--	7.43	8.03	N/A
	DO	7.7	7.3	--	5.9	7.0	
	BOD	0.2	0.9	--	10.0	3.7	
	TC	24	11	--	>1,600	545.0	
Sukhana Nallah U/S Sukhana Nallah Sec-V Parwanoo (Land fillsite)	pH	8.67	8.38	8.19	--	8.41	A
	DO	8.1	6.1	6.3	--	6.8	
	BOD	1.8	0.5	0.4	--	0.9	
	TC	28	28	12	--	22.7	
Sukhana Nallah D/S Sukhana Nallah Sec-V Parwanoo (Land fillsite)	pH	6.54	8.44	7.55	--	7.51	N/A
	DO	5.1	5.0	5.6	--	5.2	
	BOD	14.0	3.0	2.0	--	6.3	
	TC	412	32	26	--	156.7	
Masulkhana Nallah U/s Morepan Lab	pH	8.12	8.42	7.82	6.70	7.77	A
	DO	7.9	6.3	6.8	6.4	6.9	
	BOD	0.6	3.5	1.6	0.1	1.5	
	TC	6	22	4	<1.8	8.5	
Masulkhana Nallah D/s Morepan Lab	pH	8.50	8.29	8.05	8.63	8.37	N/A
	DO	4.8	7.1	6.3	6.8	6.3	
	BOD	120.0	2.0	2.0	16.0	35.0	
	TC	410	160	110	>1,600	570.0	
Sukhana Nallah D/S WSS Kalka	pH	--	--	--	7.06	7.06	N/A
	DO	--	--	--	6.6	6.6	
	BOD	--	--	--	110	110.0	
	TC	--	--	--	>1,600	1,600.0	
U/s TSDF Site at Majra (Well)	pH	8.72	8.13	6.74		7.86	A
	DO	--	--	8.9	--	8.9	
	BOD	0.4	--	1.2	1.0	0.9	
	TC	8	--	6	<1.8	5.3	
D/s TSDF Site at Majra (Well)	pH	8.68	--	8.04	7.32	8.01	A
	DO	--	--	6.5	--	6.5	
	BOD	0.1	--	0.8	0.1	0.3	
	TC	Nil	--	<1.8	<1.8	1.8	
Well at house of Sh Gurudyal	pH	8.05	--	8.07	87.52	34.55	N/A
	DO	--	--	4.0	--	4.0	
	BOD	0.1	--	0.1	0.1	0.1	
	TC	Nil	--	<1.8	<1.8	1.8	
Well at house of Sh Rana	pH	8.53	--	8.17	6.79	7.83	N/A
	DO	--	--	3.9	--	3.9	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
Well of Sh Gurubaskh Vill Majra	BOD	0.1	--	0.2	0.1	0.1	N/A
	TC	Nil	--	<1.8	<1.8	1.8	
	pH	8.39	--	8.33	6.91	7.88	
	DO	--	--	3.8	--	3.8	
	BOD	0.1	--	0.4	0.1	0.2	
Groundwater at Totu	TC	Nil	--	<1.8	<1.8	1.8	B
	pH	7.72	7.68	7.52	7.45	7.59	
	DO	5.3	--	4.1	5.5	5.0	
	BOD	0.1	0.1	0.2	0.1	0.1	
Handpump Near Dhaggar, Market	TC	Nil	Nil	<1.8	<1.8	1.8	C
	pH	--	--	8.71	--	8.71	
	DO	--	--	7.8	--	7.8	
	BOD	--	--	0.4	--	0.4	
Handpump near Total Health Care, Parwanoo	TC	--	--	<1.8	--	1.8	N/A
	pH	8.27	--	--	--	8.27	
	DO	--	--	--	--	#DIV/0!	
