Gujarat Forest Department
The State of Gujarat
Republic of India

The Preparatory Survey
on
Project for Ecosystem Restoration in Gujarat
in India

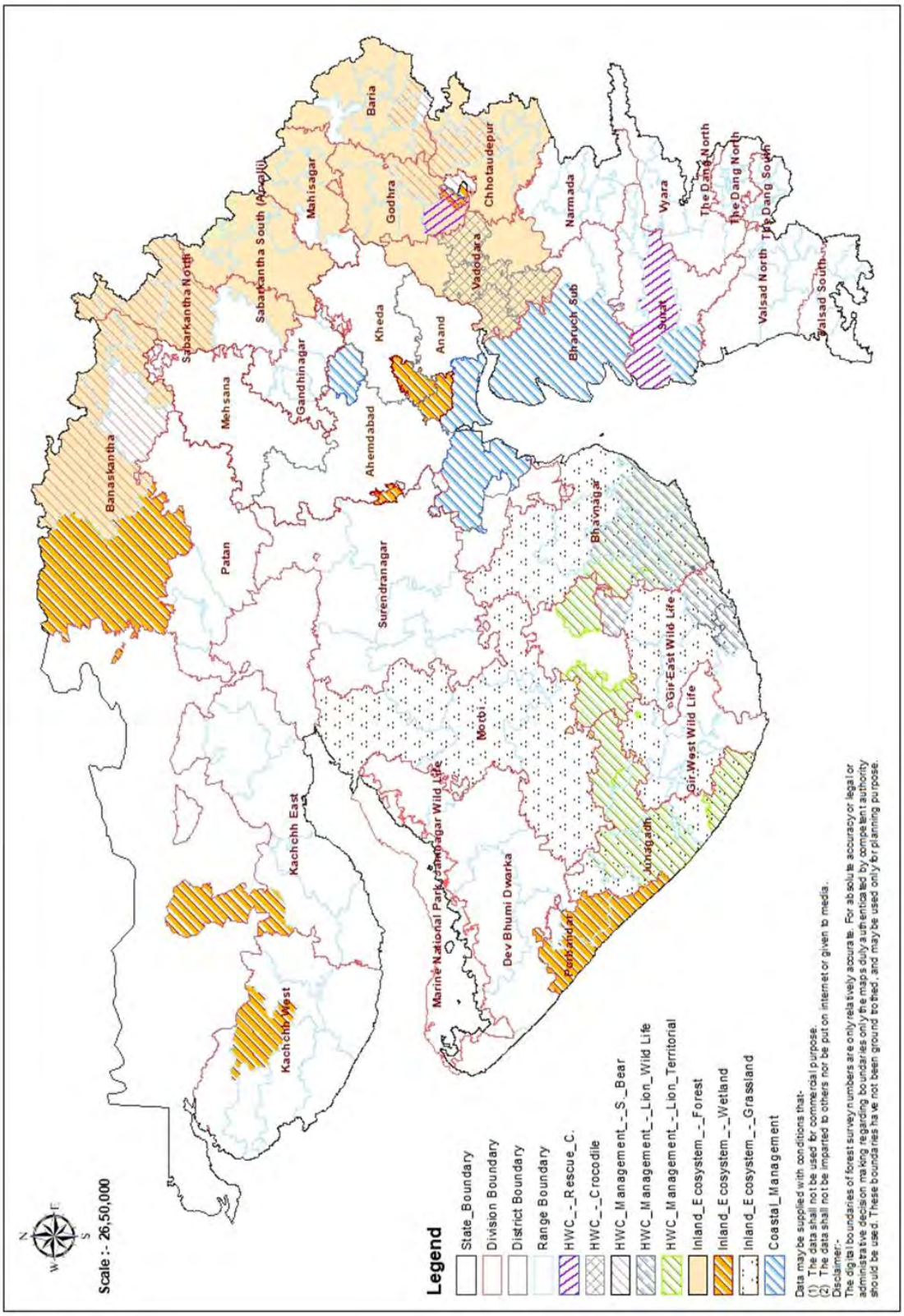
FINAL REPORT

January 2020

Japan International Cooperation Agency (JICA)

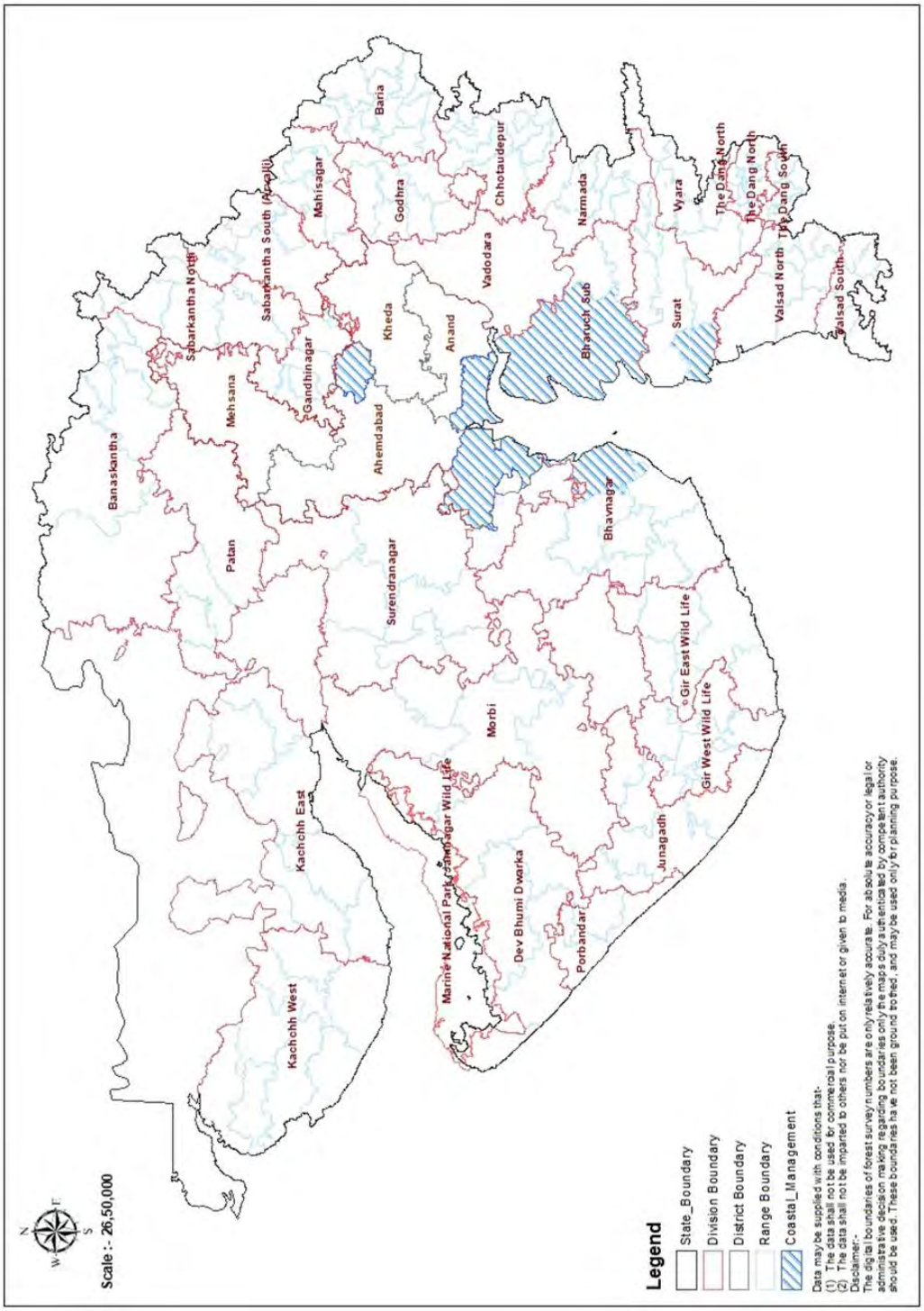
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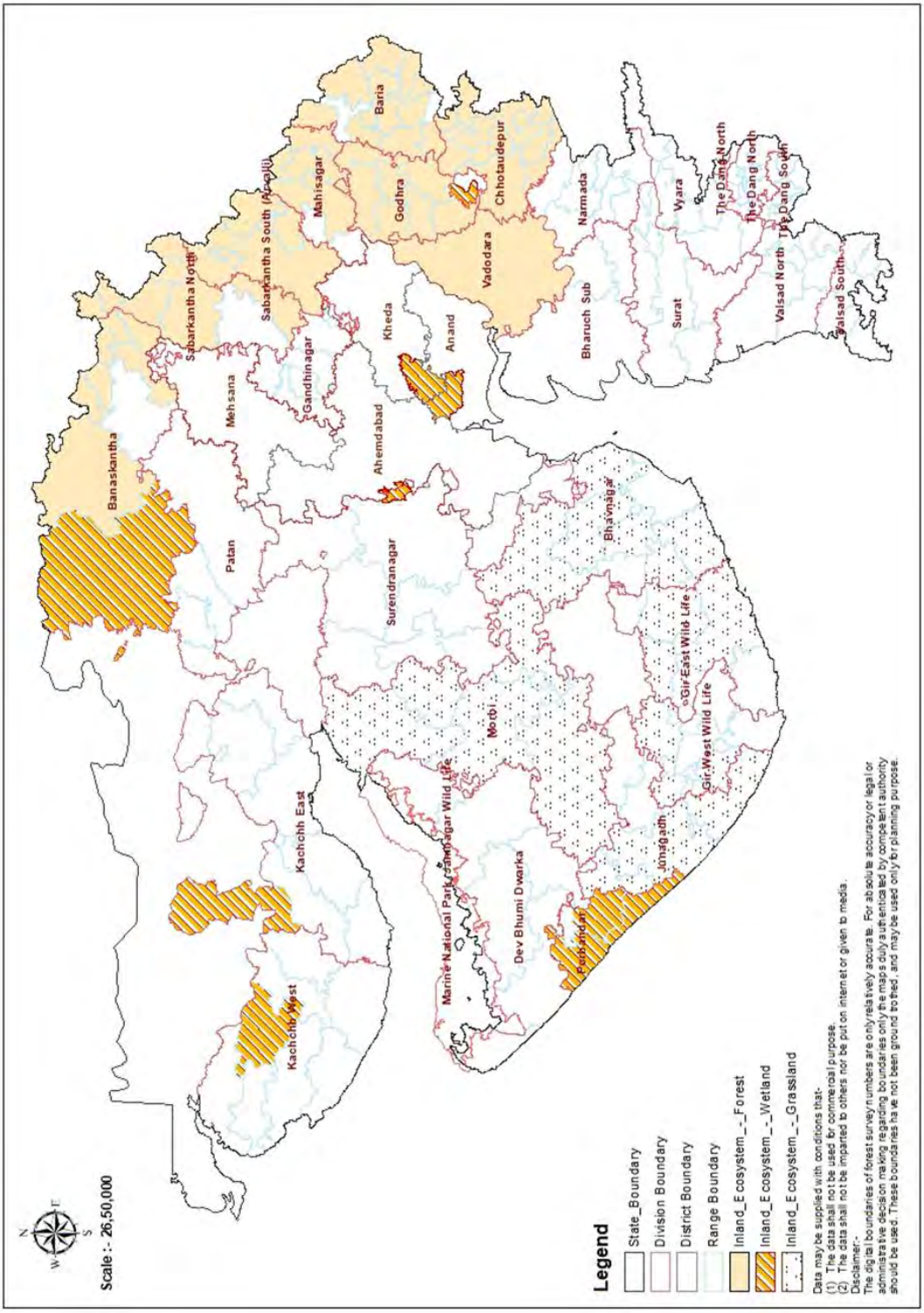
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MAP 1: Priroritized Project Area



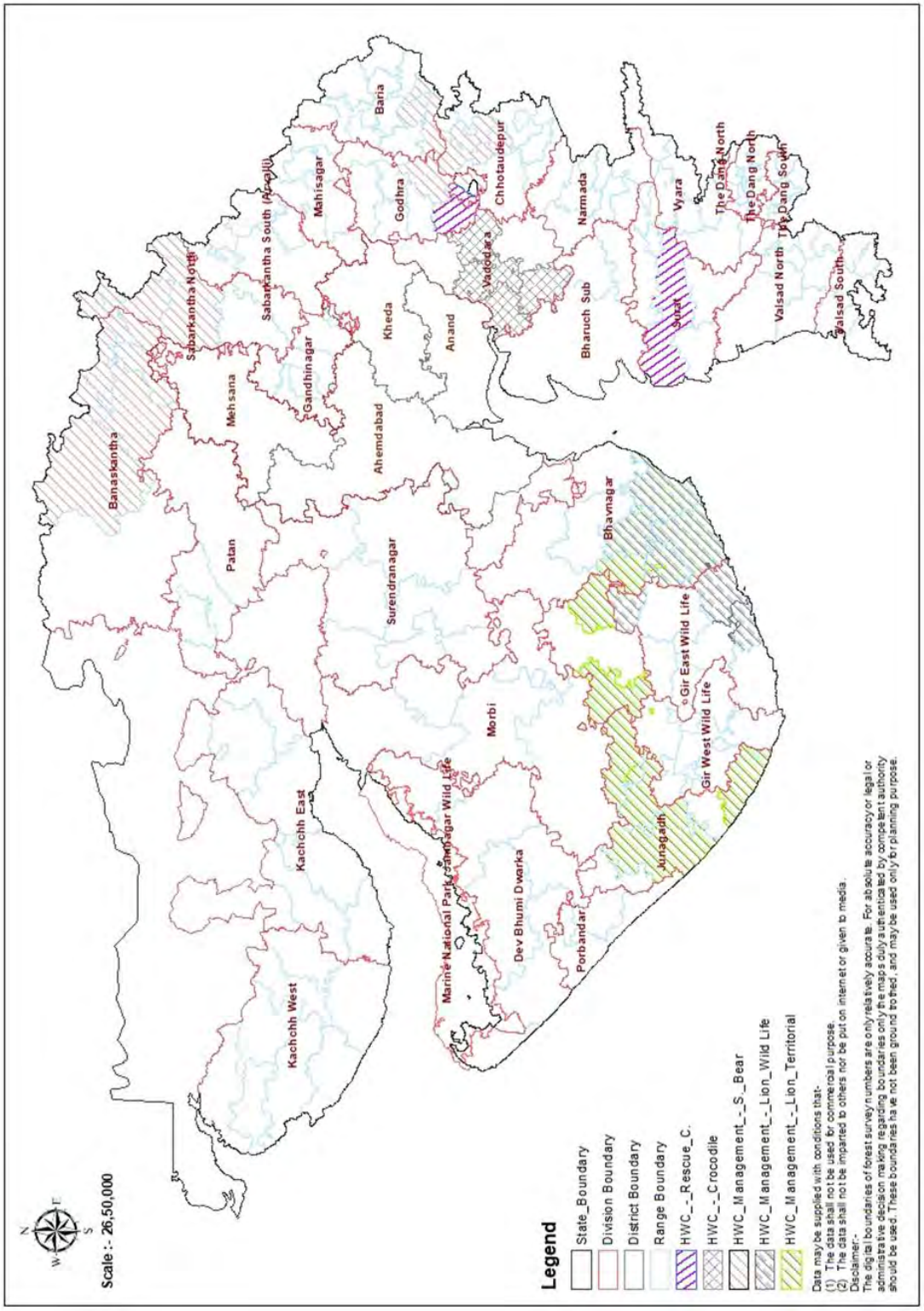
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Map 2: Prioritized Project Ranges for Development of Ecological Infrastructure in Coastal Area



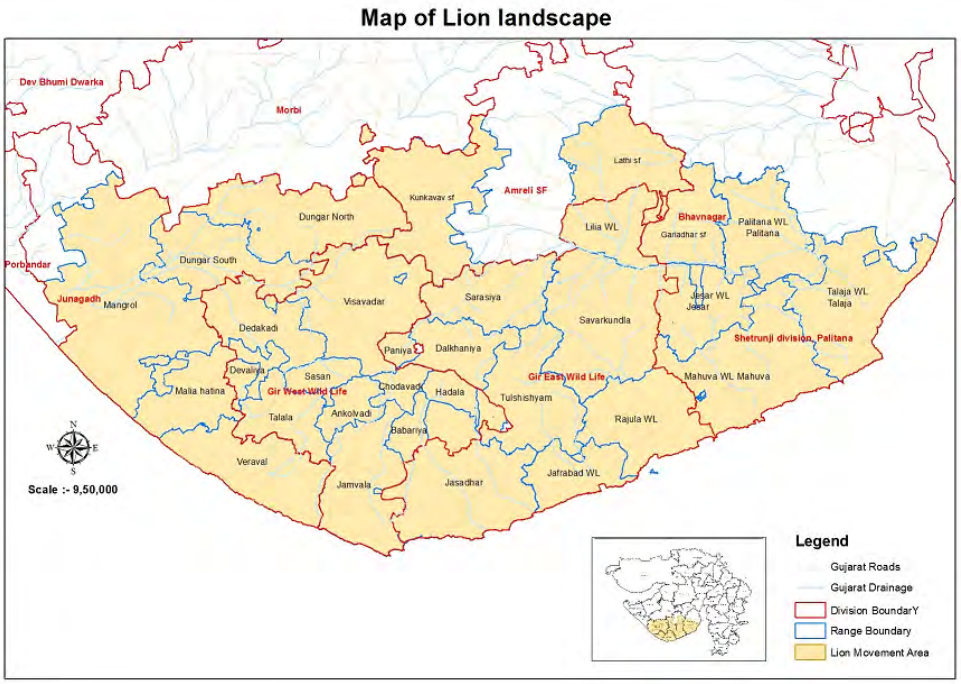
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Map 3: Prioritized Project Ranges for Development of Ecological Infrastructure in Inland Area (Grassland, Wetland and Degraded Forest)



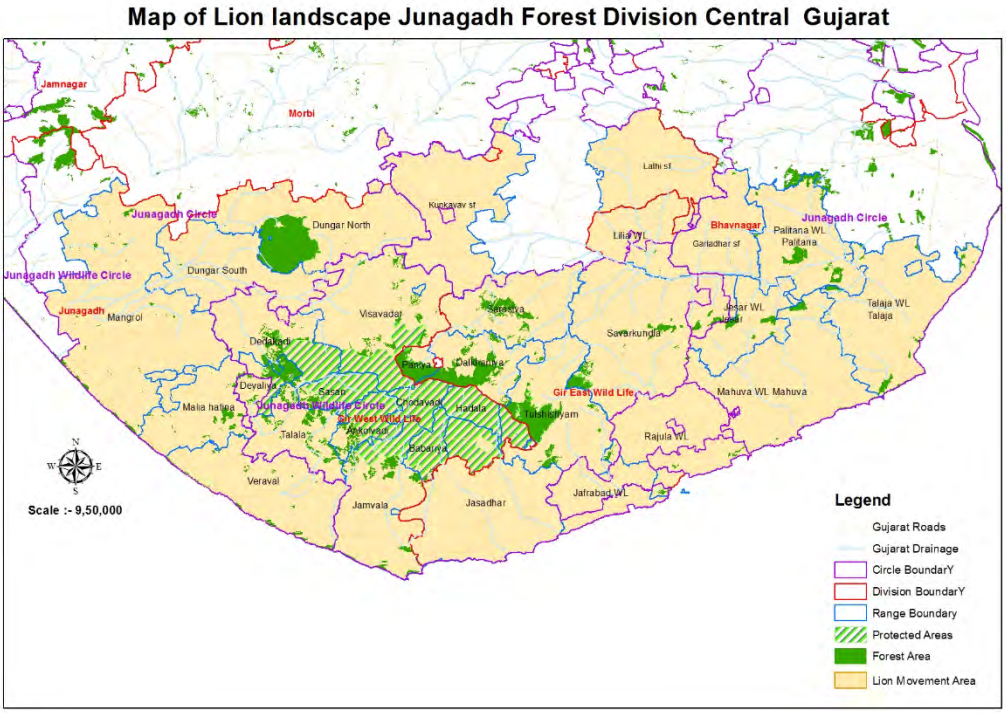
Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 4: Prioritized Project Ranges for Human Wildlife Conflict Management



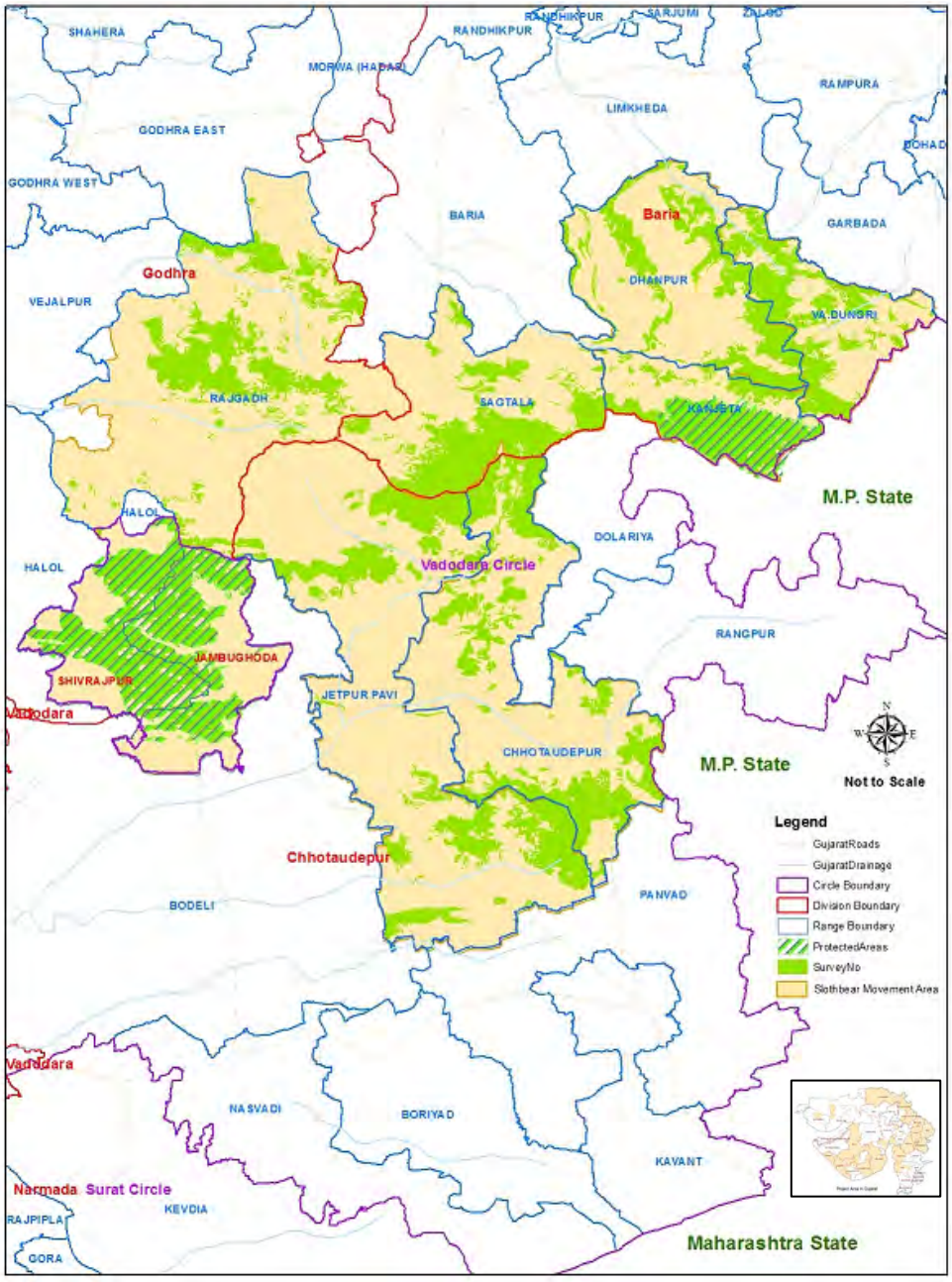
Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 5: Map of Lion Landscape (1)



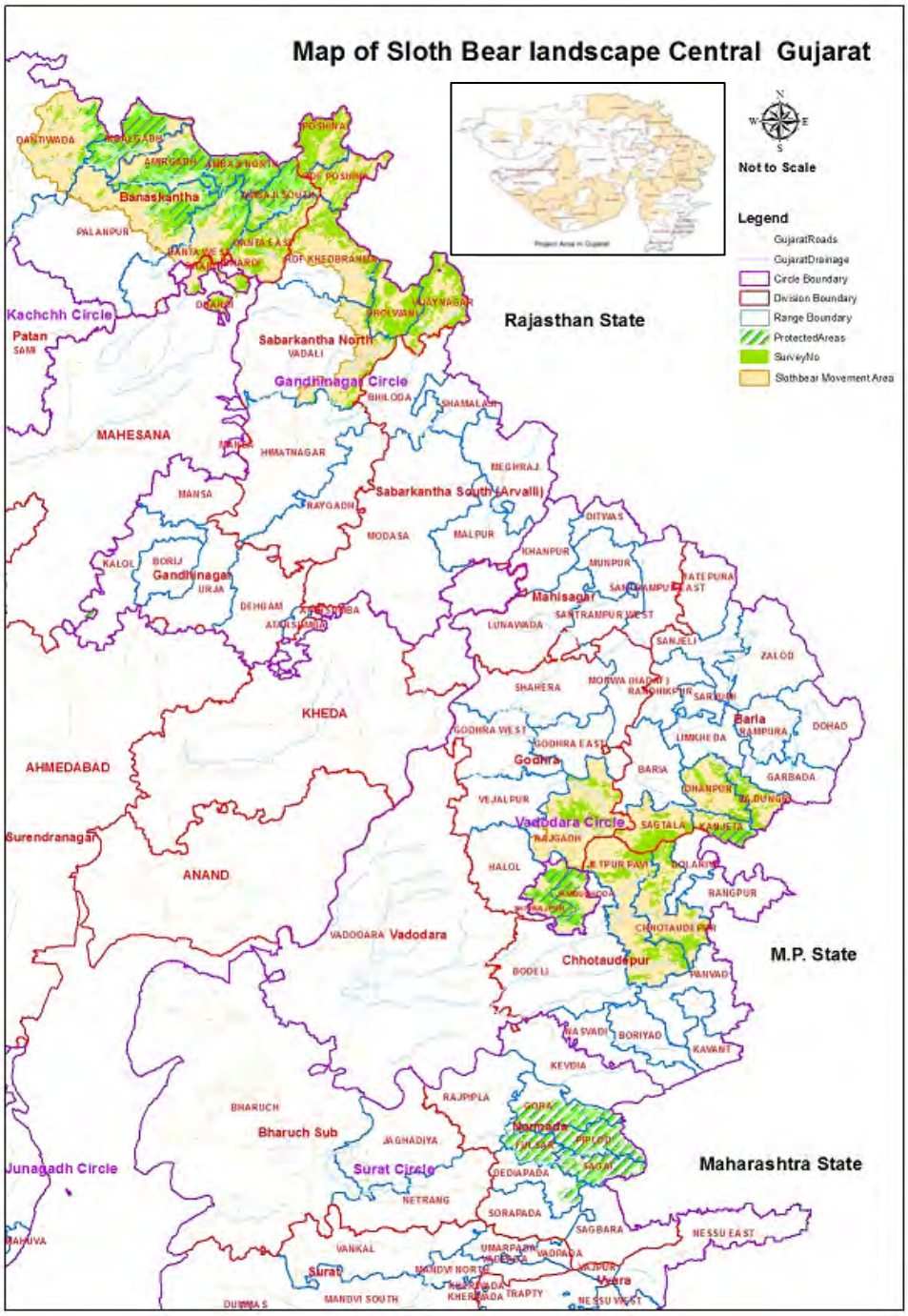
Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 6: Map of Lion Landscape (Junagadh Forest Division) with Forest Cover (2)



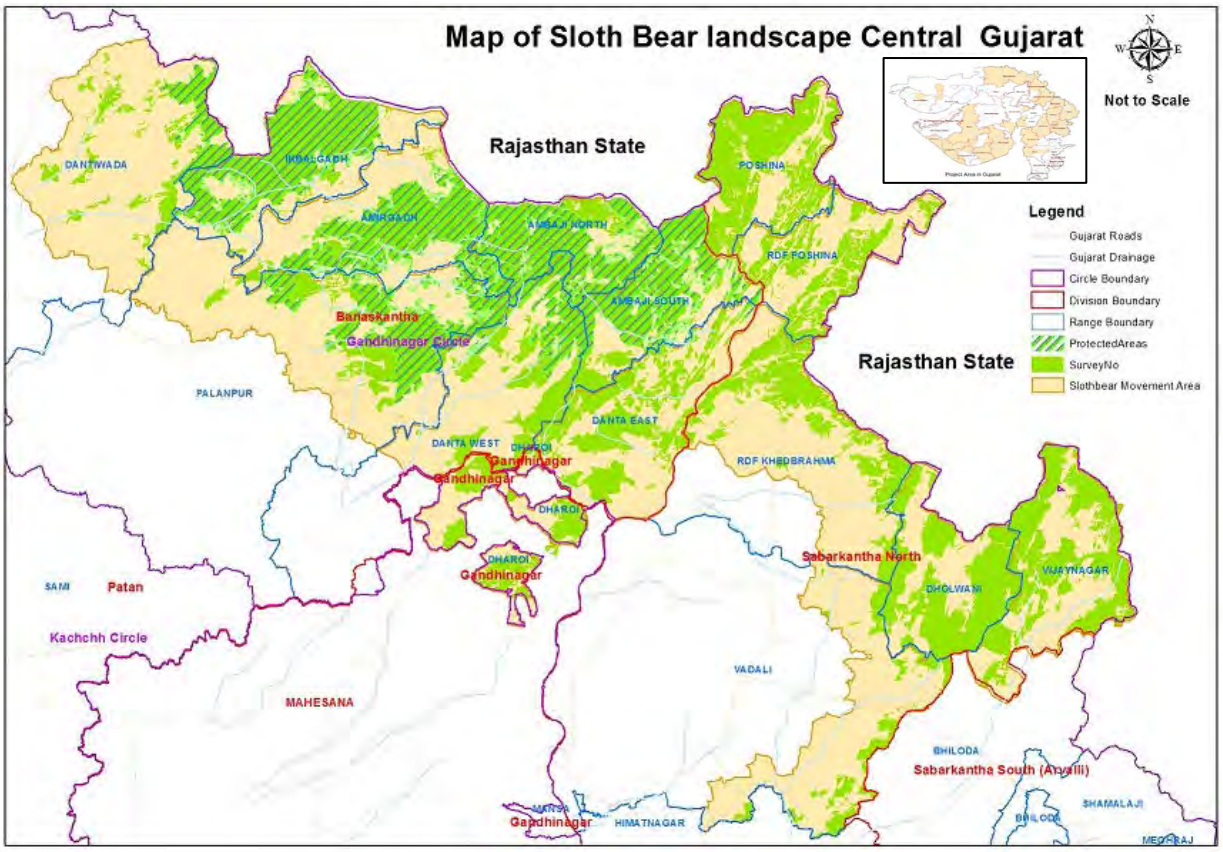
Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 7: Sloth Bear Landscape (1)



Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 8: Sloth Bear Landscape (2)



Source: Prepared by GIS Cell, GFD based on the Information Provided by the JICA Survey Team

Map 9: Sloth Bear Landscape Central Gujarat (3)

Photographs



Mangrove Afforestation Area (1) in the Potential Project Site



Mangrove Habitation (2) in the Potential Project Site



Grassland in the Project Area (1)



Grassland in the Project Area (2)



Mangrove site visit



Consulation with the GFD officers

Source: JICA Survey Team (2019)

PREPARATORY SURVEY

ON PROJECT FOR ECOSYSTEM RESTORATION IN GUJARAT

FINAL REPORT

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List of Acronyms

Acronym	Name in Full
ACF	Assistant Conservator of Forest
APCCF	Additional Principal Chief Conservator of Forests
APO	Annual Plan of Operation
AWS	Automated Weather Stations
BAC	Block Advisory Committee
BHS	Biodiversity Heritage Sites
BISAG	Bhaskaracharya Institute for Space Applications and Geoinformatics
BMCs	Biodiversity Management Committees
BNHS	Bombay Natural History Society
BPL	Below the Poverty Line
BSUP	Basic Services for Urban Poor
CA	Chartered Accountants
CAAA	Central Aids, Accounts and Audit Division
CAG	Comptroller & Auditor General of India
CAMP	Conservation Assessment and Management Plan
CAR	Civil Aviation Requirements
CBD	Convention in Biological Diversity
CBO	Community-Based Organization
CCF	Chief Conservator of Forest
CCSU	Circle Coordination & Supervision Units
CDS	Capacity Development Strategy
CEC	Central Empowered Committee
CF	Conservator of Forests
CFR	Community Forest Rights
CHG	Green House Gases
CITES	Convention on International Trade in Endangered Species
CPCB	Central Pollution Control Board
CPD	Chief Project Director
CPP	Communication and Publicity Plan
CPSUs	Central Public Sector Undertakings
CRZ	Coastal Regulation Zone
CSR	Corporate Social Responsibility
CZA	Central Zoo Authority
D&M	Development and Management
DCF	Deputy Conservator of Forests
DDP	Desert Development Program
DEA	Department of Economic Affairs
DEM	Digital Elevation Model
DEO	Divisional E & S Officer
DFO	Divisional Forest Officer
DGCA	Directorate General of Civil Aviation

Acronym	Name in Full
DMU	Divisional Management Unit
DPAP	Drought Prone Area Program
DPC	District Planning Committee
DPO	Divisional Project Officer
DPR	Detailed Project Report
DST	Department of Science & Technology
EC	Executive Committee
EDCs	Eco-Development Committees
EIRR	Economic Internal Rate of Return
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EPA	Entry Point Activities
ESA	Environmental and Social Assessment
ESG	Environmental, Social & Governance
ESMS	Environmental and Social Management System
ESMSF	Environmental and Social Management Systems Framework
ESZ	Eco-Sensitive Zones
ETDS	Eco-Tourism Development Society
F&ED	Forest and Environment Department
FCA	Forest Conservation Act
FDA	Forest Development Agencies
FEF	Front End Fee
FPIC	Free Prior & Informed Consent
FRA	Forest Rights Act
FSI	Forest Survey of India
GB	Governing Body
GDP	Gross Domestic Product
GEC	Gujarat Ecology Commission
GEE	Google Earth Engine
GEER	Gujarat Ecological Education and Research
GeM	Government e-Marketplace
GEMI	Gujarat Environment Management Institute
GFD	Gujarat Forest Department
GFDP	Gujarat Forestry Department Project
GFPEA	Gujarat Forestry on Ecosystem Services and Adaptation
GFRC	Gujarat Forest Rangers College
GFRF	Gujarat Forest Research Foundation
GHCL	Gujarat Heavy Chemicals Limited
GHG	Greenhouse Gas
GIB	Great Indian Bustard
GIL	Gujarat Informatics Limited
GIS	Geographical Information System
GLPC	Gujarat Livelihood Promotion Corporation

Acronym	Name in Full
GMB	Gujarat Maritime Board
GMDC	Gujarat Mineral Development Corporation
GO	Government Order
GoG	Government of Gujarat
GoI	Government of India
GP	Gram Panchayat
GPCB	Gujarat Pollution Control Board
GPS	Global Positioning System
GRK	Great Rann of Kachchh
GSBTM	Gujarat State Bio-tTechnology Mission
GSDMA	Gujarat State Disaster Management Authority
GSDP	Gross State Domestic Product
GSFDC	Gujarat State Forest Development Corporation
GST	Goods & Service Tax
GSWAN	Gujarat State Wide Area Network
GSWMA	Gujarat State Watershed Management Agency
HM	Hard Mudflat
HoFF	Head of Forestry Force
HPSC	High Power Steering Committee
HTL	High Tide Line
HWC	Human Wildlife Conflict
IA	Implementing Agency
IBA	Important Bird Area
ICT	Information Communication Technology
ICZMP	Integrated Coastal Zone Management Project
IDC	Interest During Construction
IDWH	Integrated Development of Wildlife Habitats
IFDP	Integrated Forestry Department
IFMS	Integrated Financial Management System
IIRS	Indian Institute of Remote Sensing
IMD	Indian Meteorological Department
INR/ Rs.	Indian Rupee
IPCC	Intergovernmental Panel on Climate Change
IPPF	Indigenous Peoples Plan Framework
IUCN	International Union for Conservation of Nature
IWDP	Integrated Wastelands Development Program
IWMP	Integrated Watershed Management Agency
IZ	Interidal Zones
JBIC	Japan Bank for International Cooperation
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
JICA	Japan International Cooperation Agency
JPY	Japanese Yen

Acronym	Name in Full
KVK	Krishi Vigyan Kendra
LA	Loan Agreement
LRK	Little Rann of Kachchh
LTEM	Long Term Ecological Monitoring
M&E	Monitoring and Evaluation
MF	Mudflats
MFP	Minor Forest Produce
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MHA	Ministry of Home Affairs
MIS	Monitoring Information System
MMR	Maternal Mortality Rate
MoD	Minutes of Discussions
MoEF&CC	Ministry of Environment Forests and Climate Change
MoU	Memorandum of Understanding
MPCS	Multi Purpose Cyclone Shelters
MVTS	Multiple Value Tree Species
NABARD	National Bank for Agriculture and Rural Development
NAP	National Afforestation Plan
NBA	National Biodiversity Authority
NBAP	National Biodiversity Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
NBSS-LUP	National Bureau of Soil Survey & Land Use Planning
NCRMP	National Cyclone Risk Management Project
NEP	National Environment Policy
NFP	National Forest Policy
NGO	Non-Government Organizations
NPCA	National Plan for Conservation of Aquatic Ecosystems
NPL	National Physical Laboratory
NPNT	No Permisson No Take-off
NPV	Net Present Value
NRLM	National Rural Livelihood Mission
NRV	Non Reserved Vidis
NTFP	Non Timber Forest Produce
NWCP	National Wetland Conservation Program
O&M	Operation and Maintenance
OBC	Other Backward Classes
OEM	Original Equipment Manufacturer
OIP	Overall Implementation Plan
PA	Protected Area
PCCF WL	Principal Chief Conservator of Forests, Wildlife
PDA	Personal Digital Assistant
PERG	Project for Ecosystem Restoration in Gujarat
PESA	Panchayat Extension to Scheduled Areas

Acronym	Name in Full
PHVA	Population Habitat Viability Assessment
PMC	Project Management Consultants
PMGSY	Pradhan Mantri Gram Sadak Yojana
PMU	Project Management Unit
PMUY	Pradhan Mantri Ujjwala Yojana
POs	Peoples Organizations
PPP	Public Private Partnership
PS	Panchayat Samities
PVTGs	Particularly Vulnerable Tribal Groups
RAC	Research Advisory Committee
RCWM	Research Centre for Wildlife Management
RMU	Range Management Unit
RO	Resource Organizations
RPAS	Remotely Piloted Aerial System
RPC	Regional Project Coordinator
RS	Remote Sensing
RTI	Right to Information Act
RV	Reserved Vidis
SAPROF	Special Assistance for Project Formation
SBB	State Biodiversity Board
SCALE	Sustainable Community based Approach to Livelihood Development
SCF	Standard Conversion Factor
SCs	Scheduled Castes
SDC	State Data Center
SDGs	Sustainable Development Goals
SEAC	State Expert Appraisal Committee
SEIAA	State Environmental Impact Assessment Authority
SF	Soft Mudflat
SFDC	Social Forestry Development Committee
SHGs	Self Help Groups
SIPC	Salinity Ingress Prevention Cell
SMC	Soil Moisture Conservation
SOEs	Statement of Expendiures
SOP	Standard Operating Procedure
SPSUs	State Public Sector Undertakings
SPV	Special Purpose Vehicle
ST	Scheduled Tribes
STFDPF	Schedule Tribes and Forest Dependent Peoples Framework
TCS	Tata Consultancy Services
TNA	Training Needs Assessment
TNFD	Tamil Nadu Forest Department
TOF	Trees outside Forests
ToR/ TOR	Terms of Reference

Acronym	Name in Full
ToT	Training of Trainers
TPM	Third Party Monitoring
TRC	Training Research and Communication
TREC	Technical Research Evaluation Committee
TSP	Tribal Sub Plan
UAOP	Unmanned Aircraft Operator Permit
UAS	Unmanned Aircraft System
UAVs	Unmanned Aerial Vehicles
UIN	Unique Identification Number
UNDRIP	United Nations Declaration on the Rights of Indigenous People
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention in Climate Change
UT	Union Territories
VCK	Van Chetna Kendra
WAS	Wild Ass Sanctuary
WDC	Wetland Development Committee
WLPA	Wildlife Protection Act
WMP	Wetland Management Plan

Local words used in the report

Local Terms	English Translation/ Description
Adhikar Patra	Letter of rights
Adivasis	Tribals
Anganwadi	Govt run child care centre
Aonla	Indian gooseberry
Arzia	Application
Ashram Shalas	A kind of school
Bajra	A kind of millet
Bhils	A group of tribals
Caoutchouc	A kind of natural rubber obtained as a latex from various Tropical plants
Dhanvantari	Ayurvedic medicine
Gokul Grama Yojana	Gokul village project
Gram	Village
Gram Panchayat	Village government
Gram Sabha	Village level general assembly
Gram Vatika	Village forest
Gurcharans	Forest land
Hariyali	Greenery
Haveldar	Guard
Awas	Residence
Jagirs	Farmer owned land
Jawahar Grama Samriddhi Yojana	Labour's village development program
Jowar	A kind of millet
Kadaya	A kind of natural rubber obtained as a latex from various tropical plants
Khadi	Hand-woven fabric
Khatedar	Farmers having recorded agriculture lands in their names
Kisan Shibbirs	Workshops for acquainting farmers with all the necessary technical knowledge to help them undertake various programme available for them
Kotar Lands	Ravine land
Kotwalia	Name of tribal group making bamboo handicrafts
Kurans	Grazing land
Lakh	0.1 million
Mahila Mandal	Woman's group
Maladharis	Cattle breeders
Malki	Ownership
Manavel	A kind of bamboo
Mandal	Group
Myrobalans	Groups of depict three species, Terminalia, chebula and belerica
Nala	Water channel/dike
Nayak	Village chief
Panchayat	Local Government bodies
Panchayat Raj	Rule of panchayat
Parishad	Governmental body
Patta	Settlement of disputes regarding land entitlement
Rakhals	Forest
Rashtriya Mahila Kosh	National woman organization
Ryots	Farmers having recorded agriculture lands in their names
Sabha	Meeting
Samitis	Meeting of local governmental body
Sarpanch	Head of village
Shalas	School

Local Terms	English Translation/ Description
Shibbirs	Gathering of villagers
Shramik Suraksha	Labour protection
Swarnajayanthi Grama	Swarnajayanthi village
Swarozgar Yojana	self-employment project
Swarozgar	Self-employment
Tahl	Cutting of branch
Talavdis	Pond/reservoir
Taluka	Governmental body under district level/ a group of village in a district
Van	Forest
Van Chetna Kendras	Center to provide people with information on forestry schemes, practices and techniques
Van Mahotsav	Tree-planting ceremony
Vansfodia	Name of tribal group making bamboo handicrafts
Vansodia	A kind of bamboo
Van-Talavadis	Water reservoir in forest
Vidis	Grassland
Vikas	Development
Vikas Mandals	Development block
Wadi	Home farming lot
Yojana	Project
Yuvak Mandal	Youth group
Zilla Panchayat	District government

Unit Conversion

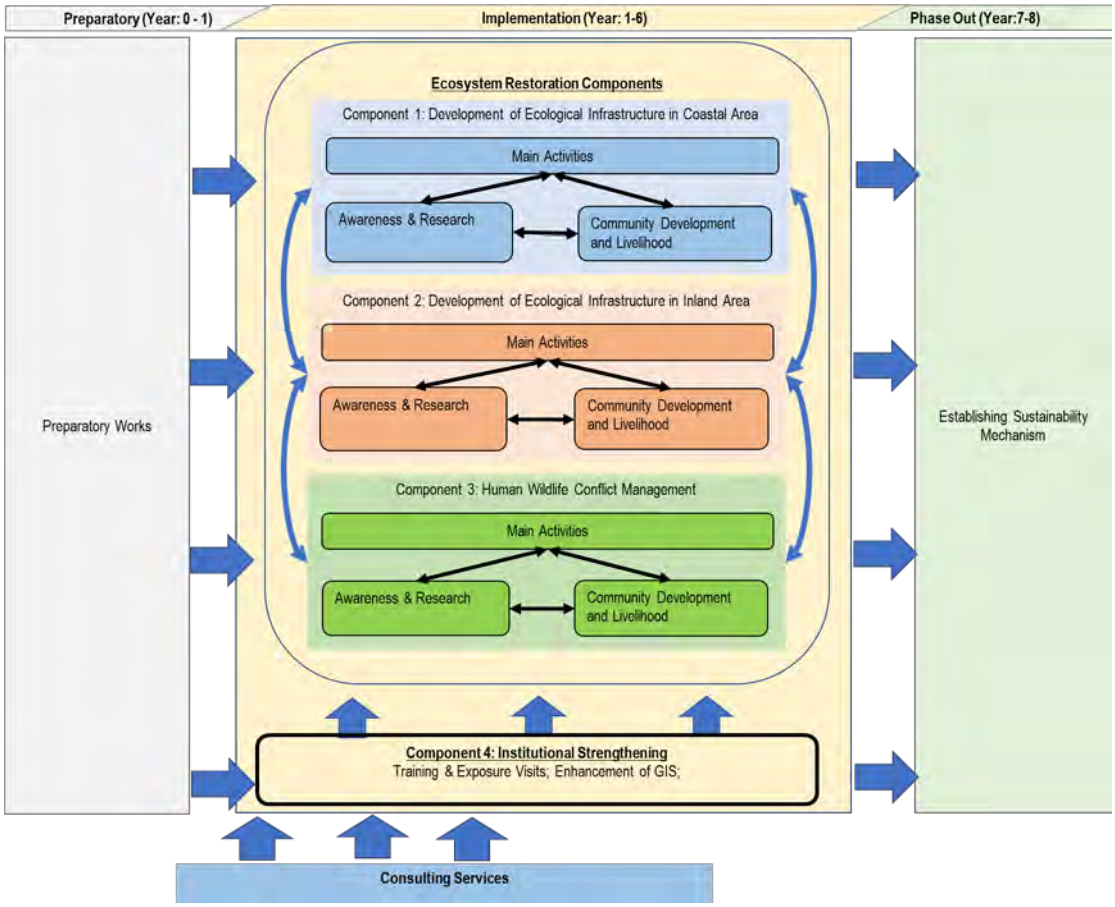
Extent:	Weight:
1 km2 = 100 ha 1 acres = 0.40 ha	1 Quintal / qtl. =100kg
Number:	**Currency:**
Lakh = 100,000 Crore = 10,000,000	1 INR(Rs./ Indian Rupees) = 1.52 JPY (Japanese Yen) 1 USD(United State Dollars) = 71.5 INR (December 2019)

EXECUTIVE SUMMARY

The Indian state of Gujarat has implemented two Japanese assisted forestry projects, namely, Integrated Forestry Department Project (IFDP) (Phase I) (1995-2004) and Gujarat Forestry Department Project (GFDP) (Phase II) (2007-2017) and on the completion of the second phase of the project the State Government submitted a proposal for a Project for Ecosystem Resoration in Gujarat (PERG/ the Project). Following the submission of a DPR by the government of Gujarat JICA assigned a team to conduct a preparatory survey for "further detailed examination of the DPR including reviewing the current DPR and supplemental information collection, contents of components, institutional arrangement, implementation schedule, basis of the cost estimate and environmental and social consideration". Based on the survey findings, the project components and costs were fine tuned. The outline of the project is as below:

1. Project Framework

The objectives of the Project are "to restore ecosystems through coastal ecosystem management, inland ecosystem management, human wildlife conflict management and institutional strengthening thereby contributing to improvement of ecosystem services in Gujarat State". To achieve this objective, PERG is designed various ecosystem restoration and management interventions in three components of development of ecological infrastructure in coastal area and inland area, and human-wildlife conflict management. To provide the basis for these components, institutional strengthening component is designed. The project is planned for 8 years, which is divided into three phases of preparatory, implementation and phase out.



Source: JICA Survey Team (2019)

Figure S.1 Overall Project Framework

Although the phase out period is planned for two years, to ensure the sustainability of the project outcomes, the project will strategically phase out during implementation. During the phase out stage, further capacity enhancement is to be undertaken to reinforce the capacity of the concerned entity to operate and maintain the assets created by the project.

2. Project Components

Main work items and targets are given in the table below.

Table S.1 Key Interventions of the Project

Component	Key Interventions
Component 1: Development of Ecological Infrastructure in Coastal Area	1. Engaging local community in mangrove plantation and conservation 2. Livelihood enhancement through convergence 3. Community Implementation Unit: Gram Panchayat 4. Mangrove Afforestation 5. Coastal Shelter Belt 6. Community development
Component 2: Development of Ecological Infrastructure in Inland Area	
SC-2.1: Restoration of Grassland	1. Sustainable vidi management through community participation 2. Weed removal, protection of the area and plantation of grass 3. Livelihood promotion and community development
SC-2.2: Restoration of Wetlands	1. Taking eight wetlands for project interventions. 2. Weed removal, protection of the wetland boundaries, eco-tourism 3. Preparation of Integrated Wetland Management Plans, World Heritage Dossier, and Ramsar Dossier for mainstreaming of wetlands 4. Livelihood promotion and community development
SC-2.3: Restoration of Degraded Forest	1. Plantation in the degraded forest having canopy density between 40% - 10% 2. Emphasis in the tribal area 3. Management of Old JFM Plantation as a livelihood option 4. Livelihood promotion and community development
Component 3: Human Wildlife Conflict Management	1. Interventions are planned for lion landscape, sloth bear landscape, crocodile habitat. 2. Rescue Centre establishment; awareness creation 3. Promotion of fruits tree planting 4. Eco Tourism 5. Livelihood promotion and community development

Source: JICA Survey Team (2019)

The institutional strengthening component is comprised of various technical and managerial trainings for the project officials and staffs and community level institutions and supporting activities that facilitates the smooth implementation of the project activities. Key work items include GIS/ RS based planning and monitoring and promotion of private partnership.

3. Project Area

The project is planned to be implemented in 114 ranges across 27 divisions (22 districts). The list of project divisions and ranges is given in the table below. Component wise area can be found in Chapter 7.

Table S.2 List of Divisions in the Project Area

S. No.	District	Division	No of Ranges
1	Ahmedabad	Ahmedabad SF	2
2	Amreli	Amreli SF	2
3	Anand	Anand SF	2
4	Aravalli	Aravalli	5
5	Banaskantha	Banaskantha WL	9
6	Dahod	Baria	12
7	Bharuch	Bharuch Sub- division	1
8	Bhavnagar	Bhavnagar	6
9	Bhavnagar	Botad SF	1
10	Botad	Botad SF	1
11	Chhota Udaipur	Chhota Udaipur	10
12	Gandhinagar	Gandhinagar	1
13	Junagadh	Gir East WL	4
14	Junagadh	Gir West WL	4
15	Godhra	Godhra	1
16	Panchmahal	Godhra	1
17	Godhra	Godhra SF	6
18	Junagadh	Junagadh	5
19	Kutchh	Kutch East	1
20	Mahisagar	Mahisagar	6
21	Morbi	Morbi	5
22	Kheda	Nadiyad SF	1
23	Ahmedabad	Nalsarovar WL	2
24	Porbandar	Porbandar	2
25	Sabarkantha	Sabarkantha	8
26	Bhavnagar	Shetrunji WL	7
27	Surat	Surat	3
28	Vadodara	Vadodara SF	3
29	Vadodara	Vadodra WL	3
Counts	22	27	114

Source: JICA Survey Team (2019)

4. Institutional Arrangement

The Project Management Unit (PMU) will be established as an autonomous society to manage the entire project implementation. PMU will be guided by Governing Body and Executive Committee. For field implementation, Circle Coordination Unit (CCSU), Divisional Management Unit (DMU) and Range Management Unit (RMU) will be established. CCSU functions are a monitoring unit for a cluster of DMUs. Implementation will be mostly undertaken by DMU and RMU. Project

Management Consultants (PMC) will be engaged to assist PMU in the early stage of the project implementation.

Community Institutions such as JFMC, EDC and ETDC will be either established or revived to be engaged in the project activities. As for the Development of Ecological Infrastructure in Coastal Area, Gram Panchayat will be engaged for the implementation and maintenance of the mangrove plantation instead. Cluster Level Organization will be established for cluster-based enterprise promotion through private partnership.

In this project, some of the works will be executed through partner organization. Resource organizations and specialized agencies will also be engaged as required.

5. Project Cost and EIRR

The total project cost is estimated at 12,308 million INR (or 18,709 million JPY), out of which the eligible portion is 10,724 million INR (or 16,300 million JPY), whereas the base cost (i.e. costs for the project components) is estimated at 8,145 million INR (or 12,380 million JPY).

Taking into the project cost including the maintenance cost of the physical assets created by the project and benefits deriving from plantation works, livelihood and carbon sequestration are taken into consideration while generating EIRR. The project currently has yielded 11.9% with the NPV of 58.07 billion INR.

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

The state of Gujarat has an ecological profile characterised by four mountain ranges along its eastern boundary- Western Ghats, Vindhyas, Satpura and Aravlli where they start or terminate, covered by diverse forest types, biodiversity rich plain forests, extensive savannahs, a complex and dynamic coastal system with two gulfs, multiple rivers and a huge network of inland wetland and a unique system of saline desert. It also has a socio-economic system composed of advanced industrial development on one hand and the ecosystem-dependent tribal and pastoral communities on the other, displaying steadily improving overall social indices. Gujarat has implemented two Japanese assisted forestry projects, namely, Integrated Forestry Department Project (IFDP) (Phase I) (1995-2004) and Gujarat Forestry Department Project (GFDP) (Phase II) (2007-2017) and on the completion of the second phase the State Government submitted a new proposal for Project for Ecosystem Restoration in Gujarat (referred as 'PERG/ the Project' hereinafter unless the of context requires otherwise).