	BOD	0.1	--	--	--	0.1	
Handpump Sec-1 Near Shivalik Hotel	TC	<2	--	--	--	2.0	A
	pH	8.18	--	8.94	7.60	8.24	
	DO	--	--	7.9	8.3	8.1	
	BOD	0.1	--	0.8	0.1	0.3	
D/s ACC Bar., Satluj River	TC	<2	--	<1.8	<1.8	1.9	B
	pH	7.94	7.81	7.64	7.76	7.79	
	DO	9.1	8.9	9.0	9.3	9.1	
	BOD	0.2	0.3	0.2	0.1	0.2	
R. Suketi U/s of conf. of dragger outfall of SNR Balancing reservoir	TC	220	350	350	150	267.5	B
	pH	8.15	7.57	8.05	8.36	8.03	
	DO	7.9	7.1	8.5	10.6	8.5	
	BOD	0.1	0.1	0.1	0.1	0.1	
River Suketi at Dadour bridge	TC	180	430	210	110	232.5	C
	pH	8.20	7.46	7.40	8.19	7.81	
	DO	11.7	6.0	9.5	13.0	10.1	
	BOD	0.2	0.1	0.2	0.1	0.2	
U/s Mandi, Suketi Khudd	TC	540	>1,600	920	350	852.5	C
	pH	8.15	7.39	7.78	7.98	7.83	
	DO	7.9	6.3	8.2	9.9	8.1	
	BOD	0.1	0.1	0.1	0.1	0.1	
U/s Darang, Salt Mine	TC	280	1,600	350	220	612.5	B
	pH	6.08	8.38	8.80	8.38	7.91	
	DO	7.3	7.4	7.7	8.9	7.8	
	BOD	0.1	0.1	0.1	0.1	0.1	
D/s Darang, Salt Mine	TC	46	43	140	70	74.8	B
	pH	8.22	8.42	8.17	8.51	8.33	
	DO	7.4	7.1	7.9	8.3	7.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
River Beas, U/s of conf. of envisaged TRT of UHL-III	TC	94	46	150	79	92.3	B
	pH	7.66	7.31	7.75	8.46	7.80	
	DO	9.5	9.0	9.3	9.5	9.3	
	BOD	0.1	0.1	0.1	0.1	0.1	
River Beas, D/s of conf. of envisaged TRT of UHL-III	TC	170	63	170	170	143.3	B
	pH	7.71	7.09	8.86	8.70	8.09	
	DO	9.1	8.8	9.4	9.4	9.2	
	BOD	0.2	0.1	0.1	0.1	0.1	
	TC	220	70	170	220	170.0	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
R.Beas, D/s of conf.of TRT of Largi HEP power house	pH	7.60	7.50	6.78	7.63	7.38	B
	DO	9.4	9.7	9.8	9.5	9.6	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	180	120	130	150	145.0	
River Beas, U/s Fermenta Biodil	pH	8.05	8.23	7.50	7.54	7.83	B
	DO	9.4	8.6	9.7	9.4	9.3	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	240	170	280	170	215.0	
River Beas, D/s Fermenta Biodil	pH	7.91	7.16	7.36	7.65	7.52	B
	DO	9.4	8.6	9.7	9.3	9.3	
	BOD	0.2	0.1	0.2	0.2	0.2	
	TC	350	280	430	280	335.0	
R. Parvati U/s of Dam site of Parvati-II at Pulga	pH	8.00	7.09	7.60	7.16	7.46	B
	DO	11.5	9.6	9.6	9.1	10.0	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	49	46	63	47	51.3	
R. Parvati D/s of Dam site of Parvati-II at Pulga	pH	7.17	7.16	7.47	7.24	7.26	B
	DO	11.5	9.6	9.6	9.1	10.0	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	63	94	79	48	71.0	
R.Beas, U/s Waste processing facility, Manali.	pH	7.61	7.69	7.89	7.07	7.57	B
	DO	9.9	9.6	9.5	9.6	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	280	280	350	130	260.0	
R.Beas, D/s Waste processing facility, Manali.	pH	7.60	7.42	7.72	7.03	7.44	C
	DO	9.9	9.6	9.5	9.6	9.7	
	BOD	0.1	0.1	0.3	0.2	0.2	
	TC	540	430	920	220	527.5	
R.Beas, D/s of confluence with Allaign Nalla.	pH	7.27	7.28	7.53	7.01	7.27	B
	DO	9.9	9.6	9.5	9.6	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	170	140	240	140	172.5	
Allaign Nalla before confluence with R.Beas	pH	7.68	7.62	7.66	7.25	7.55	B
	DO	10.4	10.0	10.0	9.9	10.1	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	79	70	140	70	89.8	
R.Beas, D/s confluence with Duhangan Nalla.	pH	7.57	8.26	7.78	7.02	7.66	B
	DO	9.9	9.6	9.5	9.6	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	180	170	280	130	190.0	
Duhangan Nalla before confluence with R.Beas	pH	7.62	7.23	7.78	7.57	7.55	B
	DO	10.5	9.7	9.6	9.7	9.9	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	49	79	170	63	90.3	
R.Beas, U/s of confluence of R.Parvati	pH	7.73	7.40	7.52	7.60	7.56	B
	DO	9.1	8.5	9.2	9.4	9.1	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	130	210	280	220	210.0	
R.Beas, D/s of confluence of R.Parvati	pH	7.57	7.20	8.08	7.62	7.62	B
	DO	9.5	8.6	9.3	9.4	9.2	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	140	220	350	280	247.5	
R.Beas, U/s Waste processing facility Kullu	pH	7.70	7.36	7.48	7.32	7.47	B
	DO	9.3	8.8	9.3	8.8	9.1	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	280	350	350	110	272.5	
R.Beas, D/s Waste processing facility Kullu	pH	7.82	7.22	7.34	7.38	7.44	C
	DO	9.1	8.5	9.1	8.6	8.8	
	BOD	0.3	0.3	0.2	0.2	0.3	
	TC	540	430	920	350	560.0	
R.Sainj, U/s envisaged power house site of Parvati-II	pH	7.22	7.25	7.68	8.11	7.57	B
	DO	9.4	9.8	9.9	9.8	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	63	79	220	79	110.3	
R.Sainj, D/s envisaged power house site of Parvati-II	pH	7.35	7.60	7.70	7.86	7.63	B
	DO	9.4	9.8	9.9	9.7	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	130	94	240	170	158.5	
R.Sainj, U/s envisaged power house site of Parvati - III	pH	7.46	7.59	7.69	7.88	7.66	B
	DO	9.5	9.7	9.8	9.7	9.7	
	BOD	0.1	0.2	0.1	0.1	0.1	
	TC	70	110	240	110	132.5	
R.Sainj,, D/s envisaged power house site of Parvati - III	pH	7.68	6.70	7.76	7.86	7.50	B
	DO	9.5	9.7	9.8	9.7	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	140	130	280	170	180.0	
* River Satluj U/s Landfill Site Rampur	pH	7.58	7.82	7.57	7.94	7.73	N/A
	DO	9.4	9.3	9.4	9.2	9.3	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Satluj D/s Landfill Site Rampur	pH	7.63	7.99	7.58	7.91	7.78	N/A
	DO	9.4	9.3	9.4	9.2	9.3	
	BOD	0.3	0.1	0.2	0.2	0.2	
	TC	--	--	--	--	--	
* R. Satluj D/s Duttanagar, D/s envisaged conf. of TRT of RHEP	pH	7.67	7.95	7.77	7.80	7.80	N/A
	DO	9.3	9.3	9.4	9.2	9.3	
	BOD	0.1	0.1	0.1	0.2	0.1	
	TC	--	--	--	--	--	