In follow up to the submission of a detailed project report (DPR) to JICA by the Gujarat forest Department (GFD), JICA assigned a preparatory survey team (herein after referred to as the survey team or the team unless the context requires otherwise) for undertaking "further detailed examination of DPR including reviewing the current DPR and supplemental information collection, contents of components, institutional arrangement, implementation schedule, basis of the cost estimate and environmental and social consideration".

1.2 Approach of the study

In line with the framework of the relevant national/state laws and policies, and the priorities of GFD and informed by the JICA guidelines.

- Drawing on the lessons learned from the implementation of the past projects
- Assessing the effective community engagement in the project implementation process
- Prioritization of the project areas based on the available data and objective assessment of the need
- Designing institutional arrangement for the efficient project implementation
- Integration of the GIS technologies for the technology-based planning and monitoring
- Effective convergence with other interventions and private sectors
- Identifying the landscape-based livelihood interventions to complement the ecosystem restoration and management interventions

1.3 Structure of the Final Report

This report provides the basis for the project design for PERG. First chapters provide the situational analysis and identification of issues based on the review and analysis of the available data and literature. Chapter seven onwards provides the prioritization of project areas followed by the detailed scope of work, institutional arrangement, economic evaluation, detailed implementation schedule and operation and maintenance structure. Environmental and social consideration as per JICA guidelines is provided in Chapter 16.

PERG is composed of four main components of development of ecological infrastructure in coastal area and inland area comprised of grassland, wetland and degraded forest restoration, and human wild life conflict management supported by institutional strengthening component. Livelihood components are incorporated in each component to promote land scape based micro enterprises and eco-tourism. The project is designed for eight years and to be implemented by the Project

Management Unit (PMU) which is to be established as an autonomous society.

In parallel to this preparatory survey, the Preparatory Study for Project for Ecosystem Restoration in Gujarat was carried out by an independent study team to design components concerning GIS and CSR/ Private Partnership for PERG. The project components proposed by the Study Team has been integrated in the relevant sections of Chapater 8: Component 4: Institutional Strengthening of this report. The sections which are integrated/ adopted from the Final Report of the Study have been cross referenced to the same.

CHAPTER 2 THE STUDY AREA: GUJARAT

This chapter describes the state context in terms of its geography, administration, infrastructure, socio-economy, environment, forests and ongoing developmental interventions in the state to set the background for the project.

2.1 Location and Topography

Situated on the west coast of India, the state of Gujarat extends over an area of 196,024 km^2 and lies between latitudes 20°01′ to 24°07′ N and longitude 68°04′ to 74°04′ E. It shares its northern and north-eastern border with the state of Rajasthan; a small part of the eastern border with Madhya Pradesh and the south-south-eastern border with Maharashtra. In its north-west part it shares its boundary with international border of Pakistan; and to its western and south-western side lies the Arabian Sea with two gulfs - the Gulf of Kachchh and Gulf of Khambhat (also called Cambay). The state has a coastline of about 1,663 km, which is the longest in the country.

The state is characterized by a diverse topography with varied landscapes, ranging from the arid desert flatlands in the north-west, to estuarine tracts, alluvial basin with high agricultural productivity, and forested hill ranges. In geomorphological terms, the state can be distinguished into the following types:

- Mainland – an expanse of land covering more than half the state area, from north-east to south (about 121 km wide and 400 km in length), through central Gujarat, comprising the vast alluvial plains of the Indus, Sabarmati, Banas and Luni rivers
- Eastern hilly region – a strip of hilly, forested areas along the eastern boundary, comprising of four major hill ranges, viz., the Aravallis, Vindhyas, Satpudas and Sahyadris
- Peninsular – the state has two peninsular regions –Kachchh in the north-west and Saurashtra-Kathiawar below it, with average altitude of 75-150 m; the vast saline deserts of the Great and Little Rann of Kachchh, and flat low-lying areas of Bhal and Banni in Kachchh, with typical soil and hydrological systems, are unique land features of the peninsular region.

Table 2.1 Talukas, villages and demographic details of districts in Gujarat

S. No.	District	Year of formation	Formerly	Area (sq km)	Number of Talukas	Number of villages	Population
1	Ahmedabad	1960		7,170	10	456	7,059,056
2	Amreli	1960		6,760	11	609	1,504,639
3	Anand	1997	Kheda	4,690	8	343	2,078,654
4	Aravalli	2013	Sabarkantha	3,217	6	676	1,023,724
5	Banaskantha	1960		12,703	14	1237	3,120,506
6	Bharuch	1960		6,524	9	653	1,551,019
7	Bhavnagar	1960		8,334	10	678	2,410,211
8	Botad	2013	Bhavnagar & Ahmedabad	2,564	4	184	653,814
9	Chhota Udaipur	2013	Vadodara	3,237	6	891	1,071,831
10	Dahod	1997	Panchmahal	3,643	8	692	2,127,086
11	Devbhoomi Dwarka	2013	Jamnagar	5,684	4	280	748,227
12	Gandhinagar	1964	Ahmedabad & Mehsana	2,163	4	252	1,391,753
13	Gir Somnath	2013	Junagadh	3,754	6	479	1,210,749
14	Jamnagar	1960		8,441	6	419	1,389,283
15	Junagadh	1960		5,092	10	548	1,525,690

S. No.	District	Year of formation	Formerly	Area (sq km)	Number of Talukas	Number of villages	Population
16	Kheda	1960		3,667	10	523	2,092,371
17	Kutch	1960		45,652	10	924	2,067,860
18	Mahisagar	2013	Kheda & Panchmahal	2,500	6	711	2,044,788
19	Mehsana	1960		4,386	10	610	994,624
20	Morbi	2013	Rajkot, Surendranaga & Jamnagar	4,871	5	340	970,548
21	Narmada	1997	Bharuch & Narmada	2,749	5	609	590,297
22	Navsari	1997	Valsad	2,211	6	372	1,329,672
23	Panchmahals	1960		3,272	7	598	1,642,268
24	Patan	2000	Banaskantha & Mehsana	5,738	9	516	1,339,557
25	Porbandar	1997	Junagadh	2,294	3	181	584,704
26	Rajkot	1960		7,550	11	580	3,034,722
27	Sabarkantha	1960		4,173	8	700	1,404,865
28	Surat	1960		4,418	10	713	6,081,322
29	Surendranagar	1960		9,271	10	575	1,561,066
30	Tapi	2007	Surat	3,249	7	488	807,022
31	The Dangs	1960		1,764	3	308	228,291
32	Vadodara	1960		4,312	8	646	3,093,795
33	Valsad	1966	Surat	3,034	6	434	1,705,678
	Total for state				**250**	**18,225**	**60,439,692**

Source: Compiled from Census and Other Reports of Gujarat by JICA Survey Team

2.2 Administration

Carved out of the Bombay Presidency in the year 1960 on linguistic grounds, Gujarat attained separate statehood in the year 1960. One of the 29 states (and 7 Union Territories) comprising the Indian union, Gujarat has a reputation of being a well-administered state with a capable bureaucracy.

Table 2.2 Schedule V areas in Gujarat

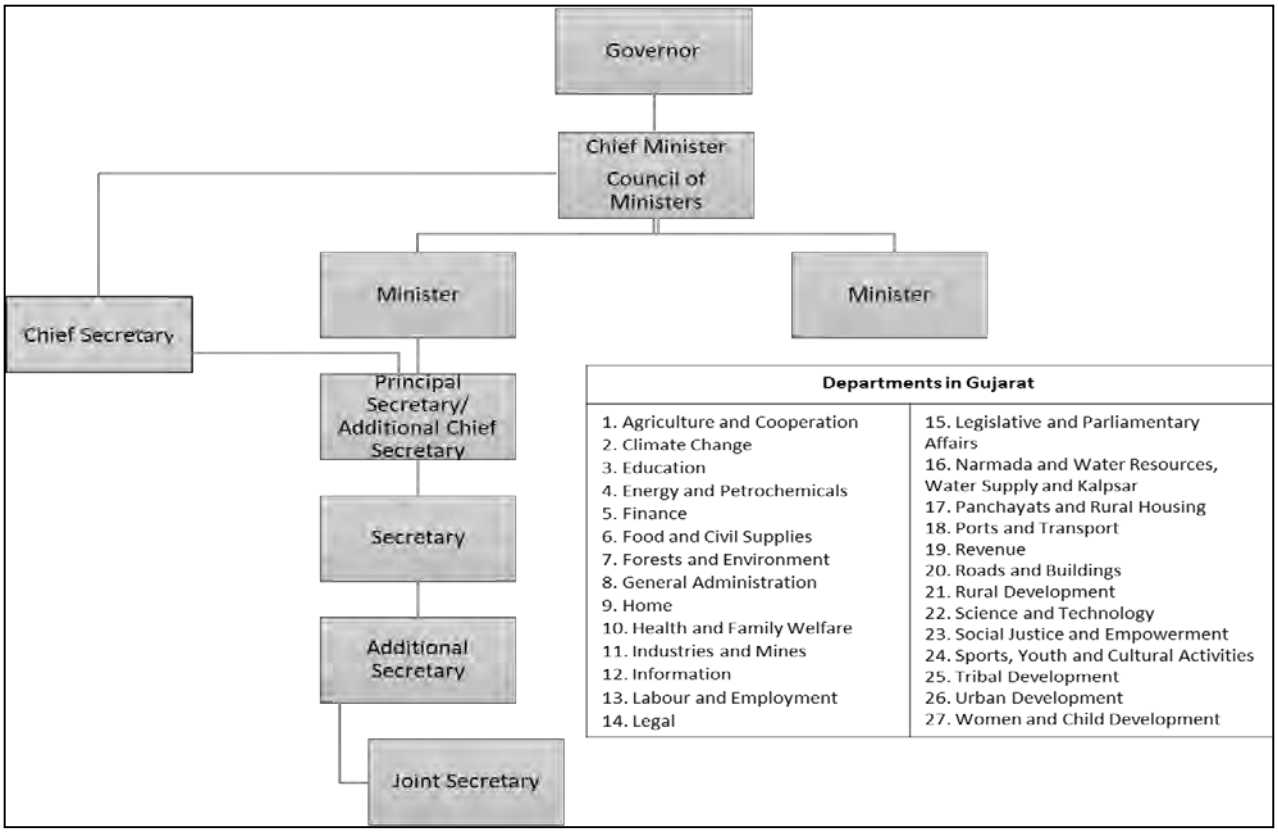
S. No.	District	No. of Taluka in District	No. of Taluka under PESA	Name of Taluka/Pocket under PESA
1	Aravali	6	2	Meghraj, Bhiloda
2	Banaskantha	14	2	Amirgadh, Danta
3	Bharuch	9	5	Jhagadia, Amod, Valia, Ankleshwar, Netrang
4	Chhota Udaipur	6	7	Chhota Udaipur, Nasvadi, Kevant, Jetpur Pavi, Sankheda, Bodeli
5	Dohad	8	9	Fatepura, Jhalod, Limkheda, Dohad, Devgarh Baria, Dhanpur, Garbada, Sanjeli
6	Mahisagar	6	2	Santrampur, Kadana
7	Narmada	5	5	Tilakwada, Nandod, Dediapada, Sagbara, Garudeshwar
8	Panchmahals	7	4	Ghoghamba, Kalol, Halol, Godhra
9	Sabarkantha	8	4	Idar, Vijaynagar, Khedbrahma, Poshina
10	Surat	10	8	Mangrol, Mandvi, Bardoli, Palsana, Chorasi,

S. No.	District	No. of Taluka in District	No. of Taluka under PESA	Name of Taluka/Pocket under PESA
				Kamrej, Umarpada, Mahuva
11	Tapi	7	7	Nizar, Uchchhal, Songadh, Vyara, Valod, Dolvan, Kukarmunda
12	The Dangs	3	3	Subir, Aahwa, Waghai
13	Navsari	6	5	Navsari, Gandevi, Bansda, Chikhali, Khergam
14	Valsad	6	5	Dharampur, Pardi, Umbergaon, Kaprada, Vapi
		101	68	

Source: Tribal Development Department, 2019

2.2.1 State Administrative Structure

The state is headed by the Governor, who is appointed by the President of India. It has a unicameral legislative assembly, led by the Chief Minister who is the head of the party with the largest share of the 182 members elected by the people of the state for a term of five years. This is the policy and decision-making body at the state-level. It is supported in administration and execution of works by 27 different departments and associated agencies. At the state-level, officers of the rank of Principal/Additional Chief Secretary are administrative heads of departments, with the Chief Secretary being the senior-most administrative officer in the state; s/he is the advisor to the Chief Minister, interface between the political and the administrative establishment, and responsible for inter-departmental coordination (Figure 2.1).

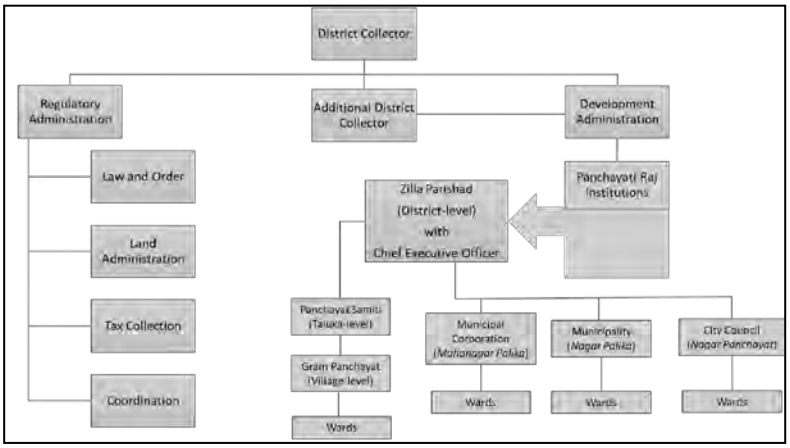


Source: JICA Survey Team (2019)

Figure 2.1 Administrative structure of Gujarat State Government

2.2.2 District Administration

Across all the 33 districts, there is a well-defined administrative structure, with the district magistrate-cum-collector as the head of each district. Below the district is the town (350 at present) and Taluka (250 at present), which is the unit of planning and management for most community development programs, implemented at the village-level through the Gram Panchayat, which is body of community representatives elected by the residents at the sub-village or Ward-level. There is a total of 18,225 villages in Gujarat. The three-tier system of local self-governance thus consists of the Zilla Parishad, Panchayat Samiti and Gram Panchayat at the district, Taluka and village level respectively (Figure 2.2). A list of all districts in the state with area about area, population and year of formation may be



Source: JICA Survey Team (2019)

Figure 2.2 District administrative structure in Gujarat

2.2.3 Physical Infrastructure

Gujarat has historically been at the forefront of industrialization and economic development in India. The manufacturing sector in the state is a major contributor to the pharmaceuticals, dyes and chemicals, petrochemicals and textile production in the country. The state also has vast offshore petroleum and natural gas reserves which have been gainfully exploited. Industrial development has always been a top priority in the state, and a 2,200 km gas grid for supply of gas to the industrial areas is an indicator of the same. Installed power capacity was 32,374 MW (9% of national capacity, 2019).

Economic development in the state is buoyed by an extensive network of roads and railways connecting rural and urban areas seamlessly. The state government is also developing a 508 km-long High-Speed Rail passenger corridor with Japanese cooperation, connecting Ahmedabad and Mumbai.

Table 2.3 Major physical infrastructure in Gujarat

Sn.	Type of infrastructure	Unit of measurement	Length/ Number
1	National highways	km	6,635
2	State highways	km	17,201
3	Major district roads	km	20,641
4	Other district roads	km	10,493
5	Village roads	km	21,119
6	Railway line	Route kms	5,258.5
7	Ports	Number	42
8	Domestic airports[1]	Number	16

Source: Gujarat State Infrastructure Development Corporation & Gujarat Infrastructure Development Board

[1] Location of domestic airports in Gujarat: Amreli, Bhavnagar, Bhuj, Deesa, Jamnagar, Kandla, Keshod, Mandvi, Mehsana, Mithapur, Mundra, Palanpur, Porbandar, Rajkot, Surat, Vadodara.

2.3 Population and socio-economic conditions of the state

Social development indicators for Gujarat have been unable to keep pace with its accomplishments in the area of economic development; for development of education and health facilities in the state, the Gujarat Social Infrastructure Development Society was established by the state in the year 2007 to accelerate development in the social sector; Gujarat Infrastructure Development Board, a statutory body established under the Gujarat Infrastructure Development Act,1999 is also responsible for facilitating public-private partnerships for development of health and education projects in the state. The status of social infrastructure in the state is outlined in the table below.

Table 2.4 Social infrastructure capabilities in Gujarat

Sl.	Type of facility/ infrastructure/ capability indicator	Unit of measurement	Number	Remarks
1	Children enrolled in primary classes	million	8.2	
2	Students enrolled in secondary and higher secondary educational institutions	Million	2.77	
3	Universities	Number	20	10 private
4	Institutions of higher learning and research	Number	900	
5	Technical education (engineering, MBA, Pharmacy, MCA, Architecture)	Number of seats	90,748	
6	Primary Health Centers (PHC)	Number	2089	
7	Sub-Centers	Number	9681	
8	Community Health Centers	Number	3350	
9	Urban Family Welfare Centers	Number	106	
10	District Hospitals	Number	51	
11	Sub-district Hospitals	Number	390	

Source: Gujarat Infrastructure Development Board and Gujarat Economic Review (2017-18)



Source: www.mapsofindia.com

Figure 2.3 Political map of Gujarat showing district boundaries

Average literacy rate in the state is 79%, with male literacy being 87% and female literacy 71% (GER, 2017-18). Maternal mortality rate (MMR) in the state stood at 112 in the year 2013, down from 160 in 2006; infant mortality rate also decreased from 53 to 36 in the same period. However, stunting continued to be a concern with 42% children in the 0-5 age group being stunted. There are special provisions for Schedule V areas, which are districts or Talukas where the Schedule Tribes are in majority, on account of the Panchayat Extension to Scheduled Areas (PESA) Act or 1996; these comprise 18% of the state's geographical area. Under the PESA Act, Gram Sabhas, which means bodies comprising all adults residing in a village, and Panchayats have been vested with greater powers, including the approval of plans, programmes and projects for social and economic development; mandatory consultation before acquisition of land in the Schedule Areas for development projects and before resettling or rehabilitating persons affected by such projects; mandatory recommendations prior to grant of prospecting license or mining lease and grant of concessions for exploitation of minor minerals in Scheduled Areas.

2.3.1 Demographic profile

The population of Gujarat is 60.4 million comprising 31.5 million males and 28.9 million females, with a decadal growth rate of 19.3% between 2001 and 2011. Of this, the rural population is 34.7 million and the urban population is 25.7 million. (census 2011). The state ranks 10th in total population and 14th in population density among the states in the country (excluding UTs), accounting for 4.99% population of the total population of India. The distribution of population is though, highly skewed, with three districts viz. Ahmedabad, Surat and Vadodara contributing 29% of the total population of Gujarat. Nearly 50% of the State's population resides in the seven districts viz. Ahmedabad, Surat, Vadodara, Rajkot, Banaskantha, Bhavnagar and Junagadh. 57.4% (decrease of 5.2 % during the decade) is the rural population and 42.6% (increase of 5.2% during the decade) is urban population of the total population[2]. The demographic features of Gujarat are provided in the table below.

Table 2.5 Demographic attributes of Gujarat

Sr. No.	Demographic Characteristics	Gujarat	India	%
1	Population (2011) in million	60.44	1210.6	4.99
2	Population Density (per sq km)	308	382	
3	Rural Population (2011) in million	34.7	833.5	4.16
4	% of Rural Population	57.4	68.85	
5	% of Growth of Population (2001-2011)	19.3	17.7	
6	% of Growth of Rural Population (2001-2011)	9.3	12.3	
7	% of Growth of Urban Population (2001-2011)	36	31.8	
8	SC Population in million	4.07	201.38	2.02
9	% of SC Population in Gujarat	6.7%		
10	ST Population in million	8.92	104.28	8.55
11	% of ST Population in Gujarat	14.8		
12	Sex Ratio (females per 1000 male)	919	943	
	Sex Ratio in ST	981		
	Sex Ratio in SC	931		
13	Persons in Working age group 15-59 years	60.19%		
14	% of SC Population	6.7	8.6	
15	% of ST Population	14.8	16.6	
16	Literacy Rate (overall)	78%	73%	

[2]Directorate of Economics & Statistics (DES), Socio Economic Review 2017-18, Gujarat Government

Sr. No.	Demographic Characteristics	Gujarat	India	%
	Literacy Rate (Rural)	71.7	67.8%	
	Literacy Rate (ST)	62.5%	59%	
	Literacy Rate (SC)	79.2%	66%	
	Literacy Rate (Women)	69.7%	64.6%	
17	Total Worker (%)	40.97	39.79	

Sources: Directorate of Economics & Statistics (DES), Socio Economic Review 2017-18, Gujarat Government. and https://www.census2011.co.in/census/state/districtlist/gujarat.html

2.3.2 Scheduled Tribes

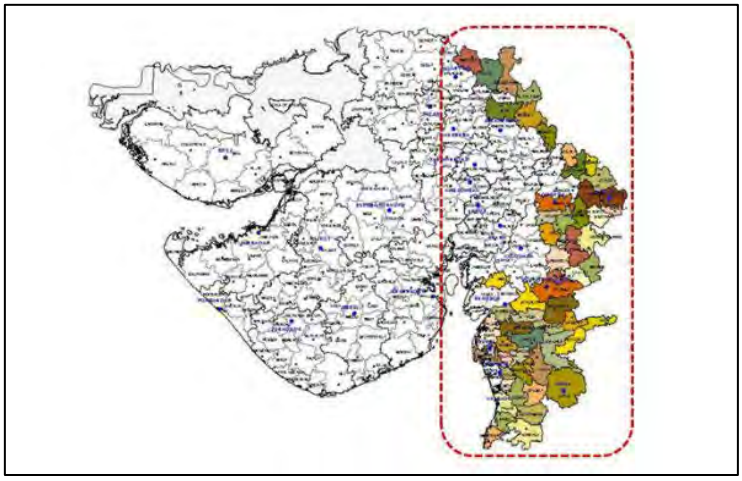
The tribal (Scheduled Tribes) population of Gujarat, numbering 8.917 million, constitutes 14.8% of the state's population and 8.1% of the Scheduled Tribe population of the country. They are mainly concentrated in the eastern districts, spread over 14 districts and 48 Talukas. The Tribal Sub Plan (TSP) area constitutes 18% of the state's geographical area and covers 5,884 villages (32% of total number of villages in the state). There are 4 districts (pre-2013) in the state where the tribal population is between 20% to 50% and 6 districts with tribal population of above 40%. District wise distribution of the tribal population of Gujarat is given in Annex 2.1.

The tribal population comprises of total 26 tribes, the largest tribe being Bhil, which constitutes 47.89% of the state's tribal population. The 5 tribes are considered to belong to Particularly Vulnerable Tribal Groups.

The tribal of Gujarat could be divided into following three geographical categories based on population:

- Bhils and their sub tribes such as Rajput Garasiyas, Dungri Garasiyas and Bhil Garasiyas live in the North Gujarat explicitly in Banaskantha and Sabarkantha districts.
- Scheduled tribes of Bhils that is Pateliya, Dhanka, Naikda and Rathva live in central Gujarat precisely in Panchmahal and Vadodara districts.
- Tribes such as Vasava, Tadvi, Dubala, Gamit, Kukna, Dhodiya, Varli, Bhil, Nayaka, Chaudhari and primordial groups as Kathodi, Kolgha and Kotvadiya live in the South Gujarat namely in the Dangs, Valsad, Surat and Bharuch districts.

The following map shows the tribal talukas of Gujarat.



Source: https://tribal.gujarat.gov.in/tribal-demography-of-gujarat

Figure. 2.4 Tribal Talukas of Gujarat

The socio-economic status of the tribal population is relatively worse compared to other communities on almost all the parameters, including incidence of poverty. According to the Planning Commission's estimate (2013), almost half (48.6%) of the ST population in the state of Gujarat lived below poverty line as against 26.7% among all social groups. Low land holding and landlessness was identified as one of the important reasons for the abject poverty among the tribals of the state. According to NSSO report of 2006, 82.9% of the ST households in rural areas have less than 1 ha land in Gujarat's rural areas. According to Rural Development Statistics on Scheduled Casts and Scheduled Tribes, poverty levels among STs went up during the 11-year period ending with 2004-05 in the state of Gujarat along with other states like Andhra-Pradesh, Kerala, Maharashtra, Madhya Pradesh, Odisha and Punjab[3].

2.3.3 Scheduled Castes (SCs)

Gujarat has a comparatively small population of SCs, a socially and economically backward community, with a total population of 4.074 million (2011 Census), which is 6.74% of total population. Compared to 2001, the share of their population has declined from 7.09%. The district wise distribution of the population of the SCs is given in Annexe 2.2.36 different castes are notified as Scheduled Caste in Gujarat. Their population is dispersed over all the districts with maximum share in their population at 12.4% (in Kachchh). Seven districts have less than 3% of SC population and four districts have more than 10% of SC population. There are 3100 villages and towns which have SC population of 250 and above. These villages and towns contain about 50 percent of the total SC population of the State[4].

2.3.4 Poverty level

Gujarat has a large population of people below the poverty line (BPL). According to information tabled in the State Assembly in March 2018, 20 per cent of the population, amounting to 12.5 million or 3.146 million households, live below the poverty line. Banaskantha district tops in poverty and the tribal belt of the eastern region remains particularly poor, Dahod remains the second poorest district.

The government is embarked on promoting poverty alleviation measures as outlined in the ensuring sections.

2.3.5 Gender issues

The sex ratio in the country was 933 in 2001 which has increased by 10 points to 943 in 2011. The increase in rural area has been of 3 points (946 to 949). The increase in urban area has been of 29 points (900 to 929). The sex ratio in the state has slightly decreased to 919 in 2011 from 920 in 2001. In rural areas of the state it has increased by 4 points from 945 in 2001 to 949 in 2011, while in urban areas it remained 880 in 2001 as well as in 2011. The overall sex ratio of the state is 919 against the national figure of 943.

Since the formation of Gujarat state in 1961, the sex ratio of the state shows a decreasing trend except in 1981 census. It is an interesting feature that The Dangs district is showing a steady increasing trend in sex ratio, whereas the Surat district is showing a steady declining trend since 1961. The sex ratio of Ahmadabad district has an increasing trend since 1961 census except 2001 census. The large migration from within and outside the state into industrial urban areas is one of the main factors for the low sex ratio observed in Ahmedabad and Surat.

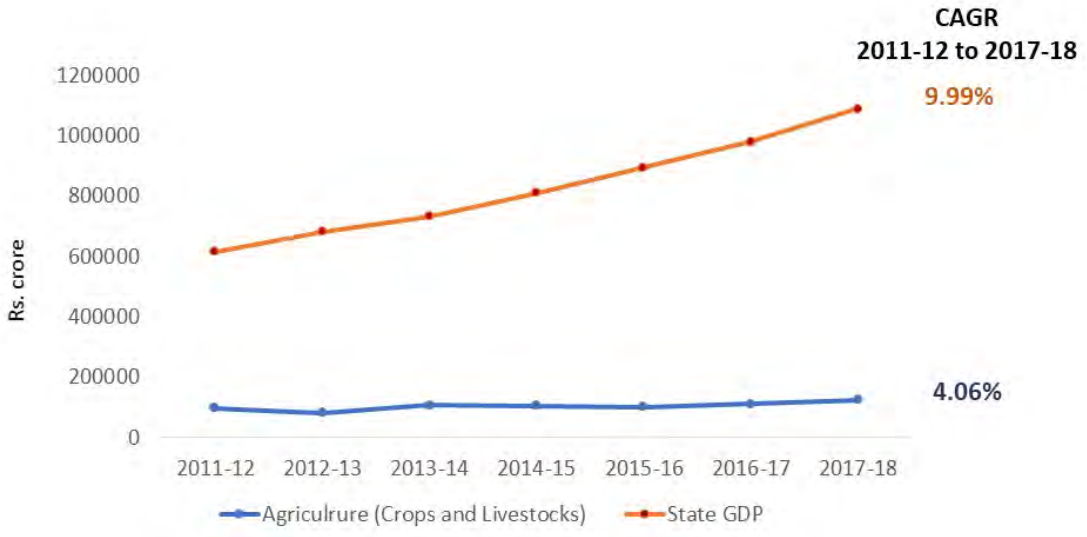
3 https://tribal.gujarat.gov.in/tribal-demography-of-gujarat
https://trti.gujarat.gov.in/primitive-tribal-group
https://tribal.nic.in/pvtg.aspx
Evaluation of the Composition of Developmental Assistance: A Case Study of Tribal Regions in Gujarat. Dr. Satyajeet S Deshpande, IOSR Journal of Economics and Finance (Jan. - Feb. 2016)
4 https://sje.gujarat.gov.in/dscw/showpage.aspx?contentid=1821&lang=english
https://sje.gujarat.gov.in/showpage.aspx?contentid=1543&lang=English
https://sje.gujarat.gov.in/downloads/scsp_1819_11022019.pdf

2.3.6 Gross State Domestic Product

The Gross State Domestic Product (GSDP) at market constant (2011-12) prices in 2017-18 has been estimated at INR 10,902.6 billion as against revised estimates of INR 9,807.36 billion, registering a growth of 11.2 percent over the year 2016-17. The Gross State Domestic Product at market current prices in 2017-18 has been estimated at INR 13,146.8 billion as against revised estimates of INR 11,533.27 billion in 2016-17, registering a growth of 14.0 percent over the year 2016-17[5].

2.3.7 Agriculture production and food security

The role of agriculture sector is very crucial considering employment and food security that it provides. As per the census, 2011, the agriculture sector accounts for about half of the employment in Gujarat state (49.6 percent)[6]. Despite agriculture sector (crops and livestock's) being the highest employment provider, it along with other primary sector constituents (forestry, fishing, mining & quarrying) accounted for 18 per cent of the state GDP in 2017-18[7] well behind industry sector (28 per cent) and tertiary sector (54 per cent)[8]. In this respect, it is interesting to understand growth of agriculture sector vis a vis state GDP as given in figure 2.5.



Source: Socio Economic Review, 2018

Figure 2.5 Growth in Agriculture Sector vis a vis State GDP at Constant Prices (2011-12 prices)

It can be observed that the agriculture sector has registered steady growth but the pace is much lower as compared to state GDP. It may be noted that the output of agricultural sector in Gujarat State has been largely dependent on south-west monsoon. However, irrigation network and shift towards high value cash crops such as groundnuts, cotton etc. may have somewhat reduced the volatility in agriculture production as observed in figure above. The shift towards the cash crop is also evident from the fact that the percentage share of Gujarat's production of groundnuts and cotton was 42.31 per cent and 26.32 per cent to India's production in 2016.

It may be noted that production of food grains during 2018-19 is estimated at 6.691 million tons which is lower as compared to 7.661 million tons of 2017-18 on account of 30% shortfall in rain. This indicates

[5] Socio-economic Review 2018-19

[6] Socio Economic Review of Gujarat, 2018

[7] At Constant Prices

[8] Socio Economic Review of Gujarat, 2018

that agriculture sector still depends on rainfall even after state's efforts towards development of comprehensive irrigation network. Key statistics of agriculture production is given in table below.

Table 2.6 Crop Production

Crop	Production ('000 tonne)	
	2017-18	2018-19
Rice	1,889	1,909
Wheat	3,068	2,378
Jowar	125	105
Bajra	965	801
Total Food Grain	7,661	6,691
Cotton (*)	10,113	5,053
Groundnut	4,066	2,036
Total Oil seeds	6,143	3,509

Source: Socio Economic Review, 2018 . (*) Production in '000 bales of 170 kgs. Each

Apart from food grain, horticulture has been gaining momentum as the area under fruit crops, condiments and spices and floriculture has increased. This has resulted in an enhanced share of horticulture to total agricultural economy. At present, horticultural crops contribute about 20% to total agricultural economy. During the year 2017-18, the production of fruits, vegetables, spices and flowers is estimated to be 9 million tons, 13.234 million tons, 1 million tons and 0.193 million tons respectively.

The State Government has launched Ma Annapurna Scheme under the National Food Security Act, 2013. Under the scheme two kinds of beneficiaries get benefit: (a) card holders of the state under the Antyoday Anna Yojna (b) Priority Household Families as per the norms fixed by the state government. Against the target of reaching out to 38.284 million beneficiaries under the Food Security Act, 33.1 million beneficiaries have been covered. Under the food security act, 35 kg of food grain is provided to Antyodaya families. Food grain of wheat and rice is provided at subsidized rate of INR 2 per kg and INR 3 per kg respectively. Government of India has allocated monthly quantities of food grain under the food security act i.e. wheat –0.138 million MT, Rice -0.059 million MT[9]. This may be because production of food grain in the state may not be sufficient to meet demand under the food security act.

Public distribution is carried out through Fair Price Shops. There are total 17060 Fair Price Shops in the state. In order to bring transparency, these shops are equipped with computer, printer and fingerprint device to ensure supply to identified beneficiaries. The State may have to device a comprehensive strategy encompassing different aspects including the re-orientation of cropping pattern to suit condition better for reducing the volatility due to rainfall.

2.4 Major Develoment Programes

The major development programs and projects in the state are aligned with the national development agenda and are as outlined in the following sections. Numerous government initiatives with the objective of improving quality of life in poverty-ridden rural and urban areas are implemented under the Twenty Point Programme of GoI, which was launched in 1975, and subsequently revised and restructured. The programme has an all-encompassing mission which includes socio-economic aspects like poverty, employment, education, housing, health, agriculture, land reforms, irrigation, drinking water, protection and empowerment of disadvantaged sections, consumer protection, afforestation, e-governance, etc. The list of agendas of the twenty-point programme is given in the table below.

[9]Source: Socio Economic Review 2018

The achievements of the afforestation component of the Twenty Points Program is given in Annex 2.3

Table 2.7 Agenda under the Twenty Point Programme

Point	Item	Point	Item
1	Poverty Eradication	11	Women Welfare
2	Power to People	12	Child Welfare
3	Support to Farmers	13	Youth Development
4	Labour Welfare	14	Improvement of Slums
5	Food Security	15	Environment Protection and Afforestation
6	Housing for All	16	Social Security
7	Clean Drinking Water	17	Rural Roads
8	Health for All	18	Energization of Rural Areas
9	Education for All	19	Development of Backward Areas
10	Welfare of SC, ST, Minorities and OBCs	20	IT enabled e-Governance

Source: General Administration Department, GoG website

2.4.1 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

The MGNREGA which came into effect from 2005, guarantees at least 100 days of wage employment, on demand, to every household living in rural areas, and is implemented by the Rural Development Department. Implementation of the Act has contributed to reducing distress migration of rural poor by providing wage employment opportunities in and around the village, while also creating community assets and infrastructure such as village ponds, plantations and so forth. Of the works undertaken in Gujarat, focus has mainly been on soil and moisture conservation and afforestation. In addition to creation of community infrastructure, there is also scope for undertaking individual beneficiary schemes under this programme, on lands of BPL, SC, ST and small and marginal farmer households.

2.4.2 Minimum wages

Minimum Wages Enforcement (Including Farm Labour) scheme under Labour and Employment Department vide the Minimum Wages Act, 1948 & Gujarat Rules is to fix minimum wages rate in the employments scheduled to the Act. Basic Wage and Variable D.A. shall be fixed based on Consumer Price Index. It can be minimum piece rate or time rate. The minimum wages are fixed in Gujarat on the advice of the state level minimum wage advisory Board or by a Government Notification.

2.4.3 National Rural Livelihood Mission (NRLM-Aajivika)

NRLM is another programme being implemented in Gujarat as “Mission Mangalam” by the Gujarat Livelihood Promotion Company Limited (GLPC), which is the executive arm of the Mission, functioning under the aegis of the Commissionerate of Rural Development. GLPC works through strategic partnership between large industries and Sakhi Mandals/ Self Help Groups/ Producer Groups/ Service Groups/ Collectives of the poor, through decentralized micro-enterprise ventures. The promoting companies/ entrepreneurs redesign the process where intensive tasks as job-works are undertaken by SHGs in their respective homes or villages as self-employment activities. The main objectives are:

- Empowering the Poor by organizing them into SHGs/federations/other collectives
- Empower the poor through ensuring access to financial services.
- Augmenting existing livelihoods and enhancing incomes

- Explore livelihood opportunities through newer ventures in rural service sector
- Developing inclusive value chains

2.4.4 Programs For economically disadvantage

Housing for the rural poor is supported by Pradhanmantri Awas Yojana-Gramin under the Panchayats Rural Housing and Rural Development Department provides poor families with housing. Pradhanmantri Awas Yojana-G is sponsored by the Centre for housing for the economically disadvantaged families. Urban Development and Urban Housing Department has a programme for housing earmarked for economically weaker section in urban areas, implemented under Basic Services for Urban Poor (BSUP). The provision for rural sanitation is provided under the Swachta Bharat Mission by constructing low cost household latrines. The Integrated Child Development Scheme supports the nutritional care of children and women. Road access to rural areas without connectivity, especially to tribal areas, is provided through the Pradhan Mantri Gram Sadak Yojana (PMGSY) implemented by the Roads and Building Department.

2.4.5 Soil and Water Conservation through Watershed Management

Soil and water conservation measures carried out following watershed management principles are being implemented by the Rural Development Department in Gujarat, through its nodal agency, the Gujarat State Watershed Management Agency (GSWMA), which is a registered society functioning under the department leadership. The main objective of the flagship Integrated Watershed Management Programme (IWMP) is to conserve and protect the degraded natural resources like soil, vegetative cover and water. This is done by preventing surface runoff, promoting vegetative growth and ground water recharge. It also helps in sustainable agriculture in water scarce areas.

Desert Development Programme (DDP) is also being implemented by GSWMA as part of the pre-IWMP component. The objective of this programme is to minimize the negative effect of drought and to control desertification through rejuvenation of natural resources. The other pre- IWMP programme is the Drought Prone Area Programme (DPAP). Its objective is to minimize the adverse effects of drought on production of crops and livestock. It also focuses on the productivity of land, water and human resources which would assist in drought proofing. Both the programmes also focus on promotion of economic development and improving the socio-economic conditions of the population in and around the drought prone areas.

The third soil and water conservation scheme which is a forerunner of the IWMP is the Integrated Wastelands Development Programme (IWDP). The main objective of this programme is to undertake integrated wastelands development based on village-/micro-watershed planning.

2.4.6 National Cyclone Risk Management Project (NCRMP)

Under the NCRMP scheme, different components such as construction and establishment of Multi-Purpose Cyclone Shelters (MPCS), roads, underground cabling, etc., are implemented. The nodal agency for this is the Gujarat State Disaster Management Authority (GSDMA). The scheme is being implemented to shield against the adverse impacts caused by cyclones along the coast and in cyclone prone areas. Gujarat receives support from the GoI under the NCRMP Phase II (2015-2020), a World Bank aided project.

2.4.7 Sustainable Community-based Approach to Livelihood Development (SCALE)

The Aga Khan Foundation (AKF) had implemented the livelihood development project SCALE with co-financing from the European Union. SCALE was focused on improving livelihood opportunities across rain-fed, semi-arid regions of Gujarat. The project included establishment of host community institutions, which play an important role in generating public awareness regarding developmental activities and sustainable management of local common resources. These institutions also address local issues and concerns related to basic amenities, gender, human resources and employment generation.

2.5 Tribal Development Programmes

The Tribal Sub-Plan (TSP) was introduced in the country in 1974 to accelerate development in the tribal areas. TSP funds are non-divertible and are expended by the Tribal Development Department of the State, in areas outside the Scheduled Areas. Vanbandhu Kalyan Yojana, assisted by the central government and with focus on 13 sectors from employment generation to road connectivity in the tribal areas are implemented in the State. The Forest Rights Act is being implemented in the State and this provides recognition of the historical rights of tribal communities over forests and harvestable resources, as explained in chapter 3. The claims of rights recognized under the Forest Rights Act in Gujarat so far is given in Annexe 2.4. The government has provided Particularly Vulnerable Tribal Groups (PVTGs) special assistance since they prefer to live in remote forest areas and shy of outside contacts. PVTG households are estimated to be 23,479. Housing, roads, drinking water, education etc. are the provisions provided to the PVTG groups. Provision for border villages amenities for the tribal people living in the areas bordering Maharashtra, Madhya Pradesh and Rajasthan is another.

2.6 Externally assisted development projects

Currently the State Government has six externally aided projects sanctioned by multilateral agencies. Details of the same are as follows:

Table 2.8 List of Externally Aided Projects in Gujarat

S.R.	Funding Agency	Project Name	INR Million
1	World Bank (WB)	Gujarat State Highway Project (GSHP- II)	2,507.0
		Integrated Coastal Zone Management Programme	579.2
2	Japan International Cooperation Agency (JICA)	Gujarat Investment Promotional Program	2925.0
3	Asian Infrastructure Investment Bank (AIIB)	Gujarat Rural Road Project (MMGSY)	17,640.0
4	German Development Bank (KfW)	Green Energy Corridor project	825.1
Total			24,476.6

Source: Development Programme 2018-19, GoG

The state government has established a separate Project Monitoring Unit in the Finance Department to facilitate and derive maximum benefit from external aid. Thirteen project proposals have been submitted to GoI, out of which six projects have been approved in principle for further submission to and consideration of donor agencies.

2.7 Natural Conditions

Gujarat falls in the Agro Climatic Zone-XIII, which is called the Gujarat Plains and Hills region. It is further sub-divided into the following seven sub-zones based on agro-climatic conditions: Southern Hills (Dangs and Valsad); Southern Gujarat; Middle Gujarat; North Gujarat; North-west Arid; North Saurashtra & South Saurashtra (Figure 2.3). Mean soil temperature in most of Gujarat exceeds 28° C.

2.7.1 Ecosystem types

Although Gujarat has only about 8% forest area, owing to the diversity of physiographic types accompanied with wide variations in rainfall (300 to 2000 mm) and soil (45 sub-groups), one finds significant differences in ecological conditions across the state. Accordingly, four out of ten biogeographic regions of the country and 5 biotic provinces are represented in the state[10]. It has Indian Desert, Semi-arid Region, Western Ghats forest and Estuaries and Mangroves of coastal belt. These biogeographic regions and biotic provinces provide ideal habitat for a variety of floral and faunal species including many endangered and rare ones. Another important feature of the state is the confluence region of four major hill ranges viz. Aravallis, Vindhyas, Satpudas and Sahyadris (Western Ghats); these support a great diversity of natural ecosystems ranging from desert areas encompassing open scrub, desert thorn forest and grasslands, to coastal regions endowed with mangroves, coral-reefs, estuaries, fresh and brackish water wetlands abundant with bird life and forests of different types. Singh (2000) described the following ecosystem types for the State.

2.7.2 Forests

The state possesses dry deciduous and thorny forests, with a small area of moist deciduous forest types. Based on Champion and Seth's classification[11](1968), forests of Gujarat fall under four sub-groups, viz., (i) 3B-South Indian Moist Deciduous Forests; (ii) 4B-Swamp Forests or Tidal Forests; (iii) 5A-Southern Tropical Dry Deciduous Forests; and (iv) 6B-Northern Tropical Thorn Forests. Forests are found in all districts, but most predominantly along the eastern and northern borders of the state.

2.7.3 Grasslands

These are located mainly in the Saurashtra and Kachchh regions, and to a lesser extent in Dahod district on the eastern edge. They are dry grasslands and regarded as edaphic or biotic climaxes; essentially being seral stages held by some abiotic or biotic limiting factor. Scrublands and thorny trees often overlap with these ecosystems. The grasslands support unique floral and faunal biodiversity, including some threatened species of global significance, e.g. the Great Indian Bustard, lesser Florican, Houbara Bustard, among others.

2.7.4 Mangroves

The long coastline of the state is rich in intertidal communities, with excellent and frequently well-preserved mangrove habitats. The Gulf of Kachchh and Khambhat are where most of the mangrove forests are located. Between 2011-12 and 2016-17, a total of 431 km^2 of mangrove plantations had been raised and the current estimate of mangrove forest cover in the state is 1,107 km^2.

[10]Rodgers, W.A. and Panwar, H.S. 1988. Planning a Wildlife Protected Area Network in India. Wildlife Institute of India, Dehradun

[11]Champion, H. G. and Seth, S.K. 1968. A Revised Survey of the Forest Types of India.Govt. of India, New Delhi.

2.7.5 Coral Reefs

In Gujarat, corals have been recorded mainly in the Marine National Park in the Gulf of Kachchh. There are 42 islands in the Gulf of Kachchh with a majority supporting fringing reefs. More recently, these magnificent ecosystems have also been found in few small disjointed patches along the Kachchh and Saurashtra coasts (in Dhamlej, Veraval, Medha Creek, Dwarka, etc.) and Umbergam in Valsad South Gujarat coast. In the Gulf of Kachchh 218 sq km area of coral reefs has been mapped as informed by the Gujarat Ecology Commission.

2.7.6 Inland Wetland

Inland wetlands include both natural and man-made types and comprise the following categories: (i) Natural: lakes/ponds, ox-bow lakes/cut-off meanders, waterlogged areas, rivers/streams; and (ii) Man-made: reservoirs/barrages, tanks/ponds, waterlogged areas such as paddy fields, and salt pans. A total of 11,433 inland wetlands are recorded in the state, with a total area of 658,191 km2. These are in addition to coastal wetlands, numbering 2,750. Total area under aquatic vegetation is recorded as 152,318 km2 pre-monsoon and 205,159 km2 post-monsoon. Some of the wetlands in the state, like the Little Rann of Kachchh, Thol, Porbandar Chharidandh, and Nalsarovar already have a Protected Area status, with the last being a recognized Ramsar site. Some others of national importance are the Khijadia lake in Jamnagar, Pariej lake in Anand, Vadhawan lake in Vadodara and Nani-Kakarad in Navsari.

2.7.7 Deserts

The Great and Little Rann of Kachchh are two unique areas of dry saline wilderness, spread over about 22,000 km2 area. During monsoon, these dry deserts turn into wetlands, creating the most unique ecological conditions supporting a diversity of life-forms.

2.7.8 Land Use Pattern

The Great and Little Rann of Kachchh are two unique areas of dry saline wilderness, spread over about 22,000 km2 area. During monsoon, these dry deserts turn into wetlands, creating the most unique ecological conditions supporting a diversity of life-forms.

Table 2.9 Land-use in Gujarat: time-series data

Year	Area (thousand km2)								Percentage of Net Area Sown to Reporting Area
	Reported Area	Not available for cultivation	Permanent Pasture & Other Grazing land	Land Under Misc. Tree Crops & Groves	Culturable Waste	Current Fallow	Other Fallows	Net Area Sown	
1985-86	188.2	37.6	8.5	0.042	19.5	9.4	0.43	94.0	49.9
1995-96	188.1	37.4	8.5	0.040	19.7	7.5	0.28	96.7	51.4
2005-06	188.1	37.5	8.5	0.040	19.7	7.0	0.14	97.2	51.7
2007-08	188.1	37.2	8.5	0.036	19.6	5.1	0.20	99.7	53.0
2015-16*	188.1	34.8	8.0	0.025	19.5	6.7	0.18	97.6	51.9

* Provisional Data *Source: Season and Crop Reports (https://dag.gujarat.gov.in)*

2.7.9 Soil Types

Extensive survey of soil of State was conducted by National Bureau of Soil Survey & Land Use Planning (NBSS-LUP, 1994). They covered 5 landforms and 14 physiographic types of Gujarat and

recorded that the soils of Gujarat belong to 5 orders, 11 sub-orders, 20 great-groups and 45 sub-groups. The French Institute of Pondicherry identified six soil types in Gujarat[12], as described below:

a. **Coastal Alluvial Soil** appears in the form of very narrow bands in Southern Gujarat and on the south-eastern and south-western coast of Saurashtra peninsula. The texture of soil is predominantly sandy, but silt of marine alluvial origin is also present. These soils mostly support grazing grounds.
b. **Alluvial Soil** has many variants depending on texture, thickness, climatic conditions and topographic situations. Loamy-sandy alluvium possessing considerable depth is found mainly on the northern part of the state and in Kachchh. The soils are poor in nitrogen and phosphates but with some irrigation, they are cultivable. Alluvial sandy-loamy soils, on the other hand, are found mainly in the flat regions of eastern Gujarat and northern Saurashtra. These are usually very deep and permeable and thus are good agricultural soils.
c. **Black Soil** is the most dominating soil type of Gujarat found in three major variations:(i) on alluvium are represented in parts of Bharuch, Ahmedabad and Mehsana districts. (ii) on limestone formation are found in some parts of Kachchh and under best conditions, cotton cultivation is possible on these soils and (iii) on trap occupy a major part of Saurashtra, with cotton as main crop.
d. **Lateritic soil** is found in the zone of highest rainfall (>1800 mm) in Southern Gujarat and supports good forests like in The Dangs.
e. **Tropical ferruginous soil** covers the hilly areas and small hillocks in the eastern and southern regions, and is considered as good forest soil, like in the Gir forests.
f. **Holomorphic soil** covers are present in the plains of the Rann of Kachchh, the Bhal and the coastal areas. Due to their inherent high salinity, these soils support very little vegetation.

2.7.10 Meterology

Climatically, Gujarat experiences a predominantly sub-tropical weather, with the Tropic of Cancer passing through the state. Most parts of the state have sub-humid and semi-arid climates merging in the arid zone in the North and North-West; geographically, about 58% of the state falls in the arid and semi-arid zone categories. Atmospheric conditions in the state are influenced mostly by the monsoon climate regime, physiography, insularity and the neighbouring Thar Desert in the North.

The state has four distinct seasons: the winter from December to February, the summer from March to May, south-west monsoon from June to September and autumn from October to November. The Indian Meteorological Department (IMD) has divided Gujarat into two climatic sub-divisions based on mean annual rainfall: (i) mainland Gujarat, which receives 800-2000 mm; and (ii) Saurashtra (including Kachchh), which receives only 300-600mm. Rainfall follows an upward gradient from west to east, and it rains more in most parts of the 1600 km long coastal region. The average annual rainfall is about 828 mm, but some parts of the state, about 20% of the total area, are considered drought prone.

2.7.11 River systems

The state has 185 river basins, with the largest number being in Kachchh (97), followed by Saurashtra (71), and then mainland Gujarat (17); most of these rivers are seasonal in nature. In terms of volume of water 38,100 million cubic meters (mcm) is carried in them, of which major shareholder is mainland Gujarat (89%), followed by Saurashtra (9%) and Kachchh (2%).

[12]Gaussen, H., Legris, P., Blasco, F., Meher-Homji, V.M. and Troy, J.P. 1992. International Map of the Vegetation- Notes on the sheet Kathiawar. Institut Francais de Pondichery.

South and Central Gujarat are endowed with three large perennial rivers, viz., Mahi, Narmada and Tapi and a few smaller ones, such as the Damanganga. These rivers drain into the Gulf of Khambhat. North Gujarat has very few rivers and most of them are seasonal. The most important ones include the Sabarmati, Banas, Rupen and Saraswati. They carry stream flows only during the monsoons, for three to four months. The Sabarmati also drains into the Gulf of Khambhat. In Saurashtra, major rivers are either flowing towards the Little Rann of Kachchh or the Gulf of Khambhat; Shetrunji, Aji, Machhu are the better-known ones here. In Kachchh, most of the rivers are small in length. Khari and Rukmavati are important rivers in this region which drain into the Gulf of Kachchh.

Table 2.10 Major rivers of Gujarat, their catchment areas and dams thereon

Sl.	Region	River	Catchment area (sq km)	Drains into	Major Dam/s
1	East Gujarat	Sabarmati	21,674	Gulf of Khambhat	Dharoi
2		Mahi	34,842	Gulf of Khambhat	Kadana, Panm
3		Banas	8,674	Little Rann of Kachchh	Dantiwada
4		Narmada	97,410	Gulf of Khambhat	Sardar Sarovar
5		Tapi	65,145	Arabian Sea	Ukai
6		Damanganga	2,318	Arabian Sea	Damanganga
7	Saurashtra	Shetrunji	5,514	Gulf of Khambhat	Shetrunji
8		Bhadar	7,094	Arabian Sea	Bhadar (I-II)
9		Aji	2,130	Little Rann of Kachchh	Aji (I-IV)
10		Machhu	2,515	Little Rann of Kachchh	Machhu-2
11		Saraswati (Gir)	370	Arabian Sea	-
12	Kachchh	Khari	113	Arabian Sea	Jagadia
13		Rukmavati	448	Gulf of Kachchh	Vijaysagar

Source: Compiled by JICA Survey Team based on the Data of Narmada Water Resources Water Supply and Kalpsar Department (https://guj-nwrws.gujarat.gov.in/showpage.aspx?contentid=1&lang=english)

2.7.12 The Coastal System

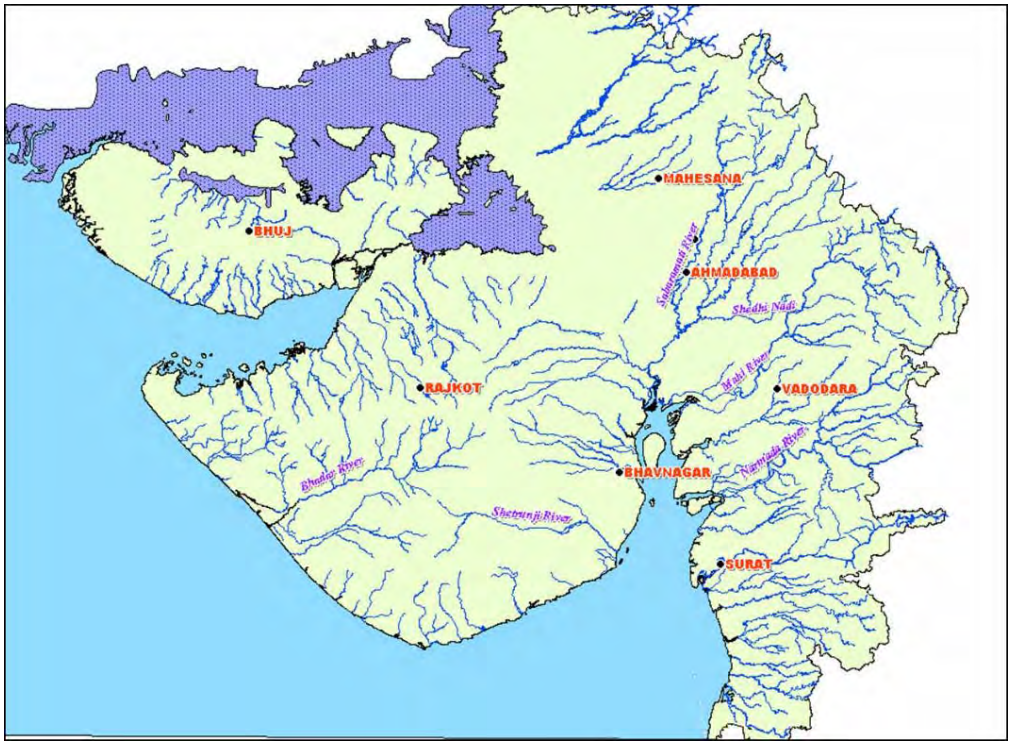
Gujarat has more than 1,600 km long coastline, the longest among Indian states, and the most extensive continental shelf of nearly 164,000 km^2. These represent nearly 20 and 32 percent of India's coastline and continental shelf respectively. Four major, 25 minor and 5 desert rivers discharge into the coastal waters. The coastal system of the state supports diverse habitats; some of the important natural coastal and marine habitats in Gujarat waters include mangroves, coral reefs, sea-grass beds, sandy and rocky beaches, mud flats, estuaries and creeks. Also, the entire coast line is embedded with(man-made) salt pans.