* River Satluj U/s TRT of Nathpa Jhakri Project	pH	7.61	8.00	7.30	8.02	7.73	N/A
	DO	9.4	9.3	9.4	9.4	9.4	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Satluj D/s TRT of Nathpa Jhakri Project	pH	7.37	7.92	7.24	7.94	7.62	N/A
	DO	9.5	9.3	9.5	9.4	9.4	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	---	--	--	--	--	
* River Satluj U/s confluence with Ganvi Khad	pH	7.54	7.79	8.02	8.06	7.85	N/A
	DO	9.4	9.4	9.5	9.5	9.5	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Satluj D/s confluence with Ganvi Khad	pH	7.43	7.85	7.22	8.06	7.64	N/A
	DO	9.3	9.4	9.5	9.5	9.4	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* Ganvi Khad before confluence to River Satluj	pH	7.46	7.85	7.88	7.92	7.78	N/A
	DO	9.3	9.3	9.3	9.4	9.3	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
* River Satluj D/s NJPC Dam Nathpa	pH	7.49	7.86	7.64	7.93	7.73	N/A
	DO	9.5	9.5	9.5	9.4	9.5	
	BOD	0.2	0.2	0.1	0.1	0.2	
	TC	---	--	--	--	--	
* River Satluj U/s confluence with Sorang Khad	pH	7.53	7.77	7.41	7.87	7.65	N/A
	DO	9.4	9.5	9.5	9.5	9.5	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	---	--	--	--	--	
* River Satluj D/s confluence with Sorang Khad	pH	7.55	7.83	7.72	7.87	7.74	N/A
	DO	9.4	9.5	9.5	9.5	9.5	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Sorang before confluence to River Satluj	pH	7.57	7.86	7.78	8.01	7.81	N/A
	DO	9.3	9.4	--	9.7	9.5	
	BOD	0.3	0.1	0.1	0.1	0.2	
	TC	--	--	--	--	--	
* Karcham Dam	pH	7.65	7.59	7.78	7.65	7.67	N/A
	DO	9.8	9.4	9.6	9.5	9.6	
	BOD	0.3	0.2	0.2	0.1	0.2	
	TC	--	--	--	--	--	
* Baspa River Baspa Project	pH	7.68	7.66	7.87	7.91	7.78	N/A
	DO	9.3	9.3	9.5	9.6	9.4	
	BOD	0.2	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Baspa D/s reservoir at Kuppa	pH	7.58	7.79	7.67	8.10	7.79	N/A
	DO	9.4	9.5	9.7	9.6	9.6	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Tidong before conf. to River Satluj	pH	7.84	7.74	8.05	7.76	7.85	N/A
	DO	9.5	9.6	9.8	9.6	9.6	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Satluj U/s conf. with River Tidong	pH	7.58	7.62	7.86	7.98	7.76	N/A
	DO	9.7	9.7	9.7	9.8	9.7	
	BOD	0.1	0.1	0.1	0.1	0.1	
	TC	--	--	--	--	--	
* River Satluj D/s conf. with River Tidong	pH	7.33	7.71	7.72	8.08	7.71	N/A
	DO	9.6	9.7	9.7	9.8	9.7	
	BOD	0.2	0.2	0.1	0.1	0.2	
	TC	--	--	--	--	--	
Swan River D/S I.A. Gagret	pH	8.85	7.48	8.31	8.22	8.22	B
	DO	6.1	6.0	--	6.8	6.3	
	BOD	0.8	0.7	5.5	2.6	2.4	
	TC	--	--	43	500	271.5	
Swan River U/S I.A. Gagret	pH	8.88	7.54	8.25	8.17	8.21	B
	DO	6.0	6.1	--	6.8	6.3	
	BOD	0.4	0.2	0.4	0.8	0.5	
	TC	--	--	34	350	192.0	
River Ravi U/S Land Fill Site Chamba	pH	8.73	7.07	7.95	7.34	7.77	B
	DO	8.7	8.7	8.8	8.7	8.7	
	BOD	0.5	0.8	0.2	0.4	0.5	
	TC	--	--	--	140	140.0	
River Ravi D/S Land Fill Site Chamba	pH	7.15	6.95	7.94	7.28	7.33	B
	DO	8.5	8.5	8.7	8.5	8.6	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
	BOD	0.8	1.4	0.3	1.6	1.0	
	TC	--	--	--	170	170.0	
River Ravi before conf. with River Baira	pH	7.6	7.1	7.76	7.85	7.58	B
	DO	8.6	8.8	8.7	8.6	8.7	
	BOD	0.3	0.8	0.4	0.2	0.4	
	TC	--	--	--	170	170.0	
Bhiral Khad D/S STP Palampur	pH	7.27	7.01	6.91	--	7.06	N/A
	DO	7.1	7.7	8.1	--	7.6	
	BOD	0.8	2.5	0.6	--	1.3	
	TC	--	--	--	--	--	
Bhiral Khad U/S STP Palampur	pH	7.09	6.92	6.96	--	--	N/A
	DO	7.5	7.8	7.8	--	7.7	
	BOD	0.8	0.3	0.4	--	0.5	
	TC	--	--	--	--	--	
River Ravi after conf. with Baira River	pH	8.01	7.53	7.58	8.06	--	B
	DO	8.5	8.6	8.7	8.6	8.6	
	BOD	0.3	0.2	0.5	0.2	0.3	
	TC	--	--	--	240	240.0	
River Ravi D/S Dam of Chamera-I HEP	pH	8.18	7.5	7.66	7.25	7.65	B
	DO	8.7	8.6	8.8	8.5	8.7	
	BOD	0.4	3.5	0.2	0.2	1.1	
	TC	--	--	--	220	220.0	
River Ravi D/S TRT Power House -I HEP	pH	8.10	7.75	7.71	7.33	7.72	B
	DO	8.6	8.8	8.8	8.7	8.7	
	BOD	0.5	1.4	0.4	0.2	0.6	
	TC	--	--	--	280	280.0	
River Baira before conf. with River Ravi	pH	8.12	7.70	7.37	8.02	7.80	B
	DO	8.7	8.7	8.6	8.7	8.7	
	BOD	0.2	2.5	0.3	0.3	0.8	
	TC	--	--	--	110	110.0	
Chounch Khad D/s Ind. Area Bain Attarian	pH	7.59	6.63	7.28	8.19	7.42	B
	DO	6.2	7.5	7.3	7.1	7.0	
	BOD	0.6	0.4	0.4	0.2	0.4	
	TC	--	--	--	300	300.0	
Chounch Khad U/s Ind. Area Bain Attarian	pH	7.98	6.86	7.19	8.36	7.60	N/A
	DO	6.7	7.8	6.9	7.2	7.2	
	BOD	0.2	28.0	0.8	0.4	7.4	
	TC	--	--	--	350	350.0	
River Satluj U/S Bhakhra	pH	8.13	6.77	8.19	8.15	7.81	B
	DO	7.1	6.5	6.9	7.1	6.9	
	BOD	0.3	0.4	0.2	0.2	0.3	
	TC	--	--	31	170	100.5	
River Swan U/S MSW landfill Santokhgarh	pH	8.14	7.21	7.88	8.34	7.89	B
	DO	6.1	6.0	5.5	6.9	6.1	
	BOD	0.4	0.5	0.6	1.8	0.8	
	TC	--	--	43	350	196.5	
River Swan D/S MSW land fill Santokhgarh	pH	8.19	7.49	8.00	8.36	8.01	B
	DO	6.0	5.8	5.6	6.9	6.1	
	BOD	0.5	0.3	0.5	1.0	0.6	
	TC	--	--	46	500	273.0	
River Baira U/S of Dam on Baira siul HEP	pH	7.96	7.57	7.38	7.23	7.54	B
	DO	8.7	8.8	8.7	8.5	8.7	
	BOD	0.2	0.3	0.2	0.3	0.3	
	TC	--	--	--	140	140.0	



Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
River Baira D/S Dam on Bairasiul HEP	pH	8.28	7.68	7.38	7.32	7.67	B
	DO	8.6	8.6	8.7	8.4	8.6	
	BOD	0.2	0.2	0.2	0.3	0.2	
	TC	--	--	--	130	130.0	
River Siul U/S Dam of Siul for BSHEP	pH	8.17	7.75	8.06	7.39	7.84	B
	DO	8.8	8.7	8.9	8.7	8.8	
	BOD	0.1	0.4	0.2	0.3	0.3	
	TC	--	--	--	110	110.0	
River Siul D/S Dam of Siul for BSHEP	pH	7.99	7.84	7.96	7.35	7.79	B
	DO	8.7	8.7	8.9	8.7	8.8	
	BOD	0.2	0.2	0.4	1.0	0.5	
	TC	--	--	--	110	110.0	