Table 2.11 Coastal habitat types, numbers and area

Habitat Category	Area (sq km)
Lagoon	222.89
Creeks	1498.98
Sand/ Beach	65.08
Intertidal Mudflats	22603.65
Salt Marsh	1442.68

Habitat Category	Area (sq km)
Mangroves	904.75
Coral Reefs	335.47
Salt Pantal habitat types, numbers and area	908.78

Source: SAC, 2010



Source: https://guj-nwrws.gujarat.gov.in

Figure 2.6 Rivers of Gujarat and their tributaries

A unique feature of the state is the presence of two gulfs – the Gulf of Kachchh and Gulf of Khambhat (Cambay) with distinctive characteristics. Gulf of Khambhat is known for its extreme tides, going up to 12 meters. The Gulf of Kachchh has greater depth, calmer tidal rise and thus greater suitability for port and other developmental activities. In ecological terms, the Gulf of Kachchh supports more diverse ecosystems than Khambhat, as evidenced from the preceding paragraphs. The Gulf of Khambhat, on the other hand, provides estuarine habitats of nine rivers including: Sabarmati, Mahi, Narmada, Kim, Tapi, Purna, Ambika, Auranga and Damanganga.

Table 2.12 Key ecological characteristics of the Gulf of Kachchh and Khambhat

Sl	Aspect	Gulf of Kachchh	Gulf of Khambhat
1	Area (sq.km.)	7,350	3,120
2	Water Balance	Negative: evap. > inflow & rain (evap. 7350 MCM/Yr)	Positive, evap. < Inflow & Rain (evap. 1560 MCM/yr)
3	Residence/ Turnover Time	8 to 51 days	4 to 15 days
4	Pollution Load	Low	High
5	River Flow – volume of water (mcum/annum)	140	38,000
6	Tidal range (m)	3 – 8	3 – 12

Sl	Aspect	Gulf of Kachchh	Gulf of Khambhat
7	Primary Production	Relatively High	Low (almost 1/10th)
8	Mangroves Extent	High	Less
9	Corals	34 islands with coral reefs	Absent
10	Estuaries	Nil (only seasonal streams)	Several

Source: Sengupta & Deshmukh, 2000

2.7.13 Rann of Kachchh

Kachchh district encompasses one of the world's largest saline and marshy tracts- the Great Rann of Kachchh (GRK) and Little Rann of Kachchh (LRK). Due to a complex interplay of marine transgressional processes, soil characteristics, geo-morphology, neo-tectonics and climatic fluctuations, the two Rann took the present form of a huge landmass with monotonous flatness, high salinity and annual inundation patterns. With an average altitude of about 15 meters above mean sea level, both the Rann appear like a table-top surface, interspersed with small uplands (islands) locally called 'bets'.

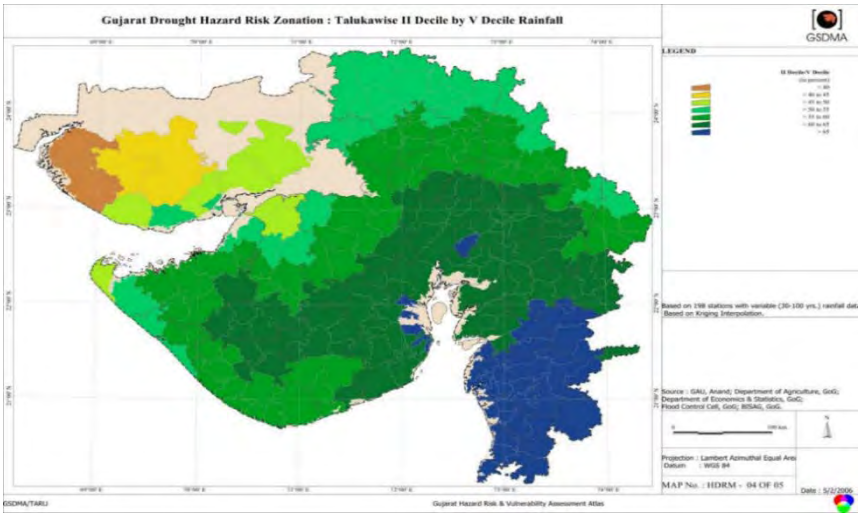
GRK, spanning over an area of about 16,780 sq km, is one of the most remarkable and unique features of Kachchh and probably one of its own kinds in the entire world due to its wilderness value. In dry period after the monsoon, when the water evaporates, a thick layer of salt covers large tracts of GRK, giving it a very unusual snow-white appearance. All these factors make this land area completely inhospitable for any kind of human use. However, due to its near wilderness status and water inundation pattern, mostly determined by inflow of tidal water from the Kori Creek, it provides an ideal habitat for breeding of flamingos, one of the largest such sites in the world. Due to the presence of geologically diverse rocks, many bets also support rich fossilized fauna, including the skulls of dinosaurs and wood fossils (Singh, 2001). Large part of the GRK is covered under the Kachchh Desert Wildlife Sanctuary. The Khadir bet in GRK is also famous for Dholavira, one of the important archaeological sites of the Harappan period. Except in Khadir bet, GRK does not support any human habitation.

LRK is located on the eastern fringe of Kachchh and encompasses an area of about 5,180 sq km. Compared to GRK, it is significantly different in terms of its silt deposition and inundation dynamics. It is mostly fed by many monsoonal rivers (like Banas, Rupen, Saraswati) and tidal water from Surajbari Creek, which therefore creates brackish water wetlands. Due to inflow of freshwater, the level of salt on the soil surface is lower than in GRK. The LRK is one of the Gujarat's biodiversity hotspots and famous for the last remaining population of endemic Wild Ass (Equus hemionus khur); to protect this and other large numbers of resident and migratory bird species, the LRK was declared as the Wild Ass Sanctuary (WAS) in the year 1972. During a good monsoon year, LRK produces a bounty of brackish water fisheries, especially the endemic prawn (Metapenaeus kutchensis). During summer and post-monsoon, the LRK is the hub for thousands of salt manufacturing units, using underground brine water.

2.8 Natural Disasters

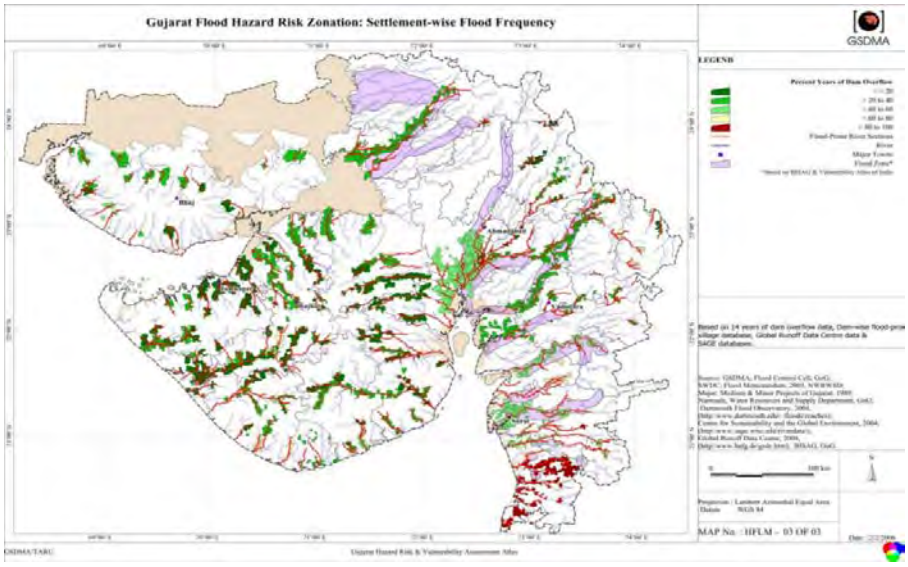
Gujarat is prone to four types of major natural disasters: earthquake, cyclone, drought and floods, with droughts and floods being more frequent occurrences. Under the direction and supervision of the Gujarat State Disaster Management Authority (GSDMA), every district has an emergency preparedness and disaster management plan, with time-bound implementation measures and clear lines of command and control. Drought and flood proneness maps of the state are placed as Figures 2.7 and

2-8 respectively. Some of the major natural disasters experienced in the state are listed in Annexure 2-4.



Source: GSDMA, 2016

Figure 2.7 Drought proneness map of Gujarat showing taluka boundaries



Source: GSDMA

Figure 2.8 Map of Gujarat indicating 'flood zones' and flood prone river sections

2.9 Climate Change Scenario in Gujarat

Climate change is one of the most pressing environmental issues with both local and global implications. Global warming is one of the major symptoms of climate change; data conclusively suggest that its influence is visible in multiple ways, including ocean warming, rise in average global temperatures, mean sea level temperature, wind patterns, etc. Some of the other impacts of climate change include, melting of glaciers and shrinking of polar ice mass, ocean acidification, increasing frequency of extreme events like flood, cyclone, droughts etc., change in crop phenology, loss of biodiversity etc. Increasing level of greenhouse gases (GHG) is a major contributing factor; at the global level, CO2 levels had increased to 400 ppm by 2014, about 1.5 times more than in the pre-industrial era and continues to rise further.

Considering that various climate change projections use complex, data-driven modelling tools, their projections are usually made at regional or global scales. Further, given the inter-connected nature of these impacts, it is very challenging to make reliable forecasts about climate change at the state-level. Nevertheless, analysis of key parameters such as temperature, rainfall pattern, etc., indicate that the situation is rapidly changing. For example, between 1969 and 2005, the mean maximum and minimum temperature of the state has increased by 0.11°C and 0.107°C, respectively. The data also indicate that at the state level there is an increase in frequency of heat waves, while there is a decline in cold wave events[13]. The tide gauge records suggest that in Kandla and Okha coasts of Gujarat, sea level is rising at the rate of 1.3 mm per year[14]. Regional Climate Models indicate that, compared to 1970, annual average surface temperature of the state is projected to rise in the range of 1.5 to 2.5°C by 2030. Monsoonal rainfall is also projected to increase by about 6 to 8 percent in the same period. The regional model (PRECIS) simulation of cyclone tracks and intensity show that the cyclonic disturbances over Arabian Sea may be less during the 2030s vis-à-vis 1970s, but their intensity would be higher.

Given the fact that the state has the longest coastline and the largest continental shelf among all Indian states, global climate change impacts are particularly worrisome for the state. Thus, compared to other parts of the country, the state is more vulnerable on following key sectors which have a direct bearing on people's livelihoods: agriculture, fisheries, animal husbandry, and salt industry. In addition, important ecosystems which are very important for biodiversity values, such as the wetlands, mangroves, coral reefs, grasslands, etc., are particularly vulnerable. Following are some of the projection scenarios of impact of climate change in Gujarat:

- Adverse effect on crop yields: the maximum yield reduction (-61%) is projected in wheat and lowest in pearl millet (-<8%). Kharif yield of maize would be affected more (-47 %) than that in the Rabi season (-10%) (based on InfoCrop and DSSAT models)
- Loss of wetlands: A ten cm rise in sea level could result a loss of about 2500 km2 of wetland area in the state. The major effect will be on mudflats and its supporting fauna including migratory species, such as the flamingos that breed in Gujarat
- Events of coral bleaching will increase due to increased sea surface temperature and ocean acidification.
- Impact on forests: Based on simulations performed on different models, it has been shown that more than half of the area under forests, including of Gujarat, is vulnerable to climate change impacts (based on regional climate (RCM) and BIOME 4models).

To comprehensively address the issues arising from climate change in the state, the GoG has established a Department of Climate Change in 2009, which has the following main objectives:

- Mainstreaming climate change perspectives in different departments and building their capacities
- Generate strategic knowledge for informed decision making for climate resilience
- Enabling a low carbon pathway for Gujarat's economic growth
- Empowering communities for participatory and decentralized actions on climate change
- Creating public awareness and education programs on climate change

Conclusion: Gujarat has a robust socio-economic system and well-oiled administrative system and it seeks to address the socio-economic issues by improving the conditions of the disadvantaged groups

[13]Ray, K., Mohanty, M and Chincholikar, J.R. 2009. Climate variability over Gujarat, India. Proceedings of Archives XXXVIII-8/W3 Workshop: Impact of Climate Change on Agriculture.

[14]Unnikrishnan, A.S. and Shankar, D. 2007. Are sea-level-rise trends along the coasts of the north Indian Ocean consistent with global estimates? Global and Planetary Change.

even as it strives to improve economic productivity. The natural endowments of the State are its critical important resource base and the sustainable management of the same is important for achieving the twin objectives of economic progress and ecological stability.

CHAPTER 3 FORESTS, OTHER CRITICAL ECOSYSTEMS AND THE MANAGEMENT SYSTEM

This chapter profiles the important ecosystems in the State, especially the forests, grasslands, wetlands and the coastal system as well as the wildlife, describes the legal and policy framework for natural resources management as well as the institutional systems for the same and the community organizations involved in conservation in partnership with the Forest Department.

3.1 Forests

Gujarat has rich and diverse forest coverage although limited in size of the area in relation to the geographical size of the state. The edaphic and climatic conditions and the presence of four mountain systems along the eastern side of the State, namely, the Western Ghats, the Vindhya and Satpura, and the Aravalli mountain ranges, from south to north gives Gujarat a special geophysical setting for natural forests to grow. The legally recorded forests in the state totals 21647 sq km area that is 11.03 per cent of the geographical area of the state amounting to 0.04 ha per capita[15]. Of the total recorded forests, 66.39 per cent is Reserve Forests, 13.33 per cent is Protected Forests and 20.28 per cent is unclassed forests.

3.1.1 Forest types of the State

The diverse agro climatic conditions of the state lead to varying forest types in the state. Distribution of forests and its types undergo major changes from north to south and east to west. The forests of Gujarat are part of following major types of forests as per Champion and Seth[16] classification of forest types.

(1) Moist deciduous forests – The forests of southern most districts Dangs, Valsad, Navsari, Vyara, Surat and some parts of Narmada. They are the source of commercial timber with *Tectona grandis, Adina cardifolia, Terminalia crenulata, Bambusa bambos, Dendrocalamus strictus* etc being the main species.
(2) Dry mixed deciduous forests – Central Gujarat and parts of Saurashtra that receive moderate annual rainfall (600-800mm). Teak, *Tectona grandis*, remains the dominant species (about 30%), *Terminalia crenulata, Lannea coromandelica, Boswelia serrata*, and *Dendrocalamus strictus* being the other important species.
(3) Dry scrub forests - Located in northern and western regions of state, the region receiving low rainfall <600mm. Thorny tree and shrub species dominate the vegetation. *Acacia species, Anogeissus latifolia,* and *Ziziphus mauritiana* are commonly found in these forests.
(4) Mangrove forests – Mangrove occupy muddy coasts. *Avicinea marina, Rhizophora mucronata* and *Ceriops tagal* are the main species of Gujarat mangroves.

3.1.2 Forest cover in the State

The India State of Forest Report 2017 produced by the Forest Survey of India, Dehradun estimates the forest cover in Gujarat at 14,757 sq km, which is 7.52% of geographical area of the state. The tree cover outside the forests is 8024 sq km, making the total forest and tree cover 22781 sq km, which is 11.61% of the geographical area of the state. The State of Forest Reports are produced biannually, and it classifies forest coverage as follows: Very dense forests- where canopy cover is 70% and above; Moderately dense forests- where the canopy cover is from 40 to 70%; Open forests- 10 to 40% and less than 10% is scrub. Table 3.1 below gives detailed breakup of the different classes of forests in Gujarat.

[15]India State of Forest Report 2017.Forest Survey of India, Dehradun.
[16] Champion H G and S K Seth, 1968. *A revised survey of the forest types of India*. Government of India, New Delhi

Table 3.1 Forest and Tree Cover in Gujarat

Forest cover within recorded Forest area	Area in sq km
Very dense forest	353
Moderately dense forest	4,741
Open forest	5,156
Total	10,250
Forest Cover outside recoded forest area	
Very dense forest	25
Moderately dense forest	459
Open forest	4,023
Total	4,507
Total Forest cover	14,757
Of the State's geographical area	7.52%
Tree cover	8,024
Total forest and tree cover	22,781
Of State's geographical area	11.61%
Of India's forest tree cover	2.84%
Per capita forest and tree cover	0.04 ha

Source: India State of Forest Report 2017, Forest Survey of India, Dehradun

There has been a net increase of 47 sq km of forest cover from 2015, attributed to plantations within and outside the legally recorded forests and the gains in mangrove forest cover. There is marked difference in the coverage of forests in the different districts of the State. The forests are distributed mainly in the hill districts along the eastern length of the state. The distribution of the various classes of forests as of 2017 in the different districts and the change in forest cover in relation to the 2015 State of Forest Report are given in the table below.

Table 3.2 District wise forest coverage in Gujarat

No	District	Geo-graphical Area	Very Dense Forest	Moderate Dense Forest	Open Forest	Total	% of FA to GA	Change in forest cover*	Scrub
1	Ahmedabad	8107	0	12	117	129	1.6	-1	52
2	Amreli	7397	0	63	188	251	3.4	1	66
3	Anand	3204	0	18	45	63	2	0	19
4	Banaskantha	10743	0	372	476	848	7.9	1	208
5	Bharuch	6509	0	71	243	314	4.8	2	26
6	Bhavnagar	10034	0	47	230	277	2.8	5	76
7	Dahod	3642	1	118	419	538	14.8	1	45
8	Gandhinagar	2140	0	11	81	92	4.3	0	50
9	Jamnagar	14184	0	55	380	435	3.1	12	99
10	Junagadh	8831	15	956	663	1634	18.5	17	60
11	Kachchh	45674	0	301	2011	2312	501	11	752
12	Kheda	3953	0	20	74	94	2.4	0	37
13	Mehsana	4401	0	13	146	159	3.6	-1	64
14	Narmada	2817	20	464	479	963	34.2	-2	32
15	Navsari	2246	18	125	159	302	13.4	2	15
16	Panchmahals	5231	0	219	518	737	14.1	-5	57
17	Patan	5792	0	1	101	102	1.8	1	126
18	Porbandar	2316	0	16	108	124	5.3	0	20

No	District	Geo-graphical Area	Very Dense Forest	Moderate Dense Forest	Open Forest	Total	% of FA to GA	Change in forest cover*	Scrub
19	Rajkot	11198	0	3	138	141	1.3	0	37
20	Sabarkantha	7394	29	304	474	807	10.9	1	130
21	Surat	4549	5	294	216	515	11.3	1	90
22	Surendranagar	10423	0	6	169	175	1.7	-2	36
23	Tapi	3139	80	479	251	810	25.8	1	7
24	Dangs	1766	210	743	415	1368	77.5	1	3
25	Vadodara	7546	0	145	484	629	8.3	0	60
26	Valsad	3008	0	344	594	938	31.2	1	27
	Total	1,96,244	378	5200	9179	14757	7.52	47	2194
*Change in forest cover between 2015 and 2017 State of Forest Reports									

Source: India State of Forest Report 2017.

3.1.3 Forest degradation

There has been a progressive reduction in the forest coverage in the state until the recent past, leaving the state with only 7.5% forest cover. Significant parts of the open lands in the forest are grasslands; yet there are large tracts of degraded forests that need attention. The causes of forest reduction include over-grazing, fuel wood collection and illegal encroachments. The diversions of forests for non-forestry purposes have also played a significant role in the reduction in forest cover. During the financial year 2017-18 a total of 342.05 sq km of forest was cleared under the Forest (Conservation) Act for various development projects and the cumulative area of forest cleared during the past 17 years stands at 10,777.06 sq km[17]. However as mentioned earlier there has been marginal increase in the net forest cover during 2015-17, largely owing to plantations and mangrove restoration.

3.1.4 Afforestation by GFD

Afforestation is the major program of GFD. Annually more than 50,000 ha afforestation works are done by GFD under various schemes of plantation. The GFD has undertaken afforestation in 56864 ha during 2018-19, the areas of afforestation undertaken during the past five years is given in the table below. Seedling distribution is an important component of the social forestry program of GFD. Annually about 100 million seedlings are made available to people of the state for planting. To enlist participation of people campaigns are organized to celebrate Vanmahotsav at state and district level.

Table 3.3 Afforestation and seedling distribution by GFD

Year	Plantation ha	Seedling distribution million
2014-15	53,958	102
2015-16	60,245	71.1
2016-17	51,810	113.9
2017-18	50,227	93.8
2018-19	56,864	n.a

Source: Monitoring Branch Gujarat Forest Department, Gandhinagar

[17]Gujarat Forest Statistics 2017-18. Gujarat Forest Department.

3.1.5 Forest produces

Forest produces are grouped as timber and fuel wood, and non-timber forest produce (NTFP). The outturn of timber and fuel wood produced from the forests of Gujarat for the period 2013-14 to 2017-18 is provided in Table 3.4. However, much higher quantities are produced from farmlands. A large volume of timber is imported and Kandla port in Gujarat serves as a major center for landing imported timber in India. Annual timber import from Kandla is about 4 million cubic meters. Thus, timber trade in Gujarat is of much higher order, but production from forest in this context is relatively small.

Table 3.4 Timber Fuel wood Production from the forests of Gujarat

S.R.	Year	Round wood '000 m3	Sawn wood '000 m3	Other timber '000 m3	Total timber '000 m3	Fuel wood '000 MT
1	2013-14	7.73	0.098	22.788	30.616	110.221
2	2014-15	5.205	0.564	13.112	18.88	68.943
3	2015-16	11.036	0.025	11.658	22.719	179.777
4	2016-17	544.641	0	455.313	999.954	2,642.186
4	2017-18	606.742	0.912	308.483	913.973	964.847

Source: Gujarat Forest Statistics 2017-18. Principal Chief Conservator of Forests & Head of Forest Force, Gandhinagar

The Gujarat forests produce significant quantities of a number of NTFP. These include bamboo, grasses, bidi leaves (Timru- Dispyros melanoxylon leaves), mahuva (Madhuca longifolia) flower and seeds, gums, myrobalans, non edible oil seeds like Neem (Azadirachta indica), Karanj, Piloo, Khakhra (Butea monosperma), honey and wax. Gujarat Forest Development Corporation plays pivotal role in marketing NTFP other than Bamboo and grasses. The quantities of NTFP collected by the GFD directly and by the GFDC and their financial values are given in Annexure. 3.1.

3.1.6 Working Plans

The forests in each Forest Division is managed and developed in line with a ten year Working Plan prepared for each Division, based on a Working Plan Code and approved by the Ministry of Environment and Forest. The Working Plans prescribes the interventions to be undertaken within the Division during its period. The current status of Working Plans for the various Divisions is provided in the table below. Wherever the period has lapsed, the Working Plans are being revised. The Working Plans divide the Divisions into functional Working Circles, on themes such as afforestation, restoration and enrichment, JFM, development and conservation, etc. and assign respective responsibilities across the smaller administrative units.

Table 3.5 State of Working Plans for Forest Divisions

No	Forest Division	Period
1	Dangs *	1997-98 to 2012-13
2	Valsad **	2004-05 to 2013-14
3	Vyara	1999-00 to 2018-19
4	Rajpipla(Narmada)	2017-18 to 2026-27
5	Chhotaudepur	2017-18 to 2026-27
6	BariaDivision	2008-09 to 2017-18
7	Junagadh	2017-18 to 2026-27
8	Kachchh**	2003-04 to 2012-13
9	Bhavnagar	2017-18 to 2026-27
10	Sabarkantha	2017-18to 2026-27

No	Forest Division	Period
11	Gandhinagar	2017-18 to 2026-27
12	Surendranagar	2017-18to 2026-27
13	Jamnagar	2012-13 to 2021-22
14	Banaskantha	2017-18 to 2026-27
15	Panchmahal& Kheda	2008-09 to 217 - 18
16	BanniPro.Forest	2009-10 to 2019-20
17	Rajkot	2012-13to 2021-22

Existing Working Plan extended upto 15 years by State Level Committee.
***Working Plan under revision*

3.2 The wildlife

3.2.1 The wildlife profile of the State

Natural habitats in Gujarat vary from dry, saline Ranns of Kutch, grasslands (or vidis), rivers, wetlands and reservoirs, coastal area with mangroves and coral reefs, dry deciduous forests and moist deciduous forests. This diversity has contributed to diversity of ecosystems and species of the State.

The total number of recorded species of flora and fauna in Gujarat is estimated to be over 7,360, which may be much less than the number of total species in reality. The total number of plant species recorded in Gujarat is given in the table below. Out of the best-known and recorded groups of animals in India, Gujarat has 24% of the fish, 24 % of the reptiles, 37% of the birds and 27 % of the mammals.

Table 3.6 Recorded number of plant species in India and Gujarat

Taxon	No. of species		Taxon	No. of species	
	India	Gujarat		India	Gujarat
Algae	2,500	1,933	Pteridophyts	1,022	16
Fungi	23,000	164	Gymnosperms	64	1
Bryophyta	2,700	8	Angiosperms	17,000	2,198
			Total	46,286	4,320

Source: Gujarat Ecological Society, Vadodara (2002). State Environment Action Plan Sub Component Biodiversity Conservation, sponsored by World Bank.

Table 3.7 Recorded number of animal species in India and Gujarat

Animal group	Number of species reported in Gujarat	Number of species reported in India	Percentage representation
Protozoa	255	2,577	9.89%
Porifera	64	519	13.20%
Cnidaria	78	237	32.90%
Ctenophora		10	
Platyhelminthes		1,622	
Nematoda		2,350	
Rotifera	87	310	28.06%
Kinorhyncha		10	
Gastrotricha		88	
Acanthocephala		110	
Sipuncula	15	38	39.40%
Mollusca	350	5,042	6.90%
Echiura	11	33	33.30%

Animal group	Number of species reported in Gujarat	Number of species reported in India	Percentage representation
Annelida	69	1,093	6.30%
Onychophora		1	
Arthropoda	743	57,525	1.29%
Phoronida	1	3	33.30%
Bryozoa	42	170	24.70%
Entoprocta		10	
Brachiopoda	1	3	33.30%
Chaetognatha	6	30	20%
Echinodermata	15	765	1.96%
Hemichordata		12	
Protochordata		116	
Pisces	351	2,546	14.29%
Amphibia	19	204	9.30%
Reptilia	91	428	21.26%
Aves	454	1,228	36.97%
Mammalia	94	372	25.26%

Source: Gujarat Ecological Society, Vadodara (2002). State Environment Action Plan Sub Biodiversity Conservation,

Table 3.8 Diversity in different groups of vertebrates in Gujarat

Class	Orders	Families	Genera	Species
Mammalia	12	33	68	101 (107)
Aves	17	59	228	452 (479)
Reptilia	4	20	61	89 (107)
Amphibia	2	5	8	18 (19)
Pisces	34	136	317	606
Freshwater	8	24	60	119
Marine	26	112	257	487

Source: ZSI (2000). Fauna of Gujarat (Part-I), Vertebrates State Fauna Series 8, Zoological Survey of India, Calcutta.

The diversity of fauna in different groups is given in the table above. The wild biodiversity of Gujarat consists of 4,320 species of plants and 2,763 species of animals documented. These include microorganisms, plants and animals, which exist in undomesticated and uncultivated state. Gujarat is home to two endangered mammals - the Asiatic Lion and the Asiatic Wild Ass; an endemic amphibian Ichthyophis bombayensis. There occur over 37 species of corals; and about 35 % of bird species found in the country including the endangered Great Indian Bustard, Lesser Florican and Sarus Crane are some aspects of Gujarat's diversity of wild species.

3.2.2 Protected Areas

There are 28 wildlife PAs in the state, 4 National Parks, 23 sanctuaries and 1 Conservation Reserve. The PA network is spread over 17099.93 sq km. Though geographical area of Gujarat is only 5.9% of the country, PA network of Gujarat is about 11.37% to the total PA area of the country (148532 sq km). A profile of the Protected Areas of Gujarat is given in the table 3.9 It is worth pointing that only 4,640.58 sq km of the PA area is forestland and larger contribution to PA area comes from non-forest areas of state. The PA network covers all the available bio-geographic zones in the state. It includes wetlands one of which namely Nalsarovar is a Ramsar site. Gujarat is the only home to Asiatic lion and Wild Ass. Other important wildlife species found in Gujarat include sloth bear, black buck, wolf, caracal, Great Indian Bustard, Lesser florican, a large number resident and migratory birds and marine life

including corals.

Table 3.9 Protected Areas of Gujarat

#	Name of PA	Year of Notification	Area (sq km)	District	Highlights
National Parks					
1	Gir National Park	1975	258.71	Junagadh	Known for conservation of Asiatic Lion
2	Velavder National Park	1976	34.53	Bhavnagar	Flagship species Blackbuck, Other species Indian Grey wolf, known for congregation of harriers, breeding of Lesser Florican
3	Vansda National Park	1979	23.99	Navsari	Located in a patch of moist deciduous forests with Leopard as large carnivore.
4	Marine National Park	1982	162.89	Jamnagar & Devbhumi Dwarka	Marine biodiversity, corals
	Total		**480.12**		
Sanctuaries					
1	Kachchh Bustard Sanctuary	1992	2.03	Kutch	Flagship species Great Indian Bustard
2	Jambughoda WLS	1990	130.38	Panchmahal	Flagship species Sloth bear
3	Balaram WLS	1989	542.08	Banaskantha	Flagship species Sloth bear
4	Shoolpaneshwar WLS	1982	607.7	Narmada	Flagship species Sloth bear
5	Jessor Sloth Bear WLS	1978	180.66	Banaskantha	Flagship species Sloth bear
6	Purana WLS	1990	160.84	Dang	Located in a patch of moist deciduous forests with Leopard as large carnivore
7	Hingolgdh WLS	1980	6.54		Wilderness area known for Nature education
8	Khijadia Bird Sanctuary	1981	6.05	Jamnagar	Wetland known for diverse avifauna.
9	Nalsarovar Bird Sanctuary	1969	120.82	Ahmedabad	Ramsar site. Known for diverse avifauna.
10	Barda WLS	1979	192.31	Porbandar	Being developed as alternate home for Asiatic lion
11	Gaga WLS	1988	3.33	Jamnagar	Wilderness area with significant biodiversity including Indian Grey Wolf
12	Rampara WLS	1988	15.01	Morbi	Wilderness area. Home to grass land bird species and significant floral diversity.
13	Narayan Sarovar Chinkara WLS	1995	443.61	Kutch	Flagship species Chinkara also known for Caracal
14	Marine Sanctuary	1982	295.03	Jamnagar & Devbhumi Dwarka	Marine biodiversity, corals
15	Porbandar Bird Sanctuary	1988	0.09	Porbandar	Wetland known for diverse avifauna
16	Wild Ass WLS	1973	4953.7	Little Rann of Kutch	Flagship species Wild Ass
17	Thol Lake WLS	1988	6.99	Ahmedabad	Wetland known for diverse avifauna.
19	Ratanmahal Sloth Bear WLS	1982	55.65	Dahod	Flagship species Sloth bear

#	Name of PA	Year of Notification	Area (sq km)	District	Highlights
18	Girnar WLS	2008	178.87	Junagadh	Parts of Gir PA network, known for conservation of Asiatic lion. Area rich with diverse fauna including avifauna
20	Gir WLS	1965	1153.42	Junagadh and Amreli	
21	Paniya WLS	1989	39.64	Amreli	
22	Mitiyala WLS	2004	18.22	Amreli	
23	Kachchh Desert WLS	1986	7506.22	Kutch	In Great Rann of Kutch
	Total		**16619.19**		
Conservation Reserve					
1	Chhari - Dhandh Conservation Reserve	2008	227	Kutch	Wetland in Great Rann of Kutch. Known for large congregation of migratory birds

Gujarat Forest Statistics- 2017-18. Principal Chief Conservator of Forests & Head of Forest Force, Gandhinagar

3.2.3 Human-wildlife conflicts

Successful wildlife conservation in Gujarat and the expansion of human habitation in modern times has thrown up challenges for wildlife conservation. It is cause of human wildlife conflict in many parts of the state. There are conflicts due to carnivores mainly leopard and crocodile and occasionally due to lion. There are instances of conflict due to sloth bear that are increasing with time. Herbivores too cause significant damage to agriculture crops leading to distress among farmers. Blue bull and wild boar cause crop damage in large parts of the state. There are localized instances of crop damage due black buck, Sarus crane and vultures too. The Table 3.10 presents the population of wild animals involved in HWC in Gujarat. **Table** 3.11 shows the details of instances of HWC caused by carnivores.

Table 3.10 Population estimates of key mammals involved in HWC

Species	Population estimate no. (year)	Population estimate no. (year)
Asiatic lion	411 (2010)	523 (2015)
Leopard	1160 (2011)	1395 (2016)
Sloth bear	293 (2011)	343 (2016)
Blue bull		186770 (2015)
Wild boar		179500 (2015)

Source: Wildlife Branch, Gujarat Forest Department, Gandhinagar

Table 3.11 HWC record

HWC type	2014-15	2015-16	2016-17	2017-18	2018-19
Lion					
Human death	0	3	4	0	2
Human injury	21	14	23	18	15
Leopard					
Human death	11	12	9	12	14
Human injury	122	105	109	101	120
Sloth bear					
Human death	*n a	0	3	0	0
Human injury	34	10	13	16	9
Crocodile					
Human death	n a	4	6	5	3
Human injury	10	8	5	9	12

*Source: Wildlife Branch, Gujarat Forest Department, Gandhinagar (*not available)*

The local communities, especially in the lion landscape, by and large support conservation. Yet, the

death and injury to human result in resentment negating the work of the forest department field staff in raising awareness for wildlife conservation. The instances of conflict in lion landscape indicate a less number of conflicts due to lion as compared to leopard. Crop damage by bluebull and wild boar are serious concerns among farmers. The government has introduced a scheme for subsidizing fencing of farmlands. Yet the concern remains.

3.3 Grasslands and their management

Grassland is an ecological system, which is mostly found in physiognomic forms of Savannah. Savannahs are areas with vegetation cover dominated by various grass species, scattered with bushes or trees, and are characteristic features of Gujarat's grasslands known as vidis. Although, in few pockets pure grasslands are also found, mainly due to directed management in such areas, so as not to allow woody vegetation to grow. Actually, Gujarat State, do not support true grasslands or savannahs of the climatic climax stage; instead they are found as tertiary seral communities, where the successional processes are arrested due to continued biotic interference like livestock grazing and to some extent by fire. Most of the grasslands of these regions are recorded in the physiognomic forms of either shrub or tree savannas[18,19,20.]

Except in some part of Gir, Girnar and Barda in Saurashtra, the entire region of Kachchh and Saurashtra had sparse thorny and scrub forests. The openness of area coupled with low and variable rainfalls, provided ideal ecological conditions for development of savannah grasslands in these regions. Interestingly, on the basis of climate, soil, and more importantly the physiographical differentiation, Gujarat support diverse grassland communities. Some of the major grassland areas of the state include the seasonally flooded regions of Banni, Bhal and fringe areas of Little Rann of Kachchh. Some parts of coastal tracts also have patches of good grasslands. The extent of grassland in the state is described in Annexure 3.2. In terms of vegetation types, grasslands of Gujarat can be grouped under three major types[21:]

- 5A/DS2 – Dry Savannah
- 5A/DS4 – Dry Grassland
- 5/E8- Saline or Alkaline Scrub Savannah

However, a countrywide survey of grasslands identified two distinct grass communities from Gujarat[22]:

i) *Sehima nervosum, Chrysopogon fulvus* and *Dichanthium annulatum* type on hilly, undulating terrain, including the intervening valleys.
ii) *Dicanthium annulatum, Cenchrus ciliaris, Cenchrus setigerus, Elusine compressa* and *Sporobolus marginatus* type on alluvial plains.

3.3.1 Management categories of Grasslands

In the context of Gujarat, the extent and distribution of grasslands and savannahs are critical for two counts: the conservation of biodiversity values and extraction of fodder through open grazing as well as by cutting, storing and distribution during scarcity period. For the administrative purpose, most of these grasslands and savannah systems are under the jurisdiction of Forest Department and are managed

[18]Singh, J.S. and Yadava, P.S. 1974. Seasonal variation in composition, plant biomass, and net primary productivity of a tropical grassland at Kurukshetra, India. Ecol. Monogr. 44 (3): 351-376.
[19]Gaussen, H., Legris, P., Blasco, F., Meher-Homji, V.M. and Troy, J.P. 1992. International Map of the Vegetation- Notes on the sheet Kathiawar. Institut Francais de Pondichery. Pp. 76.
[20] Whyte, R.O. 1974. Tropical Grazing Lands. Junk, The Hague, pp. 222.
[21]Champion, H.G. and Seth, S.K. 1968. A revised survey of the forest types of India. New Delhi.
[22]Dabadhgao, P.M. and Shankarnaryan, K.A. 1973.The Grass Cover of India. ICAR, New Delhi.

in two forms: Reserved Vidis and Non-Reserved Vidis[23]. During princely period, the main objectives of managing these vidis were to ensure supply of big games and grass for State purposes. Clearly, the creation of these vidis was a part of long-term strategy towards creating large blocks of forests and grassland tracts in the otherwise dryland region. Apart from Forest Department, there are substantial tracts of grasslands that are under private control, locally known as 'Private Vidis' and are managed by their owners. Other than the vidis, Gujarat also has large contiguous area of Banni grasslands (of more than 3,500 sq km) in Kachchh district, which is notified as Protected Forest but are under administrative control of Revenue Department.

Table 3.12 Extent and ownership of different types of grassland areas in Gujarat

Type	Approx. Area (sq km)	Land Ownership &Legal Status	Community Rights
Reserved Vidis	542	RF, under Forest Dept.	Rights non-transferable; Restricted Grazing
Non-Reserved Vidis	436	RF & PF under Forest Dept.	
Private Vidis	NA	Private Ownership	No rights
Banni Grassland	3,500	PF under Revenue Dept.	Forest Right Act applies, especially for Community Forest Rights; Free Grazing

Source: JICA Survey Team, 2019

3.3.2 Reserved and non-Reserved vidis

Forest Department, based on production potential, classified these areas into two main types: the reserved and non-reserved. The reserved vidis are those grasslands where annual average production of grass was more than 100,000 kg and in these vidis grass is protected, collected and stored by Forest Department and distributed during the period of scarcity. Reserved vidis are further grouped into A and B types. In 'A' types taliyata grazing [24] is not allowed even after the grass cutting, whereas in 'B' type taliyata grazing is allowed post-harvest.

Non-reserved vidis have less than one hundred thousand kilograms of annual average grass production and in most of the cases, local people are allowed to collect grasses to fulfill their needs. These are managed by Forest Department by leasing out the grasses through auctions to various agencies for annual grass collection like Gaushalas and Panjrapols[25], Maldhari Cooperative Societies, Village Panchayats and Milk Cooperatives- in the same order of priority. If none of the above bodies is keen to take non-reserve vidis, only then these vidis are put to open auction for collection of grass. A brief analysis of grassland production and distribution is presented in Annexure 3.3.

In Gujarat, there are 145 reserved and 469 non-reserved vidis, located mainly in Saurashtra and Kachchh, covering a total area of about 67,818 ha and 49,825 ha, respectively). Junagadh, Rajkot, Bhavnagar and Kachchh support large extent of grassland areas.

[23] In Kachchh, the equivalent terms for Reserve and Non-Reserve Vidis are Superior Rakhal and Inferior Rakhal.
[24] Taliyata grazing means grazing practice after grass are cut and removed.
[25] Charitable Trusts that maintain aged and left alone cattle

Table 3.13 District wise summary of reserve and non-reserve vidis and grass collection

SI.	District	Reserve Vidi		Non-Reserve Vidi		Grass Collected (100,000 kg)	Grass Godowns		Platform Godowns	
		No.	Area (ha)	No.	Area (ha)		No.	Storage Capacity (100,000 kg)	No.	Storage Capacity (100,000 kg)
1	Junagadh	30	5,658.35	82	2,678.06	32.74	43	60.25	5	9.25
2	Rajkot	18	6,292.89	123	4,963.54	30.12	31	50.50	12	18.00
3	Bhavnagar	18	6,529.87	29	1,407.13	44.71	33	52.75	7	9.50
4	Kachchh	18	19,420.36	28	22,649.61	6.91	32	41.25	0	0.00
5	Amreli	13	5,094.21	27	3,372.89	8.00	19	31.25	8	13.50
6	Jamnagar	9	3,816.20	44	2,449.54	28.09	28	44.00	7	10.50
7	Morbi	7	6,412.04	44	2,943.59	1.50	8	11.00	0	0.00
8	Surendranagar	6	3,671.90	12	479.98	3.65	13	16.70	0	0.00
9	Botad	5	622.36	16	428.66	1.42	4	6.50	0	0.00
10	Porbandar	3	3,299.64	22	2,609.34	7.15	9	15.00	0	0.00
11	Gir Somnath	3	388.93	24	4,455.46	0.28	2	3.20	0	0.00
12	Devbhumi Dwarka	1	90.14	18	1,387.49	0.00	5	4.00	0	0.00
13	Panchmahals	1	754.04	0	0.00	12.32	23	31.50	8	16.00
14	Dahod	13	5,766.86	0	0.00	23.24	41	72.60	10	22.50
15	Chhotaudepur	0	0.00	0	0.00	7.05	1	2.00	0	0.00
Total		145	67,817.79	469	49,825.29	207.18	292	522.50	57	99.25

Source: Gujarat Forest Statistics-2016-17

3.3.3 Biodiversity Values of Grassland of Gujarat

As a first consolidated account of the grasses in the state, Patel (1965) described 203 grass species belonging to 90 genera from different parts[26]. Dabadghao and Shankarnarayan (1973) during their landmark study reported 215 plant species, including 84 grass species, from grasslands of Saurashtra and Kachchh[27]. Some of the most frequently recorded perennial grass species include *Dichanthium annulatum*, *Chrysopogon fulvus*, *Heteropogon contortus*, *Sehima nervosum*, *Cenchrus setigerus*, *Eremopogon foveolatus*, *Cenchrus ciliaris*, *Eleusine compressa*, *Sporobolus marginatus*, *Cynodon dactylon*, *Cymbopogon martini*, *Desmostachya bipinnata*, *Iseilema laxum* etc.

Gujarat's grasslands are also known for supporting quite diverse faunal elements. The grasslands of Saurashtra and Kachchh support good avian diversity including of larks, finches, munias, partridges, harriers, bustards etc. Islam and Rahmani (2004)[28] reported more than 100 species of birds using semi-arid grasslands of the state for foraging and/or nesting purpose. Several bird species in the grasslands of Gujarat have been listed as threatened species in the IUCN Red Data Book. For example, Great Indian Bustard (GIB) and Lesser florican are two globally threatened species found in the grasslands of the region. Grasslands also support wild population of many mammalian species including lion, blackbuck, chinkara, wild ass and blue bull (Annexure 3.4). Grassland of Velavadar National Park is known for highest congregation of winter migratory harrier species that use this and adjoining grasslands for their roosting purpose. Importantly, about 25,000 ha area of vidis in the state are represented in seven protected areas of the State (Singh 2005).

[26]Patel, R.I. 1965. Grasses of Gujarat State. Indian Forester 91: 309-340.
[27] Ibid.
[28]Islam, M. Z. and Rahmani, A. R., 2004.Important Bird Areas in India: Priority sites for conservation. Indian Bird Conservation Network: Bombay Natural History Society and Birdlife International (UK).

Table 3.14 Area of Vidis represented in PA network of State

Name of Protected Area	Area (ha)
Gir Wildlife Sanctuary	5,580
Hingolgadh Nature Education Sanctuary	654
Rampara Wildlife Sanctuary	150
Velavadar National Park	3,408
Lala Bustard Sanctuary	203
Narayan Sarovar Wildlife Sanctuary	15,295
Gaga Wildlife Sanctuary	333
Total	**25,623**

Source: Singh, 2005

3.3.4 Grassland (Vidi) Management System

The grasslands are an integral part of economic sustenance of the pastoral communities in Gujarat (See Annexure 3.5). The first key policy decision regarding the management of grasslands of the State was to transfer administrative control of grasslands from Revenue to Forest Department. Later, based on the differences in production potential, all the grasslands were grouped into reserved and non-reserved vidis[29]. Following the recommendation of an expert committee in 1972, the state government has modified the definitions and working models of reserved and non-reserved vidis[30].

In 2015, the government issued a carrying capacity-based livestock grazing system and also Joint Forest Management system for non-reservd vidis (Govt. order no. MFP/12/2015/C.F. 28/M dt. 14/9/2015). Accordingly, in Non-reserve vidis, each adult livestock unit will get grazing access in two-acre area. Interestingly, for each maldharis, 16 adult livestock units can be allowed for free grazing in the non-reserved vidis. JFM committees can also be engaged in joint management of Reserved Vidis, the order stipulated. JFM Committee members have rights on 20% of total grass production of the vidis, which committee members can harvest. In case of no JFMC near reserved vidis, local people can engage in regular grass cutting practice, and eligible to take 10% of their cut grass at the rate of INR 1 per kilogram. Working Plans are the main basis for working direction in forest areas under State Forest Department[31]and thus the management of its resources, including the grasslands. These working plans are prepared in accordance with the national working plan code and are generally valid for 10 years. While the working plans decide the objectives of management for respective forest divisions, the treatment plans for specific areas are known as 'working circles'- the basic forest management unit in the working plan[32]. Grassland working circle is one of the key working circles in most of the forest divisions in Kachchh and Saurashtra regions. Accordingly, out of total working plan area of 489,000 ha in six grassland dominated forest divisions, 88,000 ha (i.e. about 18%) is covered under grassland working circles.

Table 3.15 Area under grassland working Circles in divisions of Kachchh & Saurashtra

SI.	Working Plan	Forest Divisions/ Sub-Divisions	Total Area (ha)	Grassland Working Circle Area (ha)
1	Junagadh	Junagadh &Porbandar	38,164	9,565
2	Bhavnagar	Bhavnagar	38,852	11,663

[29]Govt. order no. MFP-1660/1482-A dt.7/7/1962 (Source: Gujarat Forest Manual)
[30]Govt. order no. MFP/1072/93332-p, dt. 4/2/1976
[31] Separate management plans are the basis for various conservation and improvement measures in the Protected Areas.
[32]A working circle is defined as the area (forming the whole or the part of a Working plan area) organized with a particular objective and subject to one and the same silvicultural system and the same set of working prescriptions. In certain circumstances, however, two or more working circles may overlap (Gujarat Forest Manual).

SI.	Working Plan	Forest Divisions/ Sub-Divisions	Total Area (ha)	Grassland Working Circle Area (ha)
3	Jamnagar	Jamnagar	77,135	16,301
4	Surendranagar	Surendranagar	50,143	4,479
5	Kachchh	Kachchh East & West	284,842	46,448
Total			**489,136**	**88,456**

Source: Working Plans, Gujarat Forest Department

Based on satellite imageries of 1998, 2000 and 2005 periods, some of the Grassland working circle areas of Saurashtra were mapped for their grassland and woody vegetation cover. This is included in respective working plans and accordingly set some targets. The data suggested presence of about 44% and 15% of working circles of six districts are dense grass and tree covers, respectively. Since, there was no follow-up monitoring data of these areas available, it is difficult to suggest what way these compositions of grass and tree cover areas shifted over the years. But, considering the overall trend of invasion of Prosopis juliflora in most part of the state, it can safely be assumed that grassland areas have reduced.

Table 3.16 Grassland & tree cover under Grassland working circle of six Saurashtra districts

District	Grassland (ha)			Tree cover (ha)			Total Area (in ha)#
	Dense	Open	Degraded	Dense	Open	Sparse	
Amreli	911.02	238.08	17.46	469.51	956.67	259.16	2,858.88
Bhavnagar	4,318.12	1,042.73	15.80	421.83	2,248.02	923.82	8,972.06
Jamnagar	3,043.30	1,438.50	383.20	1,932.60	587.30	27.00	7,824.90
Junagadh	1,344.21	554.61	68.92	273.21	609.07	123.48	3,026.86
Porbandar	3,351.78	725.94	52.19	398.59	855.15	206.48	5,901.11
Rajkot	8,078.80	3,084.10	1,331.40	3,710.40	2,071.80	269.20	19,417.20
Total	21,047.23	7,083.96	1,868.97	7,206.14	7,328.01	1,809.14	48,001.01
% of Working Circle Area	43.85	14.76	3.89	15.01	15.27	3.77	100.00

 # Total area of Grassland Working Circles also includes water bodies, blanks, etc.
Source: Anon (2001, 2004, 2008a, 2008b)[33]. (Satellite imageries used of year 1998-99; 2000; 2005)

3.4 Wetlands and their management

Wetlands are one of the most important productive ecosystems that provide variety of ecosystem services to the humankind. The types of ecosystem services provided by the wetlands include provisioning, regulatory, supporting and socio-cultural. Apart from water for human consumption, wetlands provide numerous goods in terms of biomass products, climate change mitigations, disaster risk reductions, biodiversity conservation, flood and drought control, water purification, eco-tourism, cultural values etc.

Though, there are several definitions of wetlands the two most relevant definitions in Indian context are Ramsar Convention definition as India is signatory to it and another as per Wetlands (Conservation and Management) Rules, 2017 of India. Article 1 of the Ramsar Convention defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide

[33]Anon. 2001.Status of Forest Cover in Bhavnagar and Amreli Divisions using Remote Sensing technology. GEER Foundation, Gandhinagar.
Anon. 2004.Status of Forest Cover in Junagadh and Porabandar Divisions using Remote Sensing technology. Gujarat Forest Department.
Anon. 2008a.Status of Forest Cover in Jamnagar Division using Remote Sensing technology. Gujarat Forest Department.
Anon. 2008b.Status of Forest Cover in Rajkot Division using Remote Sensing technology. Gujarat Forest Department.

does not exceed six meters".

Whereas according to the Wetlands (Conservation and Management) Rules 2017, a wetland means an "area of marsh, fen, peatland or water; whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters, but does not include river channels, paddy fields, human-made water bodies/tanks specifically constructed for drinking water purposes and structures specifically constructed for aquaculture, salt production, recreation and irrigation purposes".

3.4.1 Wetlands of Gujarat

India has 15.26 million ha area under wetlands (including those less than 2.25 ha), roughly equal to 4.63% of its land area[34]. Of this, total inland wetlands constitute 69.22% (10.56 million ha), total inlands natural wetlands constitute 43.58% (6.65 million ha) and natural lakes and ponds account for only 4.78% (0.73 million ha). In terms of number of wetlands, Gujarat holds total 3.1% of the total wetlands of India (that include all sizes of wetlands) whereas it has 7.0% of the wetlands of India that are larger than 2.25 ha. In terms of area, it holds 22.7% of the total wetland areas of the country. Gujarat State holds 3.1 % number of wetlands and 22.77 % of total area of the wetlands of India. Gujarat has 3.48 million ha (17.59% of its geographical area) area under wetlands, which is higher than the national average (4.63%). Of this, total inlands wetlands constitute 19.83% (0.69 million ha); total inland natural wetlands constitute 9.2% (0.32 million ha) and lakes and ponds constitute 0.68% (0.12 million ha) only. The broad wetland types of Gujarat include inland natural wetlands, inland man-made wetlands, coastal and marine wetlands as profiled in Annexure 3.6.

3.4.2 The significance of Gujarat's wetlands

The spread and variety of wetland of Gujarat are not only important for their ecosystem services to local community but it also has wider global biodiversity linkages for the conservation of global migratory bird populations. Being in semi-arid landscape, a large part of Gujarat mitigates their water scarcities through storage of water in wetlands and ground water replenishment. There are 17 dams spread across the state provides water for domestic use and agriculture purposes to people of Gujarat. Several of these wetlands of Gujarat provide livelihood options to local people in terms of products such as agriculture, fisheries, plants products and eco-tourism opportunities. One of the 5 particularly vulnerable tribal groups of Gujarat, the Padhars, substantially depends on Nalsarovar wetland for their day to day livelihood. Wetlands such as Thol, Nalsarovar, Khijadiya, Little Rann of Kutch, Chhari Dhandh, etc. are some of the Important Bird Areas of Gujarat which attracts good number of tourists. Local communities get benefits of these ecotourism sites of Gujarat. Wetlands of Gujarat harbours great variety of floral and faunal biodiversity. A total of 323 species of wetland birds of India are endemic or globally threatened, and at least 30 of them are seen in Gujarat[35]. Of 114 endemic wetland plants of India, 11 are found in the wetlands of Gujarat. Among numerous wetlands of Gujarat, there are clusters/complexes of wetlands that have hydrological and ecological connectivity to complement each other and together acting as a functional ecosystem. Such wetlands have higher ecosystem services and values. Some of the major wetland complexes include, Rann of Kutch, Nalsarovar-Malika/Vadla-Bhaskarpura, Coastal Wetlands of Mahuva, Nanavada-Kaj-Velan, Gosabara-Mokar, Harshad-Sanidam etc.

Apart from major ecosystem services, major wetlands of Gujarat are of immense importance not only for local community but also for biodiversity conservation, especially for the migratory birds. Waterbird populations in wetlands are used as bio-indicators as they provide overall picture of wellbeing of wetlands. The data analysis of migratory water bird census conducted by Wetlands International for the

[34]The National Wetland Atlas, 2011. Space Application Centre, ISRO, Ahmedbad
[35]Singh H. S. Wetlands in Gujarat, Versatile yet vulnerable, 2014.Gujarat Biodiversity Board.

period 1987-2007 showed that the highest number of water bird sites covered was from India- 3296 sites (49.1%) out of 6705 Asian sites (Li et al 2009[36]). It also evaluated these sites and shortlisted number of sites that meet Ramsar criteria for Internationally Important Wetland sites for migratory birds, out of 462 sites in India, 132 (28.6%) are in Gujarat alone. Most of the large wetlands of Gujarat are protected and provide safe staging and wintering habitats to the waterbird populations of the Central Asian Flyway.

3.4.3 Management of wetlands

a) The Legal Frameworks for Wetlands Conservation

Multiple legal instruments cover the protection of wetlands. Wetlands (Conservation and Management) Rules, 2010 issued under the Environment (Protection) Act, 1986 is the key wetland statute and this was amended in 2017. This Rules mandates the conservation and management of the wetlands that are natural and not falling within the Coastal Regulation Zone area (as per CRZ notification, 2019), Protected Areas (as per Wildlife Protection Act, 1972) and recorded forest areas (as per Indian Forest Act, 1927). It provides for conservation of wetlands against threats of reclamation and degradation due to activities like drainage and landfill, pollution, hydrological alteration, over-exploitation resulting in loss of bio-diversity and disruption in eco-system services. It stipulates setting up National Wetlands Committee and State Wetland Authority in each State/UTs. It prohibits activities like conversion of wetland for non-wetland uses, setting up expansion of industries, waste dumping and discharge of untreated waste and affluent from industries, cities, towns, villages and other human settlements. It provides definition for prioritization of wetlands for conservation and management that excludes river channels, paddy fields, human made water bodies / tanks specifically constructed for drinking water purposes, structures specially built for aquaculture, salt production, recreation and irrigation purposes. Gujarat has established the State Wetlands Authority in 2017 before the amendment of the Rules, the new Authority with a changed composition under the amended Rules has not been established.

b) National Wetland Conservation Programme

Government of India initiated National Wetland Conservation Program (NWCP) in 1985-86 in collaboration with State Governments. A total of l 115 wetlands were prioritized by the Ministry of Environment and Forests, which requires urgent conservation and management initiatives. This was an independent program run by the Ministry of Environment Forests & Climate Change (MoEF&CC), now this is merged with National Lake Conservation Plan and is being administered under the National Plan for Conservation of Aquatic Eco-systems (NPCA) under the same Ministry. Eight wetlands from Gujarat are prioritized for conservation and management interventions under this programme. These wetlands are Greater Rann of Kutch, Little Rann of Kutch, Khijadia wetland, Pariej lake, Vadhawan lake, Thol lake, Nalsarovar lake and Nani-Kakarad wetland. Under this programme, 100% financial assistance is provided for management and research activities for these wetlands. Until date, INR 73.69 million has been received against the management plans submitted for 6 wetlands areas of Gujarat.

c) Wetland tenure

Wetlands of Gujarat are being managed by various authorities such as Forest Department, Irrigation Department, and Village Panchayat. Total 38.3% of the wetland areas are already under protected area network managed by Gujarat Forest Department under Wildlife Protection Act 1972. The wetlands areas in the form of 19 major dams are being governed by 'Narmada, Water Resources, Water Supply

[36]Li, Z.W.D., Bloem, A., Delany S., Martakis G. and Quintero J. O. 2009. Status of Waterbirds in Asia - Results of the Asian Waterbird Census: 1987-2007. Wetlands International, Kuala Lumpur.

and Kalpsar Department' in Gujarat. There are numerous village ponds and check dams across the state owned and managed by village Panchayats in the state.

d) Wetlands under Protected Area Network:

A total of 8,32,510 ha of wetland areas are protected in Gujarat: one National Park, 7 wildlife sanctuaries and one conservation reserve. Gujarat has one of the 27 Ramsar sites of India i.e. Nalsarovar wetland and one of the 18 Biosphere Reserves of India i.e. Kutch Biosphere Reserve which is a seasonal wetland. Among 19 Important Bird Areas identified by Birdlife International in Gujarat, 14 are wetland areas, as outlined in the table below.

Table 3.17 Wetland Protected Areas of Gujarat

S.R.	PA	Area in ha.	NP	WLS	CR	BR	RS	IBA	WNI
1	Chhari Dhandh	22,700			■			■	
2	Kutch Desert WLS	750,622		■		■		■	
3	Marine NP & WLS	45,793	■	■				■	
4	Khijadiya WLS	605		■				■	■
5	Wild Ass Sanctuary	**495,400**		■		■		■	■
6	Nalsarovar WLS	12,082		■			■	■	
7	Porbandar Bird Sanctuary	9		■					
8	Rann of Kutch	**		■		■		■	■
9	Thol WLS	699		■				■	
Total Area in ha.		**1,327,910**							

*** Already covered under Little Rann of Kutch and Greater Rann of Kutch areas. NP = National Park, WLS = Wildlife Sanctuary, CR = Conservation Reserve, BR = Biosphere Reserve, RS = Ramsar Site, IBA = Important Bird Area, WNI = Wetlands of International Importance*

Source: JICA Survey Team, 2019.

Despite the high ecological and socio-economic value of wetlands, these critical habitats are affected by a number of problems, including the spread of invasive species, increasing pollution, poaching of birds, over fishing, reclamation, etc. There is also inadequate public awareness on the values of wetlands and insufficient scientific knowledge about several of the wetlands. The high volt power lines passing through many of the wetlands pose a threat to migratory birds. The wetland ecosystem has a complex nature with its dynamic ecological character and its management, involving multiple socio-economic issues, ought to be both ecologically and socially appropriate.

3.5 Mangroves and their conservation

Mangroves and coastal forests have been protecting the lives and livelihoods of communities and people living along the coast against cyclones, storms, tsunamis and other catastrophic events. Role of mangroves in subsiding the impact of tidal waves was proved during the Asian tsunami in India and in other countries (Science 2005)[37]. In fact, the 2004 tsunami that devastated the South and Southeast Asia to eastern African countries has conclusively shown that coastal belts with dense mangrove cover suffered fewer losses of life and property than the coastal areas with less and no mangrove cover (Kathiresan and Rajendran, 2005).[38]

The mangroves in addition to enhancing the fishery resources provide the local communities with fuel

[37]Finn Danielsen et. al. 2005, The Asian Tsunami: A Protective Role for Coastal Vegetation. Vol.310, Issue 5748, pp.643, Science.
[38]Kathiresan, K., Rajendran, N., 2005. Coastal mangrove forests mitigated tsunami. Estuarine, Coastal and Shelf Science 65, 601-606

wood, fodder, timber and in some countries NTFPs. They play critical role in reducing the impacts of natural disasters like tsunami and cyclones. They are important spawning sites for several marine species. Additionally, they play a significant role in blue carbon sequestration, thus mitigating the impacts of climate change. It has been estimated that as much as 1.02 billion tons of carbon dioxide are being released annually from degraded coastal ecosystems, equivalent to 19% of emissions from tropical deforestation globally. When protected or restored, blue carbon ecosystems sequester and store carbon. When degraded or destroyed, these ecosystems emit the carbon they have stored for centuries into the atmosphere and oceans and become sources of greenhouse gases. Despite these benefits, the mangroves and coastal forests are under severe anthropogenic pressure, including in Gujarat, which is making inroads of their development into the coastal areas.[39]

Gujarat has been experiencing cyclones and storms for many years. During 1877 to 1998, over 16 devastating cyclones crossed Gujarat coast, mainly Saurashtra and Kachchh. The cyclone of 1998 caused considerable damage to tall mangroves but mangroves fringing the coasts and islands reduced the impact of the cyclones. Natural coasts fringed with mangroves, marshes and mudflats reduce the rate of flooding, erosion and dissipate wave energy.

3.5.1 Mangroves of Gujarat

Gujarat state has longest coastline of 1,650 km i.e. 21% of the total coastline of India among all the maritime states of the country, which makes it strategically serving as natural gateway to India. The Gujarat coast extends from Western Ghats in Valsad to Kori creek on the coast of Kachchh in north. The area of continental shelf of the state is 1,65,000 sq. km. The Gulf of Kachchh and the Gulf of Khambhat are the two Gulfs in Gujarat out of the three Gulfs in the country. Extent of the inter-tidal and high tidal mudflats in the Gulf of Kachchh, the Gulf of Khambhat, the Bhal region and the Rann of Kachchh is exceptionally large[40]. Mudflats, mangroves, marsh vegetation, coral reefs and saltpans cover a major part of the coastal wetland. Geo-morphological and climatic variation is very high on the Gujarat Coast. Rainfall varies from an average high of 2500 mm in the south to only 300 mm in Kachchh. Tidal amplitude is also very high which sometimes exceeds 10m in the Gulf of Khambhat and varies between 3m to 8m in the Gulf of Kachchh (Forests and Environment Department, Govt. of Gujarat 2009).

Mangroves play a very significant role in maintaining the coastal environment, reducing the impact of wave action and erosion in the coastal areas, preventing salinity and seawater ingress into the inland agricultural areas, and also providing protection to the coastline from the impact of cyclones. Apart from these ecological functions, mangroves play a very significant economic role in the lives of the coastal village communities. The villagers are dependent on mangroves mainly for fodder, fuel-wood and fishing activities. There has been degradation of the mangroves in Gujarat over the years. The reasons for this are many, like the dependency of the local and nomadic pastoralist communities on the mangroves for fodder, fuel, diversion of mangrove areas to industries, salt pans, and construction of ports, jetties, reduction in natural regeneration and dying off of the rich mangroves because of decreased influx of fresh water into the mangrove areas due to construction of dams, both small and big, in upstream areas.

Gujarat state is endowed with an area 1,140 sq.km of mangroves, which is second largest mangrove cover in India. The mangroves are distributed in Kori creek in Indus deltaic mangroves and Kachchh coast in Kachchh district, Gulf of Kachchh and Jamnagar coast in Jamnagar and Rajkot districts, Saurashtra coast under Porbandar, Junagarh, Amreli and Bhavnagar districts, Gulf of Khambhat

[39]Pandey, C.N., R. Pandey and M. Mali, 2013, Carbon Sequestration by Mangrove of Gujarat, 160 pp, Gujarat Forest Department and GEER Foundation, Gujarat

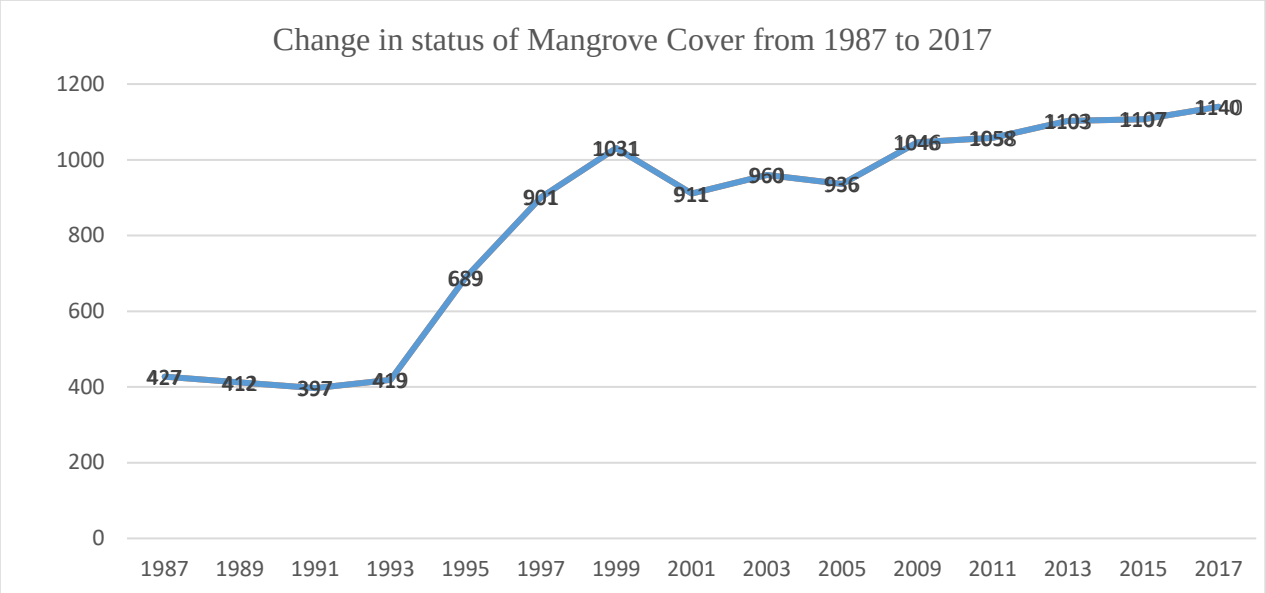
[40]Singh, H.S., Mangroves in Gujarat (Current Status and Strategy for Conservation) GEER Foundation, Gandhinagar

including the districts of Bhavnagar, Ahmedabad, Kheda and Bharuch and South Gujarat including Surat, Valsad and Navsari districts. The extent of mangroves distributed in Gujarat is given in Table 3.18. According to the reports of Forest Survey of India (FSI), dense mangroves cover an area of 172 sq.km and remaining 968 sq.km are open mangrove forests. Although the mangrove forest cover is high in Kachchh, it has minimum percentage of dense mangrove cover. Interestingly, South Gujarat, which has the minimum mangrove cover, has highest proportion of dense forests (52%) and more diversity. Region wise coverage of mangroves in Gujarat is given in Table 3.18. Regular mapping of mangrove cover in the country has been conducted by the Forest Survey of India. The change in mangrove cover according to FSI data, from 1987 to 2017 is given in the Figure 3.1.

Table 3.18 Extent of Mangrove Distribution in the State of Gujarat, India

S.R.	Mangrove Region	Region wise total Mangrove Cover Sq.km.	Percentage of State's mangrove cover
1	South Gujarat	17	1.49
2	Gulf of Khambhat	131	16.49
3	Gulf of Kachchh	188	11.49
4	Saurashtra	6	0.53
5	Kachchh Region (including Kori Creek)	798	70.00
Total		**1,140**	**100**

Source: FSI 2017



Source FSI Reports – 1987, 1989, 1991, 1993, 1995, 1999, 2001, 2003, 2005, 2011, 2013, 2015 & 2017

Figure 3.1 Change in status of mangrove cover in sq.km in Gujarat from 1987 to 2017

There is moderate species diversity in mangroves with a total of 15 true mangrove species occurring in Gujarat (Pandey and Pandey 2009), the table below lists the mangrove species occurring in Gujarat and their status.

Table 3.19 Status of Mangrove species

S.R.	Name of the species	Status of the species	Locality
1	Avicennia alba Bl.	Rare	South Gujarat
2	Avicennia marina (Forsk.) Vierh.	Represen 90% mangrove cover	All the four regions
3	Avicennia officinalis L.	Rare	South Gujarat

S.R.	Name of the species	Status of the species	Locality
4	Aegiceras corniculatum (L.) Blanco	Rare	Gulf of Kachchh, South Gujarat and Kachchh
5	Bruguiera cylindrica (L.) Bl.	Rare	South Gujarat
6	Bruguiera gymnorrhiza (L.) Lamk.	Rare	South Gujarat
7	Ceriops decandra (Griff.) Ding Hou	Extremely rare	South Gujarat
8	Ceriops tagal (Perr.) C.B. Robinson	Common in the Gulf of Kachchh, rare in other areas	Gulf of Kachchh, South Gujarat and Kachchh
9	Excoecaria agallocha L.	Rare	South Gujarat
10	Kandelia candel (L.) Druce	Rare (Rare only one tree)	South Gujarat
11	Lumnitzera racemosa Willd.	Rare	South Gujarat
12	Rhizophora apiculata Bl.	Extremely rare	South Gujarat
13	Rhizophora mucronata Lamk.	Common in the Gulf of Kachchh, rare in other areas	Gulf of Kachchh and South Gujarat
14	Sonneratia apetala Buch-Ham.	Common in South Gujarat	South Gujarat
15	*Acanthus ilicifolius L.	Rare in general but abundant in South Gujarat	South Gujarat

**Considered as a mangrove associate species by many researchers*
Source: Carbon Sequestration by Mangroves of Gujarat, GEER Foundation, 2013.

3.5.2 Restoration of Mangroves in Gujarat in the past

Gujarat Forest Department project raised mangrove plantations in Gulf of Kachchh, however the coastal areas of Gulf of Khambhat and South Gujarat was not covered given the inadequate funding position. The proposed project will undertake mangrove restoration in these areas. Mangrove plantations were initiated in Gujarat in the 1950s through the working plans of Kutch and Vyara Divisions during the 1970s. However, it was only in 1980, mangrove afforestation and development for conservation and management purposes. During 1983-84 to 2007 -2008 around 50,000 ha of mangrove plantation was carried out by GFD. Nearly 5,546 ha of mangrove afforestation was done by GEC involving local communities during 2001 -2007. Mangrove plantation was carried by Forestry department in Gulf of Kachchh during the GFDP II, as a result of which the mangrove cover has increased from 991 sq.km in 2005 to 1,1,07 in 2015 sq.km. Inter- tidal areas having high salinity and low inundation were planted with Avicennia whereas area with low salinity and better inundation were planted with less salt tolerant species Rhizophora and Ceriops along with Avicennia. The mangrove plantation development by different agencies in the recent years is given below.

Table 3.20 Mangrove plantation development by various agencies in Gujarat

Type of implementing agency	Area(ha)	% share
A) State sector agencies		
Gujarat Heavy Chemicals Limited (GHCL)	50	0.81
Gujarat Maritime Board (GMB)	120	1.95
Gujarat Mineral Development Corporation (GMDC)	170	2.76
GSPC Pipapav Power Company (GPPC)	10	0.16
India Canada Environment Facility (ICEF)	4,101	66.51
Ministry of Environment and Forests (MoEF)	300	4.87
Government of Gujarat (GoG)	1,415	22.95
Sub total	6,166 (74.1)	100.00

Type of implementing agency	Area(ha)	% share
B) Private sector agencies		
ADANI	600	27.78
Pipavav Shipyard	505	23.38
Shell Hazira	300	13.89
NIKO Resources India Ltd.	250	11.57
Essar	200	9.26
Ambuja Cement	150	6.94
Others	155	7.17
Sub total	2,160 (25.9)	100.00
Grand total	8,326 (100.0)	

Note: Figures in parentheses indicate the percentages in the total area. Others include ABG Shipyard, Anjan Cement, Bayer, Petronet LNG and Ultratech
Source: Estimated from data provided in Gujarat Ecology Commission (2010)

3.5.3 Plantation techniques commonly used

The plantation techniques used differ from area to area, which included direct dibbling of seeds, propagule plantation to plantations with nursery-raised saplings. Raised bed plantation is adopted because of the high tidal amplitude along the entire coast of Gujarat. Around 20 raised beds are prepared in one ha. area for planting about 80 to 100 seeds of Avicennia or propagules of Ceriops and Rhizophora[41]. Nurseries are developed near the plantation sites to acclimatize the nursery saplings and also to reduce the plantation coast. Mangrove conservation and management in Gujarat – Plantations were undertaken by Government of Gujarat (GoG), Gujarat Ecology Commission (GEC), NGOs and Corporate sector under CSR schemes. These models are assessed for selecting suitable models for the present project.

3.5.4 The legal basis for mangrove/coastal management

Apart from the Indian Forest Act 1927, Forest (Conservation) Act, 1980, the Wildlife (Protection) Act, 1972 described later in this chapter, the Coastal Regulation Zone Notification (CRZ) serves as the focal legal instrument for the sustainable management of the coastal zone.

The CRZ Notification was issued by the Ministry of Environment and Forests, Government of India in 1991 under the Environment Protection Act, 1986. As per the Notification, all the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters that are influenced by tidal action towards the landward side up to 500 meters from the High Tide Line (HTL) are defined as Coastal Regulation Zone. Many restrictions are imposed on the setting up and expansion of industries, hotels, resorts, residential buildings and other kinds of developmental activities.

The CRZ notification (1991) well defined and delineated coastal zones and classified the coastal area as per the need of protection, listed out the activities prohibited in those regions, and implemented regular monitoring and enforcement activities in various CRZs. The original CRZ notification (1991) classified CRZs into four categories as below:

- Category I covers areas that are ecologically sensitive and important, such as national parks marine parks, sanctuaries, reserve forests, wildlife habitats, mangroves, corals/coral reefs, etc. No new construction is permitted within 500 meters of the HTL in this area.
- Category II deals with areas that have already been developed up to or close to the shoreline. No building is permitted on the seaward side of the existing road.
- Areas that are relatively undisturbed and those that do not belong to either Category I or II are

[41]Compendium for National Workshop on Mangrove Conservation – Present Status and Future Perspective in India, 26 -27 July, 2018- Reference Articles. GEC, GEER Foundation and IUCN

classified as Category III. The areas up to 200 meters from the High Tide Line are earmarked as 'No Development Zone'. No construction is permitted within this zone except for repairs of existing authorized structures.

Key revisions to the CRZ Notification 1991 were made in 2011 and in January 2019. The revised Notification of 2019, based on the recommendations of an expert committee has the following key features:

- Re-categorizing CRZs and delegating power of clearance to the state for projects in the case of certain sub-categories,
- Re-categorizing certain areas considering rural area development (sub-categorizing CRZ III into CRZ III A and B),
- De-freezing CRZ II-Urban area to permit construction projects,
- Temporary constructions for tourism,
- No-development zones for islands (approximately 20m),
- Guidelines for ecologically sensitive areas for conservation, and provision for pollution treatment in such areas, and
- Provision for defense establishments.

The CRZ Notification provides a sound legal base for the protection of the coastal zone of Gujarat and its enforcement in Gujarat is being carried out by the Gujarat Coastal Zone Management Authority.

3.6 Coastal Shelterbelts

Shelterbelts are raised along the coasts within the intertidal zones to provide protection to coastal areas from high velocity winds, salt sprays and also from devastations like cyclones, storms and the rarely occurring Tsunamis. The shelterbelts also serve the purpose of sand binders and prevent sand erosion. High wind speeds lead to chilling of livestock and physical damage to crops through abrasion, drying and wind throw. Well-placed and well-managed shelterbelts can therefore be used to increase agricultural productivity. Shelterbelts composed of multiple value trees and shrubs cultivated using sylvicultural methods can serve as a source of livelihood to the local communities. Choice and mix of species should be decided based on the height and depth of shelterbelt required to make it effective at the proposed site.

In India, since 1970 the state forest departments have been raising shelterbelts in the coastal areas. The forest department has mastered the technique of raising shelterbelts, in which Casuarina is extensively used. Geo-morphologically and geographically Gujarat is different from other parts of western coast of India, and it can be distinguished into segments depending upon the shoreline features. For the purpose of planning shelterbelts, Gujarat can be classified into seven segments namely Kori Creek to Mandvi, Mandvi to Kandla, Navlakhi to Dwarka, Dwarka to Diu, Diu to Ghogha, Ghogha to Hansot and Hansot to Umergaon. Sandy beaches covered with sand or silt provide vast scope for developing coastal shelterbelts[42]. Professionally raised and well managed shelterbelts will also serve the purpose of sequestering carbon and hence is reckoned as a contribution to mitigating the climate change impact.

3.7 The Policy and Laws concerning Forest, Wildlife and Ecosystem Management

The following section describes the legal and policy domain for the conservation and management of the forests and wildlife, profiles the GFD and its works and describes the community level institutions involved in conservation and development.

[42]Study on Impact Evaluation of Coastal Area Shelter belt Plantations, Final Report.Agriculture Finance Corporation Ltd. Mumbai. Study sponsored by Forest Department, under JBIC aided IFDP Program

India has a sound set of laws and policy instruments to regulate the management of the natural environment, all of which are applicable all states of the country including Gujarat. The Constitutional provisions, the legal framework and the policy instruments are described below.

The subject of forests and wildlife was changed from a State subject to the Concurrent List by an amendment to the Constitution in 1976 enabling both the Centre and the States to create laws on the subject. By the same amendment, the Constitution requires the State to protect forests and wildlife as a Directive Principle of State Policy (Article 48A). In addition, Article 51A(g) makes it a duty of the citizen to protect and improve the natural environment including the forests, lakes, rivers and wildlife, as part of Fundamental Duties. Both these articles are not enforceable but play an influencing role in the policy and law-making process in the country.

3.7.1 Policy Regime for Forest Wildlife

(1) The policy domain

As well as the laws, the forest and ecosystem management are guided by a set of policy instruments as outlined below.

1) The National Forest Policy (NFP) 1988

Revising the National Forest Policy (NFP) of 1952, the current NFP 1988 incorporates social, community and environmental concerns into forest management. NFP has also served as a catalyst for the Joint Forest Management. The National Forest Policy seeks to achieve the following:

- To maintain environmental stability and restore ecological balance.
- To conserve natural heritage and genetic resources.
- To increase substantially forest/ tree cover upto 33% of the land area of the country
- To increase productivity of forest to sustainably meet first local and then national need.
- To create massive people's movement to increase and protect forests and tree cover.
- Ensuring that deriving economic benefits from forests are subordinate to above objectives and
- To initiate a process of reform at policy and operational levels of forest management in collaboration with stakeholders.
- The Ministry of Environment Forests and Climate Change is currently in the process of revising the National Forest Policy.

2) Joint Forest Management (JFM)

JFM was initiated in Gujarat in 1991, when the State government notified a resolution, providing a guideline, for involvement of local communities in protection and management of degraded forests. In 2005 the State government extended JFM to good forest areas (crown density more than 40%) as well, with a modified benefit sharing arrangement.

Since the year 2000, JFM has mainly been implemented in the context of various funded projects and schemes such as IFDP, National Afforestation Program (NAP), and GFDP-II, which focused on forest development through JFM approach. The policy framework within which JFM is based has been evolving as outlined in the table below.

Table 3.21 Key policy developments related to JFM in Gujarat

Year	Major policy developments related to JFM
1990	Central government advisory on involving forest fringe communities in development of degraded forests, including benefit sharing and working of forest based on approved working scheme prepared in consultation with the community

Year	Major policy developments related to JFM
1991	First GR and guidelines by State Government for JFM in degraded forest area; Provided for registration of PO's as cooperative societies; Only usufruct right to PO members including grass; benefit sharing from final harvest of mature trees (25% in case the funds come from government; 80% in case funds are provided from other sources); suggested mechanism of utlization of benefit share provided to community; provided for signing of agreement between GFD and PO; Regularization of existing initiatives found in Surat, Panchmahals, Bharuch and Vadodara
1994	Amendment to 1991 GR; Key amendments include: registration of PO as society or trust or cooperative society within two years of formation; 60% residents families as members condition introduced named in membership register; conditions from benefit share from cut-back (firewood free; timber at 50% of scheduled rates if wanted), from cleaning after 5-7 years (small timber free to individuals providing labour), future cleaning and thinning (firewood and 25% of poles to individuals providing labour), 50% share in net benefits from final harvest irrespective of source of funding; modified provisions for use of community's share
2000	Central Government guidelines on strengthening JFM. Suggested for registration of JFMC, adoption of common nomenclature for JFMCs, signing of MoU between FD & JFMC; women's membership, participation and leadership position in JFMC general body and Executive Committee; extension of JFM to good forest areas (except PA network). Suggested conditions for benefit sharing and utilization of the community's share. Suggested creation of JFM overlapping Working Circle; Preparation of microplans and their approval in case of existing Working Plans for the area; Focus on NTFPs; Dovetailing of microplan with Working Plan to the extent possible; Also suggested formation of division and state level Working Groups for conflict resolution. Suggested recognition and adoption of self-initiated groups as JFMCs
2002	Central Government's guidelines on further strengthening of JFM program based feedback on year 2000 guidelines. Suggested details of the MoU to be signed between FD and JFMC, including a GIS based map of JFM area and incorporation of other natural assets (grassland, water bodies, agro-forestry); relationship with Panchayat bodies; Capacity building of JFMCs for NTFPs management in good forest areas
2005	Extension of JFM to Dense forest area
2008	State Government notification on grassland
2015	Revised State Government notification on grassland
2017	De-nationalisation of four commercially important NTFPs – Timru leaf, Mahua flower, Mahua Doli, Gums – by the State Government

Source: Compiled from Various Sources by JICA Survey Team (2019)

3) National Environment Policy 2006

The National Environment Policy (NEP) 2006 recognizes the government's role as the trustee, rather than absolute owner, of public environmental resources and upholds the precautionary principle. The NEP underscores the need to reconcile the conservation and development objectives. It also recognises the disempowerment of the Scheduled Tribes caused by the forest laws and policies as a reason for the gradual degradation of forests and calls for the reform of forest laws and policies in order to recognise the traditional rights of the Adivasi communities. It states that wildlife conflicts 'may largely arise from the non-involvement of relevant stakeholders in identification and delineation of protected areas, as well as the loss of traditional entitlements of local people, especially the tribal communities, over the protected areas,' and calls for the underlying causes of the conflicts to be addressed. NEP underscores the need to increase the coverage of protected areas by designating new Community Reserves and Conservation Reserves and also by strengthening community involvement in the Protected Area program, through the means of ecodevelopment in particular.

4) Report of the National Forest Commission 2003

Government of India had set up the National Forest Commission in 2003 in order to review the working of the forest and wildlife sector, informed by the livelihood concerns of the forest dependent communities. The key recommendations of the Commission are as follows:

- There was a need to revise the criteria for the legal classification of forests;
- National Forest Policy's target needs to be revised
- There was a need to retain the Forest (Conservation) Act of 1980 to strictly control on biotic pressures.
- It was recommended that the working plans should include measures to contribute to the sustenance of the forest- dependent communities
- It was also found necessary that the JFM's objective should be revised to broadly include the restoration and development of degraded forests.

5) National Biodiversity Action Plan 2008

India formulated a National Biodiversity Action Plan (NBAP) for submission to the Convention on Biological Diversity, and its coverage is applicable to all the States. The NBAP is based on the concept of integrating the objectives of biodiversity conservation, sustainable use, and the equitable sharing of benefits resulting from the use of biodiversity. It promotes the augmentation of the natural resource base and its sustainable use, seeks to control the introduction of invasive alien species and to eliminate the species, and calls for the integration of biodiversity concerns in economic development. NBAP seeks a progressive expansion of the Protected Area network in the country and establishment of more species-focused Protected Areas. NBAP draws on the National Biodiversity Strategy and Action Plan (NBSAP) that was developed earlier but was not adopted as an official document.

6) Ecotourism policy

Ecotourism is a low impact form of tourism based on the natural and cultural endowments that helps to promote the awareness about the resource base and directly benefits the local communities. Ecotoursim as it is practiced in India has the following features:

- It should involve the local community and lead to the overall economic development of the area.
- It should identify the likely conflicts between use of resources for eco-tourism and the livelihood of local inhabitants and attempt to minimize such conflicts.
- The type and scale of eco-tourism development should be compatible with the environment and sociocultural characteristics of the local community and should be regulated within the carrying capacity of the destination.

Gujarat has been developing ecotourism facilities with community participation for a long time. The eco-physical features of the State offer good potential for ecotourism. In view of the global and national policies on eco-tourism, Gujarat state in their tourism policies time to time have given special emphasis to ecotourism around protected area and natural areas of the state. According to Tourism Policy for the State of Gujarat (2015-2020),

- Eco-tourism will be promoted as both tourism activity and a product in close collaboration with the Forest and Environment Department (F&ED) and the Climate Change Department.
- Development of campsites and various activities like trekking, nature walks and heritage walks will be actively promoted and attractive tour packages would be offered.

- Dedicated Wildlife Tourism shall be developed covering places such as Gir National Park, Vansda National Park, Marine National Park and other sanctuaries of the State in partnership with the Forest & Environment Department.

The first eco-tourism Policy for Gujarat state was prepared and approved by Gujarat forest department in the year 2007 (GR No. WLP-2005-1764-G.1 (1818) Dated 31/01/2007). The policy goals were based on the non-consumptive and sustainable tourism by involving local community participation. The government resolution provides for sharing of responsibility for hospitality, site management and guide services by local community members and details sharing of revenue with the community and eco-tourism committee. This was the first effort to suggest mainstreaming of eco-tourism activities into forestry/protected area management practices in Gujarat. This policy also laid out the guideline principles for promoting eco-tourism along with strategies to achieve them. An eco-tourism advisory board was also proposed.

The eco-tourism regulations are proposed in the eco-sensitive zone notifications around 28 Protected Areas (that includes 23 Wildlife Sanctuaries, 4 National Parks and 1 Conservation Reserve). According eco-sensitive zone notifications of most of the protected areas, State Government shall prepare Zonal Master Plans for each of the protected areas in consultation with various state government departments including forest, environment, wildlife, ecotourism etc. The eco-tourism activities shall be promoted or regulated as per the Zonal Master Plan for respective protected areas. A few sites have been developed for ecotourism development in the state. These include Iqbalgarh (Jessore), Polo (Vijaynagar forests), Kanjeta (Ratnmahal), Jambughoda, Shoolpaneshwar, and Kilad. Three of the sites have been developed under GFDP II. Case studies indicate that local community members are deriving livelihood as guides and by providing hospitality services.

3.7.2 Laws and Regulations Revant to Ecosystem Management

(1) Indian Forest Act 1927

This is the principal law for managing forests in the country. It provides for three categories of forests and the oldest existing forest legislation is the Indian Forest Act of 1927, which is the most extensively applied law for regulating forest management. The Act creates two basic categories of legal forests- Reserved Forests and Protected Forests- and provides for penalties for infractions of its provisions.

The Reserved Forests are declared through notification, wherein any community or private use is bared, while the claims at the time of notification are to be settled by a designated Forest Settlement Officer. The following are prohibited in a Reserved Forest according to Section 26 of the Act:

- Any clearing of forest, setting of fire to forest, kindling or carrying fire, trespassing or causing the trespass of cattle, felling or cutting of trees, loping or stripping off bark or any other form of damage to trees, quarrying stone or removing any forest produce, clearing any land for cultivation or any other purpose, hunting, shooting and fishing.

Protected Forests are declared through notification and the claims of rights are to be enquired into and settled as per Section 29. The Act empowers the government to impose duty on theforest produce including timber and provides for rules for regulating the cutting of trees, collection of forest produce, etc from Protected Forests and provides provisions for penalties for violations. Restrictive provisions are as per incorporation in the notification for each site and provide room for the recognition of local community rights unlike in the case of Reserved Forests.

Table 3.22 Legal instruments for forest and wildlife management in India

Year	Legal instrument	Principal features
1927	Indian Forest Act	Notification of Reserved Forest, Protected Forest, and Village Forest Proscription of certain activities and penalties for the violation
1972	Wildlife (Protection) Act	Designation of Protected Areas: Sanctuary, National Park, Conservation Reserve, and Community Reserve and Tiger Reserve No hunting of any wild species except vermin Prohibition/control of trade in wild species Establishment of the National Tiger Conservation Authority, Indian Board of Wildlife, etc.
1976	Forty-Second Amendment to the Constitution	Forest and wildlife brought to Concurrent List, allowing the Central Government to make policy and legislation The State to safeguard the forests and wildlife of the country Citizens' duty to protect and improve the natural environment including the forests, lakes, rivers and wildlife
1980	Forest (Conservation) Act	Requires the prior approval of the Central Government for the conversion of forests for non-forest purposes
1986	Environment (Protection) Act	Framework legislation to protect and improve the environment Establishment of ecologically sensitive areas under its provision
1992	Seventy-Third Amendment to the Constitution	Definition of the powers and functions of the Panchayat Panchayat may be provided the authority over social forestry and farm forestry; minor forest produces and water bodies.
1996	Panchayats (Extension to the Scheduled Areas) Act (PESA)	Extension of Panchayat Raj system to the Schedule V Areas States having Scheduled Areas to amend the concerned laws Panchayats to have control over minor forest produce
1996	Supreme Court Order of 12 December 1996	Suspension of the felling of trees in forests
2000	Supreme Court Order of 14 February 2000	States not to allow any taking of trees or grass from Protected Areas or forests in general
2002	Biological Diversity Act 2002	Regulation of access to biodiversity and related traditional knowledge Establishment of the National Biodiversity Authority, State Biodiversity Boards and Biodiversity Management Committees Provision for Biodiversity Heritage Sites
2006	Forest Rights Act	Recognising and vesting 13 kinds of the forest rights in forest dwelling Scheduled Tribes and other traditional forest dwellers Rights include the right to historical forest land as well as forest resources Gram Sabha as the primary institution to decide on the forest rights claims Empowers Gram Sabha in forest protection.
2016	Compensatory Afforestation Fund Act	For the creation of mechanisms for the management of the funds received for compensatory afforestation, penal compensatory afforestation and other funds recovered under the Forest Conservation Act 1980. Establishes national and state level authorities for the utilisation of these funds

Year	Legal instrument	Principal features
2010	Wetlands (Conservation and Management) Rules 2017	Protection of the Ramsar sites and other important wetlands Central government's prior permission mandatory for the conversion of wetlands Establishment of the National Wetland Management Committee and State Wetland Authorities

Source: Adapted from Faizi (2014)

The Act also provides for Village Forests, which are Reserved Forests, assigned to the village communities by the government for sustainable management. Gujarat has, however, not designated any Village Forest so far.

(2) Wildlife (Protection) Act 1972

The Wildlife (Protection) Act 1972 (WLPA) is the key legislation governing the management of wildlife and habitats in the country. Protected Areas are established through this Act. It also prohibits hunting, catching, and trapping of all species, except those listed as vermin or pests in Schedule V of the Act (Section 9). The State governments shall designate Protected Areas (PA) through notification, and the claims of rights by any person in the case of sanctuaries and national parks are to be examined and settled by the District Collector expeditiously. According to the 2003 amendment of the Act, the sanctuary status of the area shall take effect immediately upon notification (Section 18A.1). The four categories of Protected Areas and their legal features are described in below table.

Table 3.23 Categories of Protected Areas and their legal characteristics

PA Category	Statutory features
National Park	Strict control on resource use; no grazing or cattle movement allowed; habitat alterations for management purposes, if any, should be made with the approval of the Chief Wildlife Warden in consultation with the National Wildlife Board. No continuation of rights permitted. No alteration of the boundary without the approval of the National Board of Wildlife.
Sanctuary	District Collector settles the claims of rights before final notification. The legitimate rights of claimants may be approved by him in consultation with the Chief Wildlife Warden. No consumptive use and/or habitat alteration is allowed except with the prior permission of the Chief Wildlife Wardenwith the approval of the State government and should be intended to improve the habitat management. Provision to establish a local advisory committee for each sanctuary
Conservation Reserve	Declared on any area owned by the government, particularly areas close to existing Protected Areas and wildlife corridors; Management by the Chief Wildlife Warden, on the advice of a management committee established for the site.
Community Reserve	On community land or private land with the voluntary consent of the community or the private individual. Management committee formed by the government, composed of five representatives nominated by the village panchayat; committee elects its chairman; reserve management according to a management plan prepared by the committee and approved by the government.

Source: Compiled by JICA Survey Team (2019) based on the Wildlife (Protection) Act 1972

The Act also prescribes penalties for violations. The boundaries of protected areas shall be altered only with the approval of the National Board for Wildlife.

Following the recognition of the decline in the tiger population and upon the recommendation of the Tiger Task Force (2005) the Wildlife (Protection) Act was amended in 2006 whereby the provisions of tiger reserve, National Tiger Conservation Authority, Tiger Conservation Foundation, etc were incorporated. Although Tiger reserves were designated as a management mechanism since 1973the new amendment gives it legal status.

(3) Forest (Conservation) Act 1980

The Forest (Conservation) Act 1980 was enacted to check the conversion of forest for non-forest purposes. The Act requires the State governments to obtain the permission of the central government for the following:

- Denotification of any reserved forest, conversion of any forest land by any entity for non-forest purpose, leasing of forest land to any entity, clearing of natural forest for re-afforestation.

The conversion of forest for any non-forest purpose such as farming, plantation, mining, development project etc. can only be done by obtaining the permission of the MoEF&CC. The Act prescribes imprisonment up to fifteen days for contravention of its provisions, and this covers the responsible government official as well. This law has created a significant in fact in checking the trend of forest conversion.

(4) Biological Diversity Act 2002

The Biological Diversity Act was enacted in 2002 for the national implementation of the Convention Biological Diversity. This law has the triple objectives of conservation, sustainable use and equitable benefit sharing although in its operative parts it deals mainly with issues related to access and benefit sharing. The Act prohibits access to biodiversity for non-nationals and other foreign entities without the prior permission of the National Biodiversity Authority (NBA) (Section 3) established by this Act. The Act also requires any access to biodiversity and related knowledge to be subject mutually agreed terms based on equitable sharing of benefits arising out of the commercial use of the accessed biodiversity (Section 21). It also requires that research results pertaining to biodiversity shall not be transferred abroad without the prior approval of NBA, publication in scientific journals and presentations in seminars are exempted (Section 4). Indian citizens and entities can access biodiversity for commercial use or undertake bio-survey for commercial utilisation only after giving prior intimation to the concerned State Biodiversity Board (SBB) (Section 7).The Act empowers the local communities by providing for establishment of Biodiversity Management Committees (BMCs) in every panchayat for the promotion of the conservation, sustainable use and documentation of the local biodiversity and chronicling the related knowledge (Section 41). The law also has a provision for establishing Biodiversity Heritage Sites (BHS) in particularly significant habitats.

(5) Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (Forest Rights Act 2006 or FRA)

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, or the Forest Rights Act 2006, was created in December 2006 as a means to recognise the historical forest rights of the Scheduled Tribes and other traditional forest dwellers. The law was enacted, as its preamble states, to address the ‘historical injustice’ committed to the Scheduled Tribes and other traditional forest dwellers, and to ‘strengthen the conservation regime of the forests while ensuring the livelihood and food security’ of these communities. This law, by incorporating the

conservation, sustainable use and benefit sharing objectives and by providing for community management represents a meaningful translation of CBD principles and its ecosystem approach into national statute.

The Act defines 13 types of forest rights, and outlines the procedures for vesting such rights, and the rights include not only the recognition of forestland but also 12 other types of rights including the right to forest produce and community forest rights. The rights are not accorded anew but a recognition of historical rights held and based on evidence submitted and the Rules under the law lists 9 different kinds of evidences, one may submit more than one form of evidence. The Gram Sabha decides on the claims raised and the District Level Committee formed under the Rules which will give the final approval on the of forest rights. The Tribal Department serves as the nodal agency for the implementation of the Act.

The Act also provides powers to the local communities to manage and protect the forests. Section 5 of the Act empowers the holders of any forest right and the Gram Sabha to a) protect the wildlife, forest and biodiversity; b) ensure that adjoining catchment areas, water sources and other ecologically sensitive areas are adequately protected; c) ensure that the habitat of forest dwelling Scheduled Tribes and other traditional forest dwellers is preserved from any form of destructive practices affecting their cultural and natural heritage; and d) to ensure that the decisions taken in the Gram Sabha to regulate access to community forest resources and stop any activity which adversely affects the wild animals, forest and the biodiversity are complied with. The Rules under the Act in Section 4.e states that the Gram Sabha shall 'constitute committees for the protection of wildlife, forest and biodiversity, from among its members, in order to carry out the provisions of Section 5 of the Act.'

(6) 73rd Constitutional Amendment 1992 and PESA 2006

The 73rd Amendment to the Constitution was made in 1992 wherein under Art 243A, Gram Sabha was empowered in a way that it can perform such functions at the village level, as the Legislature would do at the State level, thereby giving the powers and authority through the 11th Schedule on fisheries, social forestry and farm forestry, minor forest and fuel and fodder within the village limits.

Gujarat Panchayat Act 1993 has vide Sec 99 given the Village Panchayats powers and duty to make provision for preservation of village forests. It states that it is the duty of the Panchayat to make provision for raising, preservation and improvement of village forests, pastures and orchards.

Since the Scheduled Areas were notified under the Schedule V of the Indian Constitution and since the provisions of the Constitution overpowers an Act enacted by the Parliament, in order to extent the provisions of the 73rd Amendment of the Constitution, the Panchayats (Extension to the Scheduled Area) Act (PESA), 1996 (Amendment 1997) wherein the provisions of the Panchayat Act were extended to the Scheduled Areas. It also states that the state laws related to the Panchayats should be in accordance with the customary law, social and religious practices, and traditional management practices of community resources of the tribal population.

PESA confers upon the Gram Sabha the right to own and to manage non timber forest produce (minor forest produces) within its jurisdiction. Whereby it portrays that the Gram Sabha is competent to safeguard and preserve the traditions and customs of the people, their cultural identity, community resources and the customary mode of dispute resolution.

(7) Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951

This law, applicable to the whole of Gujarat state, is to control the indiscriminate felling of trees.A total of 26 tree species are protected from unregulated felling under the Act, and this includes five

reserved tree species. The Act covers trees on both public and private lands. Permission of the Gujarat Forest Department is required for the felling of the five reserved tree species while the Gram Panchayats are authorized to give permit for felling the remaining 21 species. For trees raised on private lands proof of ownership of land and the tree are required for considering the application for permission for felling.

(8) Gujarat Minor Forest Produce Trade Nationalization Act, 1979

This law was enacted in 1979 to nationalize the trade select species of non-timber forest produce in the State. It was formulated with the view to eliminate the exploitation of the tribal people by middlemen and private traders and covers the collection and marketing of timru (Diospyrous melanoxylon) leaves, mahua (Madhuca indica), gums, etc. The Act makes the Gujarat Forest Development Corporation as the exclusive agency for the trading of the listed NTFPs in order to enable the tribal collectors of the produce to get a fair price.

(9) Supreme Court rulings on forest management

In an order based on the Forest (Conservation) Act 1980, the Supreme Court issued a landmark order on 12 December 1996 (T. N Godavarman Tirumulpadu case) that Mandated the prior approval of central government for all activities within the forest, and ceased all on-going activities not having central government approval.

- Suspended the felling of trees in all forests except as provided in the working plans approved by MoEF.
- Defined forests as per the dictionary meaning, affirming the coverage of Forest (Conservation) Act to all forests regardless of ownership or classification.

The Supreme Court has constituted a Central Empowered Committee (CEC) to oversee the implementation of the Court orders in what has come to be called the forest case. In a subsequent order in the same case, the Supreme Court directed that no national park or sanctuary shall be de-reserved without the prior approval of the CEC. It has also prohibited non-forest activities in national parks and sanctuaries even if the approval as required by the Forest (Conservation) Act had been obtained.

(10) Eco-Sensitive Zones

The National Wildlife Action Plan 2002-2016 called for integrating biodiversity conservation in the land use policy of the areas outside protected areas. It stated, "Wildlife conservation cannot be restricted to national parks and sanctuaries. Areas outside the protected area network are often vital ecological corridor links and must be protected to prevent isolation of fragments of biodiversity, which will not survive in the long run. Land and water use policies will need to accept the imperative of strictly protecting ecologically fragile habitats and regulating use elsewhere.'[43] The Wildlife Conservation Strategy 2002 elaborated it further. It detailed requirement and provisions for notifying Eco-fragile Zones. Para 9 of the strategy states,"Lands falling within 10 km. of the boundaries of National Parks and Sanctuaries should be notified as eco-fragile zones under section 3(v) of the Environment (Protection) Act and Rule 5 Sub-rule 5(viii) & (x) of the Environment (Protection) Rules."[44]

Government of India based on proposals from states has been progressively notifying Eco-Sensitive

[43]National Wildlife Action Plan 2002-1016.Ministry of Environment and Forest, New Delhi.
[44]Wildlife Conservation Strategy 2002.Ministry of Environment and Forests, New Delhi.

Zones (ESZ) for various PAs. The regulations in ESZ areas include ban on mining and polluting industries and guarding against change in landscape. Supreme Court of India exasperated by delay on part of states has ordered that pending notification of ESZ areas upto 10 km from the boundaries of the PA shall be considered as ESZ areas (2006).

Thus, ESZ areas provide buffer to PA areas and help maintain corridors of migration. It guards against PA becoming an isolated island. In Gujarat, so far 20 ESZs have been notified covering 21 PAs.

The specific legal instruments related to wetlands, grasslands and coastal management are described in the respective sections above.

3.7.3 Institutions Concerning Ecosystem Management in Gujarat

(1) Gujarat Forest Department

1) Mandate of GFD

The Gujarat Forest Department (GFD) has mandate to conserve and manage forests and wildlife, practice extension forestry, conserve wild bio-diversity and ecology of the various ecosystems of Gujarat. This translates to following functions.

Management of forests that includes Protection, Conservation and development of forests. It includes production from forests and its marketing. It also includes regulation of forest produce from forests and non-forest areas. Main instruments of regulation are the India Forest Act, 1927 and The Forest Conservation Act, 1980. Forests are managed according to working plans prepared for periods of 10 or 20 years and approved by Government of India in an elaborate process. Gujarat has 21899.49 sq km forest area for which GFD is responsible.

Protection and conservation of Wildlife and wild biodiversity. The responsibility for conservation of wildlife is holistic irrespective of its occurrence. The Wildlife Protection Act 1972 provides for protection and conservation of Wildlife and regulations for possession, trade and transport of wildlife and its products. The act provides for designation of Protected Area (PA) that is prime habitats of wildlife. There are 28 wildlife PAs in Gujarat.

Extension forestry is one of the prime responsibilities of GFD in modern times. GFD is also responsible for extension forestry with the objective of increasing tree cover. It includes forestation of village community lands, strips along road, rail & canals, wastelands, agroforestry, urban forestry.

GFD also addresses concerns related to conservation of ecology and environment. This includes conservation of biodiversity, wetlands, grasslands, marine ecosystems, and other eco-systems. This extends to address issues related to climate change and need to enhance carbon sequestration.

GFD is concerned for welfare of forest dwellers. GFD participates in development programs for communities inhabiting in and around forests.

2) Thematic programs of GFD

GFD has programs based on various themes of the GFD mandate. There are schemes to support each of these thematic programs and arrangement to administer/execute and manage them.
Forest conservation management - Forests are managed according to prescriptions of working plans. It includes harvesting, improvement works, cultural operations and regeneration. Following schemes are included under this theme.

- Afforestation of degraded forest areas
- Aided artificial regeneration of forest lands
- Eco-restoration
- People's participation in regeneration of degraded areas
- Development of silvi-pasture
- Bamboo plantation
- Teak, Khair and Bamboo plantation

Wildlife conservation and management - Wildlife conservation includes PA management, protection of wildlife, biodiversity conservation. Management of human wild life conflict, etc. There are 4 National Parks, 23 Sanctuaries, one Conservation Reserve. One of the sanctuaries is recognized as Ramsar site. The areas of Little Rann of Kutch designated as Wild Ass sanctuary and Kutch Desert Sanctuary have been declared as Kutch Biosphere reserve.

Grassland management – GFD is custodian of states grasslands called vidis that are categorized as reserved (103, 54217.3 ha) and non-reserved vidis (385, 43597.2ha)[45]. Grass is harvested from these vidis and stored for use during scarcity years. There are large number of grass godowns (260 with capacity of 50 million kg) wherein GFD stores grass harvested from these vidis. There are schemes for construction of grass godowns and development of grasslands. Storage capacity is progressively augmented with construction of new grass godowns. Vidi improvement works are taken under grass development scheme.

Soil moisture conservation (SMC) – Large parts of state are in arid zone. Even in the south Gujarat region that receives good rainfall there is scarcity of water in forest areas during summer. It needs SMC works to promote growth of seedlings planted and reverse the process of forest degradation. SMC works compliment almost all the schemes of afforestation in the state. SMC works include nallah bunding, gradonies, mini gradonies, contour trenches, check dams, earthen bunds to construct Van talavdis. Many plantation schemes are clubbed for government approval under a group named SMC scheme. This reflects at priority and value assigned to SMC works.

Forestry Extension - Extension forestry is an important function of the GFD. It aims at planting trees on vacant lands in non-forest areas and contributes to improvement of environment. There are components of strip plantation, Village woodlots (planting of trees on community land), farm forestry, and urban forestry, distribution of seedlings implemented under the program.

Coastal area management – Mangrove plantation and coastal border plantation are two major components under this theme. Sandy coasts are planted under coastal area plantation component. Mangrove plantation is a success story of Gujarat. Mangrove forests increased from 427sq km to 1,140 sq km[46]. This has been made possible with mangrove plantations done by GFD over years.

Wetland management – Gujarat has large number of inland and coastal wetlands. Gujarat is part of Central Asian Flyway largely due to large number of wetlands. GFD has been making effort to conserve wetlands in Gujarat. Nalsarovar, Khijadiya, Porbandar, Marine National Park, Marine Wildlife Sanctuary, Wild Ass Sanctuary, Kutch Desert Sanctuary and Chari Dhand Conservation Reserve are wetlands notified as PAs. Nalsarovar is a Ramsar site. Eight of state's wetlands are recognized as nationally important wetlands.

Participatory management of natural resources – GFD has been pursuing Joint Forest Management since 1991. Over period of time participatory approach is extended to wildlife

[45] Gujarat Forest Statistics 2017-18. Principal Chief Conservator of Forests & Head of Forest Force, Gandhinagar.
[46] State of Forest Report 2017, Forest Survey of India, Dehradun

management and social forestry programs too. There are over 3414 JFM committees participating in management of 4,583 sq km forest area[47]. In wildlife PA areas eco-development program is pursued to promote participation of local communities. Social Forestry Development Committees (SFDC) is promoted in non-forest areas to enlist public participation in extension forestry programs.