Baled Khad U/S of Dam on Baled for BSHEP	pH	8.24	7.83	7.52	7.39	7.75	B
	DO	8.7	8.7	8.8	8.4	8.7	
	BOD	0.2	0.2	0.2	0.5	0.3	
	TC	--	--	--	170	170.0	
Bhaled Khad D/S Dam on Baled for BSHEP	pH	8.10	7.82	7.63	7.43	7.75	B
	DO	8.7	8.6	8.7	8.4	8.6	
	BOD	0.2	0.2	0.3	0.5	0.3	
	TC	--	--	--	220	220.0	
River Baira before conf. of TRT of BSHEP	pH	8.14	7.81	7.42	7.38	7.69	B
	DO	8.6	8.6	8.6	8.6	8.6	
	BOD	0.2	0.3	0.2	3.0	0.9	
	TC	--	--	--	170	170.0	
River Baira after conf. of TRT of BSHEP	pH	8.11	7.80	7.09	7.58	7.65	B
	DO	8.6	8.7	8.7	8.5	8.6	
	BOD	0.3	0.7	0.2	2.0	0.8	
	TC	--	--	--	220	220.0	
River Ravi U/S Chamera -II	pH	7.65	7.02	7.16	7.25	7.27	B
	DO	8.7	8.7	8.7	8.0	8.5	
	BOD	0.3	0.4	0.2	0.3	0.3	
	TC	--	--	--	130	130.0	
River Ravi D/S Chamera -II	pH	7.99	7.21	7.20	7.18	7.40	B
	DO	8.6	8.5	8.6	8.3	8.5	
	BOD	0.3	0.6	0.4	0.4	0.4	
	TC	--	--	--	110	110.0	
River Ravi U/S of Conf. of Budhil Nallah	pH	8.16	7.27	7.51	7.32	7.57	B
	DO	8.7	8.7	8.6	8.5	8.6	
	BOD	0.3	0.8	0.2	0.5	0.5	
	TC	--	--	--	110	110.0	
Budhil Nallah U/S Dam of Budhil HEP	pH	8.09	7.33	7.85	7.28	7.64	B
	DO	8.8	8.5	8.7	8.4	8.6	
	BOD	0.3	0.3	0.2	0.3	0.3	
	TC	--	--	--	110	110.0	
Budhil Nallah D/S Dam of Budhil HEP	pH	8.12	7.45	7.69	7.24	7.63	B
	DO	8.8	8.6	8.8	8.6	8.7	
	BOD	0.2	0.2	0.4	0.3	0.3	
	TC	--	--	--	170	170.0	
River Ravi D/S TRT of proposed Budhil HEP	pH	8.12	7.40	7.71	7.3	7.63	B
	DO	8.7	8.6	8.7	8.7	8.7	
	BOD	0.4	0.7	0.2	0.4	0.4	
	TC	--	--	--	130	130.0	
River Beas U/S Pong Dam	pH	8.37	8.20	7.24	8.18	8.00	B
	DO	8.0	8.5	7.9	7.1	7.9	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
	BOD	0.5	0.3	0.7	0.2	0.4	
	TC	--	--	--	220	220.0	
U/S Swan Khad IA Sansarpur Terrace	pH	8.86	8.33	7.64	7.32	8.04	N/A
	DO	7.0	7.5	7.0	6.9	7.1	
	BOD	0.3	0.2	0.2	28	7.2	
	TC	--	--	--	350	350.0	
D/S Swan Khad IA Sansarpur Terrace	pH	7.85	7.95	7.65	8.07	7.88	B
	DO	6.9	7.1	7.0	6.9	7.0	
	BOD	0.9	0.5	6	2	2.4	
	TC	--	--	--	500	500.0	
Lund Khad U/s STP Jawalamukhi	pH	7.56	8.26	7.99	7.48	7.82	N/A
	DO	6.7	7.2	7.4	6.9	7.1	
	BOD	10	10	0.6	36	14.2	
	TC	--	--	--	500	500.0	
Lund Khad D/s STP Jawalamukhi	pH	7.05	7.93	8.20	8.02	7.80	N/A
	DO	6.6	7.0	7.1	7.1	7.0	
	BOD	12.0	2.0	0.7	40.0	13.7	
	TC	--	--	--	900	900.0	
Baner Khad U/s STP TMC	pH	7.44	7.83	7.31	7.67	7.56	B
	DO	6.9	7.3	7.4	7.2	7.2	
	BOD	0.5	0.2	0.2	1.0	0.5	
	TC	--	--	--	280	280.0	
Baner Khad D/s STP TMC	pH	7.42	7.56	7.34	7.99	7.58	B
	DO	7.2	7.1	7.3	7.5	7.3	
	BOD	0.6	0.5	0.6	0.8	0.6	
	TC	--	--	--	350	350.0	
Charan Khad U/S STP Dharamshala	pH	6.70	7.22	7.78	7.87	7.39	B
	DO	7.4	7.1	7.2	7.1	7.2	
	BOD	0.3	0.2	0.4	0.2	0.3	
	TC	--	--	--	220	220.0	
Charan Khad D/S STP Dharamshala	pH	6.40	7.48	7.93	7.81	7.41	B