Eco-tourism – Government of Gujarat brought out eco-tourism policy in 2007. Since then efforts are being made to promote eco-tourism. Infrastructure facilities have been developed at number of sites. Local community groups are encouraged to manage such facilities. Government has issued detailed instructions regarding sharing of revenue from eco-tourism. Earlier GFD had organized training for enthusiastic community members to provide hospitality services and guide services at eco-tourism centers.

Biodiversity conservation – Biodiversity conservation is being pursued by the GFD as an agenda under various program components. While there are flagship species for most of PAs but effort is to conserves available biodiversity holistically in-situ. In forest areas beyond PAs emphasis is on planting of local species and include rare species in planting wherever possible. GFD has identified six biodiversity hotspots in forest areas.

NTFP promotion – State forests are rich in NTFP. Tribal population of state earns significant income from collection and sale of NTFP. Gujarat State Forest Development Corporation (GSFDC) promotes production, processing and marketing of NTFP in the state. Bidi leave (timru), mahuva flower and seeds and gums are the main NTFP collected by forest dwellers. Honey, seeds, medicinal plant materials are other NTFP that provide livelihood to forest dwelling communities. GFD has scheme to plant NTFP bearing trees in forest areas.

Medicinal plant promotion –Number of medicinal plant species grow in Gujarat forests. Local communities collect use and sell these medicinal plant materials. GSFDC facilitates marketing of medicinal plant materials. GSFDC also has facility to process some of the medicinal plants. It markets its medicinal products made from natural materials sourced from forests under the brand name 'Dhanvantri'. GFD also has scheme for planting of medicinal plants.

Some of the themes cut across other themes like, participatory management, soil moisture conservation, biodiversity conservation, etc. There are overlaps too. There is provision for working plans and management plan for forests and PAs respectively. These management tools are broad based covering a range of themes apart from the main theme of conserving forests and wildlife. There are schemes to address prescriptions of management with specific objective to be addressed.

3) Administration capacity

GFD is organized on the basis of various themes to perform its statutory mandate as well as extension responsibilities and contributions expected of it for the cause of betterment of environment. It is led by Principal Chief Conservator Forest and Head of Forest Force, Gandhinagar. There are four main wings detailed hereafter.

Development and Management – responsible for conservation, management and protection of forests. It is charged with responsibility of implementation of working plans, manage forest produce, implement participatory program for forest management, and promote NTFP bearing and medicinal plants and conservation of biodiversity in forest areas with emphasis on soil moisture conservation. It is also responsible for conservation and management of grasslands. An important consideration in managing grass production in state is to store grass as a measure of insurance against drought that are

[47] GFD web site, https://forests.gujarat.gov.in/joint-forest-management.htm

frequent in state. Addl PCCF D&M heads the Development and Management wing. It has field units, 23 divisions, organized in six circles.

Wildlife – responsible for conservation and management of wildlife, PA management (28), wetland conservation, bio-diversity conservation, eco-tourism, Ramsar site (1), biosphere reserve (1), etc. The wildlife wing is headed by PCCF, Wildlife. It is organized in four circles with seven divisions reporting to wildlife circles.

Community forestry wing – is the extension wing of the GFD. Forestry extension program includes social forestry and agroforestry. Community Forestry Wing is led an Addl. PCCF. It is organized in five circles with 21 divisions.

Research wing – is responsible for forestry research, education, training, awareness, orientation, etc. It has units/divisions for research with field station in various parts of state. There are training institutions for Range Forest Officers and junior field staff of GFD that are part of this wing of GFD. It has a campus at Gandhinagar with training facilities and a hostel. Short refresher and orientation program are conducted at the facility. There is a publicity unit responsible for publicity needs of GFD.

4) Other units

Working plan – Working plan is basis for management of forests. There are separate working plans for each forest division of state. Working plan documents are generally for ten-year period after which it is revised. There are three working plan units each led by a CF/CCF reporting to Addl PCCF Working Plan for the state.

Administration - Additional PCCF Administration led cell at head quarter provides administrative inputs to PCCF& HOFF.

Finance management – A cell led by Addl PCCF Finance Management manages budget and finances for GFD and reports to PCCF & HOFF.

Land management – Forestland is the most important asset managed by the GFD. Addl PCCF Land led cell manages issues related to land and is responsible for observation of the Forest Conservation Act, 1980.

Monitoring and Evaluation – There is a unit for Monitoring and Evaluation of forestry works headed by Addl PCCF Monitoring. It conducts sample checks as part its monitoring program. It is also responsible for third party monitoring of afforestation works.

MGNREGA – MGNREGA is a major Government of India program for employment generation in rural areas. A unit to supervise and facilitate MGNREGA program by GFD is established at GFD headquarters. An officer of the Rank of Addl PCCF leads it.

5) Field Organization of GFD

There are a total of 52 forest divisions working in various districts of Gujarat. Each of the division is headed by a Dy Conservator of Forests and has number of forest ranges, rounds and beats. Many divisions have sub-divisions. Asst. Conservator of Forests lead these sub-divisions. List of circles and divisions is given in the table below.

Table 3.24 Field Units of Forest Department

D& M Wing			SF Wing		
S. No.	**Circle**	**Division**	**S. No.**	**Circle**	**Division**
1	Gandhinagar	Arvalli	7	Ahmedabad	Ahmedabad
		Gandhinagar			Anand
		Sabarkantha			Nadiad
2	Junagadh	Bhavnagar			Surendranagar
		Jamnagar	8	Mehsana	Banaskantha
		Junagadh			Mehsana
		Morbi			Sabarkantha-SF
		Surendranagar	9	Rajkot	Amreli
3	Kutch	Kutch-Ext.			Botad
		Kutch-E			DB-Dwarka
		Kutch-W			Gir-Somnath
		Patan			Rajkot
		Banni Grass land	10	Bharuch	Bharuch
4	Vadodara	Baria			Narmada SF
		Chhotaudepur			Navsari
		Godhra			Surat
		Mahisagar			Valsad
5	Surat	Bharuch	11	Godhra	Dahod
		Surat			Godhra
		Vyara			Vadodara
6	Valsad	Dang-N	Wildlife Wing		
		Dang-S	12	Vadodara WL	Narmada
		Valsad-N			Vadodara WL
		Valsad-S		North Gujarat	Banaskantha
			13	Junagadh WL	Gir West
					Gir East
					Sasan Sanctuary
					Porbandar
			14	MNP-Jamnagar	MNP-Jamnagar

Source: Administration Branch Gujarat Forest Department, Gandhinagar

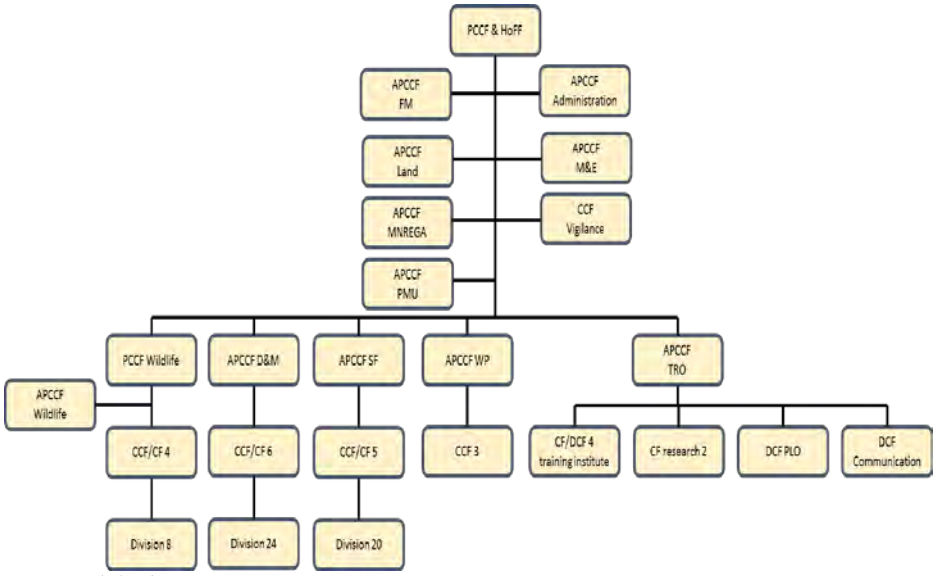
The GFD which structure is shown in Figure 3.2 has total sanctioned posts of 8,959 belonging to but 3,176 posts remain currently vacant, as detailed in the table below.

Table 3.25 Human Resources with GFD

S. No.	Cader	Sanctioned	Posts filled	Vacant posts
1	Indian Forest Service	119	74	45
2	Deputy Conservator of Forest	81	12	69
3	Deputy Director	1	1	0
4	Assistant Conservator of Forest	128	113	15
5	Admin Officer	1	1	0
6	Range Forest Officer	534	277	257
7	Forester	1,791	1,386	405
8	Forest Guard	3,890	2,811	1,079
9	RFO Surveyor	29	28	1
10	Surveyor	144	43	101
11	Office Superintendent	51	21	30

S. No.	Cader	Sanctioned	Posts filled	Vacant posts
12	Legal Superintendent	4	3	1
13	Head Clerk	90	36	54
14	Accountant	329	218	111
15	Accountant (DAT)	32	21	11
16	S.A.	31	2	29
17	Stenographer	35	11	24
18	Clerk	676	495	181
19	Driver	296	37	259
20	Class-4	672	193	479
21	Librarian	1	0	1
22	Lab Assistant	7	0	7
23	Lab Attendant	3	0	3
24	Animal Keeper	14	0	14
Total		**8,959**	**5,783**	**3,176**

Source: Administration Branch Gujarat Forest Department, Gandhinagar



Source: JICA Survey Team (2019)

Figure 3.2 Organogram of the Gujarat Forest Department

(2) Associate Organizations

There are number of independent organizations associated with GFD. Some of them are listed here.

1) Gujarat State Forest Development Corporation (GSFDC)

GSFDC was constituted in 1979. Its objectives include efficient utilization and development of NTFP occurring in state forests, promote production of NTFP, remove middlemen that exploit local tribal people and provide remunerative price for NTFP collected by them. Its main activity is collection, grading and marketing of forest produce. GSFDC has a woodworking unit and a unit for production of Ayurveda medicines named Dhanvantri for value addition.

2) GEER Foundation

Gujarat Ecological Education and Research (GEER) Foundation is an autonomous body, set up in 1982 by the Forests & Environment Department, Government of Gujarat. Its objectives include raise public conscience to inculcate love for & promote knowledge of ecology, ecosystems, environment and natural history and initiate and facilitate scientific researches & studies for conservation of natural resources and to promote all branches of natural history, actively engage in biological research and allied activities. GEER has conducted number of studies and research works. The disciplines it has included in its works are habitat studies, biodiversity studies, wildlife species-specific studies mainly for avifauna, mangrove and corals, climate change, carbon sequestration etc. It has done commendable work in the field of communication too with radio program Haryalu Gujarat, and eco-clubs under National Green Corps Program of Government of India. It also has socio-economic research studies to its credit. It has a small modern research laboratory to conduct sample analysis. There is a zoo, botanic garden and Dinosaur museum open to public at GEER Foundation.

3) Gujarat Ecology Commission (GEC)

Established in 1991 GEC works for restoration and conservation of eco-systems of Gujarat. It has made significant contribution to the cause of coastal eco-system. GEC was state Project Management unit for Integrated Coastal Zone Management Plan supported by World Bank. It is responsible for drafting Coastal Zone Management Plan for Gujarat. It has been involved in raising mangrove plantations and several programs for raising awareness for ecology and environment.

4) Training facility with GFD

There are four training institutions with GFD.

a. Training facility at Gandhinagar – Refresher programs, orientation programs, special trainings.
b. Gujarat Forest Rangers College, Rajpipla – Institute to train Range forest Officers. It also caters to other states of India.
c. Kakrapar Forester training college – Foresters of Gujarat are trained at this institute.
d. Dungarda training school – Forest Guard of Gujarat are trained at this institute.

(3) Forestry Research facility with GFD

There is a research circle for silviculture research headed by a Conservator of Forest with head quarter at Rajpipla. There are ten research stations located in different agro-climatic zones of state. Facilities vary at these centers as below.

Table 3.26 Facilities at research Centers

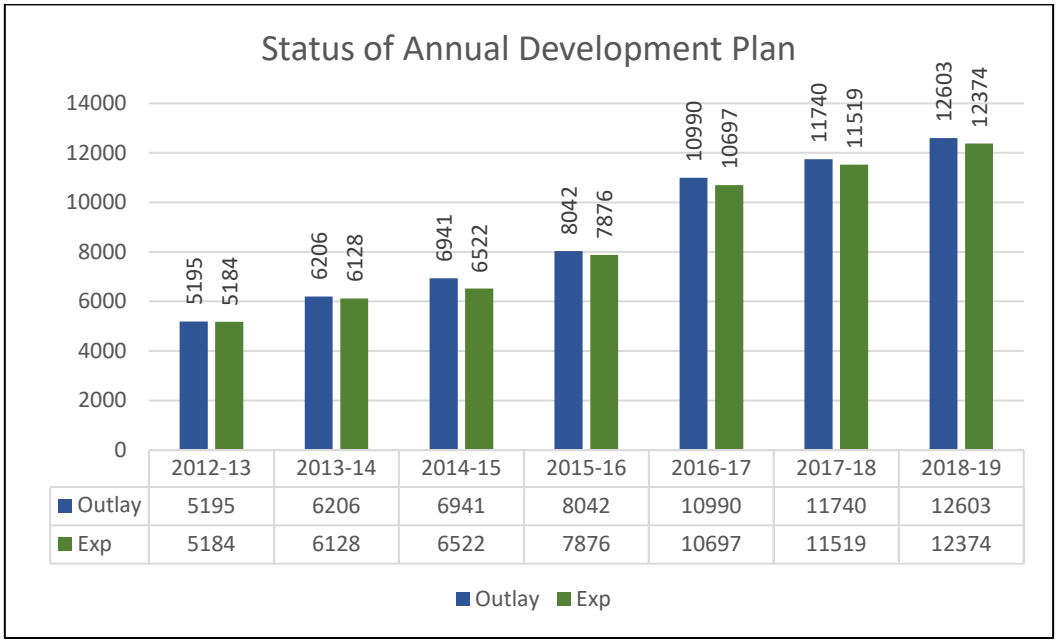
Res. Centre	Mist Chamber	Net Chamber	Compost Unit	Vermi Compost Unit	Multipurpose Shed	Germination chamber
Rajpipla	Yes	Yes	Yes	Yes	Yes	Yes
Godhra	Yes	Yes	Yes	Yes	Yes	Yes
Motia		Yes	Yes	-	-	-
Bhavnagar	Yes	Yes	Yes	Yes	Yes	Yes
Kheralu	Yes	Yes	Yes	Yes	Yes	Yes

Res. Centre	Mist Chamber	Net Chamber	Compost Unit	Vermi Compost Unit	Multipurpose Shed	Germination chamber
Deesa	Yes	Yes	Yes	-	Yes	Yes
Gandhinagar	Yes	Yes	Yes	Yes	-	-
Bhachau	Yes	Yes	-	-	Yes	Yes
Junagadh	Yes	Yes	Yes	Yes	Yes	Yes
Rajkot	Yes	Yes	Yes	Yes	-	Yes

Source: GFD web site. https://forests.gujarat.gov.in/research-station-loacation.htm

(4) GFD budget and Expenditure

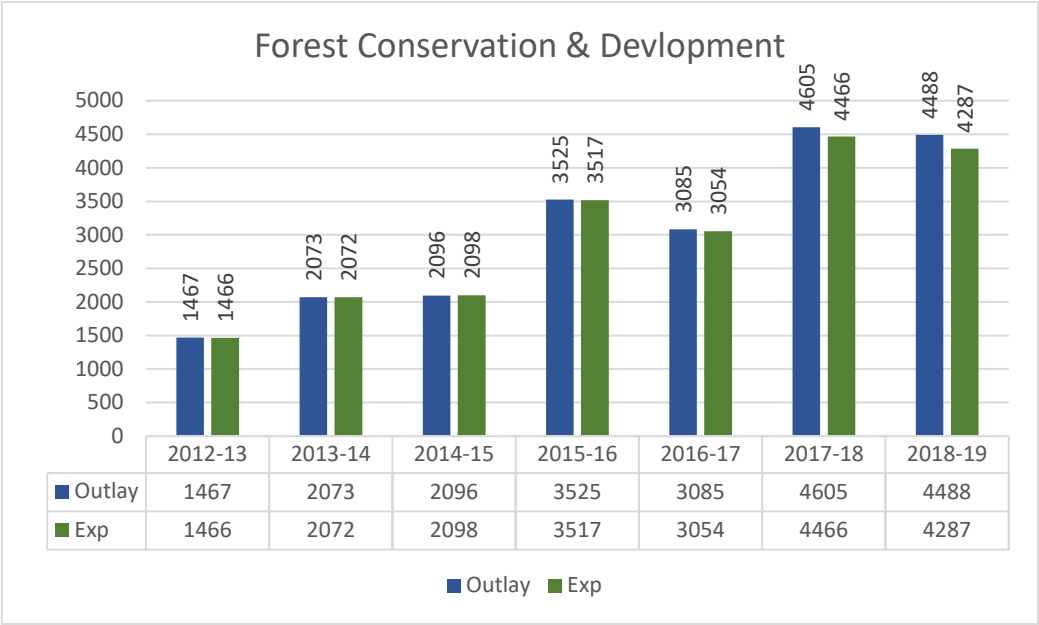
GFD receives funds from State Government and Government of India and from decentralized schemes approved at district level. The funds received from the State Government form major part of budget of GFD. It may be seen from the Figure 3.3 that total budget allocation from state government is continuously increasing. This is to keep pace with inflation to ensure that in real terms budget allocation does not fall. In 2018-19, budget allocation from State Government was INR 12,603 million of which 98.18% was utilized.



Source: Budget Branch Gujarat Forest Department, Gandhinagar

Figure 3.3 Outlay and expenditure – Annual Development (Figures in INR Million)

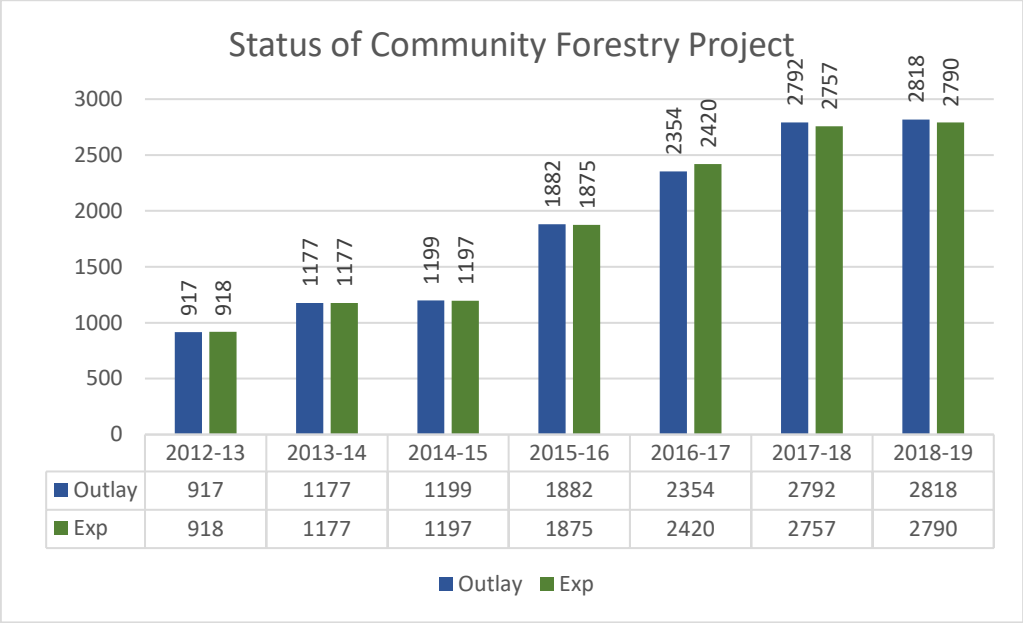
Forest Conservation and development program receives largest part of the budget allocation as in the figure below amounting to over 35%. The allocation for conservation and development is largely utilized by the D&M wing for conservation of state forests including afforestation works.



Source: Budget Branch Gujarat Forest Department, Gandhinagar

Figure 3.4 Outlay and expenditure – Forest conservation and development (Figures in INR Million)

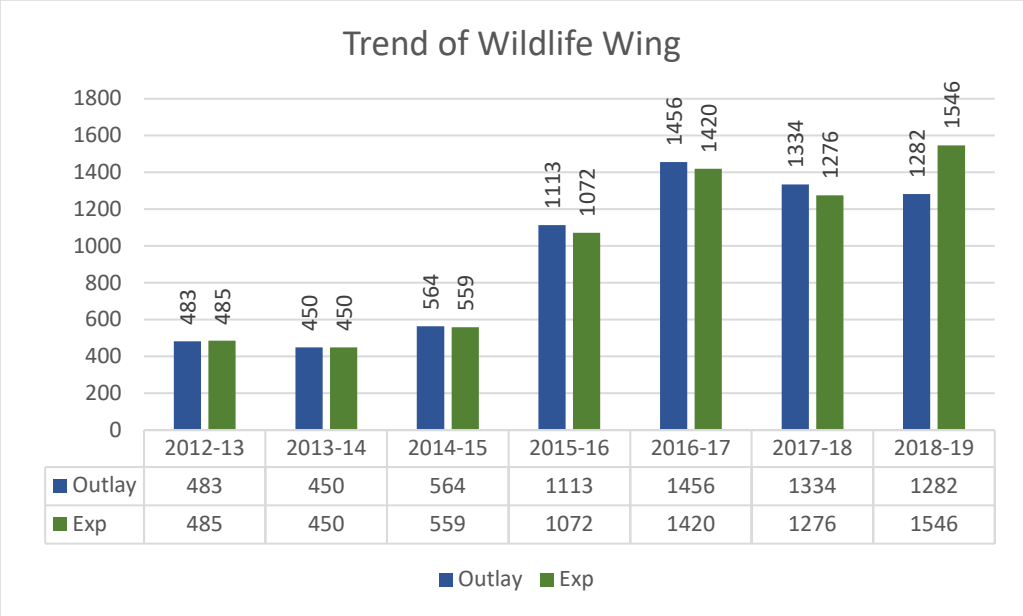
Community Forestry Project receives second largest allocation as in the figure below accounting for 22.35% of budget allocation. This is allocation for extension forestry. Allocations under this head are utilized for plantations on non-forest lands, i.e., community lands (Gauchar lands), strips along rail, road and canals, farmlands and seedling distribution, environment planting as part of urban forestry.



Source: Budget Branch Gujarat Forest Department, Gandhinagar

Figure 3.5 Outlay and expenditure – Community forestry (Figures in INR Million)

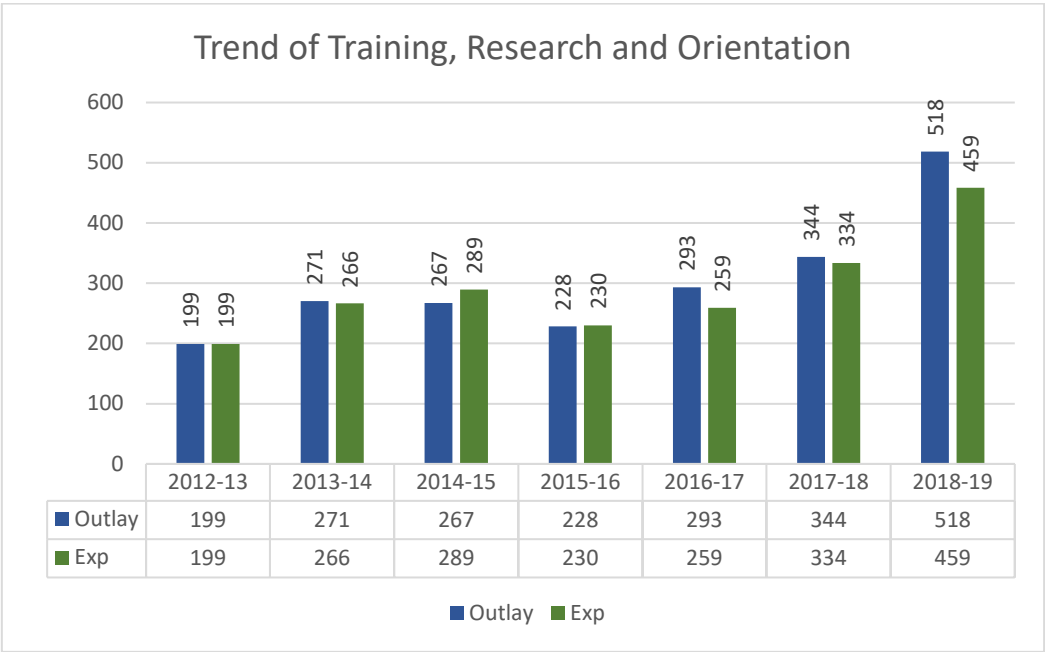
Wildlife conservation received an allocation of INR1,282 million for the year 2018-19. This amounts to 10.17% of budget allocation to GFD.



Source: Budget Branch Gujarat Forest Department, Gandhinagar

Figure 3.6 Outlay and expenditure – Wildlife (Figures in INR Million)

Allocation for research & training for the year 2018-19 was INR 518 million (4.11%). This amount includes expenditure towards research, training, orientation, awareness programs and publicity.



Source: Budget Branch Gujarat Forest Department, Gandhinagar

Figure 3.7 Outlay and expenditure – Training, Research etc (Figures are in INR Million)

(5) Community organizations involved in conservation

1) Joint Forest Management Committees

Currently there are 3,410 JFMCs in Gujarat and they have been allocated a total forest area of 528,248 ha averaging 155 ha per JFMC. 15 Divisions account for 81% of the total JFMCs, with at least 100 JFMC's each. The Division wise distribution of JFMCs across the state is given in the table below.

Table 3.27 Division wise distribution of JFMCs and the area allocated to them.

Sr. No	Division Name	No. of JFMCs	No. of JFMC Registered	Area under JFMCs (Ha)
1	Banaskantha	108	108	7,791.13
2	Baria	293	232	39,239.22
3	Bharuch	68	37	5,935
4	Bhavnagar	52	52	8,754
5	Chhotaudepur	349	189	62,221.1
6	Dang (N)	129	125	20,953.73
7	Dang (S)	120	120	4,122.08
8	Gandhinagar	27	15	2,154.66
9	Gir (E)	12	7	3,932.62
10	Gir (W)	12	12	3,353.72
11	Godhra	198	186	38,796.87
12	Jamnagar	36	36	10,905
13	Junagadh	74	74	4,875
14	Kachchh (East)	53	53	26,500
15	Kachchh (West)	109	109	40,480
16	Nadiad	0	0	0
17	Narmada	187	90	18,973.56
18	Patan	25	25	2,200
19	Rajkot	57	57	5,976
20	Sabarkantha	187	155	15,773.13
21	Surat	174	17	18,633
22	Surendranagar	57	40	7,181.55
23	Valsad (N)	193	121	44,702.21
24	Valsad (S)	132	132	46,989.81
25	Vyara	193	80	42,272
26	Aravalli	254	254	18,888.39
27	Mahisagar	310	310	26,567.99
28	WL Vadodara	1	1	75.91
	Total	3,410	2,637	528,248

Source:https://forests.gujarat.gov.in/forest-area-information.htm#table20 & https://forests.gujarat.gov.in/writereaddata/images/pdf/GFS-2017-18-PCCF-20122018.pdf

JFM in Grasslands: JFM program was extended to the grass lands (Vidi Areas) under the control and management of the forest department vide Government of Gujarat Resolution No.JFM-1208-SFS-11-M dated 22/07/2008. Subsequently in year 2015, the State government came out with further clarification for sharing of benefits from grass land.

As per the Government Resolution dated 22/07/2008 regarding the JFM in grass vidis, the 20% of the total grass production from the vidi area will be equally distributed to the members of the JFMC who

are engaged in collection of grass. Remaining 80% of Grass collection will be handed over to the forest department. Labour charges for grass collection will be paid to JFMC members.

2) Biodiversity Management Committees (BMCs)

Biodiversity Management Committees are established under the Biological Diversity Act in village panchayats to translate the objectives of conservation, sustainable use and equitable use to the community level. The BMC is composed of a seven-member committee nominated by the local panchayat and shall have a chairperson elected by the members in a meeting presided by the President of the village panchayat. It shall have six officials of different line departments as invitees to its meetings.

The BMCs shall be promoting the conservation, sustainable use and chronicling of the biodiversity and related traditional knowledge in their respective villages. They can charge fees on persons and entities accessing or collecting biological resources for commercial use from their villages. The BMCs shall be consulted by the National Biodiversity Authority and the State Biodiversity Board on issues related to the use of biological resources and knowledge within their jurisdiction. Another key function is the preparation of Peoples Biodiversity Register of the village using local resource persons and community knowledge. Gujarat has established 7,596 BMCs so far.

3) Eco-development Committees (EDCs)

Eco-development Committees (EDCs) are formed to implement eco-development is the equivalent of the JFM in and around the Protected Areas, designed to promote the alliance of the local communities with the conservation project and at the same time provide means to improve the livelihood of the communities. Eco-development was started in the late 1990s as the India Eco-development Project (IEDP) funded by the Global Environmental Facility, covering seven key protected areas of the country, including the Gir to improve the capacity of protected area management to conserve biodiversity and increase local community participation in management. However, unlike JFM ecodevelopment does not permit benefit sharing on forest resources as no resource harvesting is permitted in the protected areas.

GFD's Resolution on eco-development WLP-1103-2858-G1(1) dated 4.1.2005 sets the basis for the formation of Eco-development Committee (EDC) and its mandate. The EDC members are to cooperate with the forest department for the protected area and have to be vigilant against forest fire, hunting and encroachments and help the forest department in addressing these issues. The work of the EDC is based on a micro plan that is formulated in a similar way as the JFM micro plan, and the assets created by the EDCs can be used by the beneficiaries with the oversight of the EDCs.

One member of each household of the village can be enrolled as members of the EDC. The executive committee is composed of 13 members, including 6 members, 3 women members and one SC/ST/BC member from the EDC, one local school teacher and one from an NGO, and the EC members elect the president. The local forester or beat guard shall be the member secretary, and the EC runs for one year. The EC meets on a monthly basis and ensures that the works entrusted to it are undertaken properly, the EDC meets at least once a year. There are currently 377 EDCs in the state.

4) Social Forestry Development Committees (SFDCs)

SFDCs are established in the areas covered by Social Forestry Divisions for the promotion of trees outside forests (TOF). 822 SFDCs were formed during GFDP to implement the social forestry component of the project. GFD has formalised the SFDCs through a government resolution which sets the basis for the formation and management of these community based organizations spread across 20 Social Forestry Divisions. There is an increasing trend of trees outside the forest in the state, and SFDCs have a role in creating this trend.

Conclusion: The critical ecosystems of the state are valuable ecological infrastructure rich in biodiversity and providing ecosystem services, yet there are management challenges and the state has a sound legal and policy framework and a well-established institutional regime for management which needs strengthening.

CHAPTER 4 REVIEW OF THE GUJARAT FOREST DEVELOPMENT PROJECT (PHASE II)

The Gujarat Forestry Development Project Phase II was undertaken during the period 2007-08 to 2014-15, eight years, implemented by the Gujarat Forest Department, with JICA loan assistance, following the completion of the OECF assisted Integrated Forestry Development Project Phase I, with the objective of restoring the degraded forests and improving the livelihood of the local communities.

Methodology: The Preparatory Survey team reviewed the achievements of the GFDP II using reports concerning GFDP Phase II, Minutes of Meeting, Project Completion Report prepared by the Project Monitoring Unit, reports of project evaluation[48] , interviews with PMU and GFD officials, field visits, interactions with members of community organizations in the field and questionnaire surveys. The project's main components and budget allocation are given in Table 4.1.

Table 4.1 Project components and budget of GFDP II

Components	Allocation		Actual	
	Million JPY	Million INR	Million JPY	Million INR
Forest development management (including grassland development)	10,788	4,281	10,734	6,230
Wildlife conservation and development	212	84	147	86
Community/tribal development	1,749	694	1,801	1,032
Supporting activities	1,671	663	1,265	697
Consulting services	675	147	430	250
Foreign currency and others	1,658	1,083	555	-
Total (JBIC portion)	17,521	6,953	14,931	8,295

Source: Compiled by JICA Survey Team (2019) based on the Project Reports of GFDP II

4.1 Forest Development Management

Forest development was the key focus of the project and there were departmental, JFM and social forestry modes of plantation followed. Improvement in dense forests, gap plantation in open Forests and JFM approach in degraded forests were implemented and the achievement of 172,456 ha of plantation surpassed the original target of 147,800 ha in 13 Forest Divisions. While over grazing remains a serious problem in the forest areas, a significant reduction in grazing through social fencing as the BASIX study has shown, and this also offers a lesson that the vexing issue of over grazing could be addressed through effective community participation. The stall feeding introduced has also yielded significant dividends.

The survival rate of plantations implemented through JFM was found to be 92% in the first year and 73 percent in the second year which is quite satisfactory, and the plantation has achieved the set target of 113,200 ha, while the social forestry intervention produced a different result as discussed below.

4.2 Social Forestry Development and Management

The main purpose of this subcomponent was to mitigate biotic pressure on the forest areas by providing fuel wood and fodder to the local communities, to augment tree cover in degraded public

[48] Impact Assessment Study of JICA Assisted Forestry Project in the State of Gujarat, 2016. BASIX Consulting and Technology Services, Hyderabad and All State Financial Services Private Limited, Noida., and the same team's Impact Assessment Study of JICA Assisted Projects (States of Rajasthan, Gujarat and Odisha) 2016

lands and to improve the livelihood of the local communities[49]. The models followed were village multipurpose plantation- regular and intercropping, village fruit orchard plantation- regular and intercropping, and plantation on culturable wastelands- regular and intercropping. The Project Completion Report mentions the original target as 14,400 ha and the actual achieved as 10,653 ha, although the MOD figure of the target works out to 13,220 ha. The total budget allocation was INR 762.6 million and the actual expenditure was INR 672.6 million. Unlike in the case of JFM, the survival rate of plantations in social forestry was discouraging, except for 20% cases where the survival rate was 65%[50].

The subcomponent was implemented with the involvement of the local communities through Social Forestry Development Committees at the village level. These committees were established, as recommended by the Special Assistance for Project Formulation (SAPROF) 2007 Study, through Government Resolution JBIC/102008/SFS7/M in September 2008 to undertake social forestry work. There were 822 SFDCs formed to implement the social forestry component.

The nurseries established or strengthened under the subcomponent have largely served their purpose. However, on the overall social forestry subcomponent the Project Completion Report of the PMU observes that it "faced limited success as in most of the cases survival rate was below expectation. The main reason behind this was limited control of forest department and less investment in small areas with limited fund." The success rate of the plantation was below fifty per cent, but the reason for the limited success need not be the limited control by the forest department but on the other hand the inadequate training given to the SFDCs and the weak group coherence within SFDCs could have played a role as well as the unavailability of highway sides and rail line sides for strip planting. The saplings were not protected by fence and the idea of social fencing did not yield results, with cattle taking toll on the planted saplings.

Some of the social indices of the SFDC communities showed perceptible increase between the pre and post project period[51], for example, there has been 19% increase in the household income from forest related produces during this period. This may be due to several other factors, the social forestry work being one. Given the low rate of success of the social forestry through SFDC such a subcomponent may not be pursued in the new project.

4.3 Grassland Development

As understood, the GFDP-II has drastically different approach of forest management than the GFDP-I, mainly in terms of engaging the people with forest protection and management and in the process sustaining their livelihood. Thus, joint management of forest and protected areas through JFMCs and EDCs were promoted. The grasslands or vidis are focused for the first time in any forestry project in the State. It is therefore, important to review the grassland improvement work and the outcome in terms of capacity building for effective community engagement in managing the vidis and sharing the benefits. It is also important to describe the key lesson learnings from the project.

As an approach, following broad methods are adopted to understand the above:

- Review of GFDP-II project proposal
- Review of project completion report of GFDP-I & GFDP-II
- Review of technical report of Grassland study undertaken during GFDP-I
- Review of report on impact assessment of GFDP-II by independent agencies (e.g. BASIX & ASFS, WAPCOS, ILRT etc).

[49]Gujarat Forestry Development Project Phase II, report prepared by PMU, 2009.
[50] Impact Assessment Study of JICA Assisted Forestry Project in the State of Gujarat. 2016. BASIX and All State Financial Services.
[51]Project Completion Report.PMU. 2018

Following are the key observations emerged from the above reports vis-à-vis grassland component:

- **Project Completion Report (Gujarat Afforestation and Development Project, Integrated Forestry Development Project).** In GFDP-I, the project proposed to cover 1000 ha area under the Plantation Model - 'Fodder Development (F)'. Through this, grass and grazing resources within forest areas and village community lands get attention, basically to improve availability of fodder. However, there were no specific programs targeting Grassland areas. At the end of the project, gains from project were reported as 'villagers cut green grass, three or four times form the forest, as well as collect dry grass from the area. On an average 400 kg of green and 100 kg of dry grass is collected per ha from the forest area. Better protection of the area from fire and grazing resulted into availability of more grasses. This lessen the burden of women, who normally spent much time collecting grasses. It is also recorded that 'by afforestation in village community land, the grazing area available to the village livestock get reduced. This may have resulted into illegal grazing and damage to the plantation in the community as well as in government forest land. This issue of diversion of community usable land and resources, for other forestry purpose need adequate attention while designing any forest and grassland restoration programs.

- **Study report on grassland by Agricultural Finance Corporation Ltd.** Under GFDP-I, a study entitled 'ecological status of grassland and measure for improving productivity' was commissioned, which was probably one of its kind study on grassland of the state. The study specifically aimed to assess the ecological status of both reserved and non-reserved vidis in Gujarat. Final technical report (undated) of the study suggested that total of 86 vidis were studied for their species composition, productivity etc. and also recorded people's perception about the management of vidis and grasslands. Study recommended various management options for the vidis.

- **GFDP-II Project Proposal (PMU, GFD).** For the first time, under GFDP-II, the grasslands (Reserved and Non-reserved vidis) were given a separate attention, under the broad project component of 'Forest Development and Management'. Project recognize the significance of grasslands (vidis) in managing the fodder demands of the state especially during the scarcity period. Thus, vidis (reserve and non-reserve) under Rajkot Territorial Forest Division were selected for different intervention under project. Project targeted to cover 5,750 ha of reserve vidis and 1,180 ha of non-reserve vidis. The project earmarked INR 94.072 millions for working with reserve vidis and include the works like grassland improvement, making of seed plots and construction of storage godowns.

  For working with non-reserved vidis, the project earmarked INR 21.292 millions mainly to engage communities in vidi management in the line of JFM. However, other than people's engagement in vidi protection, improvement and management works through JFMCs, project did not provide any details of activities to be undertaken in non-reserve vidis. Thus, it suggests that the project was not very clear about the mechanism of engaging the communities in vidi management especially because it also need to make serious departure from the existing methods of bringing people into the management of vidis (like through auctioning to some village institutions like Panjrapol, panchayat, milk cooperative etc.). Considering the complex ground situation, the project was actually trying to develop some model of joint management system of non-reserve vidis. Overall, total target area for Vidi improvement was 6,930 ha by 7th year of project (as suggested in Project Log Frame).

- **Project Completion Report of GFDP-II (GFD).** On benefits derived from the project, the report suggested that all the all the physical targets were achieved including the 6930 ha of vidi

improvement and six grass godowns were completed and were in use by department. The grassland development works were carried out (i) exclusively by Forest Department in Reserve Vidis and (ii) by engaging communities in non-reserve vidis, through JFMCs. Both models have three years of seeding and planting work and 2nd 3rd and 4th year of maintenance work.

On achievement of project objectives report suggests "satisfactory performance was achieved in grassland development in the project area of Junagadh and Vadodara Circle. Due to plantation of grass rhizome the grass productivity has gone up. However, the basis for satisfactory performance is not reflected in quantitative and qualitative terms. Although, in the log frame two outcome indicators were suggested for grasslands- increase in grass yield in reserved vidis and improvement in ratio of palatable grasses. But the completion report did not inform anything on these indicators. Similarly, there is no reporting on JFMCs created in villages around vidis in Rajkot division. So, in both ecological and social terms, impacts of project interventions in vidis are not clearly discernible. On capacity building, completion report indicate that no grassland specific handbooks and manuals were prepared on their restoration and engagement of local communities in the grassland management.

- Study by BASIX and ASFS. The study assesses the impact in terms of five criteria[52]. In terms of effectiveness it finds that 'intervention on grassland development has been increased and the grass production was enhanced in the intervention area. However, no quantitative data is provided to substantiate the findings. It, however, suggested that 'ploughing in 20% area and saucer pits in 30% area in non-reserved vidis were carried out and thus, plantation of grasses with 444 tussocks per ha and seed sowing in entire area was attempted. But, study strongly recommended that 'protection must be ensured prior to any grassland intervention to rehabilitate the grasslands'. In term of efficiency and impacts the report suggests that while in overall terms 'sites were selected properly by Forest Dept.', in 80% cases working relationship of JFMCs with Forest Dept. has improved. Report indicated quantitative changes in the values but failed to provide any information on grassland sub-component. Furthermore, it highlights that in overall terms 'JFMCs and EDCs are more effective than SFDCs, but it would have been more meaningful if the comparison should be made between the JFMCs in forested region and JFMCs in grassland region. Thus, while they assess the institution of JFMCs, being a very different types of resources and dependent communities, grasslands (vidis) should have been examined separately. The JFM in forest areas have very different nature of resources, management cycle and tenure right regimes compared to grasslands, where the entire approach was executed for the first time. It can safely be assumed that in case of grasslands, JFM approach was not seriously attempted under GFDP-II. Lack of such comparative analysis does not give clear idea about the actual performance of JFMCs in grassland areas.

- Study by WAPCOS. The study analyse socio-economic impacts of JFMCs and other Public Organizations (like EDCs, SHGs etc.). To understand the socio-economic impacts of GFDP-II, 128 People's Organization, including 63 JFMC were sampled and surveyed. However, study ignores JFMC from Rajkot division created for vidi management.

Based on analysis of findings of above reports, it is clearly emerged that the project although considered grassland (vidi) development as one sub-component in a Rajkot division, but it was not received adequate attention for institutional development and thus link the resource improvement with livelihood improvement. Actually, on JFMC's creation and their engagement, except some entry point activities, not much have been attempted for livelihood improvement and income generation aspects of the project.

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[52] Five criteria include: Relevance, Effectiveness, Efficiency, Impact and Sustainability.

4.4 Wildlife Conservation

The GFDP Phase II project provided wildlife conservation and management with financial provision of INR 84 million. It addressed wildlife conservation issues along the forested eastern belt of the Gujarat State. This included seven PA, viz. Purna, Shoolpaneshwar, Jambughoda, Ratanmahal, Balaram Ambaji and Jessore wildlife Sanctuaries and Vansda National Park. It also aimed at conservation of five biodiversity hotspots viz., Kevadi, Piparia, Sarsi, Samli and Pavagarh. The interventions included in the project are summarized below.

Table 4.2 Planned wildlife subcomponents of GFDP II

Subcomponent		Target and activities
1	Protected area management	i) Protection, ii) habitat improvement and management iii) soil and water conservation
2	Conservation and Development of Biodiversity Hotspots	i) Area demarcation, ii) management plan preparation, iii) community mobilization, iv) Eco-development, v) designation of the sites as community reserves or Biodiversity Heritage Site.
3	Ecotourism Development	i) Site development, ii) community mobilization, iii) building marketing channels.
4	Eco-development	Community development through EDCs.

Source: SAPROF 2007 for GFDP Phase II

The project provided for various habitat improvement and protection works in the seven PA areas and five biodiversity hotspots (HS). These included watchtowers, check posts, boundary marking removal of alien species, fodder cultivation, water guzzlers, soil moisture conservation work and drainage line treatment. These targets were achieved, and the conservation of the five Biodiversity Hotspots seems to be a worthwhile approach as it develops a conservation regime without excluding the local people but by taking them on board through the EDCs.

A total of 110 EDCs were formed during GFDP II (89 for PAs & 21 for Biodiversity HS) and 89 old ones were strengthened, the EDC activities under GFDP are provided in the table below.

Table 4.3 EDC activities under GFDP II

Parameters	Project target	Revised	Achievement
New EDC formation for PA	137	83	89
EDC formation for HS	35	20	21
Re- orientation of existing EDC	121	84	89
Formulation of eco-development	214	210	206
Signing of MOU for eco-development	229	281	124
Registration EDC as a Society	229	281	121
Training coaching and information	654	900	444
Exposure/exchange visits	523	433	404
Annual EDC meeting	520	1431	1,496
EDC fund management	164	207	200
Net working	164	210	68
Fund raising	164	210	68
Construction of multipurpose center	52	60	56
Renovation of multipurpose center	35	51	39

Sources:JICA Preparatory Surevy for Gujarat Forestry Project Phase-II

Although there are some inconsistencies in the data for some indicators, the data overall shows a successful evolution of EDCs wherein number of annual meetings exceeded the mandatory

requirement and there were significant large exposure/exchange visits. The project provided INR 250,000 and 125,000 per EDC for new and old EDC respectively. These funds were spent for the creation of community assets during the project period.

It is reported that women participation in EDC was as members (34%)[53] and executive members (17%) but not the level of office bearers. All the members (100%) participated in the process of micro plan preparation. 20% EDC reported active role in protection while 20% reported no active role. Remaining 60% participated in protection to varying degree. However, all the EDC reported grazing in the forests with 33% avoiding plantations and 67% indulging in free grazing. SHGs have been formed with provision of revolving fund in EDC villages. However, it is reported that credit provided by SHG was insufficient to break the pattern of dependence on no-institutional credit as 46.5% continued to depend on it[54]. It is further reported that SHG were not able to build linkages with livelihood services. Dependence on forests continued to be high at 86.4%. The household income during the period rose at the rate of 9% for the villages with JFMC/EDC while the inflation rate 7.2% reflecting at some improvement due to project[55].

4.5 Eco-tourism

The project provided for setting up of three Eco-tourism sites, establishing nature trails and creating awareness facilities. Eco-tourism facilities under the project have been created at Iqbalgarh (Jessore), Shoolpaneshwar wildlife sanctuary and at Kilad (Vansda National Park). Details of achievements are given below:

Table 4.4 Achievements under eco-tourism subcomponent

Project component	Unit	Project provision		Achievement	
		Physical	Financial	Physical	Financial
Accommodation	Set	3	3.206	3	3.8
Furnishing utensils	Set	3	0.376	3	0.28
Nature trail &	Km	25	1	25	2.3
Signage	no.	250	3.606	250	3.75
Information center	no.	3		2	
TV & DVD player	no.	3	0.06	3	0.068
Brochures	no.	15,000	0.15	15,000	0.15

Source: Project Completion Report and data from project cell

Though it may take longer period to discern the impacts of the wildlife interventions there are positive indications such as the enlarged participation of communities through the EDCs. The three eco-tourism centers developed during project are working well and contributing to livelihood opportunities as guide and in hospitality in the respective villages.

However, overall impact of the habitat improvement and protection works can be inferred from the population trend of flagship species of the PA/ region. There is uptrend in sloth bear and leopard population in the region (Leopard 2011-1160, 2016- 1395; Sloth bear 2011-293, 2016- 343[56]). Sloth bear is the flagship species for four for the five PAs Jessore, Balaram Ambaji, Ratanmahal, Jambughoda and Shoolpaneshwar wildlife sanctuary. Leopard is important for other PAs. Population of both these species have been increasing in general. It would have been possible with combination

[53] Impact Assessment Study of JICA Assisted Forestry Project in the State of Gujarat, 2016. BASIX Consulting and Technology Services and All State Financial Services private Limited.
[54] Study of change in livelihood status of Self-Help Groups established during JICA Phase II of GFDP. Institute of Livelihood Research and Training, Hyderabad.
[55] Socio-economic Impact Survey of JFMCs/EDCs/SFDCs/IGA-Gs/SHGs ex ante, midterm and ex post Project. WAPCOS
[56] GFD.2018. Gujarat Forest Statistics.

of impact of both community inputs and habitat management interventions.

4.6 Coastal management

An important dimension of the coastal component is addressing the coastal protection of Gujarat coast through a comprehensive landward spatial approach of establishing, (i) Mangroves, (ii) Mangrove associates and (iii) Shelterbelts, which is a sound ecological approach of coastal protection and bioresources development.

The GFDP Phase II concentrated on the Gulf of Kachchh and Jamnagar areas including Jamnagar, Kachchh, Valsad, Navsari Bharuch, Vadodara whereas the Project will be concentrating on Gulf of Khambhat and South Gujarat area that includes the districts namely Valsad, Navsari, Surat, Bharuch, Ahmedabad, Anand and Bhavnagar. Though Valsad, Navsari, Bharuch and Vadodara districts were taken up in Phase II, it did not undertake coastal activities here.

The marginal increase in the net forest cover reported for Gujarat in the 2017 Forest Status Report of the Forest Survey of India is attributed to mangrove restoration and forest plantations. In the proposed project, in addition to mangrove restoration, plantation of mangrove associates and coastal shelterbelt are included as subcomponents which are proposed to contribute to further increase in the forest cover of Gujarat enabling to reach closer to the average national forest cover.

The Phase II started up with an area of 940 sq.km and the project interventions increased the mangrove area to 1,140 sq.km. Gujarat with its overall mangrove area of 1,140 sq.km (114,000 ha) provides ecological services worth of USD 399,000,000 per year. In terms of fishery resources, it is worth of USD 290 million. The impact created by the coastal interventions in Phase to prompt the expansion of the interventions to increase mangrove cover and the creation of coastal shelterbelts for their ecosystem services as well as a buffer against extreme climatic events.

4.7 Monitoring and Evaluation

Monitoring and evaluation was an integral part of the project. It was developed during the preparatory phase of the project. This project being participatory in nature the PMU had also included the Peoples Organizations (POs) at village level in the monitoring process. Different documents were developed as a part of the M&E framework design viz. M&E Plan, M&E Guidelines, Monitoring Instruments and Project MIS. Manuals, guidelines, rules, etc. developed during the preparatory phase has helped in the efficient implementation of the project.

A GIS Portal was embedded with the MIS architecture which was supported by Bhaskaracharya Institute for Space Application and Geo informatics. MIS System in collaboration with NIC was used which integrated the new project components into the already existing MIS used by GFD. MIS was divided in two phases. With phase one consisting of FCA, establishment, working plan, finance, physical targets, registers, participatory management and eco-tourism and phase two with modules on forest produce, legal cases, sawmill, wildlife management, forest protection and offence and research and training. Effectiveness of the initiative was handicapped by lack of GIS analyst in the IT lab, which otherwise was well equipped in terms of computer hardware and software. An impact assessment study has observed that due to the inadequacy of trained manpower the state-of-art infrastructure was found to be underutilized[57] and this observation continues to hold true as the JICA survey team has noted.

The project had developed a well-defined monitoring module with codified manual having various

[57] Impact Assessment Study of JICA Assisted Forestry Project in the State of Gujarat. 2016. BASIX and All State Financial Services.

reporting formats to be incorporated into the MIS system and training was provided to the staff members for its use. However, because of the manual system of progress reporting the system was not able to yield the best results possible.

While most of the SHGs functioned well the documentation at the SHGs were less than desired. This may be in part due to the heavy work load of the Livelihood Enhancement Team, with each team having had to look after about fifty villages as against the planned 10-15 villages. Basix Report states that there were discrepancies observed in documentation at village level for SHGs during the study. This was concurred during the JICA survey team's field visits at the Villages Odh and Moha Chapra of Aravalli and Golwada, Dholvani and Bedi of Sabarkantha Districts. The SHGs in these villages seem to have functioned well but the document keeping was very poor. It was often an individual's effort that kept the SHG afloat, rather than it being a group activity.

Assets created under the project for the POs existed on ground, but they were not properly documented during the monitoring process. The Preparatory Survey Team visited the multi-purpose hall constructed at Village Moha Chapra in Aravalli District and Golwada in Sabarkantha District.

Project Director was updated on monthly basis by the District Coordinators in standard pro forma format. However, due to improper linkages with the MIS, the MIS portal was not extensively used and remained underutilized. In the Morbi District, where the Preparatory Survey Team visited villages of Thitva and Kachia Gala with afforestation and grassland development components it was observed that JFMCs were created for the purpose of community participation, but the institutional capacity building process of the POs was not captured effectively by the M&E process. This, in part, resulted in these JFMCs largely being defunct after the project funding ended. This resulting from the sustainability criteria for POs not being effectively addressed during the project monitoring phase, which has also been noted by the external evaluator for the project (Basix Report).

Parallel M&E works were done for afforestation component during project implementation by the M&E Wing of the GFD and the Project Director. Monitoring results of the GFD M&E Wing are easily accessible from the GFD archives. It was found that there was inadequate coordination in reporting activities, which were done both manually and on MIS for monitoring the JICA Project progress. Thus, despite works being successfully executed on field, there was a large gap in coordination of monitoring for different project components being implemented. A good afforestation plantation done during phase II was visited by the JICA survey team in village Golwada of Sabarkanth District where the plantation records were found to be well kept.

Based on the lessons from the phase II project the proposed project should adopt fully technology-based monitoring and evaluation system, not relying on a manual reporting system, and should be adequately staffed. The assets mapping process should be strengthened. The community support teams should be provided in enough numbers to be able to effectively cater to the village level institutions. GFDP has made significant achievements both in terms of afforestation and in engaging the local communities in the conservation endeavor and these achievements need to be consolidated and expanded by the new phase, especially in areas previously not covered.

CHAPTER 5 REVIEW OF THE DETAILED PROJECT REPORT SUBMITTED BY THE GUJARAT FOREST DEPARTMENT

GFD submit the DPR for the Gujarat Forestry Project on Ecosystem Services and Adaptation (GFP-EA 2019), following the conclusion of the Gujarat Forestry Sector Development Project Phase II. The DPR aims to make use of the momentum created by GFDP II and to address areas not adequately addressed in the past project. It seeks to enhance the ecosystem services in the multiple ecosystems, address the climate change, and to improve the livelihood of the ecosystem dependent communities, besides seeking to mitigate the complex human-wildlife issue especially through ecological means.

The main components of the DPR are as follows:

- Coastline management, water harvesting, shelterbelts
- Human wildlife conflicts
- Fragile ecosystem management (Grasslands, wetlands and degraded forests)
- Project management
- Technology interventions

5.1 Coastal Management

The subcomponents under coastal management are:

- Expansion and restoration of mangrove areas
- Replenishment of groundwater and aquifers
- Developing coastal shelterbelts

With the proposed project, JICAs contribution towards the conservation and sustainable management of mangroves and coastal areas of Gujarat will be complete, as the entire state will be covered with the proposed project including Phase I and II projects which is a significant contribution to the conservation of degrading mangroves which are of global to national importance.

As in the Phase II, the proposed project will also contribute towards afforestation of new mudflats, restoration of degraded mangroves and restocking of old mangroves which would provide ecological niche areas for resting, roosting and breeding of aquatic birds and both the shell and fin fish. Improvement in mangrove vegetation was done by natural and artificial regeneration of appropriate species considering the ground level conditions and tidal inundation. Direct sowing of seeds / hypocotyls on the mounds, planting by polypots, were the plantation methods used in Phase II. Plantation on raised plots increased the density for which spacing has to be changed which will be corrected in the proposed project.

The proposed project is proposed to undertake mangrove plantation in a total area of 12,850 ha. By the end of the project the area of mangroves in Gujarat will increase by 1,28.5 sq.km and if this is extrapolated with the acknowledged value of ecosystem service this would amount to USD 4,43,97,50,000. In terms of fishery resources, it will be of worth, USD 318 million.

In the Gulf of Khambhat and South Gujarat areas, more diversity is available, due to its geomorphological conditions and hydrodynamics based on which species selection will be done during the implementation of the project. Coastal protection with a combination of estuarine, coastal and inland green belts in the proposed project is a new approach for the project.

The subcomponents proposed are relevant and feasible and are to yield ecological dividends. However, the aquifer recharging subcomponent, lies largely outside the experience of the implementing agency and it will have difficulties in implementing this part and hence may be dropped. However, conventional groundwater recharging work can be added as soil and moisture conservation work in the shelterbelt development.

5.2 Human-wildlife conflicts

5.2.1 Background

DPR identifies three main factors that have led to increase in HWC.

a. Human encroachment into wildlife habitats.
b. Land use change of wildlife habitats to urban/semi urban areas, industrial areas, and infrastructure needs, etc.
c. Fragmentation of wildlife habitat.

All these factors relate to land use change. It records various alternatives used world over to address the concerns due to HWC. In Gujarat it takes cognizance of recent uptrend in population of Asiatic lion, leopard, sloth bear and crocodile. It relates the population trend with HWC instances. It identifies lion, leopard, sloth bear, crocodile, and blue bull as big five that cause most of the HWC in Gujarat.

Gujarat has been successfully conserving its wildlife. As discussed in chapter 3 population of various wildlife species has increased in past decades. Expanding human habitations, land hunger, fragmentation of wildlife habitat with increasing numbers of wild animals has led to spurt in HWC instances. The DPR rightly identifies the lion, leopard, sloth bear and crocodile that cause injury and loss of human life. Blue bull and wild boar raid agriculture crops leading to economic loss to farmers.

5.2.2 Interventions

DPR proposes interventions in four groups.

Protection and improvement of habitats in forest areas including PAs.

The actions included in this group are:

a. Habitat assessment & build data base
b. Improve habitats – weed clearing, waterholes, hideouts, and increase prey base.
c. Awareness - Long distance awareness module and eVAN, Nature trails, Bio-parks, site specific orientation programs.
d. PA Protection

Habitat management holds significance for mitigating HWC as animals are likely spend more time in their habitat than near human habitation if the habitat provides for their needs of food, water and safety. The habitat improvement inputs would be better directed with inputs from collection of data and mapping of habitat quality. However, there is need to identify the habitats/landscapes that should be addressed with adequate justification for the project inputs. Primary identification of the landscape on the basis of available data is possible. GFD has data on villages of HWC incidents and observations on movement of target species. This may be used as animal habitat landscape for first level of data collection for habitat quality mapping. This will help in delineating the habitat that requires detailed study. It will also facilitate detailing of corridors of movement of animals for which next level of detailed data both form remote sensing and ground observation may be collected/recorded and

mapped. However, initiation of interventions for habitat improvement need not wait as GFD field units have information on pressing needs for intervention. However, habitat improvement intervention could be made more specific as the data collection process proceeds.

Weeds do impair the quality of habitat. Weed infested areas often become unavailable for the wildlife. Removal of weeds followed by restoration of habitat is desired option. Infestation of Lantana camera, Cassia tora, Prosopis juliflora and Parthenium species is reported in the PA areas of Gujarat. Management plan of Gir PAs records presence of Lantana camera, Cassia tora and Prosopis juliflora in Gir PA network and provides for their removal. Management plans of Jessore and Balaram wildlife sanctuaries record presence of Prosopis juliflora weed occasional occurrence of Lantana camera. Mapping of vegetation will facilitate the process of systematic weed removal proposed in the project.

Water requirement and consumption habits may vary but it is basic requirement of any species. Animals migrate in search of water. Non-availability of water in animal habitat brings them close to human habitation in search of water. Geographically well-dispersed water holes could help retain animals in their habitat and reduce HWC. Water holes could be better geographically dispersed in the habitat including migration corridors with inputs of habitat use, topography and information on natural water points and time line of water availability in them.

Hideouts for animals better described, as prime habitats need be available as mosaic for resting, breeding and migration of animals. Grooves of preferred species, grasslands provide such habitat niche and are desired input. Project would do well to provide for creation of such niche.

Food is primary requirement of any species. In absence of adequate prey base in forest areas carnivores often move closer to human habitation in search of easy prey. DPR identifies improvement of prey base as one of the inputs. This activity has long gestation period. This is attempted by GFD on pilot scale. Project should identify the prey species for breeding and make effort to detail inputs.

Wildlife and PA/landscape habitat need to be protected. DPR provides for strengthening protection. It proposes skill development of frontline staff, strengthening fencing and provides equipment's. It suggests use of UAV in protection. There is need to better equip frontline staff with information, skills and equipment. Use of UAV in monitoring works and studying areas and animals may be useful but in routine protection its utility may have to be examined.

Animal Rescue

Primarily aims at providing infrastructure for rescue of HWC causing animal and provide succor to communities through quick response teams. There is proposal to establish a number of District Rescue Centers, two Animal Hospitals, and one or two Animal Care Centers. These centers are proposed to be equipped with required men and material. Animal rescue is also needed for welfare of sick and distressed animals. GFD rescues over 1000 animals annually. These include lion, leopard, sloth bear crocodile whale shark and birds of many species. Many of these animals are required to be released back to their habitat while few are retained in various facilities. There is an organized rescue system and care facilities in lion PA area that cares for Gir PAs and adjoining region. Rescue network and facilities are getting developed in the lion landscape in newly occupied grasslands of Amreli and Bhavnagar. In south, central and north Gujarat region there is need for animal rescue organization and infrastructure. GFD has developed a facility at Pavagadh in Pancmahal district to house rescued leopards. However, much remains to be done at Pavagadh in terms of equipment and hospital facilities. DPR identifies south and central Gujarat for creating required facilities. It would be good to link one of the animal rescue centers to the infrastructure developed at Pavagadh.

People's participation in Wildlife management (emphasis eco-sensitive zones)

It includes eco-development and ecotourism promotion. Eco-development includes entry point activities, i.e., creation of community assets, income generating activities, microfinance, and cooperative activities for enhancing income from their produce. There is provision to train community mobilizers. It also includes promotion of solar alternative for electricity generation for people living in PA areas, as provision of electric supply line is often restricted inside PA areas. There is need of eco-development inputs to enlist participation of local communities for wildlife conservation. Communities that partner wildlife conservation may be better equipped to manage HWC or even have fewer instances. Community mobilizers for operationalizing eco-development by catalyzing EDC would be welcome in the project. Community participation is equally crucial in landscape away from PA not included in ESZ. Corridors of migration, often-small regions of habitat, need greater awareness and attention of local community for less HWC and welfare of animals. Often such areas are not cared even not recognized for their value to wildlife conservation by local communities. JFMCs may be the village level POs for such areas. Project may do well to include/promote JFMCs in landscape region where EDC may not be relevant PO.

There is need to promote eco-tourism at selected sites. It has multiple objectives of providing income to local people, raising awareness among local communities as also civil society and also guarding against unorganized deleterious growth of tourism in wilderness areas and PAs. The project may provide for infrastructure development and capacity building at selected sites for eco-tourism. It may include stay facilities, nature trails, interpretation centers, etc. Skill development for hospitality, facility management and guides for local community members who will provide services need be inbuilt in the project.

Awareness raising

Awareness campaign target areas include HWC impacted areas as well as civil society of the state. Awareness related interventions are provided under two components provided in the DPR. In the component for Protection and improvement of habitats there is provision of web based long distance learning modules, eVAN an ICT communication tool, site specific orientation programs, Nature trails and Biological parks. Under the component of People's participation there is provision for awards to local communities and forestry field staff for conservation of wildlife, development of Van Chetna Kendras as information centers, participation of volunteers in wildlife monitoring, small grants to NGOs and volunteers. It also includes provision for publication and newsletters, web portal in Gujarati, road shows and use of various mean of publicity. Aware community and civil society is an asset to conservation. It also helps address HWC efficiently in a scientific manner. Various participants from communities, NGOs and forest officials in consultative meetings held by the study team for SAPROF emphasized importance of raising awareness. It requires innovative approach with flexibility at implementation stage. DPR provides for large number of activities that may be judiciously used by the GFD.

Research and studies in HWC

It is proposed to establish Research Center for Wildlife Management (RCWM). Principal Chief Conservator of Forests Wildlife is to chair the RCWM with a secretariat to support. It is proposed that RCWM shall contract out studies and research projects. The list of topics suggested include monitoring and disease surveillance, population dynamics studies of HWC causing animals, corridor studies, PHVA for threatened species and development of models for compensating damage caused by herbivore animals. DPR proposes to create new center that has only secretariat with PCCF WL in chair and one officer as secretary. It proposes to contract out the research work. The DPR does not

take account of the existing research organization associated with GFD. There exists GEER foundation, Leo-gen lab, Forestry Research Foundation as the research institutions headed by the forest officials. There may not be any character of the institution having no capability of in house research. It may generate synergy if associated with one of the existing institutions selected after due consideration. There is opportunity for collaborating with national institutes of repute like Wildlife Institute of India and SACON who may not like to take projects through a process of bidding.

5.3 Grassland Development

Under the grassland's subcomponent the DPR proposes the following:

a. Development of 16500 ha of degraded grasslands, including reserved and non-reserved vidis in 4 districts of Saurashtra region (viz. Junagadh, Amreli, Bhavnagar and Morbi)
b. Development of Banni grasslands in Kachchh district
c. Engagement of communities in vidi management using JFMC route
d. Broadly, two major area of intervention is suggested: 16000 ha of grassland development in rainfed condition and 500 ha in irrigated conditions.
e. Total proposed financial outlay for the sub-component is INR 2,139.6 million. Of this, major allocations are as follows:
    - Rainfed grassland development – INR 1,639 million (77%)
    - Irrigated grassland development - INR 90.5 million (4%)
    - Protection (fencing, watch tower, fire lines) – INR 350 million (16%)
    - Woody vegetation management- INR 20 million (1%)
    - Research work- INR 40 million (2%)

5.3.1 Rationale of the Component

The DPR adequately described the ecological and economic roles of grasslands in Gujarat and also provide key causes of their degradations like excessive livestock grazing[58] and invasion of woody plants-mainly the Prosopis juliflora and Acacia senegal. The collection of grass from reserved vidis for creating buffer stock of grass for scarcity period is described as major policy instrument which keep the grasslands in program focus. While the grass production (=collection) has shown increasing trend in last few years, overall about 24 million kg grass is collected from all the reserve vidis. However, the issues of loss in volume and quality during storage was not discussed in DPR. This needs a thorough understanding. The role of series of vidis in greater lion landscape has also been described as critical need for their development and management. In the section on project synergies, restoration of degraded grasslands is visualized as providing 'better grazing ground for wild herbivore and thus better prey base for lion and leopard. While this is important aspect of grassland management in the state, it failed to recognize the great synergy in fodder security for local communities. Resultantly, the proposal undermined in its description about the need of livestock grazing management in the vidis, which is otherwise play very crucial role in the overall development strategy. It is in this context, the project totally overlooked the traditional transhumant pastoral migration in the state, especially in the Saurashtra region and also JFM framework of participatory management of vidis.

5.3.2 Selection of project area

DPR proposed to work on grasslands of Junagadh, Amreli, Bhavnagar, Morbi and Kachchh districts.

[58] Project proposal highlighted the increase in livestock population from 20.97million in 2001 to 27.13 million in 2012, putting serious grazing pressure on forest and vidis .

Except in Kachchh, grassland interventions are proposed in reserve and non-reserve vidis.

- While the increase in grass production and collection is major management objective of the state, the selection of Junagadh, Amreli and Bhavnagar districts also have another important reason for grassland restoration. Many of the vidis in these districts are currently providing suitable habitat for dispersing lion population and thus act as important movement corridor. Restoration of grassland habitat in these vidis will help the wildlife conservation in the state like by reducing the human wildlife conflicts. In this sense the selection of these districts for grassland restoration is of paramount importance.

- The logic of selection of Morbi district and non-selection of other neighbouring districts, viz. Jamnagar, Rajkot and Surendranagar, under project is not explained properly. While in DPR no objective criteria were applied for selection of districts for grassland interventions, the reason of selecting the geographically distanced districts (like Morbi from above three districts) was described as '…the spread (of district) has been chosen to increase the sustainability of current interventions (of grass storage for distribution in scarcity period) as it is less likely that subsequent droughts will affect all these areas with same strength '. So, the focus was on ensuring grass collection to meet scarcity situations. DPR also missed a point that Morbi district is carved out from Rajkot district, which was otherwise covered under GFDP-II for grassland development. Effectively, interventions in many of the vidis of current Morbi districts were covered under GFDP-II.

- In Kachchh it is proposed to take up Banni grassland. While describing different objectives of the proposed project, DPR listed Banni as one of the project sites for restoration of grasslands and thus also marked in project area map. Project also describes Banni as one of the major grassland areas of the state. However, while framing different interventions and thus the budget earmarking, the area is completely ignored. It seems that in final stages of DPR preparation, Banni was omitted from the project area. It is important to mention here that while Banni is an important contiguous grassland area of the state supporting rich biodiversity and traditional pastoral culture, due to unsettled boundaries, departmental jurisdiction and yet to settle the Community Forest Rights (CFR) claims of local pastoralists, the area is in midst of legal litigations and administrative issues. Therefore, it is correct decision not to include Banni in the present project designing.

5.3.3 Selection of Vidis

While the project targets 16500 ha of grassland development in four districts, it does not provide any break-up of targets at district level, which is important to describe. Also, within a district or division, criteria were not given to identify 'candidate' vidis for consideration under project interventions. One of the fundamental dilemma in identification of vidis need to be seen in terms of 'few large or many small?'[59]. Under GFDP-II, many vidis were covered, but the actual treatment area in each vidi was quite small and thus the impact was not up to the mark[60]. Considering the shortage in FD staffs, wage labours and other logistic needs of patrolling, monitoring etc, DPR did not discuss this critical issue of site selection.

5.3.4 Proposed interventions

The proposal suggested three major sets of interventions for vidi development: protection measures,

[59]In wildlife /biodiversity conservation through PAs, the question of 'single large or several small' (SLOSS) is critical, and mainly answered in terms of level of inputs (manpower and money) one can spare/allocate for management.

[60]The meeting with retired DFOs in Rajkot on 5th August cautioned about the 'spreading thin' effect.

productivity enhancement and research to fill knowledge gaps.

The project rightly argued that the protection measures in GFDP-II causes increase in grass production, mainly in Reserve vidis. It shows that such protection based model can be replicated in other Reserved Vidis. But, DPR did not discuss any concrete measures to address the degradation in non-reserved vidis, where the forest department is just auctioning the vidi to some village based community organization.

- Proposal suggested three major interventions for productivity improvement viz. manipulation of woody vegetation/weeds, improve palatable grass cover and productivity through seeds sowing (mainly in rainfed situation) and tussock plantation (in irrigated condition). The key features of the proposal are presented in the table below.

Table 5.1 Summary of the proposed intervention in Grassland areas and suggested indicators

S. No.	Activity	Interventions	Target (ha)	Indicators	Key Synergy
1	Protection	Fencing, watch tower, fire line	NA	NA	Better grazing ground for wild herbivores Better pray base for lion and leopard Carbon sequestration Livelihood enhancement
2	Canopy manipulation including removal of non-palatable species or those detrimental to grass growth and reduction of woody vegetation	Removal of non-palatable species or those detrimental to grass growth; Reduction of woody vegetation	4,000	Canopy proportion (%): Area treated under canopy manipulation (ha)	
3	Improvement of degraded grassland areas by seeds (rainfed) and with tussock plantation (irrigated)	Improvement of degraded grassland areas: by seeding by tussock planting	16,000 500	Change in grass production (kg/ha)	
4	Research on promoting superior grass species, collection & storage	Promote studies	NA	Publications; Number of tested methods of grass collection & storage	

Source: DPR

- The total area suggested for intervention is 16500 ha, which is about 20% of 85000 ha of potential grassland area available for intervention in the entire state[61]. This sound logical. The model of grassland restoration in both rainfed and irrigated conditions are described well.
- Although proposal suggested physical interventions in Reserve and Non-reserved vidis, but despite their different management system, project proposal did not provide any roadmap for engagement of local communities through institutional arrangement to manage and share the benefits (mainly the grass) in each type of vidi. This needs to be examined vis-à-vis Government Resolution (GR) in 2015 facilitating JFM arrangement for management of Vidis

[61]DPR suggested that out of 111,000 ha of total grassland area in Saurashtra and Kachchh, about 25,750 ha has already been treated. Thus, about 85,000 ha remains to be treated (i.e. potential area for intervention)

- In above context, the project failed to provide any concrete road map for backward-forward linkages with grassland development program. For example, livelihood support and integration on milk, wool, dung (like vermicompost), etc. could be important areas of intervention.
- The scheduling of intervention activities is well planned, especially the condition that protection fencing is first to take-up before actual grassland development work starts.
- Project impact indicators need to cover more parameters like enhancement in biodiversity values, JFMCs formation, people's contribution (cash and kind) in resource management, etc.
- Suggested research topics are very vague in nature. It does not attempt to describe key research gaps in the management of grassland /vidis and then suggest topic of research.

5.3.5 Proposed Budget

- Unit rate for different activities and procurements are given and seems by and large nicely worked out and gave break-up in terms of labour and materials. However, they need to be rechecked before using them in final project development and the implementation details and costing details need to be worked out.
- The budget to support grassland dependent livelihood system is completely missing.
- While it is strongly suggested that without completing protection fencing, grassland restoration work will not be initiated, budget is asked for grassland plantation in first year itself. The plantation work can be initiated in second year onwards.

5.4 Wetlands

Though the coastal wetlands such as mangrove and coral reef restoration activities have been carried out during JICA funded GFDP-II (2007-2015) project, and an Integrated Coastal Zone Management Project (ICZMP, 2010-2016), it is for the first time that inland wetland conservation and management issues are being considered as serious ecological restoration activities through external aided projects in Gujarat. This provides opportunities for strengthening of conservation and integrated management by promoting a cross sectoral planning and decision making. DPR has timely identified inland wetlands as one of the fragile ecosystems that require urgent attention and mainstreaming into management and regulatory regime of the state government. It explains the immense importance and various threats to this ecosystem in general and in the state. The DPR aptly justifies the inclusion of inland wetlands as fragile ecosystem that requires additional financial support for furthering the wetland conservation efforts in the state. In order to achieve the objective of mainstreaming of wetlands, the DPR suggested two prong strategy i.e. a) use legal provisions available in the form of 'The Wetlands (Conservation and Management) Rules, 2017' and b) use National Wetland Conservation Plan to ensure 'Conservation and wise use of wetlands.

The activities and intervention suggested for bringing unprotected inland natural wetlands into regulatory regime of state government under the Wetlands (Conservation and Management) Rules, 2017' are mapping, demarcation and preparation of digital inventory of all wetlands of the state and eco-profiling of selected wetlands. The activities and intervention suggested for further strengthening conservation and management of selected 20 wetlands include reducing threats by tackling issues of pollution, encroachment and water withdrawal through multi-stakeholder processes. The DPR also proposed multi stakeholder process to enhance awareness and socio-economic development of local communities through preparation and implementation of wetland conservation plan.

The DPR proposals on wetlands are sound though needs to be further developed. However, in the consultations with the GFD it emerged at some point that since the new State Wetlands Authority under amendment of the Rules in 2017 has not been established, and since the Rules does not automatically give GFD the automatic authority over all the wetlands, it is desirable to focus on wetlands where the GFD already has legal mandate, namely, wetlands declared as Protected Areas under the Wildlife Protection Act 1972. It is therefore wise to focus on the management of wetlands

Protected Areas as it can avoid jurisdictional questions at the time of implementation, and besides the wetlands PAs are in need of conservation management support. The Preparatory Study has thus selected three PAs for intervention as the principal activity. This would also include livelihood support to the adjoining communities in order to win them over to the conservation cause. The provision for preparing the dossier for the proposing the inscription of the Great Rann of Kutch as a Unesco World Heritage Site is also proposed. The World Heritage inscription proposal has already been initiated by the GFD.

5.4.1 Restoration of degraded forests

The activities proposed under this subcomponent are:

- Afforestation and reforestation of degraded forests (8000 ha) covering 7 forest divisions
- Pilot project termed curbing fuelwood use through Smart Energy Trade
- Community participation, and
- Silviculture related research

Given the coverage of very large area for afforestation in the Phase II project, it is rational that the size of the forest plantation area remains moderate in the new project. This can be used to consolidate the achievements of the previous project.

Under the second item the installation of solar energy harvesting systems on the roofs of the houses of the forest dependent communities is an innovative idea especially since it also seeks convergence with other government agencies in availing the subsidies and to sell the excess energy to the electricity grid and that way earn an income. However, the proposal for the installation of biogas structures may be dropped as past experience show that these units are not sustainable in the long term. After some days of operation at the start many of such units installed in the past are found to have come under disuse.

The community participation activity is important, instead of the 400 JFMCs proposed to be covered these could be reduced to 200. Since the forest divisions under this activity are also covered by the HWC component, more JFMCs will be covered under those set of activities.

The silviculture related research proposed are relevant and the budget proposed is moderate.

5.5 Livelihood development and capacity building

This is a theme that runs through the HWC and fragile ecosystem management of the DPR. The activities proposed are relevant and necessary for achieving the overall project objective. The details of how these activities could be undertaken, however, is missing in the DPR.

5.6 Institutional set up

A project of this nature covering multiple ecological systems and issues demands that the implementing agency should have a fair degree of flexibility and autonomy within the government system. That would ease the implementation process, avoid delays in procurements and recruitments as well. An autonomous body, within the GFD, registered under the Charitable Societies Act could serve as a dedicated body for project implementation. This option for project implementation may be considered over the system proposed by the DPR

CHAPTER 6 ISSUES AND CHALLENGES IN THE PROJECT AREA

6.1 Coastal Management Issue

It is the forest department that managers the coastal systems though they have no little specialised training and infrastructure in this respect. They are managing the coastal and also animal related marine affairs with their limited resources and producing good results. However, there is a serious need to provide training and capacity building for the GFD shift in coastal management.

6.2 Challenges in Grasslands

The grasslands in Reserved and Non-reserved vidis, notified as forest area, are under the control of Forest Department and are managed as per Working Plans. In larger context, while, de jure, grazing is not allowed in both Reserved and non-reserved vidis, de-facto open grazing commonly takes place in most of the non-reserved vidis and also in many reserved vidis. From many RVs grasses are cut by FD by using wage labour and stored to address future contingency situations. In the case of NRV due to poor productivity, collection is not possible by the chosen agency (e.g. Gaushala, Panjrapols etc.) which get year-long lease, and thus grazing is the routine practice;

In both the types, no direct rights on grasses are given to communities, although in the case of RV, a Govt. Resolution in 2015 proposed to have JFMC kind of arrangement with local communities to get 20% share from total collection. Considering the year-to-year variability in grass productivity due to stochastic rainfall conditions, this sharing arrangement may not be very attractive for communities. Even this limited provision is not duly implemented.

Considering the fact, that chronic and excessive livestock grazing is the dominating factor of degradation of NRV, continuing with existing 'auctioning & grazing' method of resource use will not facilitate any improvement in grassland productivity. The 2015 GR proposes the responsibility of protection and improvement of NRV to the agency, but without any adequate tenural guarantee and budget provisions.

In order to make the project benefits more attractive to local communities, the GR of 2015 might need some amendments to specify on delegating some of the management responsibilities to communities, tenural rights, grass resource sharing arrangements, funding arrangement etc.

JFMC based models also have some inherent ownership related problems. For example, while FD works with 'one resource area, one JFMC' approach, it is important to understand that traditionally vidis are used as common property grazing resource by local and neighbouring livestock keepers, and in many cases by migrant pastoralists, through mutually acceptable arrangements. Thus, in most of the vidis there are more than one claimant beneficiary villages. But in past, forest department's attempts to engage with local communities for restoration and management of vidis, especially with the livestock herders, have not adequately addressed such issues of multiple stakeholders.

While, it is recognized that improvement in grass productivity will indirectly help herder's livelihood, under GFDP-II as well as in regular grassland improvement programs of GFD, tangible livelihood gains for livestock herders were not developed. Integrating the ecological recovery with livelihoods models of dependent communities is a challenge, but certainly not un-doable.

Therefore, in order to move forward towards participatory grassland management system and closely integrate it with livelihoods, the JFMCs (or any other CBO) centred models need to be innovatively designed, flexible and capacitated.

In ecological terms, vidis are responding to range of situations where at one end no livestock grazing is allowed (like in many Reserved Vidis) to other extreme end where 'open access' grazing is wide spread (like in many non-reserved vidis). Such grazing regimes have serious implications on ecological state of grasslands and are thus found in physiognomic forms of either shrub or tree savannah. While perpetual overgrazing degrades the grassland quality, a complete ban on livestock grazing, on the other hand, could shift the succession towards woodland stage. Evidence are many that mild grazing is better for maintaining good ecological health of grasslands.

Thus, management of grazing is very important and also very challenging to keep the ecological dynamics of vidis well within a desired direction and conditions. This also means project need to improve carrying-capacity of the vidis, which is a product of biomass and nutritional quality of the grassland. Working plan prescriptions are the tools through which grasslands (vidis) are managed, mainly through annual coupe /compartment level working. But, these prescriptions are very general and need to be strengthened by robust scientific information such as carrying capacity assessment.

Managing livestock grazing with the help of JFMCs and may put the vide in a better management regime.

Overgrazing in the forests is another issue that is causing serious damage to the forest ecosystem. A large number of cattle and goats are left for fee ranging in the forest and they do more harm to the ecosystem than the amount of biomass consumed, by feeding on the seedlings and trampling new growth by their movement in large numbers. A good number of cattle are un-productive. It would be expensive for the low income owners to maintain such cattle on their own. Overgrazing seems to be an intractable issue, however, JFMCs could be actively involved to bring about a control regime. Besides, the provision fodder for livestock through fodder plantation may be provided.

People may be encouraged to stall feed the livestock wherever possible. Agriculture and animal husbandry agencies should also pay attention to this issue so that the vital forest resource protected.

6.3 Issues in wetland conservation

Institutional: A major institutional issue with regard to wetland management is that wetlands are being managed/owned by various authorities such as Forest department, Irrigation department, Village Panchayat etc. Total 38.3% of the wetland areas are already under protected area network which is managed by Gujarat Forest Department under Wildlife Protection Act 1972. The wetlands areas in the form of 19 major dams are being governed by 'Narmada, Water Resources, Water Supply and Kalpsar Department' in Gujarat. There are numerous village ponds and check dams across the state which are owned and managed by village Panchayats in the state.

In order to overcome this issue of governance, a multi sectoral State Wetland Authority is provisioned in Wetlands (Management & Conservation) Rules, amended in 2017. Central Government shall constitute 'State Wetlands Authority' which would carry out processes to notify wetlands in the state. It shall also define strategies for conservation and wise use of wetlands within their jurisdiction and other relevant activities. The constitution of the State Wetland Authority in Gujarat is under process and therefore consultation for this project with the said authority could not be done.

Policy: There is difference in the Ramsar Convention definition of wetland and the one mentioned in the Indian Wetland (Conservation and Management) Rules, 2017. As per the article 1 of the Ramsar Convention wetland are defined as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres".

Whereas, as per Wetlands (Conservation and Management) Rules, 2017, wetlands means an area of marsh, fen, peatland or water; whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters, but does not include river channels, paddy fields, human-made water bodies/tanks specifically constructed for drinking water purposes and structures specifically constructed for aquaculture, salt production, recreation and irrigation purposes. The Rules also states that these Rules shall not apply to the wetlands falling in areas covered under the Indian Forest Act, 1927, the Wild Life (Protection) Act, 1972, the Forest (Conservation) Act, 1980, the State Forest Acts, and the Coastal Regulation Zone Notification, 2011 as amended from time to time. The human-made structures are considered as wetlands as per globally accepted Ramsar definition, where as they are not considered as wetlands in the 'Indian Wetlands (conservation and Management) Rules, 2017.

As per the wetland inventorization by the Space Application Centre (ISRO), only 9.2% of the total wetland areas (>2.25ha.) of Gujarat are natural wetlands. Also the number of natural wetlands (>2.25ha.) is represented by 9.5 % of the total wetlands numbers of Gujarat. Moreover, further breakup of the natural wetlands suggests that a great majority of natural wetland are represented by River/Stream i.e. 76.5% of numbers and 86.1% of area of total natural wetlands. However, as per Wetland (Conservation & Management) Rules 2017, river/stream wetland areas are to be excluded from the wetland notifications. This would imply that a great majority of natural wetlands mapped by SAC 2011 could now be excluded from mainstreaming into protection and conservation as well as development planning and decision making for various sectors.

Social: The local communities depend on numerous wetlands across the state for their day to day requirements. Some of the tribal groups such as 'Padhars' depend heavily on Nalsarovar (Ramsar) wetland. Fishery and hunting of birds for their subsistence brings them in conflict with the management of Nalsarovar protected area. Therefore, preparation of wetland management plan for non protected natural wetlands with provision of rights such as fishing, fodder collection, grazing etc. can be done but hunting of birds would require complete ban as per prevailing laws. This is one of the major issues of concern for the managers to solve in protected wetland areas such as Nalsarovar as communities would not accept reducing their traditional dependency on the wetland resources.

6.4 Issues related to JFM in Gujarat

No defined criteria or norms exists for allocation of forest area under JFM. Initially, an informal norm of 100 ha. was followed, which later got reduced to area taken up for treatment under various JFM linked schemes. Currently the forest area allocated to JFMCs is between 25 to 30% of total forest area within the village boundary, leading to issues of pressure shift to other area and its degradation.

Scope and focus of treatment of the forest under JFM limited to 'plantation' area only. JFM equated with creating plantations. No comprehensive planning for the total area of forest under JFM in the village, leading to ineffective and sub-optimal outcomes expected from management of forest under JFM, especially in flow of benefits from a sustainably managed forest.

JFM is yet to be mainstreamed in the Forest Department's normal functioning and operations leading to sporadic engagement with communities and irregular investments in JFM areas, mostly in a project, scheme or program mode. There are cases where the GFD and the forest-fringe communities have been able to create a mechanism for regular or periodic interaction.

Majority of the JFMCs become inactive or defunct within a short period of time after the Project is over which point to the need for attitude change and capacity building within all stakeholders.

Few JFMCs have benefitted directly and regularly from the forests under JFM in any major way. The benefits are primarily from cut-back operations (for site cleaning, before plantation) and usufructs (grass, bamboo or other NTFPs). No known case of interim (silivcultural operations such as thinning) or final harvest of timber and sharing of benefits with community from JFM area in past 20 years.

6.5 Wildlife Management Issues.

It is seen that there are large number of vacancies at the field level in forest department. During consultation at Sasan field officials voiced this concern. As an example the status of postings and vacancies in the lion landscape involving the Circles of junagadh WL with 8 Divisions, Rajkot SF with 2 Divisions and Junagadh with 2 Divisions is presented in table below.

Table 6.1 Field staff posting positions in the Lion landscape

Beat Guard			Forester			RFO		
Sanctioned	Filled	Vacant	Sanctioned	Filled	Vacant	Sanctioned	Filled	Vacant
764	453	311	317	196	121	71	42	29

Source: GFD

The project proposes strengthening of some units or additions that may need some staff positions as these are inevitable especially for activities like rescue teams, rescue centers, botanic gardens.

There is need for inter-sector integration for ecologically compatible development in the vicinity of wildlife PAs. Beyond eco-development, this concern has to be adopted by the line departments such as rural development and tribal development. Larger efforts should come from rural development and tribal departments. However, there is an absence of mechanism to coordinate the work of different agencies in this regard.

6.6 Challenges related to rural livelihood strengthening in Gujarat

Some of the main challenges in across different landscapes and regions are listed below:

Degradation of the natural resource base and declining returns from the grassland and forest landscapes affect livelihood security. Access to areas with relatively healthy natural resources base invariably restricted. The orientation of resource management is skewed in favour of protection, and not livelihood – projects rarely are able to move smoothly from conservation to livelihoods. Declining economic stake of neighbouring communities negatively affects the health of the resource base.

Increasing incidence of crop damage by wildlife due to significant increase in wildlife (herbivore) population, with few recourse or compensation for damage to crops. Compensation is provided only for cattle and human.

Relatively less local employment opportunities in forest region, leading to seasonal migration as a common part of livelihood portfolio (especially in the eastern region)

Low financial capital base and access to non-exploitative and formal sources of credit regularly creates livelihood stress as well as inhibits micro-entrepreneurial ventures.

Relatively poor physical, financial and social infrastructure in forested eastern region as well as poor access to services and benefits provided under various government programs due to lack of awareness and mobilization.

6.7 Issues and challenges in implementing environmental and social considerations

The major issues and challenges in inclusion of E&S Considerations in the project area are as below: This is the first JICA project being executed by the GFD which includes E&S Considerations. Hence, there is little or no information about the same with the proponent. This is evident form the DPR submitted. The challenge hence is to sensitize and make aware the GFD on the inclusion of this concept in the planning and initial stage of implementation itself. Further, there will be inputs in planning and implementation from various levels of hierarchy within the GFD with different levels of skills and priorities amongst the personnel. This makes the process even more difficult.

People's participation has been there in limited manner in the form of the POs at village levels. However, the E&S Considerations require peoples involvement as stakeholders at all levels of project planning and implementation. Capacity building of the GFD to undertake this task is an anticipated challenge.

Environmental and Social Management Systems Framework (ESMSF) and Schedule Tribes and Forest Dependent Peoples Framework (STFDPF) are the proposed mechanism for inclusion of E&S Considerations in the project planning and implementation. These frameworks are new to the GFD as they do not have any similar holistic departmental policy. Therefore an institutional development and capacity building exercise for the purpose of implementation of these frameworks will have to be carried out.

Prior disclosure of information is a crucial component of the Indigenous People Plan of the World Bank, which is one of the guiding documents for the STFDPF. This document stipulates information dissemination at all stages of project planning and execution. With the current practices followed by the GFD and their internal guidelines, microplanning is the only exercise where there is a transparent information sharing between the stakeholders – the GFD and villagers/ PO. This happens at a much later stage in the project. Hence, it will be a challenge to have free and transparent information sharing with all the stakeholders at all stages of the project planning and implementation.

Allocation of dedicated staff and funding has not been proposed for the E&S Considerations throughout the project by GFD vide the DPR. Hence, to mobilize the two will be a major task.

For the implementation of the STFDPF communities have been defined by various laws and legislations which are easy to be identified in the forest and the schedule areas. However, these communities are not clearly outlined and will have to be detailed during the planning phase of the project for wetlands, grasslands and coastal areas.

Grievance redressal is another important social consideration especially in the case of the vulnerable communities in the project area like the Schedule Tribes, Schedule Castes, other ecosystem dependent communities. It will be an important component of the project planning and implementation to establish a grievance redressal mechanism within the GFD while the project is being implemented.

6.8 Institutional and capacity development challenges

Some of the institutional issues at the level of GFD are outlined below.

Mode of implementation: Being a government department, there are some limitations of the PMU with respect to recruitment of additional staff, filling vacancies, financial discretion, etc. Implementation of the project through a registered Society will lend the management greater flexibility and allow the PMU to be responsive to situational demands for allocation of resources across geographic and thematic areas within the project. In addition, it ensures complete transparency

in allocation and use of funds.

Human resources: Overall, more than one-fourth of all posts in the department are lying vacant, with percentage of vacancies in Class-II (ACFs, RFOs, Office Superintendents, etc.) being 52.6, and Class-III (Foresters, Forest Guards, Accountants, etc.) being 21.1% of the total sanctioned posts (as of 31-03-2018). A challenge for the proposed project during the preparatory phase would be the recruitment of appropriately qualified and experienced personnel for project implementation within a short time span, without the necessity to go through the time taking government procedures[62].

Funds flow: Reimbursement mode of payment to POs (JFMCs, EDCs etc) may be a potential hurdle in empowerment and participation of POs (JFMCs, EDCs, other people's institutions), who are not able to carry out works with payments on a reimbursable basis. Funds should be made available in advance for carrying out project work (this will enable POs such as JFMCs and EDCs to undertake plantation works), to be followed by submission of utilization certificates and an annual audit (plus social audit wherever POs are involved).

JFMC participation and ownership: JFMC members have been found to be indifferent towards forestry works and are institutionally not robust. In the proposed project, community-based organizations may be given top priority for undertaking the works according to the Schedule of Rates/budget for the said activity over 'plantation companies' (to be supported by adequate awareness generation about their rights and responsibilities).

Planning: In the JFM mode of implementation, the planning calendar and systems would need to be revised to accommodate collation of microplans at the Range, Division and subsequently the Circle levels to be incorporated in the annual work plan/plan of operations of the PMU at the state level. This will facilitate implementation of works according to priorities and needs identified at the lowest unit of project management, and enable the results to be more relevant, effective and sustainable.

Monitoring, evaluation and learning: The PPME Cell has 67% vacant posts. It has established norms for internal and external monitoring systems for plantations and other works of a physical nature, which are carried out by the department. There is scope for strengthening departmental M&E capacities through additional personnel and building their capacities in M&E, especially for non-plantation activities of the department, which are gaining increasing currency with adoption of participatory management principles and methods and on account of new terminologies and methods introduced with reference to climate change mitigation efforts. There is also a necessity to introduce/create forums for experience-sharing, learning and reflection, which can be immensely beneficial in building capacities and confidence of personnel.

MIS, GIS and IT: IT capabilities, including for MIS and GIS, in the department need serious strengthening. The innovative nature of bottom-up planning and the interventions proposed under the project would require a set-up where the project management has the authority and competence to be responsive to situational requirements; to draw and disburse funds in a timely manner and to adapt the project work program and future project proposals based on experience gained and lessons learned. It would therefore require a high degree of flexibility in recruitment and management of human resources, financial decision-making, including adjusting between budget heads and most importantly, it would need MIS-driven decision-support systems.

The Integrated Financial Management System (IFMS): Which is the online financial transactions

[62] During the Preparatory Phase of GFDP-II the establishment of the project management and decision-making bodies proceeded without any significant delays. However, there were inevitable delays in filling up vacant posts (586 total) through promotions because of the existing organizational procedures and systems that are mandatory for any government agency.

portal in use by the Government of Gujarat, allows for disbursals to be carried out by a single individual (usually the accountant), sometimes even without knowledge of/ need for approval from the concerned officer (e.g., the APCCF, or the CF); however, it can only be within the budgetary norms. Ideally, the system should require that a demand is raised from the lower level (online), which is first sanctioned by the accountant (after checking its congruence with the budget/ quarterly plan), and then approved by the concerned officer (approving authority), after which funds may be transferred to the concerned entity. For the proposed project, it would be important to develop a similar online portal, with scope for bottom-up planning and a robust two-level approval system.

CHAPTER 7 OVERVIEW OF THE PROJECT

7.1 Project Rationale

The Project for Ecosystem Restoration t in Gujarat is designed to consolidate and expand the achievement made by the past two phases of JICA assisted projects. It gives emphasis to thematic and geographic areas that received only partial attention during the past two projects. The twin objectives of natural resources conservation and community development is in line with JICA's policy on Overseas Development Assistance and PERG's alignment with measures that mitigate the climate change impacts and promote adaptation readily qualifies it for a 4th generation project of JICA that JICA envisages from 2019-20. The technology interventions conceived as part of the project (being addressed by the complementary survey team), especially for aiding in implementation and monitoring adds it to be considered as a model project under its 4th generation projects.

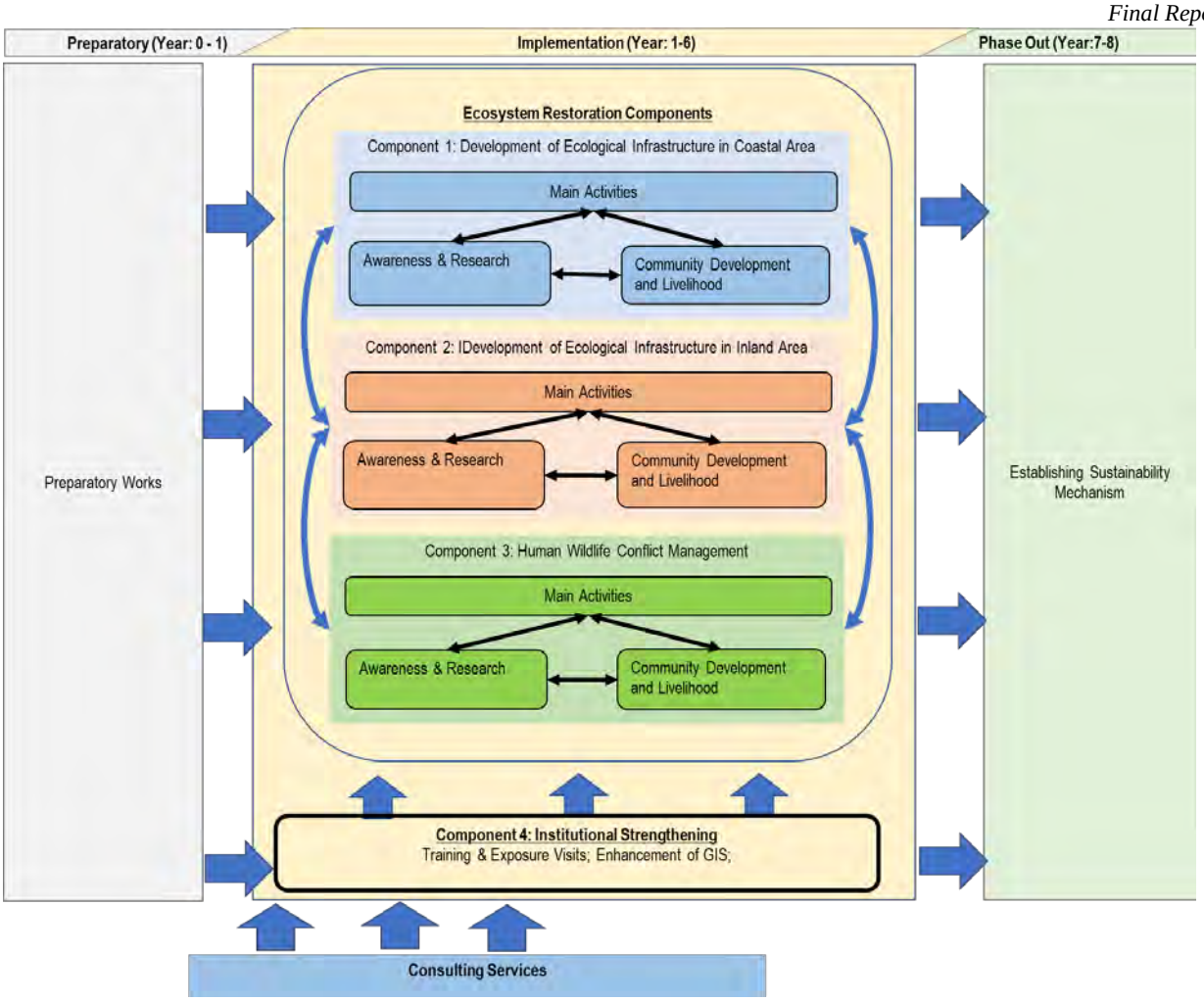
The objectives and design of the PERG are in line with the key multilateral instruments to which both Japan and India are parties. The overarching purpose of ecosystem restoration that runs through the project is in line with the Convention in Biological Diversity (CBD) and the climate change mitigation and adaptation effects of the project is in line with the UN Framework Convention in Climate Change (UNFCCC) and its Paris Agreement. PERG represents a typical initiative within the goals set by the Sustainable Development Goals (SDGs) adopted by the UN General Assembly. The project is a local level translation of goal 15 (to protect, restore and promote sustainable use of terrestrial ecosystems), goal 14 (the conservation and sustainable use of the marine resources wherein the targets include the sustainable management of the coastal systems), and goal 13 (on climate action), and goals 1 and 2 on ending poverty and hunger which are what the community development part of the project seeks to achieve among the low income groups especially the tribal communities. The project objectives and approach are in line with the integrated landscape approach of the Satoyoma Initiative, now receiving global acclaim. PERG fits within the conservation and natural resource management priorities of the state and the country. The project is handling four major ecosystems, the grasslands, wetlands, forests and the coastal system and the vexing issue of human wildlife conflicts, all priorities both at the state and natural levels and the project bears the potential to generate tangible achievements in bringing these ecosystems on a course of sustainable management. The cumulative impact of the project's inter-related components when implemented would be a significant environmental footprint for both the Gujarat state and JICA.

7.2 Project Objectives

The objectives of the Project are "to restore ecosystems through coastal ecosystem management, inland ecosystem management, human wildlife conflict management and institutional strengthening thereby contributing to improvement of ecosystem services in Gujarat State".

7.3 Project Components

The project is comprised of three ecosystem restoration and management components of coastal ecosystem, inland ecosystem (grass land, wetland and degraded forest) and human wildlife conflict management. These components are mutually complementary in order to aim for the wholistic improvement of the ecosystems in the project areas. Each of the component includes community development and livelihood, which shall be undertaken to address the drivers of ecosystem degradation caused by the interaction between the ecosystems and the beneficiaries of ecosystem services deriving from them. These ecosystem components are supported by the institutional strengthening, monitoring & evaluation and communication and publicity.



Source: JICA Survey Team (2019)

Figure 7.1 Overall Project Framework

7.3.1 Outline of the Project Component

The Project is comprised of four main components. The outline of each component is given in the table below. The project is planned to be implemented in 114 ranges across 27 divisions (22 districts). The list of project divisions and ranges is given in Annexure 7.1.

Table 7.1 Salient Features of the Project

Component	Key Interventions	Physical Targets		
Component 1: Development of Ecological Infrastructure in Coastal Area	1.Engaging local community in mangrove plantation and conservation 2.Livelihood enhancement through convergence 3.Community Implementation Unit: Gram Panchayat 4. Mangrove Afforestation 5.Community Development	Raised Bed Plantation	ha	5,000
		Nursery Raised Plantation	ha	3,000
		Mangrove Associated Species	ha	500
		Coastal Shelter Belt	ha	3,700
		No or villages engaged	villages	19
Component 2	Key Interventions	Physical Targets		
SC-2.1: Development of	1.Sustainablevidi management through community participation	Weed removal	ha	1,850
		Fencing	RMT	

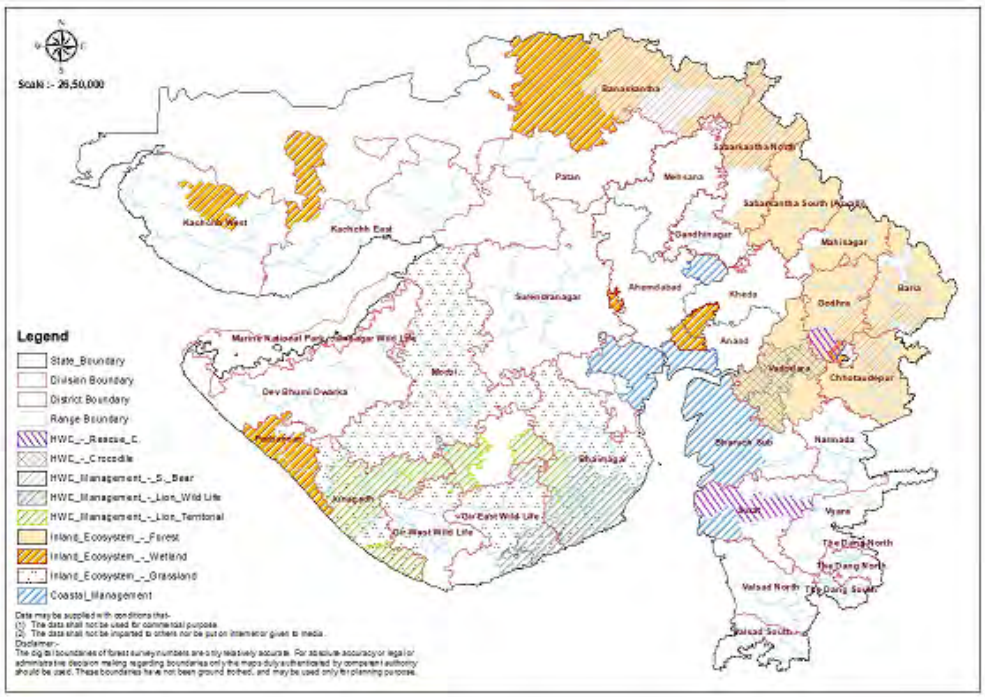
Component	Key Interventions	Physical Targets		
Ecological Infrastructure in Inland Area (Grassland)	2.Weed removal, protection of the area and plantation of grass 3.Livelihood promotion and community development	Stone Wall	RMT	210,000
		Protection Trench	RMT	120,000
		Barbed Wire	RMT	120,000
		Grassland Plantation Rainfed with SMC	ha	3000
		Grassland Rainfed Without SMC	ha	5,200
		Grassland Plantation Irrigated	ha	300
		Pilot Project on Controlled and Rotational Grazing	ha	2000
		Research projects		8
		No of JFMCs engaged		80
		No of SHGs to be supported		160
SC-2.2: Development of Ecological Infrastructure in Inland Area (Wetland)	1.Taking eight wetlands for project interventions. 2.Weed removal, protection of the wetland boundaries, eco-tourism 3.Preparation of Integrated Wetland Management Plans, World Heritage Dossier, and Ramsar Dossier for mainstreaming of wetlands 4.Livelihood promotion and community development	Weed removal (Reed)		500
		Weed Removal (Prosopies and others)		400
		Bank restoration	cubic metre	25,000
		Creation of mound	cubic metre	143,438
		Stone pitching	sq.m	9,750
		Plantation of native trees	ha	150
		Solid waste collection and disposal system	unit	1
		Integrated Wetland Management Plan preparation	sites	5
		Integrated Wetland Management Plan Implementation	sites	4
		World Heritage Dossiers	site	1
		Ramsar sites dossiers	site	3
		Eco tourism sites		2
		JFMC/ EDC engaged		21
		SHGs to be supported		42
SC-2.3: Development of Ecological Infrastructure in Inaldn Area (Degraded Forest)	1.Plantation in the degraded forest having canopy density between 40% - 10% 2.Emphasis in the tribal area 3.Management of Old JFM Plantation as a livelihood option 4.Livelihood promotion and community development	Degraded Forest Plantation	ha	9,000
		Pilot project on solar energy	households	300
		JFMC/ EDCs engaged		200
		SHGs to be assisted		400
Component 3: Human Wildlife	1.Interventions are planned for lion landscape, sloth bear landscape, crocodile habitat.	Habitat improvement		
		Removal of invasive species	ha	10,000

Component	Key Interventions	Physical Targets		
Conflict Management	2.Rescue center establishment; awareness creation are also part of the intervention. 3.Promotion of fruits tree planting 4.Eco Tourism 5.Livelihood promotion and community development	Grove Creation	ha	1,600
		SMC	ha	1,250
		Orchard corridor	farmers	1,250
		Water Point Facilities (Wind/ Solar)	set	20
		Water Point Facilities (Manual)	set	180
		Handpump	set	40
		Protection		
		Fireline	km	5,070
		Breeding Centre (Ungulate, Hare, Red Jungle Fowl)	site	8
		Nature education camp	times	1,000
		Rescue Centre	centre	6
		Eco Tourism	sites	6
		Research projects		32
		JFMC/ EDC		400
		SHGs		800

Source: JICA Survey Team (2019)

7.4 Identification of Project Area and Priority Project Areas

The area selected for the implementation of the Project for Ecosystem Restoration in Gujarat (PERG) are marked in Figure 7.2.



Source: Prepared by GFD based on the information provided by the JICA Survey Team (2019)

Figure 7.2 Project Area for the Project for Ecosystem Restoration in Gujarat

The list of divisions and ranges within the project areas under each component is given in Annexure 7.1 (without overlapping). The component wise division and range number to be covered are given in the table below. The figures in tables are compiled on the basis of component and thus the overlapping ranges are also included.

Table 7.2 Number of Divisions and Ranges under Various Components (Overlapping)

Component		Circle	Division			Range Coverage
			Territorial	SF	WL	
1	Coastal Management	3	5	2		7
2.1	Inland Ecosystem - Grassland	2		3	2	22
2.2	Inland Ecosystem - Wetland	5	2	2	3	9
2.3	Inland Ecosystem - Forest	4	6	1	1	54
3.1	HWC Management - Lion	3	2	2	1	18
3.2	HWC Management - S. Bear	4	5		2	24
3.3	HWC - Crocodile	1		1		4
3.4	HWC - Rescue C.	2	1	1		2

Source:JICA Survey Team (2019)

7.4.1 Overall Principles Adopted for Identification of Project Area

In this project, project areas are prioritized for each component based on the relevant criteria based on the overall principle as below.