	DO	7.3	7.0	7.3	7.3	7.2	
	BOD	0.6	0.5	0.6	0.3	0.5	
	TC	--	--	--	500	500.0	
Dal Lake Naddi	pH	7.34	7.59	7.91	7.83	7.67	B
	DO	7.8	8.4	7.6	6.9	7.7	
	BOD	0.4	2.8	0.4	2.2	1.5	
	TC	--	--	--	500	500.0	
River Yamuna U/S of Ranbaxy Paonta Sahib	pH	7.76	7.83	7.84	8.45	7.97	A
	DO	7.4	5.9	8.4	8.2	7.5	
	BOD	1.4	1.6	1.2	1.2	1.4	
	TC	20	18	22	22	20.5	
River Yamuna D/S of Ranbaxy Paonta Sahib	pH	7.37	7.79	7.89	8.37	7.86	A
	DO	7.3	5.8	8.2	8.0	7.3	
	BOD	1.6	1.6	1.6	1.6	1.6	
	TC	22	20	18	26	21.5	
River Yamuna U/S of landfill site Paonta Sahib	pH	8.25	7.33	7.77	8.48	7.96	A
	DO	7.2	5.5	8.0	8.0	7.2	
	BOD	1.4	1.4	1.2	1.6	1.4	
	TC	25	19	22	43	27.3	
River Yamuna D/S of landfill site Paonta Sahib	pH	8.28	7.29	7.78	8.08	7.86	A
	DO	7.0	5.4	7.8	7.8	7.0	
	BOD	1.6	1.8	1.6	1.6	1.7	
	TC	20	20	20	46	26.5	

Location	Parameter	Apr-15	Jul-15	Oct-15	Jan-16	Average	Water Class*
River Markanda U/S of Markanda Bridge Kala Amb	pH	8.25	8.21	7.78	8.43	8.17	A
	DO	6.7	6.5	7.7	8.3	7.3	
	BOD	1.6	1.2	1.5	1.2	1.4	
	TC	30	22	18	27	24.3	
River Markanda U/S of Jattanwala Nallah	pH	8.28	8.02	8.02	8.47	8.20	A
	DO	6.6	6.2	7.6	8.3	7.2	
	BOD	1.6	1.6	1.6	1.2	1.5	
	TC	32	24	24	27	26.8	
Jattanwala Nallah	pH	7.21	7.18	7.03	7.84	7.32	N/A
	DO	Int.	2.8	NIL	NIL	2.8	
	BOD	86.0	56.0	80.0	210.0	108.0	
	TC	64	58	62	140	81.0	
D/S Jattanwala Nallah	pH	7.96	7.90	6.92	7.44	7.56	N/A
	DO	2.1	5.0	1.9	1.5	2.6	
	BOD	21.0	8.0	48.0	44.0	30.3	
	TC	42	28	35	110	53.8	

Note: DO: Dissolved Oxygen, BOD: Biochemical Oxygen Demand, TC: Total Coliform, N/A: Not Applicable

\*Please be noted that the categorized water classes are just for reference as some sampling numbers are limited.

Source: Compiled by JICA Study Team (2017) from the HPSPCB Annual report 2015-16

**Table 3 Ground Water Quality in Himachal Pradesh**

(Unit: pH; N/A, D.O.; mg/l, BOD; mg/l, TC; mpn/100ml)

Name of location	Parameters	Apr-15	Oct-15	Average
Well at Kala Amb	pH	8.03	7.58	7.81
	DO	--	--	--
	BOD	0.6	0.8	0.7
	TC	4	4	4
Well at Paonta Sahib	pH	7.85	6.96	7.41
	DO	--	--	--
	BOD	0.6	0.4	0.5
	TC	3	5	4
Well at Industrial Area Kala Amb	pH	7.94	7.36	7.65
	DO	--	--	--
	BOD	0.8	0.8	0.8
	TC	5	5	5
Well at Industrial Area Paonta Sahib	pH	8.06	7.70	7.88
	DO	--	--	--
	BOD	0.8	0.7	0.8
	TC	4	6	5
Hand Pump at Nahan	pH	7.70	6.76	7.23
	DO	--	--	--
	BOD	0.6	0.8	0.7
	TC	4	4	4
Hand Pump at Kala Amb	pH	7.85	7.11	7.48
	DO	--	--	--
	BOD	0.8	0.7	0.8
	TC	3	7	5

Note: DO: Dissolved Oxygen, BOD: Biochemical Oxygen Demand, TC: Total Coliform, N/A: Not Applicable  
 Source: Compiled by JICA Study Team (2017) from the HPSPCB Annual report 2015-16