- Contiguous landscape unit where the ecosystem properties and the underlying ecological and socio-economic issues share common characteristics
- Recognizing the interconnectedness of the ecological problems at hand and the socio-economic issues.
- Emphasizing areas where the shared problems are acute and seeking resolutions within the larger landscape units.
- Potential of markedly improving the ecosystem functions and services and the mitigation of climate change and the adaptation to the same.
- Management coherence in project implementation for GFD
- Matching the priorities set in the state's policy instruments.

The prioritization criteria for the ecosystem restoration and management components are given in the respective sections of the component.

As for the livelihood activities, the intervention areas are overlapping with these divisions and thus, the identification of the sites for cluster development and other types of livelihood activities will be undertaken during the initial stage of the project implementation.

7.4.2 Prioritization Criteria for Development of Ecological Infrastructure in Coastal Area and Priority Areas

Under the Component 1: Development of Ecological Infrastructure in Coastal Area, mainly two types of treatment models are adopted: mangrove afforestation and coastal shelter belt. To achieve the

optimum results, both interventions are planned to be implemented in the same sites. The scoping by site reconnaissance and scoring will be adopted for site selection as below.

(1) Selection Criteria for Mangrove Afforestation and Shelter Belt Intervention

The selection of the Project areas to be covered under the Component 1: Development of Ecological Infrastructure in Coastal Area is carried out in two steps: 1) scoping by field reconnaissance and 2) site selection by scoring. During the scoping, following criteria were considered.

- Areas located in inter tidal zones of the creeks with tidal inundation for at least 20 days in a month
- Areas have matured mudflats which are slightly away from the creeks with ideal inundation
- Areas have silty mud soil conditions which are preferable to the different species that will be raised through the Project intervention
- Areas suitable for both raised bed and nursery raised saplings plantations

As a result of the scoping exercise, 19 villages were prioritized in 7 ranges in 5 divisions as in the table below.

Table 7.3 Divisions and the Number of Ranges and Villages Selected for Component 1: Development of Ecological Infrastructure in Coastal Area

Sl. No	Circle	District	Division	Range	No of Villages
1	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Ahmedabad SF	1
2	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF	3
3	Ahmedabad SF	Anand	Anand SF	Khambhat	4
4	Surat	Bharuch	Bharuch Sub-division	Bharuch	5
5	Surat	Surat	Surat	Dumas	4
6	Surat	Surat	Surat	Hajira	1
7	Junagadh	Bhavnagar	Bhavnagar	Bhavnagar	1
Total	3	5	5	7	19

Source: JICA Survey Team (2019)

(2) Selection of the Project Sites

The project sites shall be selected from the above ranges by adopting the criteria below. For each condition score is given. The total score between 80 and 90 will be considered highly preferable and the total score between 60 and 80 is preferable. The total score between 50 to 60 is considered to be moderately preferable. The scoring system is given in the table below.

Table 7.4 Scoring System for Site Selection for Component 1: Development of Ecological Infrastructure in Coastal Area

Priority Order	Criteria	Preferred Conditions	Scores
1	Intertidal Gradient	Intertidal area with gentle gradient to be preferred Areas with steep intertidal gradient and with convex morphology are to be avoided to prevent water logging.	20
2	Tidal inundation	Sites with gentle gradient with minimum 20 days of tidal flushing in a month should be preferred.	20
3	Site Nature- Open coast/creek/Natural Mangrove formations	Creek systems and river mouths with freshwater input should be preferred. In open coast sites gentle gradient is preferred. Adequate gaps with good tidal flushing are to be considered to promote natural regeneration of mangroves.	15
4	Sediment Texture	Silty-clay or muddy substrate preferred. Though sandy substrate supports some mangrove species such as *A. marina* it has its own drawback like shifting sand, sediment deposition on pneumatophores, etc.	10
5	Intertidal extent/Width	Sites with minimum 150-200 m width and gentle gradient close to the waterfront preferred.	10
6	Tidal Currents	Sites with gentle and low velocity currents preferred.	5
7	Seed and propagule source	Seed or propagule source from nearby mangroves preferable	5
8	Mangrove Presence/ Absence in the Vicinity	Presence of natural mangroves in the vicinity is a reliable indication that the site can support good mangroves.	5
9	Access to the site	Within 2 km of reach and easy accessibility enables increased working hours for labours and easy labour transport.	10
10	Labor Availability (Socio economic activity)	Availability of good labor in nearby villages is a major factor.	10
11	Water Salinity	Sites close to discharge points of run-off preferred which controls salinity fluctuations. Based on this candidate species are to be selected.	5
12	Grazing by livestock, resource gathering etc.	To be avoided through constant vigil Social fencing by educating, sensitizing and involving villagers through awareness generation and taking steps so that they prevent their cattle grazing in mangroves and in the plantation.	5
Total			120

Source: JICA Survey Team (2019)

7.4.3 Prioritization Criteria for Development of Ecological Infrastructure in Inland Area and Priroity Areas

(1) Grassland

The site identification was undertaken by adopting two steps. First, the division level condition of vidi was assessed to identify the areas where the project interventions were needed. Among those divisions, vidis were identified by adopting the selection criteria.

1) Higher potential for providing habitats for dispersing wildlife
2) Supporting grazing grounds for pastoral and herders

A series of consultation was undertaken with the GFD staffs to identify the potential vidis. The area where the operational issues are seen such as Shetunji Wild Life Division and Banni Region of Katchh were excluded from the priority preliminary scoping. The results of the scoping are given in the following section.

1) Scoping of Divisions

Project area for restoration of grassland sub-component were discerned based on review of DPR and round of meetings and discussions with forest department officials. Accordingly, a total of five forest divisions[63] spread over eight districts in Saurashtra, and covering two important grassland landscapes, are included in the project area. It is important to mention here that while the DPR proposed grassland related interventions in four districts (viz. Bhavnagar, Amreli, Junagadh and Morbi)[64], for the logistic ease, instead of districts, forest divisions were considered for area selection.

Table 7.5 Prioritized Divisions and Districts for Grassland Restoration Work

No.	Division (Type)	Number of Ranges	Landscape Type
1	Bhavnagar (Territorial)	6	Lion
2	Gir East (Wildlife)	4	
3	Gir West (Wildlife)	4	
4	Junagadh (Territorial)	3	
5	Morbi (Territorial)	5	Pastoral
Total	5	22	

Source: JICA Survey Team (2019)

2) Condition of Grasslands in Project Area

The proposed five divisions have both reserved vidis (RV) and non-reserved vidis (NRV). As discussed earlier (see Chapter 3), objectives and approach of management of these two types of vidis, differ. Briefly and generally, the RVs are managed with exclusionary approach, where grasslands are protected and managed by Forest Department with the help of contractual labors. Grasses are collected and stored. In case of NRV, however, being less productive, both the stakeholders, the local people and FD, have limited management focus. Public investments are tilted towards management of RVs.

63 Recently created Shetrunji wildlife division overlap geographical boundaries with Bhavnagar territorial division. However, Shetrunji division is mandated to work on revenue areas to support lion corridor and habitat and thus not going to work on forest lands including the vidis. Vidis are managed by Bhavnagar division.

64 In DPR, Banni region of Kachchh district was also included in the project area. However, due to some pending issues related to Forest Rights Act (FRA), it was dropped from the final project design

The project area has a total of 90 RVs covering 27,460 ha and 340 NRVs covering 22,683 ha[65]. The average size of vidis varies significantly across the divisions in both the types. Comparatively, mean size of the reserved vidis (304 ha) is 4.5 time more than of non-reserved vidis (67 ha). The division wise summary is presented in the table below.

Table 7.6 Number and Area of Vidis in the Project Divisions

Forest Division	Reserve Vidi			Non-Reserve Vids		
	No. of Vidis	Total Area (ha)	Avg. Vidi Area (ha)	No. of Vidis	Total Area (ha)	Avg. Vidi Area (ha)
Bhavnagar	23	7,135.3	310.2	44	2,513.2	57.1
Gir East	9	2,119.7	235.5	24	2,890.2	120.4
Gir West	15	3,174.5	211.6	37	6,491.5	175.4
Junagadh	19	3,750.0	197.4	73	3,162.7	43.3
Morbi	24	11,280.0	470.0	162	7,625.4	47.1
Total	90	27,459.5	305.1	340	22,682.5	66.7

Source: JICA Survey Team (2019)

Pandey and Pandey (2015)[66] describes the ecological status of vidis of the region and recorded that only some proportion of the vidi area is presently having grass cover. That means, remaining part of the vidis are either covered by woody vegetation or of some other land-use like water bodies, roads etc. and thus not supporting grasslands. Thus, on overall terms, while about 42% area of the RVs have grasslands, in NRV it is just about 26%. It clearly gives sense of direction for project interventions. Needless to say, NRVs need more attention for sustainable grassland restoration work. Specifically, NRVs in Junagadh and Gir East and Gir West divisions and RVs of Morbi divisions need project focus.

Table 7.7 Proportion of Grassland Area in the Vidis in the Project Divisions

Division	Reserve Vidi			Non-Reserve Vidi		
	No. of vidis	Total Area of Vidi (ha)	% of Grassland Area	No. of vidis	Total Area of Vidi (ha)	% of Grassland Area
Bhavnagar	21	6,736	51.2	42	2,479	37.7
Gir East	9	2,120	28.9	21	2,670	23.4
Gir West	15	3,175	39.9	37	6,491	25.8
Junagadh	15	3,576	79.9	70	3,136	11.2
Morbi	24	1,1280	28.4	125	6,307	30.8
Total	84	26,887	42.3	295	21,084	26.2

Source: Panday and Panday (2015)

3) Identification of the Vidis for Project Intervention

Proposed project divisions have 90 RVs and 340 NRV, covering a total area of 275,000 ha and 227,000 ha, respectively. Data collected from the respective divisions suggested that out of total 50 thousand ha area of vidi, recently (i.e. during last 5 years i.e. 2014-15 to 2018-19) a total of about 17,000 ha of vidis received treatment (i.e. annual average of about 35,000 ha) .

[65]The list and area of each vidi in the division is collected from respective division office, and thus have minor discrepancies with earlier published reports.

[66]Pandey, C.N. and Pandey, R. 2015. Status of Grasslands of Saurashtra and Central Gujarat. Gujrat Forest Dept.

Table 7.8 Area of Vidis Treated between FY 2014-15 and FY 2018-19

Unit: ha

Division	RV		NRV		Overall	
	Total Area	Treatment in last 5 yr	Total Area	Treatment in last 5 yr	Total Area	Treatment in last 5 yr
Bhavnagar	7,135	5,729	2,513	250	9,648	5,979
Gir East	2,120	651	2,890	619	5,010	1,270
Gir West	3,175	795	6,491	655	9,666	1,450
Junagadh	3,750	1,491	3,163	320	6,913	1,811
Morbi	1,1280	4,513	7,625	1,588	18,905	6,101
Total	27,459	13,179	22,682	3,431	50,142	16,610

Source: JICA Survey Team (2019)

Further, if we also consider year 2019-20, it can be safely assumed that roughly 20,000 ha of vidi area in the project divisions received support recently. Thus, about 30,000 ha area of vidis in five project divisions remained to be restored and rehabilitated. Of these, 15,000 ha (i.e. 50%) can be considered for restoration under this Project.

4) Criteria for Identification of Project Vidis

So, criteria-based selection of vidis is important. For the purpose, following are suggested criteria which can be applied to select (or exclude) vidis for project intervention as below.

Table 7.9 Proposed Criteria for Selection of Vidis in Project Area

	Criteria	Criteria Type	Description
1	Area of Vidi	Inclusion	RV: > 100 ha; NRV: >40 ha
2	GFDP-II intervention	Exclusion	Covered under GFDP-II
3	Recent interventions for Vidi improvement	Inclusion	RV: < 500 ha area covered in last 5 years NRV: < 150 ha area covered in last 5 years
4	Current Level of Degradation	Inclusion	< 50% area under woody vegetation cover
5	Community willingness	Exclusion	Not ready to participate in management of vidis
6	Conservation Value	Inclusion	Unique biodiversity or wildlife values
7	Land/Resource Conflict	Exclusion	Land or resource related disputes with any agency/community
8	Nearness of vidis	Inclusion	Vidis located within 5 km distant vidis

Source: JICA Survey Team (2019)

By applying first four criteria, which broadly describe the resource structure of the vidis, a total of 116 candidate vidis were identified, covering about 22,700 ha area and spread over 22 forest ranges as in table following two tables. A list of all the 'candidate' vidis is appended in Annexure 7.2.

Table 7.10 Summary of Candidate Vidis for Project

Division	Name of Ranges	No. of Vidis	Total Area (ha)
Bhavnagar	Bhavnagar, Jesar, Mahuva, Palitana, Shihor, Vallabhipur	26	6,823.32
Gir East	Dalkhaniya, Sarasiya, Savarkundla, Tulshishyam	22	4,444.79
Gir West	Babariya, Dedakadi, Talala, Visavadar	16	3,114.33
Junagadh	Kutiyana, Mangrol, Veraval	17	4,751.91

Division	Name of Ranges	No. of Vidis	Total Area (ha)
Morbi	Gondal, Jasdan, Morbi, Rajkot, Wankner	35	3,588.03
Total	22	116	22,722.38

Source: JICA Survey Team (2019)

Table 7.11 Summary of Candidate Reserve and Non-Reserve Vidis in Five Divisions

Forest Division	Forest Range	RV		NRV		TOTAL	
		No. of Vidis	Area (ha)	No. of Vidis	Area (ha)	No. of Vidis	Area (ha)
Bhavnagar	Bhavnagar	2	404.55	2	228.26	4	632.81
Bhavnagar	Jesar	2	1,058.79	2	164.92	4	1,223.71
Bhavnagar	Mahuva	3	715.51	2	182.17	5	897.68
Bhavnagar	Palitana	1	224.78	1	155.8	2	380.58
Bhavnagar	Sihor	4	2,211.54	3	891.93	7	3103.47
Bhavnagar	Vallabhipur	2	478.61	2	106.46	4	585.07
Gir East	Dalkhaniya	1	126.07	1	126.07	2	252.14
Gir East	Sarasiya	2	464.27	1	64.59	3	528.86
Gir East	Savarkundla	2	911.07	9	1653.45	11	2,564.52
Gir East	Tulshishyam	1	415.46	5	683.81	6	1,099.27
Gir West	Babariya	0	0	1	225.08	1	225.08
Gir West	Dedakadi	1	155.27	4	346.6	5	501.87
Gir West	Talala	1	274.9	3	357.07	4	631.97
Gir West	Visavadar	3	478.3	3	1,277.11	6	1,755.41
Junagadh	Kutiyana	2	2,147.84	6	1,537.13	8	3,684.97
Junagadh	Mangrol	5	715.56	3	301.22	8	1,016.78
Junagadh	Veraval	0	0	1	50.16	1	50.16
Morbi	Gondal	2	277.54	8	744.94	10	1,022.48
Morbi	Jasdan	0	0	8	830.49	8	830.49
Morbi	Morbi	0	0	1	54.02	1	54.02
Morbi	Rajkot	2	339.31	11	945.4	13	1,284.71
Morbi	Wankaner	0	0	3	396.33	3	396.33
Total	22 Ranges	36	11,399.37	80	11,323.01	116	2,2722.38

Source: JICA Survey Team (2019)

During preparatory phase of the project (i.e. 1st year of project), other four criteria will be applied on these candidate list to select final vidis to be covered under this project. Also, for logistic point of view, from the above list, those forest ranges can be dropped from which only one or two vidis are listed[67]. From these candidate vidis, project will consider 7,900ha for grassland restoration related interventions. For the purpose of plantation, protection and management of project, vidi specific JFMCs will be constituted.

For the selection and total project area allocation between the two types of vidis, NRVs need greater share of work and therefore better representation in the larger scheme of intervention under this project. This is considered important because: (i) poor ecological status of NRVs than the RVs (ii) proportionally less area of NRVs get treated recently (iii) substantial and direct dependency of local people on NRV resources than on RVs. Keeping all above in view, therefore, out of total intervention area for project intervention, 55% and 45% of RV may be considered. Thus, for the project purpose

[67] Forest ranges which are represented by 1 or 2 vidis include: Morbi of Morbi division, Veraval of Junagadh division, Babariya of Gir West, Dalkhaniya of Gir East and Palitana of Bhavnagar division.

following will be the coverage of grassland restoration work:

Total proposed area for grassland restoration	=	7,900 ha
Proposed area for grassland restoration in RVs	=	4,350 ha
Proposed area for grassland restoration in NRVs	=	3,550 ha

5) Selection of vidis

From the identified candidates vidis[68], GFD need to identify the final list of vidis for project intervention, using other proposed selection criteria. In total, approximately 50 vidis from 5 forest divisions will be selected.

Of the four criteria, willingness of local people to partnering in the project is very important one. Since, the engagement of communities is very critical in the entire process of project intervention, their 'readiness and agreement to participate' is a 'non-negotiable' criterion for vidis selection.

It is understood that the willingness of community to participate in vidi management mainly depend on 'what are the benefits they get?' and 'what are the reciprocal commitments they have to make?". Therefore, for project point of view, it is important to explain communities, various interventions and investment plan, tenure of project, tenurial rights on resources, the benefit sharing system during the project and after project completion etc. The revised JFM resolution for vidis with clear grass cutting, sharing and grazing arrangements will be the foundation for engaging with local communities and to garner their confidence to take informed decision for or against partnering in the vidi management.

(2) Criteria and Process of Project Wetlands and Priority Wetlands

Restoration & habitat improvements of wetlands, mainstreaming of wetlands, and achieving global recognitions are main activities identified in the project. For restoration and habitat improvement activities the large wetlands that are under the jurisdiction of the GFD having higher biodiversity values, providing higher eco-system services and facing higher challenges & issues are prioritized. Taking up of such activities in other wetlands that are not under the jurisdiction of state forest department, attract permissions from other departments. Therefore, restoration and habitat improvement activities are not planned in wetlands that are not under the jurisdiction of GFD.

The other component involves mainstreaming of wetlands under Wetland (Conservation and Management) Rules 2017. Those wetlands that are not part of the protected areas, and have higher biodiversity values, providing higher eco-system services are selected for mainstreaming. Mainstreaming of other wetlands that are not under the jurisdiction of Forest department would require consent from concerned departments such as Revenue Department, Water Resource department etc. Apart from those, a few wetlands which are under the jurisdiction of GFD and have higher biodiversity and socio-cultural values are prioritized for global recognition i.e. recognize as Natural World Heritage Site and Ramsar Sites.

[68] Candidate list of vidis are identified using four criteria of inclusion viz. not covered under GFDP, larger vidi, limited recent interventions and limited extent of woody cover

1) Criteria and Process for Prioritization of Wetlands

The criteria for inclusion and exclusion of wetlands in the project for restoration, mainstreaming and seeking their global recognition (Ramsar site and world heritage site) are summarized as below.

Table 7.12 Criteria for Inclusion and Exclusion for Final Selection of Wetlands in Project

No	Activities	Criteria	Inclusion	Exclusion
1	Restoration	Wetland Area	Large Area	Small Area
		Jurisdiction	Forest department	Water Resource & Revenue departments
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services and higher issues & challenges	Low biodiversity values and ecosystem services
		Ecosystem services		Land dispute
		Issues & challenges		sites where investments have been made recently through other projects
2	Mainstreaming into legal framework	Wetland Area	Large Area	Small Area
		Jurisdiction	Revenue, Irrigation department*	Protected Areas
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services and higher issues & challenges	Low biodiversity values and ecosystem services
		Ecosystem services		Wetland where investments have been made recently through other projects
		Issues & challenges		Land dispute
3	Global recognition, World Heritage Site and Ramsar Site	Wetland Area	Large Area	Small Area
		Jurisdiction/Status	Forest department, notified wetlands	non notified wetlands or in jurisdictions of other govt. departments
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services meet Criteria (Ramsar & World Heritage Sites	Low biodiversity values and ecosystem services
		Ecosystem services		Does not meet criteria
		Issues & challenges		Disputed land

Source: JICA Survey Team (2019)

The summary of the prioritization exercise is given in Annexure 7.3. As in table below, eight wetlands have been prioritized out of 13 wetlands. For each of eight wetlands, necessary project interventions were planned. Annexure 7.3 provides the summary of the interventions for each priority wetland.

Table 7.13 List of Prioritized Wetlands and Activities Identified for the Priority Wetlands

No	Wetland Name	Divisions	Prioritization	
			Inclusion	Exclusion of wetland and their Justification
1	Nalsarovar	Sanand WL	○	
2	Great Rann of Kutch - Flamingo City	Kutch-East	○	
3	Great Rann of Kutch -Nadabet	Banaskantha WL	○	
4	Gosabara-Mokar wetland	Porbandar	○	
5	Kanewal	Annad SF	○	
6	Pariej Lake	Nadiyad SF	○	
7	Wadhawana Lake	Vadodara WL	○	
8	Great Rann of Kutch -Chhari Dhandh	Kutch-West	○	
9	Thol Lake	Sanand WL		Small area/ Irrigation
10	Little Rann of Kutch	Dhrangadhra WL		Recent intervention by other projects
11	Khijadiya	Marine National Park		Small area
12	Chandrabhaga	Jamnagar		Low biodiversity value
13	Nani-Kakarad	Valsad North		Land dispute

Source: JICA Survey Team (2019)

2) Profile of Prioritized Wetlands

The profile of the prioritized wetlands is given below.

Nalsarovar: Located in the Central Gujarat (Ahmedabad and Surendranagar districts), it is one of the largest natural lake (120.82 km2). It is notified as a Wildlife Sanctuary Area in April-1969 and 1981 due to its higher ecological and biodiversity values. Gradually, wetland conservation works are strengthened at Nalsarovar and it is recognized as one of the Important Bird Areas of Gujarat and as 26th Ramsar Site of the Country in the Year-2012. Nalsarovar is also considered as one of the wetlands of National Importance under the National Wetland Conservation Programme by Government of India. Nalsarovar is one of the highly visited wetland sites of Gujarat. Major management issues include terrestrialization, higher anthropogenic pressures (pollution, poaching, fishing etc.) and higher dependency of local community on its natural resources. One of the 5 most Particularly Vulnerable Tribal Group of Gujarat i.e. 'Padhar' lives in the peripheral villages of Nalsarovar and they depend heavily on the resources of Nalsarovar for their day to day livelihood. Major issues and challenges for management include solid waste pollution, uncontrolled growth of reed and weed, growth of Prosopis juliflora on fringes, poaching of birds, paucity of funds and staff for effective management etc.

Great Rann of Kutch-Chhari Dhandh: Located in Great Rann of Kutch in North- Western Kutch district of Gujarat, it is one of the largest natural wetlands (227.0 km2) representatives of 'Banni' region. It is notified as first Conservation Reserve in the year 2008 due to its higher ecological and biodiversity values. It is also recognized as one of the Important Bird Areas of Gujarat by Birdlife

International. It meets most of the Ramsar criteria for recognizing it as wetlands of international importance. This wetland provides habitat for large congregations of water birds, particularly Pelicans, Cranes, Waders, etc. It also attracts large number of raptors such as eagles, buzzards, falcons, owls etc. Some of the rare birds are also found at this place i.e. Grey hypocoleus etc. attract birdwatchers. Chhari Dhandh is an important birdwatching destination of Kutch however; it lacks basic facilities and amenities at the site. Major management issues include terrestrialization, higher anthropogenic pressures (poaching, fishing, siltation, growth of Prosopis juliflora on fringes, harvesting of grasses and over grazing etc.) and higher dependency of local community on its natural resources. Paucity of funds and staff for effective management etc. Large

Great Rann of Kutch-Nadabet wetland: Located in Luni River basin in North- Eastern part of Rann of Kutch in Banaskantha district, it is the largest natural wetlands (1045.0 km2) of Gujarat state and probably second largest in the country. Some part of this wetland falls in Wild Ass Sanctuary and Kutch Desert Wildlife Sanctuary whereas most of the part falls in the un-surveyed land of Rann of Kutch landscape. Though it has not been recognized as important wetland, recent surveys in February 2016 suggests that it support largest waterbird population (6,57,891 birds) in the state and probably in the country making it a candidate for recognizing it as a Ramsar site and also an IBA sites. Being a site supporting higher congregation of variety of birds, this site has very high potential for developing it as one of the eco-tourism sites of Gujarat. Major management issues include soil erosion where some of the natural bets (naturally elevated lands) which are rendezvous for local wildlife (Indian Wild Ass, Indian Wolf, Indian Fox, and variety of birds and reptiles) are being eroded. These bets are crucial sites for local wildlife during flooding. Management intervention would involve creating and strengthening a 15.0 km long earthen bund which would stop flood water affecting such bets and it would also help in holding water for water birds congregation.

Gosabara-Mokarsagar Wetland: Located in Porbandar District in different villages Gosa Tukda, Mokar, Odadar. This wetland is part of manmade and natural wetland also. It's a cluster of different wetlands. It is among the largest wetlands (116 km2) of Gujarat. Creek Gosabara is open inland into Mokarsagar, It serves as a catchment area of Bhadar and Ozat River. In 1970's Salinity Ingress Prevention Cell (SIPC) built bund at different locations to prevent upstream freshwater runoff, before this area was an intertidal mudflat zone. In 2015, Asian Waterbirds Census conducted there near to 100 different species recorded with number of 94,204 birds. This wetland is on the path of Central Asian migratory flyway, so it attracts migratory birds because of strategic position. In March 2017, The Bombay Natural History Society (BNHS) declared 96 sq km coastal wetland area of Gosabara-Mokarsagar in Porbandar, as Important Bird Area (IBA) site. It is one of the most important places for migratory birds and other water birds. This wetland has a potential for Ramsar Site.

Pariyej: Located in Limbasi taluka of Kheda district. It is a large (378.8 ha.) manmade freshwater wetland. It is located 20 km from Kanewal wetland, in Kheda district. "Wetland of Kheda/Anand" are identified as IBA by the Birdlife International. It is prioritized as number one ranking wetland of Gujarat in biodiversity by SACON. It is selected as one of the 8 Nationally Important wetlands from Gujarat under National Wetland Conservation Programme. Recently, Narmada river water is supplied to the wetland which was earlier from Mahi canal. People use water of this wetland for agriculture and fishing purpose. This Wetland is also infested with submerged hydrophytic vegetation. One of the major issues of management is eutrophication due to higher nutrient loads from agriculture fields. This Wetland flourishes with numerous migratory and resident birds during winter. More than 60 species of birds can be seen at same time.

Kanewal: Located in Tarapur taluka of Anand district. This lake is freshwater, manmade Wetland of 7000 ha. area. It is largest among all Khambhat/ Anand wetlands which are recognized under IBA sites. It is recognized as Rank 1wetland for Biodiversity values by SACON. Kanewal is located near Gulf of Cambay. This lake was formed in 1890 especially for irrigation purposes. This wetland is

under the jurisdiction of Irrigation/ Water Resource Department of Gujarat. This wetland area is favorable for Sarus cranes population. Narmada and Mahi Rivers provides the supply of water and people use it for Irrigation and drinking purpose. This wetland consists of different aquatic floral species with planktons and it act as very good food for the Migratory and local birds species.

Wadhwana: It is located near Dabhoi, 43 km away from Vadodara city. This wetland (area of 5.8 km^2) is an Irrigation Reservoir (man made Wetland) having freshwater in 2 km radius. This wetland was constructed over 100 years before by Shrimant Maharaja Sir Sayajirao Garkwad III. It receives fresh water from rains and Orsang River and Narmada canal network. Wetland has several small islands. Wadhwana wetland is known for large congregation and richness of waterbird species. The wetland flourishes in winter with numerous migratory and resident birds. Near about 50 species of water birds could see at a same time. It is also recognized as high biodiversity value site by SACON. Forest department has developed an attractive eco-tourism facility at this site with watch towers and information boards for interpretations.

Great Rann of Kutch-Flamingo City & Khadir Island: Flamingo city is a small island located within the Kutch Desert Wildlife Sanctuary in the Great Rann of Kutchh wetland. It is one of the major wetlands of the Gujarat. This wetland area and its surrounding landscape make a complex of rich natural, cultural and ancient archeological heritage. It encompasses an ancient Harappan Civilization site, a traditional flamingo breeding site at Flamingo city, fossil deposits of Jurassic and cretaceous periods and unique saline desert. Owing to its high biodiversity values and significance this area also falls in Kutch Desert Wildlife Sanctuary and Kutch Biosphere reserve. This complex is a best candidate site for recognizing it as a "UNESCO Natural World Heritage Site". Area between Bela Island, Khadir Islad and Pacchham Island in GRK is considered as one of the most biologically, culturally and archeologically important landscape in the country. Oldest human civilization traces are discovered from Dholavira on Khadir Island on the bank of Great Rann of Kutchh wetland. There are no major issues and challenges for management for this wetland sites, however, its global ecological and archeological significance remained unnoticed.

(3) Project Area Identification and Restoration of Degraded Forest Land

The sub-component intends to achieve the restoration of degraded forest area. Degraded forest area is defined as the forests having canopy desnity between 10% and 40% and requires artificial interventions to restore the forest cover. Thus, the interventions of this component comprise of the plantation and sustainable forest management in partnership with community level institutions. While selecting the project areas, "proportion of degraded forest area to the forest area" was taken as the criteria. The prioritization exercise was undertaken at two sateges: district level and range level. Summary of the procedure is given below.

Table 7.14 Site Selection Criteria and Steps for Restration of Degraded Forests

Level	Steps Followed	Output
1. District/ Division level scoping	2. Identification of the districts having more than 50% of open forest in forest cover 3. Exclusion of the districts as per the precipitation level 4. Priority listing of districts in Schedule V area 5. Short listing of divisions within the prioritized districts 6. Identification of PAs and Sanctuaries to be excluded from the forestry	Division with Exclusion Area list

Level	Steps Followed	Output
	operation	
2. Identificatoin of Priority Ranges	1. Qualitative assessment by GFD 2. Ranges within " the Drainage Lines Treatment Proejct for the Elleven Tribal Districts of Gujarat" 3. Identification of the ranges with high proportion of open forests	List of Priority Ranges

Source: JICA Survey Team (2019)

1) Scoping of the Project Distrcits/ Divisions based on the District Wise Forest Denstiy Data (ISFR 2017)

In the absence of the division wiseforest cover data, district level prioritization was undertaken based on the data of India State of Forest Report 2017, which provides the district wise forest density data of green wash area based on the analysis of the satellite imageries. The density classes are composed of four categories of dense (canopy cover of 70% and aove), moderately dense (40%-70%), open forest (10% - 40%), and scrub (less than 10%). As shown in the table below, 11 districts have more than 70% of the opten forest, which is considered to be degraded and require artificial regeneration. Out of 26 districts, the proportion of open forests in the districts of Dahod, Panchmahal and Vadodara districts is more than 70%. In Banaskantha and Sabarkantha districts the open forests are more than 50%.

Table 7.15 District and Density Wise Forest Cover in Gujarat (2017)

District	Geographical Area	Density Class				Total	% of Open Forest to the District Total Forest Cover
		Very Dense	Moderately Dense	Open Forest	Scrub		
		70% and above	40%-70%	10%-40%	Less than 10%		
Ahmedabad	8,107		12	117	52	181	**64.6**
Amreli	7,397		63	188	66	317	**59.3**
Anand	3,204		18	45	19	82	**54.9**
Banaskantha	10,743		372	476	208	1,056	45.1
Bharuch	6,509		71	243	26	340	**71.5**
Bahavnagar	10,034		47	230	76	353	**65.2**
Dahod	3,642		118	419	45	582	**72.0**
Gandhinagar	2,140		11	81	50	142	**57.0**
Jamnagar	14,184		55	380	99	534	**71.2**
Junagadh	8,831	15	956	663	60	1,694	39.1
Kachchh	45,674		301	2,011	752	3,064	**65.6**
Kheda	3,953		20	74	37	131	**56.5**
Mehsana	4,401		13	146	64	223	**65.5**
Narmada	2,817	20	464	479	32	995	48.1
Navsari	2,246	18	125	159	15	317	**50.2**

District	Geographical Area	Density Class				Total	% of Open Forest to the District Total Forest Cover
		Very Dense	Moderately Dense	Open Forest	Scrub		
		70% and above	40%-70%	10%-40%	Less than 10%		
Panchmahals	5,231		219	518	57	794	**65.2**
Patan	5,792		1	101	126	228	44.3
Porbandar	2,316		16	108	20	144	**75.0**
Rajkot	11,198		3	138	37	178	**77.5**
Sabarkantha	7,394	29	304	474	130	937	**50.6**
Surat	4,549	5	294	216	90	605	35.7
Surendranagar	10,423		6	169	36	211	**80.1**
Tapi	3,139	80	479	251	7	817	30.7
Dangs	1,766	210	743	415	3	1,371	30.3
Vadodara	7,546		145	484	60	689	**70.2**
Valsad	3,008		344	594	27	965	**61.6**
Total	196,244	377	5,200	9,179	2,194	16,950	54.2

Source: India State of Forest Report 2017. Forest Survey of India, Dehradun.

Out of the districts having more than 50% of the open forest area, some of the districts where the climatic condition is naturally dry were excluded. The districts comoing under Schedule V, as in Chapter 3, were considered on priority, as the socio economic benefits on the forestry intervention is high.

While selecting the distrits, newly formed districts were also included for consideration. These districts are added to the above districts considered while reviewing the forest density data.

Table 7.16 New Districts Formed out of Existing Districts

Name of district	Area description
Aravalli	Aravalli district has been carved out of sabarkantha district
Chotaudepur	Chotaudepur district has been carved out of Vadodara district with most of the forest area going to Chotaudepur
Mahisagar	Mahisagar district has been constitued from area taken from Dahod, Panchamahl and Kheda districts

Source: JICA Survey Team (2019)

As a result following districts were identified and the forest divisions falling within the district boundaries were identified as priority divisions. The list of divisions are as given below.

Table 7.17 List of Priority Divisions and Areas

Division	Area included that will form part of Project area.
Aravalli	All the forest area of the Aravalli district
Banskantha	All the forest area excluding the forest area of Balaram Ambaji and Jessore Wildlife Sanctuarues

Division	Area included that will form part of Project area.
Baria	All the forest area of Dahod district except the area of Ratanmahal Wildlfie Sanctuary That is included in Kanjeta Range being part of Vadodara Wildlife division.
Chotaudepur	All the forest area of Chotaudepur district except for the area of Jambughoda Wildlife sanctuary that is part of Vadodara Wildlife division.
Mahisagar	All the forest area of the Mahisagar district
Godhra	All the forest area of Panchmahal district except for the area of Jambughoda Wildlife sanctuary that is part of Vadodara Wildlife division.
Sabarkantha	All the forest area of the Sabarkantha district

Source: JICA Survey Team (2019)

2) Identification of Priority Ranges

Based on the lsit of divisions identified as above, GFD has undertaken a qualitative assessment of the ranges. According to the information on the forest condition in the ranges, the list of priority ranges was prepared.

Out of the eight divisions and 54 ranges, 18 ranges in five divisions overlap with sloth bear interventions under Human Wildlife Component. However, there is an adequate arrangement for the Human Wildlife Conflict Management (Lion landscape) by GFD and thus, they will not be targeted under the interventions for lion landscape but included for the restoration of degraded forest restoration. The number of ranges are given in the table below.

Table.7.18 Divisions and number of Ranges to be Covered under Restoration of Degraded Forest

Sl. No	Circle	District	Division	No of Ranges
1	Gandhinagar	Aravalli	Aravalli	5
2	Gandhinagar	Sabarkantha	Sabarkantha	7
3	Gandhinagar WL	Banaskantha	Banaskantha WL	7
4	Vadodra	Dahod	Baria	12
5	Vadodra	Chhota Udaipur	Chhota Udaipur	10
6	Vadodra	Mahisagar	Mahisagar	6
7	Godhra SF	Godhra	Godhra SF	6
8	Vadodra	Godhra	Godhra	1
Total	5	7	8	54

Source: JICA Survey Team (2019) compiled based on the information provided by GFD

7.4.4 Prioritization Criteria for Human Wildlife Conflict Management

(1) Selection of the Areas for Human Wildlife Conflict Management

In Component 4: Human Wildlife Conflict Management, issues associated with the lion, sloth bear, crocodiles are to be dealt with. Their habitat is found in the north and south of the state. As the intervention require a habitat area wise approach, concerned divisions and ranges were collectively selected as intervention areas.

The project shall address the lion and sloth bear landscapes in North and Central Gujarat holistically to mitigate HWC. This will address the leopard habitat too to a great extent as detailed in the foregoing. Narmada, Surat, Navsari and Dangs with some leopard population and occurrence of HWC will be

covered under the awareness and rescue components only. Crocodile habitat along Vishwamitri will be addressed for rescue of crocodiles and awareness and education.

(2) Site Selection Criteria for Human Wildlife Conflict Management

When scoping the project sites/ villages, following critera may be taken into consideration.

a. Villages up to 3 km from the PA areas selected for project implementation.
b. Already affected by wildlife conflict (to be identified on the basis of past cases in the village).
c. High likelihood of being affected by wildlife conflict (located along corridor; number of incidents in the area / range).
d. Overlap with other Project interventions (grassland, degraded forest). It is estimated that there will be an overlap of 35 villages/JFMCs with grassland component. The JFMCs for degraded forest restoration component shall be additional.
e. Over period of time as the studies help in defining landscape and corridors more specifically the village selection will become more targeted.

The list of divisions and ranges to be covered under this component is given in the table below.

Table 7.19 List of Project Divisions and Ranges to be Covered under Component 3: Human Wildlife Conflict Management Component

Lanscape	Circle	Division	Range
Lion Land Scape	Junagadh Wildlife	Shetrunji division, Palitana	Palitana WL Range
			Mahuva WL Range
			Jesar WL Range
			Rajula WL Range
			Liliya WL Range
			Jafrabad WL Range
	Junagadh	Junagadh division	Dungar North
			Dungar South
			Verval
			Mangrol
		Bhavnagar	Mahuva
			Jesar
			Palitana
	Rajkot	Amreli SF	Kunkavav
			Lathi
		Botad SF	Gariyadhar
			Talaja WL Range
Sloth Bear Land Scape (North Gujarat)	N.G. Gandhinagar	Banaskantha	Iqbalgarh
			Dantiwada
			Amirgadh
			Ambaji North

Lanscape	Circle	Division	Range
			Ambaji South
			Danta West
			Danta East
			Palanpur
	Gandhinagar	Sabarkantha	Dholwani
			Poshina
			RDF Poshina
			Vijaynagar
			RDF Khedbrahma
			Vadali
		Gandhinagar	Dharoi
Sloth Bear Landscape (Central Gujarat)	Vadodara	Baria Division	Dhanpur
			Sagtala
			Vansiya Dungri
		Chotaudepur	Jetpurpavi
			Chotaudepur
		Godhra	Rajgadh
	Vadodara WL	Vadodara Wl Division	Kanjeta
			Jambughoda
			Shivrajpur
Crocodile Habitat	Bharuch	Vadodara SF	Vadodara
			Padra
			Vaghodia
			Karjan
Rescue Centers	Vadodara	Godhra division	Halol for Pavagadh
	Surat	Surat	Mandvi South for Khodamba

Source: JICA Survey Team (2019)

(3) Eco-Tourism

Ten eco-tourism siteshave been identified for the eco-tourism under Component 3: Human Wildlife Conflict Management Component. This may include five existing sites and ten new sites. The facilities at existing sites would be upgraded added as per requirement. Potential sites for ecotourism development are listed below. Out of the list, the Project shall identify the areas according to the potential as business enterprise and ecosystem management and services deriving from the intervention.

Table 7.20 List of Potential Eco-Tourism Promotion Sites and Existing Sites

Lion Landscape				
Potential Sites			**Existing Sites**	
Sl. No	Site	District/ Division	Site	District Division

Lion Landscape				
Potential Sites			**Existing Sites**	
1	Ambardi	Amreli	Kaj Manavada Wetland	Gir Somnath
2	Shetrunji division	Bhavnagar		
Sloth bear landscape				
Potential Sites			Existing Sites	
Sl. No	Site	District/ Division	Site	District Division
1	Balaram	Banaskantha	Bindol	Dahod
2	Kevdi	Chotaudepur	Bhat	Panchmahal
3	Sukhi dam site	Chotaudepur	Polo	Sabarkantha

Source: JICA Survey Team (2019)

(4) Project area

The interventions planned under this component will be implemented in the lion and sloth bear landscapes in North and Central Gujarat. Leopard having high adaptability occurs widely. The lion and sloth bear landscape overlap the leopard habitat that extends beyond. Crocodile habitat along Vishwamitri will be addressed for rescue of crocodiles and awareness and education. The description of each land scape is given in this section.

1) Lion landscape

The lion landscape beyond PA network including the ESZ of the PAs will be covered under the project. It is observed that there are adequate allocations for the lion PA network region. Funds are also available from Gujarat State Lion Conservation Society that collects the gate money for PA. Also, the PA areas have been intensively managed over years need less new interventions. The areas beyond PAs that have been occupied by the lions in recent times need more interventions. The project will accordingly cover entire landscape with emphasis on areas beyond PA. The total lion landscape is estimated at 15,859.92 sq. km.

Table 7.21 Lion Landscape Area

District	Division	PA(Ha)	No. of Villages in Lion landscape	Village Area in (ha) in Lion landscape	Total area in lion landscape (ha)
Junagadh	Gir West & Junagahd	148,300.68	750	601,947.41	750,248.09
Amreli	Gir East	21,411.23	423	472,847.33	494,258.56
Bhavnagar	Bhavanagar & Shetrunji	0	375	335,610.17	335,610.17
Rajkot	Rajkot	0	5	5,875.94	5,875.94
Total		169,711.91	1,553	1,416,280.85	1,585,992.76

Source:GFD (2019)

2) Sloth bear (Melursus ursinus) landscape

Conservation of sloth bear is a success story in making in Gujarat. In Gujarat sloth bear are found in the Jessore, Balaram Ambaji, Ratanmahal, Jambughoda and Shoolpaneshwar wildlife sanctuaries and forests of Sabarkantha district. Sloth bear being herbivore and insectivore do not prey on human. Accidental encounters are the main cause of conflict wherein sloth bear cause injury that may turn fatal in some cases. Sloth bear population is estimated at 343.

The sloth bear land scape consists of 4 PAs with loose connectivity often through the state of Rajasthan. The four PAs are:

a. Jessore
b. Balaram Ambaji
c. Ratanmahal
d. Jambughoda

The forest areas of Banaskantha and Sabarkantha up to Vijaynagar connect to Jessore and Balaram Ambaji sanctuaries forming a part of landscape. Second part of the landscape consists of Ratanmahal and Jambughoda PAs and connecting corridor through Kevdi and other forest areas of Chotaudepur division. Possible link between Sabarkantha forest and Chotaudepur forests has also been reported[69]. Sloth bear landscape may be considered in two parts of the state; the North Gujarat landscape and the Central Gujarat landscape. Though some connectivity is reported between the two and also with sloth bear habitats in Rajasthan.[70]

Northern Landscape: The northern sloth bear landscape consists of Jessore and Balaram Ambaji sanctuaries and the landscape region extending up to Vijaynagar in Sabarkantha district. This landscape is estimated at 4,736.55 sq km extending over 653 villages as detailed below. It is the total area of the villages. Actual habitat within landscape may be less.

Table 7.22 Sloth Bear Landscape in North Gujarat (Movement Village Area)

District	Division	No. of villages	Area ha
Banaskantha	Banaskantha	373	285,327.81
Mahesana	Mehsana	34	18,028.39
Sabarkantha	Sabarkantha	246	170,298.59
Total Movement Village Area		653	473,654.78

Source GIS cell GFD

Central Landscape: The central Gujarat landscape consisting of Ratanmahal and Jambughoda wildlife Sanctuaries, the areas in vicinity of Ratanmahal and the corridor connecting Ratanmahal to Jambughoda through Kevdi. GFD has mapped 3,362 villages in this landscape covering 17,441.60 sq km area. This includes all the area of villages in the landscape. The habitat area may be much less. There seem to some overestimation as there may be narrow corridors in some parts which has been taken as continuum.

Table 7.23 Sloth Bear Land Scape in Central Gujarat (Movement Village Area)

District	Division	No. of villages	Area ha
Dahod	Baria	703	430,343.61
Kheda	Mahisagar	23	13,635.58
Panchmahal	Godhra	1,198	572,999.07

[69]*Dhariya Nishith and Singh CP. n.a. Habitat Suitability & Corridor Analysis for Sloth Bear in Gujarat using Remote Sensing and Ecological Modeling. Completion Report of RESPOND Project of ISRO.*
[70]Dhariya Nishith and Singh CP. n.a. Habitat Suitability & Corridor Analysis for Sloth Bear in Gujarat using Remote Sensing and Ecological Modelling. Completion Report of RESPOND Project of ISRO.

District	Division	No. of villages	Area ha
Sabarkantha	Sabarkantha	695	366,448.91
Chotaudepur	Chotaudepur	743	360,733.22
Total Movement Village Area		3,362	1,744,160.39

Source GIS cell GFD

a. Leopard (Panthera pardus)

Population of leopards in Gujarat is estimated at 1,395 in 2016, as mentioned in Chapter 3. Significant leopard population is found in districts surrounding Gir i.e., Junagadh, Gir Somnath, Amreli, Bhavnagar, Dahod, Panchmahal, Banaskantha, Chotaudepur, Surat, Navsari and Dang districts. Leopards are highly adaptive. They do not restrict to forest areas and often take refuge in wooded wastelands akin to forests and farm lands with crops like that of maize, sugar cane, etc that provide good cover to hide. Leopards even breed on such farmlands. They are known to eat anything they can catch. Farmers and farm laborers are required to visit farms for various works including to irrigate as per schedule of electricity supply. Often such outings are required in dark hours. It leads to situations where they come in direct contact with leopards. Leopards are known to lift children and old people too. They find goat, small cattle, and poultry easy prey and often lift such livestock even from houses. There have been instances of children of migratory labor for sugar cane harvesting, living in temporary shelters, being lifted by leopard from farmlands in surroundings of Gir.Leopard attacks are known to be cyclic in nature. It is ascribed to the fact that once a panther found close to human habitation is rescued and removed it takes time to reoccupy the niche vacated, which invariably happens. The HWC incidents are repeated at interval of few years when the niche is re-occupied.

b. Leopard Habitat

Leopard, lion, sloth bear, crocodile and blue bull are the most significant animals that cause HWC in Gujarat. Leopard habitat is wide spread. High population areas of leopard, Junagadh (354), Gir Somnath (111), Amreli (126) and Bhavnagar (31) coincide with lion habitat. Other districts with large leopard population are Dahod (209), Panchmahal (90), Chotaudepur (82) and Banaskantha (71) and they are part of sloth bear habitat. These areas account for 1074 (77%) of the 1,395 leopards recorded in 2016. Thus, lion and sloth bear landscapes together account for over 77% of the leopard population of Gujarat. Other districts with significant leopard population are Navsari (48), Dangs (43), Surat (40) and Narmada (38). The project activities in these other districts beyond lion and sloth bear habitat will be limited to rescue and awareness raising.

c. Marsh Crocodile (Crocodylus palustris):

Crocodile are reported from Gir, banks of Vishvamitri River and Ajwa dam in Vadodara district and Narmada dam and its associated water bodies. Crocodiles have also been reported from Anand, Sabarkantha, and Mahisagar districts' indicating that they occupy few pockets along Mahi and Sabarmati rives too. In Gir crocodile were bred and released under a program for conservation during seventies. However, significant incidents are reported from Vadodara district. Raju Vyas from Vadodara reports: "I have been collecting data on crocodile attacks in Gujarat since 1960. Till 2013, some 60 attacks were reported in the state—an average of one attack a year. But in 2014, the number of attacks was 24. Of these, 12 were in the Vishwamitri basin," says Raju Vyas, crocodile expert and an official with the city administration[71]. Data obtained from the records of the Gujarat Forest department is presented in the table 3.7. The crocodile attacks are mostly fatal. This may be mainly due to fact that crocodile pulls its prey into water where the prey first dies of drowning.

[71] Down to Earth Wednesday 31 October 2018.

Vishwamitri river originates in Pavagadh hills about 55 km from Vadodara and meets sea in Gulf of Khamabat. About 25 km stretch of river passes through Vadodara. There stretch has large crocodile population along its banks. In 2015 GFD estimated number of crocodiles in Vadodara district at about 450 with about 250 in Vadodara city[72].

[72] Down to Earth Wednesday 31 October 2018.

CHAPTER 8 DETAILED SCOPE OF WORK (DRAFT)

8.1 Project Components

The project is comprised of 4 components. The summary of the project sub-components (SC) is given in the table below.

Table 8.1 Summary of Project Components

Component 1	**Development of Ecological Infrastructure in Coastal Area**
SC-1.1	Preparatory Works
SC-1.2	Plantation of Mangroves
SC-1.3	Plantation of Mangrove Associated Species
SC-1.4	Plantation of Coastal Shelter-Belts (with SMC)
SC-1.5	Community Development Activities
SC-1.6	Awareness Program
SC-1.7	Research Studies
Component 2	**Development of Ecological Infrastructure in Inland Area**
SC-2.1	Restoration of Grasslands
SC-2.2	Restoration of Wetlands
SC-2.3	Restoration of Degraded Forests
Component 3	**Human Wildlife Conflict Management**
SC-3.1	Preparatory Works
SC-3.2	Habitat Improvement
SC-3.3	Protection
SC-3.4	Awareness Program
SC-3.5	Wildlife Rescue
SC-3.6	Eco Tourism Promotion
SC-3.7	Livelihood Enhancement for Areas affected by Human Wildlife Conflicts
SC-3.8	Strengthening of GEER Foundation
SC-3.9	Research Projects
Component 4	**Institutional Strengthening**
SC-4.1	Preparation of Manuals and Guidelines
SC-4.2	Capacity Development
SC-4.3	GIS Technical Upgradation Training
SC-4.4	CSR/ Partnership Development
SC-4.5	Monitoring & Evaluation
SC-4.6	Environment and Social Consideration
SC-4.7	Strengthening of Project Implementation System
SC-4.8	Information, Education and Communication for GFD

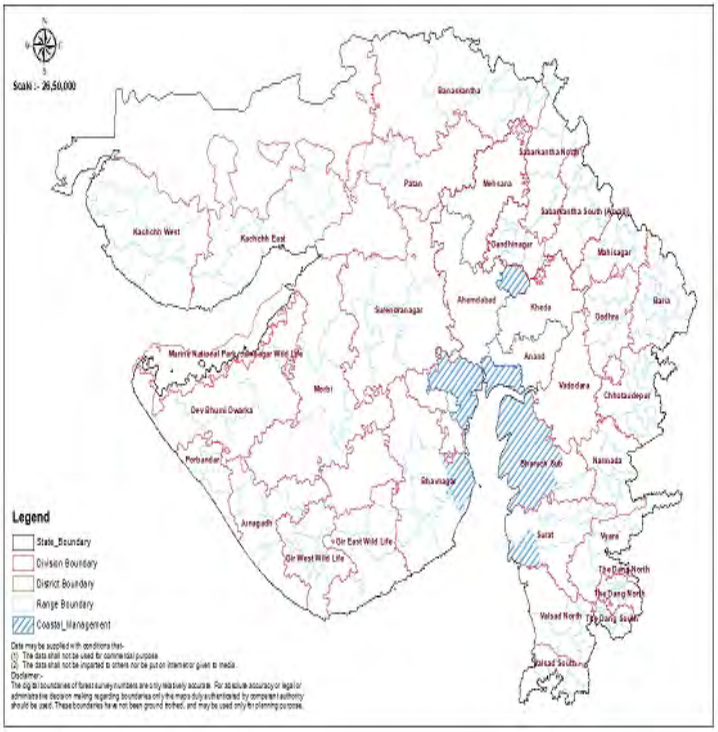
Source: Survey Team (2019)

8.2 Component 1 Development of Ecological Infrastructure in Costal Area

(1) Rationale

Despite the gradual increment in the areas under mangrove ecosystem, it continues to be exposed to various threats including excessive harvesting of the fuelwood and fodder from the mangrove areas

and land conversion for industrial development. The degradation of the mangrove ecosystem leads to the vegetation and natural environment in the surrounding areas, which also affects the performance of natural resource based productive activities like farming and dairy. Thus, there is a need to augment the mangrove ecosystem. The well-nourished mangrove ecosystem not only contributes to the betterment of the local livelihood but also provides carbon sink which contributes to mitigate the climate change impacts on the local community and natural environment. The project areas were selected from the areas where the GFD sees the need for intensive operation.



Source: Preapred by GIS cell, GFD based on the information provided by the JICA Survey Team (2019)

Figure 8.1 Prioritized Project Areas for Component 1 Dvelopment of Ecological Infrastructure in Caostal Area

(2) Objectives

The planned activities are to achieve the following objectives:

1) To minimise and mitigate the damages caused by the saline seepage and strong winds on the local livelihood
2) To reduce the vulnerability of the local communities along the Gulf of Khambhat from extreme marine and cyclonic events through restoration of mangrove ecosystem restoration
3) To reduce the vulnerability of the local communities from cyclone
4) To provide alternative livelihoods by planting multipurpose trees in the shelter belt

8.2.1 SC-1.1 Preparatory Works

(1) SC-1.1.1 Preparation of Landscape Map

In order to select the intervention area strategically for maximisation of ecosystem services, Landscape Map will be prepared. Any activities under the component shall be planned based on the Landscape Map. Mapping exercise will be conducted to integrate information on location and area of existing mangroves and shelterbelts, vulnerability to natural disasters, biodiversity, location of villages, and other information which are required for prioritization into Landscape Map. Intervention areas will be identified in accordance with prioritization criteria.

Mapping exercise will be done in a phased manner, and batch-wise activities will be planned accordingly. No activities shall be commenced prior to preparation of Landscape Map and prioritization of the intervention area.

(2) SC-1.1.2 Site Identification

Based on the landscape map, the potential project intervention areas will be identified at the division level. Since the mangrove plantation works will require to engage local communities, the stakeholder consultations will be undertaken as part of the site selection process.

(3) SC-1.1.3 Consultation with Gram Panchayat and Preparation of Micro Plan including Treatment Plan

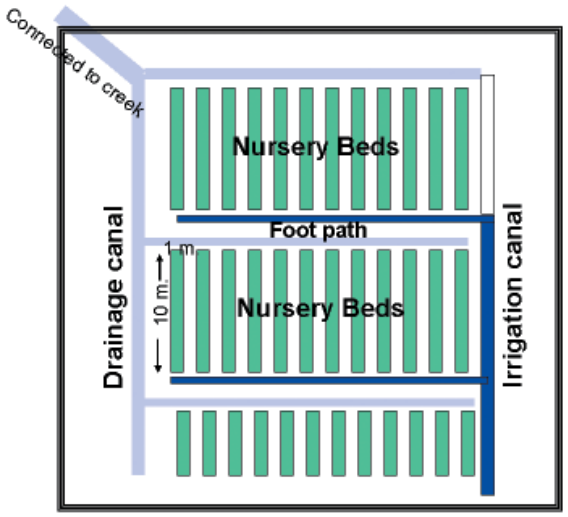
A series of consultation with local stakeholders through Gram Panchayat shall be undertaken prior to finalization of the project site. The community's responses during the stakeholder consultation shall be taken into consideration while finalising the project sites. Once the project sites are finalised, the micro plan shall be developed by the Gram Panchayat while the GFD will prepare the treatment map by integrating the needs and opinions from local stakeholders. The concerned Gram Panchayat may be assisted to constitute a sub-committee on mangrove restoration and management.

(4) SC-1.1.4 Selection of the Site for Mangrove Nursery

The site for mangrove nursery will be selected in the inter-tidal area, closer to a natural creek to draw water for raising the plants and either connected by road or by creeks for easy transportation of seedlings from the nursery to the restoration site. Water pumping facility will be established for irrigating the saplings as and when required.

Minimum requirements for a mangrove nursery site are;

- areas with periodic inundation
- access to good quality brackish water with pumping facility from the creeks
- access to road or creek to transport the saplings to the planting sites



Source: T. Ravishankar and R. Ramasubramanian.Mangrove Nursery Manual (2004) p. 17

Figure 8.2 Sample Structure of Mangrove Nursery

(5) SC-1.1.5: Collection of Seed Material

Seed collection will be undertaken by mobilizing local community members. In case, an outsourced agency is engaged for the mangrove plantation, it should be made mandatory for the agency to mobilize workers from the locality. Considering the time required for the nursery preparation, mangrove propagules shall be collected between June and October although *Bruguiera gymnorrhiza*, *Rhizophora apiculata* and *R. mucronata* bear fruits throughout the year with the peak fruiting season from September to November. The seeds/ propagules should be collected from the trees that are older than 5 years.

Identification of mature propagules : *Rhizophora mucronata* are larger in size and green coloured. Mature propagules of *R. apiculata* can be identified by the presence of red collar in the cotyledon while *R mucronata* have light green or yellow cotyledon. Matured propagules of *Bruguiera* sp. are purplish-green in colour which can be collected from water or plucked from trees. The fruit coat of the matured *Avicennia* sp. fruits is pale yellow in colour. The matured fruits of *Sonneratia apetala* can be easily distinguished by change in the colour from pale green to deep green. The taste of the fruit becomes sour as it matures. Mature fruits detach easily from the calyx and float in the water.

8.2.2 SC-1.2 Plantation of Mangroves

(1) SC-1.2.1 Nursery Works

Matured seeds/ propagules of *Avicennia marina, Aegiceras corniculatum, R. mucronata, Bruguiera gymnorrhiza* and *B. cylindrica* could be collected from the trees/creeks. The collected seeds and propagules should be kept either in polythene bags or in jute sacks for transportation to the nursery. *Avicennia marina* and *Avicennia officinalis* seeds shall be planted within two days of collection, as delay in planting reduces the rate of germination. However, the seeds of the *Rhizophoraceae* members could be stored maximum of 15 days in water.

The intertidal areas close to the high tide line are ideal sites for preparing the nursery as the seedlings will not be submerged over a prolonged time. The young seedlings will rot if these submerge over a long period of time. Sunken beds could be prepared with the dimensions 10 x 1 x 0.25 m (LBH respectively). Each bed can hold approximately 1,500 seedlings. Bamboo poles could be placed horizontally at both the ends and also in the middle to keep the bags upright. The nursery bags with the sprouted saplings will be placed inside the beds, which will be then irrigated through flooding / pumping. The nursery site and the number of beds may be prepared according to the requirement of the seedlings.

a. Preparation of Soil

Soft clayey mud available in the creeks/ mudflats will be collected during low tide. Debris and hard materials shall be removed. The soft mud will then be made into paste to fill the poly bags.

b. Nursery bags

Polythene bags of 5"x 8" will be used to raise the mangrove saplings in the nursery. Small perforations will be made at the bottom of the bag in order to drain excess water. Initially the soft mud filled bags will be kept in the shade to harden. The project will ensure the proper disposal of the poly bags after the transplantation. Any bags which are made of biodegradable materials can also be considered to be used in the nursery as an alternative.

c. Sowing

Viviparous seeds of *Rhizophora apiculata, R. mucronata* and *Bruguiera gymnorrhiza* will be planted directly in the bags and placed in the beds. Similarly, young seedlings (about 2" height) of *Excoecaria agallocha* collected from the forest and *Sonneratia apetala* from the primary bed will be planted directly in the bags. The seeds of *Avicennia marina* and *A. officinalis* sown in bags will be kept outside and transferred to the nursery bed after germination. During initial stages, watering should be done twice a day to obtain maximum germination but avoid water stagnation for an extended period may lead to rotting of seeds.

d. Grading

The sapling bags should be shifted periodically to prevent the roots entry to the soil. Initially the saplings should be shifted once in three months and later on every month after six months. Casualty of the saplings should be replaced with seeds/ wildlings before January.

(2) SC-1.2.2: Plantation of Mangroves (Raised Bed)/ SC-1.2.3: Plantatoin of Mangroves (Nursery Raised Plantation)

Plantation will be undertaken during low tides in winter months of January and February when the sea is relatively calm as they may suffer high mortality rate or get washed away during the rainy season. Seedlings of 25 to 20 cm height should be used for plantation. The entire root portion with mud ball (Pind) should be planted below the mud surface. The recommended spacing is 2m X 2m at the rate of 2,500 saplings / seeds per ha. Adopting the recommendations of GEER (2012) plantation models are suggested. The Maintenance work for three years will follow plantation. The work specification is in Annexure 8.1-a for raised bed and Annexure 8.1-b for nursery raised mangrove plantation.

The plantation sites will be selected in the inter tidal zones of the creeks with tidal inundation for at least 20 days in a month. These areas have matured mudflats which are slightly away from the creeks with ideal inundation. These areas also have silty mud soil conditions which are preferable to the different species that will be used in the plantation. Suitable for both raised bed and nursery raised saplings plantations.

Species composition for each of these areas is given in the table below.

Table 8.2 Project Areas and Recommended Mangrove and Mangrove Associates for Restoration

Sl. No.	Districts/ Division	Estuaries	Mangrove species suitable for restoration and plantation in these areas	Mangrove associate species suitable for restoration and plantation in these areas
1.	Valsad Valsad North Forest Division: Umargam, Khatalwada, Dharasana and Nargol	Varoli	Avicennia marina, Bruguiera cylindrica, Bruguiera gymnorrhiza, Rhizophora mucronata, Ceriops tagal, , Aegiceras corniculatum and Avicennia alba	Salvadora persica, Sesuvium portulacastrum, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides and
2.	Navsari Navsari Forest Division Dholai, Bhat, Bhagad, Delwada, Dhikari	Ambika, Purna and Mindholi	Bruguiera cylindrica, Bruguiera gymnorrhiza, Avicennia marina, Rhizophora mucronata and Ceriops tagal	Salvadora persica, Sesuvium portulacastrum, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides, Clerodendrum inerme, Porterasia coarctata and Salicornia brachiate
3.	Surat Surat Forest Division: Kadiya bet Isand, Hajira, Dumus, Navagam and Bhimpor	Mindholi, Tapi, Tena, Sena and Kim	Bruguiera cylindrica, Bruguiera gymnorrhiza, Avicennia marina, Avicennia alba, Rhizophora mucronata and Ceriops tagal and	Salvadora persica, Aeluropus lagopoides, Sesuvium portulacastrum, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides, Porterasia coarctata and Hygrophila auriculata
4.	Bharuch	Mahi, Dhadhar,	Avicennia marina, Avicennia officinalis, Bruguiera	Salvadora persica, Aeluropus lagopoides, Thespesia

Sl. No.	Districts/ Division	Estuaries	Mangrove species suitable for restoration and plantation in these areas	Mangrove associate species suitable for restoration and plantation in these areas
	Bharuch Sub Division: Aliybet, Dahej, Kanthiyzal, Malpur and Kishanpur	Narmada, and Kim	gymnorrhiza and Bruguiera cylindrica, Rhizophora mucronata and Ceriops tagal	populnea, Ipomoea pes-caprae, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides, Porterasia coarctata and Clerodendrum inerme
5.	Anand Anand Forest Division: Khambhat, Tadatalav, Vadgam and Navagam	Mahi and Sabarmati	Avicennia marina, Rhizophora mucronata, Ceriops tagal Bruguiera gymnorrhiza and Bruguiera cylindrica	Salvadora persica, Aeluropus lagopoides, Cressa cretica, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides and Clerodendrum inerme
6.	Ahmedabad Forest Division: Ratalav, Khoon, Mahadevpura and Bavaliyari	Sabarmati	Avicennia marina, Avicennia officinalis, Rhizophora mucronata, Ceriops tagal Bruguiera gymnorrhiza and Bruguiera cylindrica	Salvadora persica, Hyphaene indica, Aeluropus lagopoides, Cressa cretica, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides, Clerodendrum inerme and Salicornia brachiata
7.	Bhavnagar Forest Division: Kotada, Lockgate-only very small patch, Piram Island, Roniyo, Sonarai.	-	Avicennia marina, Avicennia officinalis, Rhizophora mucronata and Ceriops tagal	Salvadora persica, Aeluropus lagopoides, Cressa cretica, Thespesia populnea, Suaeda nudiflora, Tamarix indica, Phoenix sylvestris, Aeluropus lagopoides and Clerodendrum inerme

Source: JICA Survey Team compiled from various sources

There are fourteen mangroves species distributed in the potential plantation sites. These species are distributed in isolated patches. Additionally, these species are highly sensitive to ecological conditions, as they are also river water loving species and mostly distributed along estuarine areas where fresh water inflow is sufficient.

14 species as given in the table below are suggested to be used in the plantation works under this activity. Four species from the top of the list, namely *Avicennia marina (Forsk.) Vierh, Rhizophora mucronata Lamk, Ceriops tagal (Perr.) C.B. Robinson* and *Aegiceras corniculatum (L.) Blanco*, which are highly saline tolerant species, are recommended for the plantation works to be undertaken in the project sites. Furthermore, to enhance the diversity of the mangrove species, which is necessary for keeping the health ecosystem, 10 species (Sl. No 5 from 14 in the table below) may also be attempted at smaller scale in different sites based on the occurrence of the species in the proximity, which indicates that conducive edaphic factors for better survival.

Table 8.3 Indicative priority of species recommended for restoration as per salinity tolerance and occurrence in Gujarat

Sl. No.	Name of the species	Salt tolerant species priority wise for restoration	Order of priority for plantation and survival rate
1	Avicennia marina (Forsk.) Vierh.	1	1 (30%)
2	Rhizophora mucronata Lamk.	2	2 (25%)
3	Ceriops tagal (Perr.) C.B. Robinson	3	3(25%)
4	Aegiceras corniculatum (L.) Blanco	4	4 (20%)
5	Avicennia alba Bl.	5	-
6	Avicennia officinalis L.	6	-
7	Excoecaria agallocha L.	7	-
8	Ceriops decandra (Griff.) Ding Hou	8	-
9	Bruguiera gymnorrhiza (L.) Lamk.	9	-
10	Bruguiera cylindrica (L.) Bl.	10	-
11	Lumnitzera racemosa Willd.	11	-
12	Sonneratia apetala Buch.-Ham.	12	-
13	Rhizophora apiculata Bl.	13	-
14	Kandelia candel (L.) Druce	14	-
15	*Acanthus ilicifolius L.	-	-

Source: JICA Survey Team (2019) based on "The Status of Mangroves in Gujarat" by Pandey and Pandey (2009) in "Towards Conservation and Management of Indian Mangroves" (MoEF, Government of India).

8.2.3 SC-1.3 Plantation of Mangrove Associated Species

(1) Species and Site Selection

Mangrove associates are tolerant to dry habitats in saline conditions and require inundation only twice in a month and thus occur more towards landward side. These areas are abutting the mangroves towards the landward side and thus, the mangroves get fragmented. There is a need for stabilizing these exposed mudflats with mangrove associates so that it helps in consolidating the coastline and protecting mangroves from further fragmentation. The areas which are susceptible to tide influenced sediment dynamics will be selected for the intervention.

(2) Advance Action Works

Advance works will be undertaken as per the regular practices of GFD. When mobilising the workers, the local community members shall be given priority.

(3) Plantation Methods

Plantation of mangrove associated species will be carried out in mudflats which are salinity affected lands towards the landward side in the project sites. The plantation works will be undertaken in 1,000 ha of the land, with a mixture of species with woody species to herbs in order to ensure sufficient plasticity to the mudflat community and to avoid monoculture with single species. Spacing for plantation will be similar to the mangrove plantation. The work specificiation is given in Annexure 8.1-c. When mobilising the workers, the local community members shall be given priority.

(4) Maintenance

Maintenance works shall be undertaken as per the conventional procedures of GFD. Casualty

replacement and gap filling should be carried out similarly to the replacement of true mangroves. Maintenance shall be undertaken jointly with the local community.

8.2.4 SC-1.4 Plantation of Coastal Shelter Belts with Soil and Moisture Conservation

(1) Preparatory Work

Same procedures shall be followed as the preparatory works for mangroves (SC-1-1).

Furthermore, under this project activity, selection of species shall be the key to the sustainable management of the coastal shelter belts established. Thus, the following points shall be taken into consideration during the community consultation.

The composition of proposed shelterbelt is different from the regular shelterbelts. Multiple Value Tree Species (MVTS) will be considered which are of ecological and economic significance. In addition, biomass needs of the community, biophysical condition and the breadth and width of the area available for raising shelterbelts will also be taken into consideration.

The selection of the species shall be undertaken in close consultation with the local communities. The benefits deriving from the shelter belt shall be shared with the local communities as an incentive to proactively take part in the sustainable management and maintenance of the shelterbelt. While choosing species for raising multi-species shelterbelts, the following criteria should be considered.

- Species with deep and well-spread root system.
- Species with a small crown and light branching habit
- Species that are wind resistant
- Species with better propagation potential and cost-effective maintenance
- Should be able to coppice
- Species that provide economic benefit to local communities with food, fodder, etc.

The table below shows the indicative district/ divisions and coastal plant species suitable for plantation in the selected areas.

Table 8.4 Selected Areas for Coastal Shelter Belt and Suitable Species

Districts/ Division	Coastal plant species suitable for plantation in these areas
Valsad Valsad North Forest Division: Umargam, Khatalwada, Dharasana and Nargol	*Thespesia populnea, Anacardium occidentale, Azadirachta indica, Phoenix sylvestris, Adansonia digitata, Ziziphus mauritiana, Salvadora persica, Tamarindus indica and Ixora pavetta*
Navsari Navsari Forest Division: Dholai, Bhat, Bhagad, Delwada, Dhikari	*Salvadora persica, Prosopis cineraria, Thespesia populnea, Azadirachta indica, Salvadora persica, Phoenix sylvestris, Anacardium occidentale, Adansonia digitate and Ziziphus mauritiana*
Surat Surat Forest Division: Kadiya bet Isand, Hajira, Dumus, Navagam and Bhimpor	*Adansonia digitata, Anacardium occidentale, Casuarina equisetifolia, Derris indica, Ziziphus mauritiana, Hyphaene indica, Salvadora persica, and Prosopis cineraria*
Bharuch Bharuch Sub Division: Aliybet, Dahej, Kanthiyzal, Malpur and Kishanpur	*Phoenix sylvestris, Anacardium occidentale, Adansonia digitata, Ziziphus mauritiana, Hyphaene indica, Salvadora persica, and Prosopis cineraria*

Districts/ Division	Coastal plant species suitable for plantation in these areas
Anand Anand Forest Division: Khambhat, Tadatalav, Vadgam and Navagam	*Phoenix sylvestris, Adansonia digitata, Anacardium occidentale, Ziziphus mauritiana, Hyphaene indica, Salvadora persica, and Prosopis cineraria*
Ahmedabad, Ahmedabad Forest Division: Ratalav, Khoon, Mahadevpura and Bavaliyari	*Hyphaene indica, Salvadora persica, Anacardium occidentale, Prosopis cineraria, Thespesia populnea, Azadirachta indica, Phoenix sylvestris, Adansonia digitata and Ziziphus mauritiana,*
Bhavnagar Forest Division: Kotada, Lockgate- only very small patch, Piram Island, Roniyo, Sonarai.	*Hyphaene indica, Salvadora persica, Anacardium occidentale, , Prosopis cineraria, Thespesia populnea, Azadirachta indica, Phoenix sylvestris, Adansonia digitate and Ziziphus mauritiana*

Source: JICA Survey Team (2019) compiled from various sources.

Though casuarina in an attractive option for planting in the coastal landscapes, the mixed species approach, especially using native species, should be followed in this project taking community needs into account.

(2) Nursery Raising and Advance Action Work

1) Nursery Raising

Nursery raising work will be carried out as per the conventional practices of GFD. When mobilising the workers, the local community members shall be given priority.

2) Advance Action Works

In order to prevent wind attack from seaside, earthen bank shall be constructed between sea and plantation site. Mounds shall be preared in plantation site for soil and moisture conservation, if required. Water harvesting structure may also be constructed if required. The structure shall be designed as per the specification of GFD.

(3) Plantation of Shelterbelts

The plantation will be done directly by the GFD following the stipulated standard operating procedures and rules. When mobilising the workers, the local community members shall be given priority.
The MVTS shelterbelts shall be raised densely with canopy structure that will absorb the salt spray and allow wind to reach the landward side. The species in shelterbelts will be planted perpendicular to the main wind direction. The number of rows in the shelterbelt will be determined as per the velocity of the wind. Broader stripes will be established in areas with high velocity wind. The first and last rows will be planted mainly with shrubs and the central rows will be with a combination of tall and medium-sized trees. Triangular method or V shaped method at 1-meter distance between tree/shrubs will be followed. If necessary, space between the plants may be reduced depending on the species. The work specification is given in Annexure 8.1-d.

Apart from the species chosen, the length and breadth of the shelterbelts also will be discussed with the community during the project implementation for better ownership of the interventions. Linking educational institutions in this process is recommended as it can help youth to get involved in this important endeavour by bringing together academic learning and social responsibility.

(4) Maintenance Work

The plantation work will be followed by 3 years of maintenance. The maintenance work shall be undertaken jointly by GFD and the local Gram Panchayat.

8.2.5 SC-1.5 Community Development Activities

Under this component, community development activities will be implemented with Gram Panchayat through convergence with other development schemes. Micro plans will be reviewed by the Project to identify possible convergence. Facilitation fund for convergence will be prepared based on the results of the review and utilized for enhancing community engagement.

8.2.6 SC-1.6 Awareness Program

Awareness on the importance and benefits deriving from mangrove restoration and conservation will be created through various medias and publication materials under the Component 4 The programs will be designed by the PMU along with GEER Foundation and GEC.The communities taking part in the project activities especially the children and youth will be given priority in these programs. Events will also be organised on special occasions like, World Mangrove Day, Wildlife Week, World Whale Shark Day. The awareness programs will be carried out jointly with the local schools, Gram Panchayats, other line departments, NGOs and etc. Community members will be taken on exposure visits to the areas where interventions have been very positive to learn the methods followed to follow the same in their villages.

Wall paintings in the target villages on the role of mangroves and mangrove associates and coastal shelterbelts will be done in the villages, particularly on school compounds, local administrative offices for effective awareness generation. Effects of cyclones on the lives and livelihoods of the community will also be displayed in the wall paintings and also using electronic media so to reach a wider audience.

8.2.7 SC-1.7 Research Studies

(1) Establishment of a Centre for Sustainable Coastal Ecosystem Management in Gujarat

Two centres for sustainable coastal ecosystem management shall be established in Navsari and Bharuch as field research centres within the existing facilities. The facilities upgraded with this component will be used for awareness creation activities of the project. The background to the site identification for the centres is given as below.

Navsari: There is no interpretation centre of this kind in the south of Gujarat and thus, this will contribute to strengthening the knowledge base and creating public awareness on mangrove ecosystems. Navsari is close to Dandi which is being developed as a tourism destination by the State and Central Government and a hub for heritage tourism which attracts many tourists who will be interested in visiting the interpretation centre. Navsari is an estuarine area of the Purna River, which is a typical representation for this region where the Forest department has a divisional headquarter, which will be responsible for the operation and maintenance of the centre. No other centre of awareness or importance is located in south Gujarat.

Bharuch: Bharuch is in River Narmada Estuary 2. Bharuch is a historic town with district Hq. 3. It is a place of great heritage importance in terms of trade and commerce and 4. It is the divisional headquarters of Forest Department which should be able to take care of maintenance of the centre

with community involvement.

(2) Research activities

Research activities will be conducted by centres for sustainable coastal ecosystem management to produce practical knowledge. Research topics will be presented and appraised by Technical Research Evaluation Committee (TREC) under APCCF TRC. As a part of research activities, periodical sample monitoring to assess the effects of project interventions shall be undertaken. The monitoring data shall be collected in MIS. In case disaster occurs in coastal area, comparative research shall be done to assess the damage with and without mangroves and shelterbelts. Collaboration with other research institutes and universities (e.g. Ryukyu University in Japan) may also be sought.

Awareness raising materials will be developed based on the results of research.

8.3 Component 2 Development of Ecological Infrastructure in Inland Area

8.3.1 Sub-Component 2.1 Restoration of Grasslands

(1) Rationale

In the semi-arid, human dominated and fragmented landscape of grasslands, like in the present project area, maintaining the wildlife and biodiversity and productivity of grasslands need to entail not only the protection and sustainable use of grasses (either by cutting or by grazing), but also link it to designing of efficient economic systems around the grassland derived products (e.g. milk, wool, cheese etc). Furthermore, based on the experience gained under GFDP-II and also from existing departmental works, it is quite clear that the grasslands (= vidis) areas need concerted and immediate actions towards their restoration work, so that to gain in ecological values. Importantly, as discussed above, for the sustainability point of view, the efforts should be owned and carry forward by local communities, with clear long-term interest.

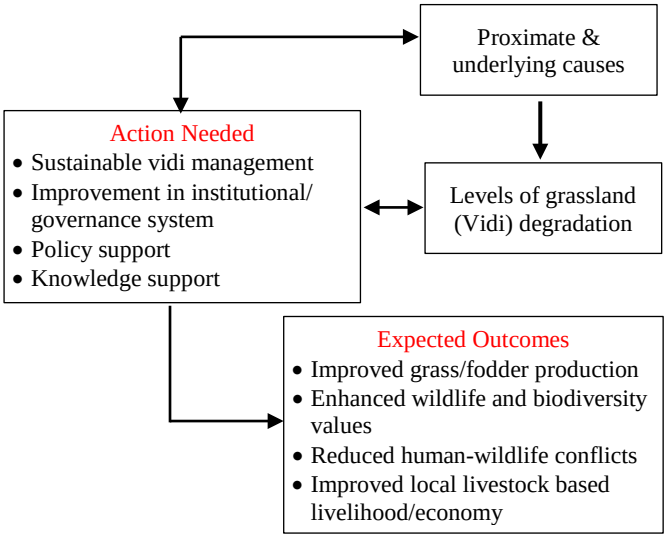


Source: JICA Survey Team (2019)

Figure 8.3: Project Divisions for Sub-Component 2.1: Restoration of Grasslands

(2) Objectives

Sub-Component 2.1 Restoration of Grasslands aims to promote protection and sustainable use of grasses and to develop an efficient economic system deriving from the produces from the grassland by adopting strategies that cover and strengthen both backward and forward linkages of social-ecological interface of grassland system.



Source: JICA Survey Team (2019)

Figure 8.4 Framework for Grassland Restoratoin Sub-Component

In achieving the above objectives, following strategies will be adopted.

A. Restoration of degraded vidis in project area to improve grassland ecosystems and thus its goods and services
B. Capacitate and engage local POs (like JFMCs/ EDCs), mainly of livestock owners, in sustainable development and management of vidis in project area including the development of controlled or rotational grazing systems and also improvement in livelihood system
C. Compliment the vidi restoration work and livelihood support system through convergence with relevant Govt. department and CSR activities
D. Program support through relevant policy backing and action and basic research
E. Indicator based monitoring of project outputs and outcomes

(3) Activities: SC-2.1 Restoration of Grassland

1) SC-2.1.1 Preparatory Works:

a. SC-2.1.1 (1) Preparation of Landscape Map

In order to select the intervention area strategically for maximisation of ecosystem services, Landscape Map will be prepared. Any activities under the component shall be planned based on the Landscape Map. Mapping exercise will be conducted to integrate information on location and size of vidis, level of their degradation, biodiversity, location of villages, number of cattle and other information which are required for prioritization into Landscape Map. Intervention areas will be identified in accordance with prioritization criteria.

Mapping exercise will be done in a phased manner, and batch-wise activities will be planned accordingly. No activities shall be commenced without preparing Landscape Map of the intervention area.

b. SC-2.1.1 (2) Preparation of Guidelines for Sustainable Vidi Management

In parallel to the mapping exercise, guidelines for sustainable vidi management will be prepared. The guidelines will also include the vidi selection criteria and procedures along with other technical guidelines to be followed during the project interventions. The guidelines shall be prepared for the use of the field level project staff who are engaged at the range level and members of POs and by

PMU/ PMC prior to the implementation of the field level intervention. The implementation schedule is given under Component 4-1: Preparation of Manuals and Guidelines. In case a resource organization is to be engaged for the preparation of guidelines and conducting training of trainers (SC-2.1.1 (3)), the project may collaborate with the instiutions as given in Annexure 8.2-a.

Table 8.5: Indicative Contents of Guidelines for Sustainable Vidi Management

1. Background to Sustainable Vidi Management
1.1 Current Status
1.2 Need of Sustainable Vidi Management
1.3 Laws and Regulations
2. Selection of Vidis for Sustainable Vidi Management
2.1 Selection Criteria
2.2 Selection Process
3. Community Engagement
3.1 Consensus Building
3.2 Rapport Building
4. Role of People's Organization in Sustainable Vidi Management
5. Benefit Sharing Mechanism its Operationalisation
6. Activities Required for Sustainable Vidi Management
7. Record Keeping

Source: JICA Survey Team (2019)

c. SC-2.1.1 (3): Training of Trainers for FD Staffs on Project Interventions

Field level project staffs and Resource Organizations engaged for community facilitation shall be given ToT prior to the implementation of the field activities. This will be based on the guidelines prepared by PMC and PMU.

2) SC-2.1.2 Community Mobilisation and Vidi Selection

a. SC-2.1.2 (1) Consultative Meetings with Potential Project Villages

Identification of the Potential Villages:

Based on the data deriving from the landscape map prepared, broad identification of the project area will be undertaken. In selecting the potential areas, the synergy with other component especially Component 3: Human Wildlife Conflict Management will be taken into consideration to yield the optimum results from the project intervention.

The preliminary analysis suggests the following five divisions as priority divisions for Grassland interventions. In these priority divisions have a total number of 90 Reserved Vidis (RV) and 340 Non-reserved Vidis (NRV). As of November, 2019, a total of 71 JFMCs and 13 EDCs are existing in the project divisions (Table 8.6). It is also reported and observed during the field visits that most of these JFMCs and EDCs are not active in their operation mainly due to (i) inadequate funding support in earlier schemes & projects like GFDP-II and FDA, (ii) because of (i), existing JFMC/EDCs were not capacitated to participate in vidi management activities and (iii) the existing vidi management guidelines are inadequate to excite local people to participate in vidi management. Project needs to address these aspects, for sustainable management of vidis.

Table 8.6 Number of Prioritized Vidis in project divisions with existing JFMCs/EDCs

Forest Division	Reserve Vidi		Non-Reserve Vidi			All Vidis	
	Total No.	No. of existing JFMC	Total No.	No. of existing JFMC	No. of existing EDC	Total JFMC	Total EDC
Bhavnagar	23	16	44	6	0	22	0
Gir East	9	0	24	0	8	0	8
Gir West	15	0	37	5	5	5	5
Junagadh	19	8	73	3	0	11	0
Morbi	24	1	162	32	0	33	0
Total	**90**	**25**	**340**	**46**	**13**	**71**	**13**

Source: JICA Survey Team (2019)

Of the total 116 candidate vidis, in 35 vidis, JFMCs were formed earlier (Table 8.7). For grassland development component of the project, project JFMCs shall be selected from the candidate vidis and JFMC/ EDCs shall be assisted by the project to build capacity to undertake sustainable vidi management.

Table 8.7 Number of existing JFMCs/EDCs among the candidate vidis across project division

Division	Reserve Vidis		Non-Reserve Vidis	
	Total no. of Candidate Vidis	Existing number of JFMC/EDC	Total no. of Candidate Vidis	Existing number of JFMC/EDC
Bhavnagar	14	9	12	3
Gir East*	6	0	16	7
Gir West*	5	0	11	2
Junagadh	7	2	10	2
Morbi	4	0	31	10
Total	**36**	**11**	**80**	**24**
* Gir East & Gir West are wildlife divisions and thus has provisions of creating EDCs.				

Source: JICA Survey Team (2019)

Community Consultation

The project will undertake community level consultation to validate the field condition as well as to understand the need and willingness of the community towards project implementation following the process as given in the Guideline to be developed under Component 4-1: Preparation of Manuals and Guidelines.

Formation/ Re-Formulation of the POs

The newly organised JFMC/ EDC shall be assisted to complete the registration process prior to the micro planning. RMU and Resource Organizations will guide the process.

b. SC-2.1.2 (2) Preparation of Final List of Project Vidis/ Villages

Once the community consultation is completed, a final list of project vidis/ villages will be prepared.

c. SC-2.1.2 (3) Preparation of Micro plan including Treatment Plan and Approval

The project JFMCs/ EDCs will prepare micro plan with facilitation by the RMU and Resource Organization. In new JFMCs and EDCs, micro plan would be developed. In villages with existing JFMCs, the old micro plan could be revised and updated, unless the old micro plan is unavailable or unusable. The micro planning process will be followed as per the guideline prepared under Component 4.1: Preparation of Manuals and Guidelines. The duration of the micro plan would be five years with the project financial assistance will be four years. The micro plan is comprised of four main sections:

- Treatment Plan
- Plan for Community based Ecological Infrastructure Development
- Plan for Livelihood Enhancement
- Convergence Plan

The treatment plan is a plan for the forest related technical intervention. Thus, RMU/ DMU in the project areas shall prepare the plan as per the procedures and planning formats of GFD. The steps to be followed in preparation of treatment plan are depicted in SC-2.3.2 (4).

The scope and thrust of the micro plan for grassland would be grassland productivity enhancement, protection and usage models, value chain development focusing on cattle-based economy, assets, access to schemes and services through convergence. The convergence will be facilitated at the district and thaluka level by DMU/ RMU and Resource Organization.

The micro plan will be reviewed and approved by the General Body of the JFMC/EDC and submitted to DMU for funding and technical guidance for implementation of the plan. The micro plan shall be prepared in Gujarati and one copy is retained by the JFMC/ EDC and another by the concerned RMU/ DMU. The annual plan shall be prepared before the end of each financial year and revision of the micro plan shall be undertaken during the 3rd year of implementation.

d. SC-2.1.2 (4) Community Development Fund: Implementation of Community Development Based on the Micro Plan including Entry Point Activity

A fixed amount of Community Development Fund will be placed with the JFMC/ EDC to implement the community development activities. Entry point activities (EPA), which are the activities planned and implemented immediately after the registration of POs, can be done by utilising the fund as per the priorities of the project community. Otherwise, the community development activities will be implemented as per the micro plan utilising the fund. This fund can also be used to facilitate the convergence with other government schemes and programs.

The guidelines for EPAs and Manual for Operating Community Development Fund shall be followed, which will be prepared under Component 4.1: Preparation of Manuals and Guidelines. The facilitation for the micro plan implementation will be undertaken by RMU/ DMU.

e. SC-2.1.2 (5) Engagement of Community Facilitator

Once the final list of villages is prepared, the JFMC/ EDC will be facilitated to select a community facilitator. The ToR of the community facilitator and selection procedures will be prepared by PMU/ PMC prior to the identification of the community facilitator. One person from each village will be engaged for the duration of four years. They will be expected to function as a linkage between the JFMC/ EDC and the Project and assist the implementation of field level activities that require

community engagement. A manual for the community facilitators will be prepared under Component 4.1: Preparation of Manuals and Guidelines and training will be given by the project based on it. Honorarium shall be paid by the project during the term of engagement. After the completion of the term of engagement, the concerned PO shall bear the expenses.

3) Implementation of the Grassland Restoration

a. Phases of Restoration Works

Restoration works shall be implemented in accordance with micro plan as well as treatment plan. The entire plantation work will be phased in the following manner:

- Year 1 and Year 2 will be considered as preparatory and planning phase. And year 3 to 6 will be considered as plantation /restoration phase. The maintenance and follow-up work in plantation areas are proposed for two subsequent years. Thus, it will spread between 4th and 8th year of the project period as shown in the table below.

Table 8.8 Broad phases of grassland restoration activities

Phase	Key work elements
Preparatory and planning	Preparation of SoPs, Guidelines, Selection of Vidis, basic training of staffs, community consultations etc
Plantation and grazing management	JFMC formation, microplanning, Entry point activities, treatment plan, protection measures, woody and weed plant removal, plantation activities; piloting of controlled and rotational grazing systems
Maintenance	Maintenance and follow-up activities in plantation areas

Source: JICA Survey Team (2019)

- As suggested above, the role of JFMCs will be critical. In each of the vidis selected for the project intervention, one JFMC/ EDC will be established or re- capacitated.

- The formation of JFMCs will be completed in batches, and thus, the plantation work will also be divided into four batches, spread over four years (i.e. Year 3 to Year 6). Batch wise, number of JFMCs and plantation area to be covered is given below (Table 8.9). The target given for first batch is smaller, so that to allow time to streamlined various technical, socio-economic and institutional development tools and processes, proposed under the project.

Table 8.9 Batch Wise Indicative Targets of JFMCs and Plantation

Batch	No. of JFMCs to be covered	Rainfed PlantatoinWith SMC	Rainfed Plantation Without SMC
1	10	600	1,200
2	35	1,200	2,000
3	35	1,200	2,000
Total	**80**	**3,000**	**5,200**

Source: JICA Survey Team (2019)

- In order to make necessary course corrections in the tools and processes, a comprehensive review will be made by the end of plantation of both 1st and 2nd batches.
- For any selected vidi, at least two years of plantation work need to be undertaken. This is essential to have meaningful engagement of JFMCs in plantation, protection and management of vidis.

4) SC-2.1.3 Removal of Unwanted Vegetation

Prior to plantating grass, the weeds will be removed. The work will be undertaken manually as per the technical guidance given by RMU. The types of weed removal works are outline below. In case the workers are to be engaged for the work, the local community members shall be given priority.

SC-2.1.3 (2) Removal of Weeds and their Growth

Annual weed species like *Cassia tora* are spreading rapidly in many vidis and occupied in dense patches Normally, persistent grazing led the way to this species in many grazing lands including the vidis. Belowground rhizomatous mass of perennial grass species in healthy vidis will not allow weeds to establish. But, in most of the vidis where they are already established, they need to be managed.

In the project, 2,000 ha area of *Cassia tora* invaded grassland area will be restored by manual uprooting method. There is also a weed removal method using chemicals. However, as the research finding is yet to prove its implications on the human and environmental health, the project will undertake a pilot study on the chemical weed removal under research component SC: 2.1.12 Research in Grassland Restoration.

The weed removal from grassland is generally done once the monsoon sets-in i.e. in July or early August, before the plants reached to flowering stage. But by that time grass-plantation work will have to be completed. Thus, in the project, the weed removal work will be done in the preceding monsoon season. In the plantation year, however, the weed will be managed as part of land-preparation work.

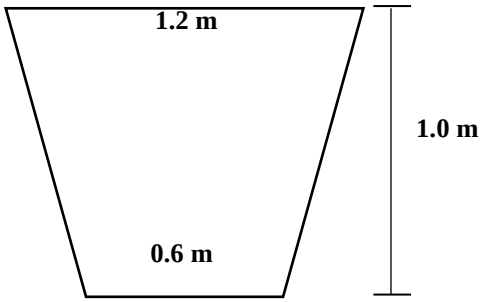
The 'annual' species of weed needs to be removed before they reach the seeding stage. Also, the area from where the weeds get removed needs continuous 'follow-up' for next two years so as to check the regrowth of the plant. The work shall be undertaken by the POs.

5) SC-2.1.4 Fencing in Grasslands (Before Grass Development Works)

Although this is very important for reviving the grasslands, it is very costly proposition, both for first time making and for subsequent maintenance. It is assumed that out of the project intervention area, about 20% of these vidis are already have some protection boundary. Thus, in project area, remaining area of vidis need boundary protection. Considering that protection of a 50 ha vidi need around 2.5 km of boundary at periphery. For instance, 10,000 ha of vidi, it would require to construct boundary of approximately 500 km length. Based on effectiveness and field conditions, following types of protection fencing will be taken-up:

a. *SC-2.1.4 (1) Stone Wall/ Rubble Wall:* It is proposed that approximately 60% of the total fencing can be made by stone Rubble wall. Stone rubble walls are considered as most effective protection measure against livestock grazing. The dimension of the stone wall should be 0.6 m (foundation) x 1.0 m (height) x 0.6 m (thickness).

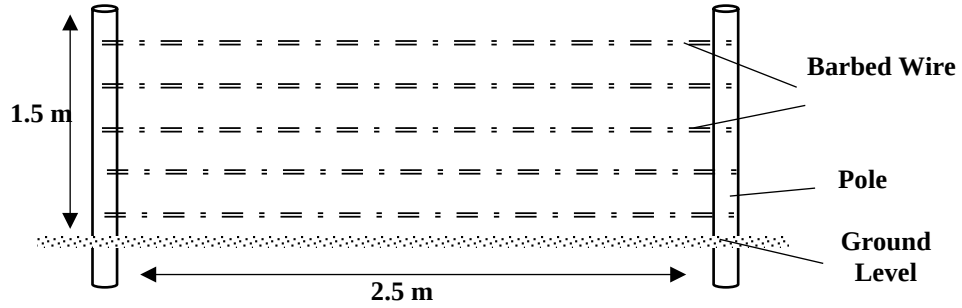
b. *SC-2.1.4 (2) Protection Trench:* 20% of protection trench is proposed in the area where soil depth is adequate. The measurement of protection trench will be 0.6 m width at bottom, 1.2 m width at top and 1.0 m depth.



Source: JICA Survey Team (2019)

Figure 8.5.: A Schematic Diagram of Protection Trench

c. *SC-2.1.4 (3) Barbed-Wire Fence:* 20% of barbed wire fencing of 1.5-meter height with 5 strands and poles 2.5 m apart, is proposed as I nthe figure below.



Source: JICA Survey Team (2019)

Figure 8.6: A Schematic Diagram of Barbed Wire Fencing

For effective protection, live hedge of Thor (Euphorbia sps) will be planted along the rubble wall boundary and protection trench.

Grassland Plantation

The grassland seeding and plantation is one of the major activities under restoration of grassland component. Needless to say, the grassland productivity and diversity maximally depend on important natural and management factors including the soil, the rainfall and the livestock grazing. Considering the fact that in natural condition these grasslands are rainfed in nature and with some SMC inputs and reduced incidence of livestock grazing, condition of grasslands can be restored. While, protection measures like fencing (see above) help control grazing and removal of weeds and woody plants reduce the competition for grasses, the efforts of seeding and planting of grasses actually facilitate the quick recovery of grassland. In a sense, the project aims to fasten the ecological process of grassland restoration. Keeping in view the dominant rainfed setting of the vidis in project divisions, three major grassland (vidi) plantation models can be followed.

1. Rainfed: grassland development with SMC work
2. Rainfed: grassland development without SMC work
3. Irrigated: grassland development

6) SC-2.1.5 Grassland Plantation – Rain fed with SMC/ SC- 2.1.6: Grassland Plantation – Rain fed without SMC

The rainfed grassland development model, which is applicable in the entire project area, has two major deviations i.e. with or without SMC work. Unlike in forest plantation work, in grassland development, SMC works are not very critical element, rather it is very much locational specific.
In project area, vidis can be situated in two different conditions- on relatively plain or undulating areas or on small hilly areas. While the former type can be traced in some parts of Morbi division, the vidis on hilly areas are mostly situated in the lion-corridor. Considering the significant difference in rainfall and topographical features of two grassland landscapes, the grassland development in undulating areas might need to take-up limited SMC work (like staggered trench, contour trench etc.) to facilitate the process of grassland restoration. It is important to caution here that while undertaking SMC works, the small stones need to be minimally removed, as they provide adequate shelter to grasses against overgrazing by livestock. (Work specification for SC-2.1.5 and SC-2.1.6 is in Annexure 8.2-b)

In the project, therefore, following will be targeted with respect to SMC work:

Plantation/restoration with SMC works = 5,000 ha
Plantation/restoration without SMC works = 5,200 ha

Three methods of grass plantation can be applied. First, by making seed pellets and then plants in a furrow. Second, by planting nursery-raised tussocks in 0.25m x 1m spacing. Third, which is found very successful in most of the vidis, is by using 'saucer pit'. The saucer pit is a circular disk like pit of 1 feet diameter and depth of ½ feet. In the central part of the pit, one nursery-raised tussock is planted, while grass seeds are planted on the rim of the pit (Figure 8.4). In one-hectare area 1,000 such saucer pits will be made. Preferably, grass species *Sehima nervosum* (saniyar) are raised in nursery and planted in saucer-pits. Considering the edaphic-climatic conditions of project area, in general, following grass species are considered suitable for plantation (Table 8.10).

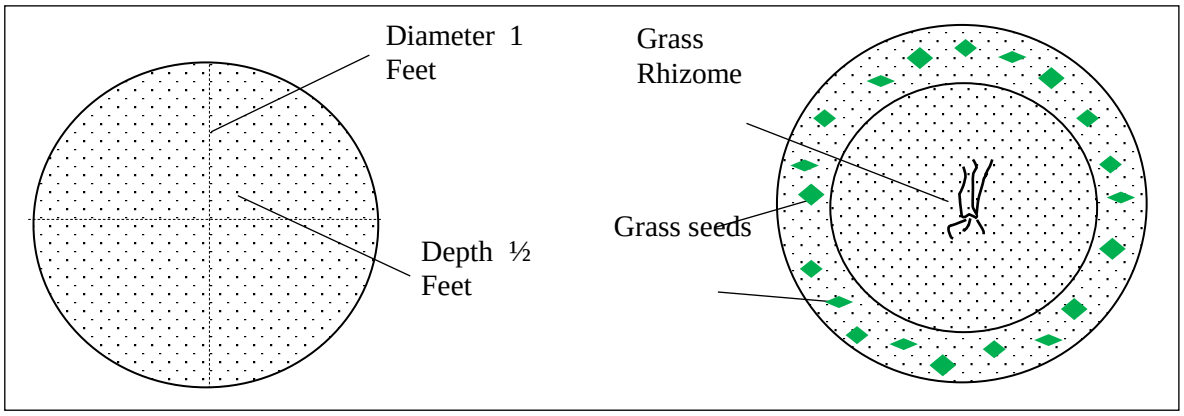
Table 8.10 Proposed Grass Species for Plantation

Grass Species	Local Name	Method of planting	Seeding Rate (kg/ha)
Cenchrus ciliaris	Anjan, Dhaman	Seed pellets	4
Themeda anathera	Ratad	Seed pellets	20
Dichanthium annulatum	Jinjvo	Seed pellets	5
Sehima nervosum	Saniyar	Tussock, Seed pellets	12

Source: JICA Survey Team (2019) based on Various Sources.

7) SC-2.1.6 Irrigated Model

Considering the chronic shortage of fodder in the state, GFD, recently started experimenting with irrigated fodder cultivation in many vidis and recorded encouraging results. Under this model, suitable areas, preferably near existing natural water bodies, are developed. The model aims to produce green grass and fodder using small irrigation system. The grass /fodder are harvested green, air dried and stored in go downs. Clearly, while the objective of developing irrigated grass/fodder area is to increase the grass collection for scarcity relief, the incurred cost doesn't justify to first raise the grass and fodder using scarce irrigation resources, and then dry and store these for distribution during drought related scarcities.



Source: JICA Survey Team (2019)

Figure 8.7 A schematic diagram of saucer-pit mode of grass plantation

Thus, while irrigated production of grass/fodder is seen as good approach to meet the fodder demand, this intervention will be tried out whether it provides the incentive and to develop active engagement of the local livestock keepers and POs in protection and management of vidis. As for POs, the availability of green grass/fodder may also help them in establishing making value added products from the grasses like Silage as cattle feed supplement. It is, therefore, important to promote irrigated grass plots more in NRVs where the grassland restoration efforts need strong community engagement. This could also be undertaken as a livelihood activity in the grassland restoration areas.

Considering the fact that availability of irrigation water is critical for this model, and they are in short supply in the project area, under this project a total of 300 ha area will be covered under this model. *Cenchrus ciliaris, Dicanthium annulatum and Sehima nervosum* are the preferred grass species to be considered under this model. The work specification can be found in Annexure 8.2-c.

8) SC-2.1.7 Fireline/ Pathway Creation

Other than above protection against open grazing, management-roads-cum-fire-lines are also important means of safeguarding grasslands against eventualities of fires. However, in the project division fire is not reported as a major issue of vidi management. While, making and maintenance of fire lines is integral part of working plans, they often fall short due to insufficient funds. Project cannot take risk of losing the restored grasses and grassland in any event of accidental fires. Fire-lines are normally made and maintained on both side of those roads which normally used by people by vehicle or on foot. Some of those roads include management/ connecting roads inside vidi or village roads along the boundary. The risk of fire is high near the road, which later spread to different parts. It is very important that fire protective measures are made around the grass go downs or Ganji (open storage). The vidis with high wildlife value need to get high priority for fire-line creation. Thus, a total of 50 km length of 15 to 20-meter-wide fire-line creation and management is suggested under project.

9) SC-2.1.8 Livelihood Enhancement for Grassland Landscape

a. SC-2.1.8 (1) Promotion of Micro Enterprise for Grassland Landscape

SHG based livelihood activities will be promoted in the project areas with convergence with Gujarat Livelihood Promotion Corporation (GLPC), which is the state nodal agency for the Mission Mangalam to address the issues related to rural livelihood. PMU will be assisted by PMC to define the nature of assistance to be required from and to exchange MOU with the GLPC.

In this sub-component, two SHGs from each PO will be identified and selected during the micro planning according to the selection criteria defined by the Project, which shall be depicted in the manuals to be prepared by PMU and PMC under Component 4.1: Preparation of Manuals and Guidelines. The livelihood activities that can be promoted could be landscape specific or otherwise. The guidelines on micro enterprise development to be developed under Component 4.1: Preparation of Manuals and Guidelines will provide the process of enterprise identification, business planning and management, and organizational management etc. The necessary technical guidance will be provided by GLPC. Indicative list of landscape specific livelihood activities is given in the table below.

Table 8.11 List of Potential Community Development and Livelihood Related Activities

#	Option	Level of operation	Proposed Units
1	Making and marketing of livestock feed Silage from fresh fodder grown under project	JFMC	15
2	Develop livestock drinking water facilities	JFMC	50
3	Training of youths for para-veterinary services	JFMC	20

Source: JICA Survey Team (2019)

b. SC-2.1.8 (2) Community Based Revolving Fund for Micro Etnerprise Promotion

The Project will place a lump sum amount of community revolving fund to each PO which shall be accessed by SHGs for the fund requirement for starting up the livelihood activities. The operation procedure will be prepared by PMU/ PMC under Component 4.1: Preparation of Manuals and Guidelines. To note, the interest accrued on the Community Revolving Fund shall be used to cover the administrative expenses of the PO and to undertake minor repair works of the community assets created under EPA.

c. SC-2.1.8 (3) Cluster Based Enterprise and Value Chain Development

Cluster development will be promoted by the Project. In this activity, the learnings from SC-4.4.1: Pilot Project for Responsible Supply Chain Development with Private Partnership shall be integrated. A scoping survey will be undertaken to identify the potential products and clusters that can be promoted under the project. PMC will assist PMU in drawing the scope of the scoping survey and short-term experts' inputs can be solicited by PMU for this purpose. Based on the scoping survey, a cluster development plan shall be prepared by PMC for implementation. If a potential is seen, Fairtrade or organic certification may also be considered to reach out to the high yielding market. Further, private partnership in development of the cluster level enterprise will be promoted so that the producers will have assured market and also to rationalise the investment to the infrastructure. The technical advice and partnership facilitation shall be provided by PMC.

As for the day to day technical and managerial guidance, a resource organization can be engaged at the cluster level. The ToR for the resource organization shall be prepared for PMC to assist PMU in procurement of the resource organization. The potential clusters for grassland landscape are given in the table below.

Table 8.12 Potential Clusters for Grassland Landscapes

#	Option	Level of operation	Potential No of Units
1	Making and marketing of cattle feeds	Cluster	10
2	Collection & Value chain development of Goat milk cheese	Clusters in Morbi division	2
3	Value chain development with sheep wool	Cluster in Morbi division	1

Source: JICA Survey Team (2019)

For the cluster level enterprise development, Cluster Development Fund will be established at PMU level for the cluster level organization to access and use for developing the enterprise. A part of the cluster fund will be used as an equity grant for the cluster organization to access loan for the enterpirse development. The rest can be used as the working capital and for infrastructure developemnt. The cluster organization will be assisted by NGOs to strengthen their value chain and make it more responsible while strengthening partnership with private companies. The operation manual of the Cluster Development Fund shall be prepared under Component 4.1: Preparation of Manuals and Guidelines. The fund shall be handed to each Cluster Organizations upon completion of the project as their corpus fund, which operation manual will be prepared by PMU during the phase out stage of the project.

10) SC-2.1.9 Piloting of Controlled and Rotational Grazing

While planting and seeding of grasses is important measures to improve the productivity, without managing the livestock grazing, the chances of sustainable recovery of grasslands are very limited. In the project area, while most of the NRVs have ineffective protection measure against livestock grazing, they constantly face excessive livestock grazing. While the protection measures like fencing (rubble wall, barbed wire or trench) help in recovery of the grassland system, for quick and substantial increase in productivity, effective grazing management is essential. Importantly, however, the grazing should be managed according to the carrying capacity of the grassland. Often, light or moderate grazing with sufficient resting period may increase grassland productivity[73], hence, controlled and rotational grazing may help in sustaining the productivity of grazing lands. It is also very important to realize that in the project area, most of the livestock herders prefer using grasslands as grazing area, not as 'cut and store'. This is mainly because of traditional pastoral and transhumant modes of life. In a sense, therefore, livestock herders used to have system of controlled and rotational grazing system in a larger grazing landscape.

So, while at one end most of the NRVs face problem of chronic and open livestock grazing, causing their degradation, conversely, no sincere efforts have been made both by GFD and communities in developing methods and tools for controlled and rotational grazing system. It is easy-saying than doing, because of age-old social and cultural practises and most importantly because of absence of community-led demonstrable models of self-regulations on grazing.

Keeping above in view, the project will also attempt, other than grassland restoration, in piloting of development of models of controlled and rotational grazing system in few of the vidis, with the help of livestock herders. The models will be monitored for 4 project years. Successful models can be replicated in other vidis, subsequently.

A total of 2,000 ha of restored vidis in project area will be targeted to bring under the controlled/rotational grazing system.

[73] Kumar and Joshi, 1972.

It is important to state here that development of such models do not seek much of the physical activities. Rather, they depend on development and strengthening of social and institutional capitals and processes.

In order to make it community led but quite scientific, transparent and accountable system, following will be done:

- Development of community institutions and their capacity building through training programs
- Prepare a detailed but adaptive grazing management protocol
- Periodical assessment of carrying capacity of grasslands by adopting simple ecological tools and community defined thumb-rules.
- Accurate recording of rainfall in the vidis
- Visibly clear demarcation of grazing blocks
- Application of few low-cost technologies like electronic record keeping of livestock and monitoring their grazing schedules etc.

11) SC-2.1.10 Awareness

Sustainable vidi management requires a concerted collective action by the villagers as well as the livestock herders. Thus, the livestock herders will be taken as one of the important audiences of the awareness program of this component. As they are travelling from time to time, the radio broad casting, handing out of leaflets, occasional awareness meetings can be undertaken in collaboration with the Gram Panchayat. The topics can include the importance of vidi, rotational grazing, management activities of vidi, project activities, research findings of the project and etc.

12) SC-2.1.11 Research in Grassland Restoration

Research activities will be conducted by centres for sustainable coastal ecosystem management to produce practical knowledge. Research topics will be presented and appraised by Technical Research Evaluation Committee (TREC) under APCCF TRC. As a part of research activities, periodical sample monitoring to assess the effects of project interventions shall be undertaken. The monitoring data shall be collected in MIS. Awareness raising materials will be developed based on the results of research.

Three major types of research proposed – the basic, the action and the policy as in the table below.

Table 8.13 A list of Suggested Research Topics on Grassland Related Issues

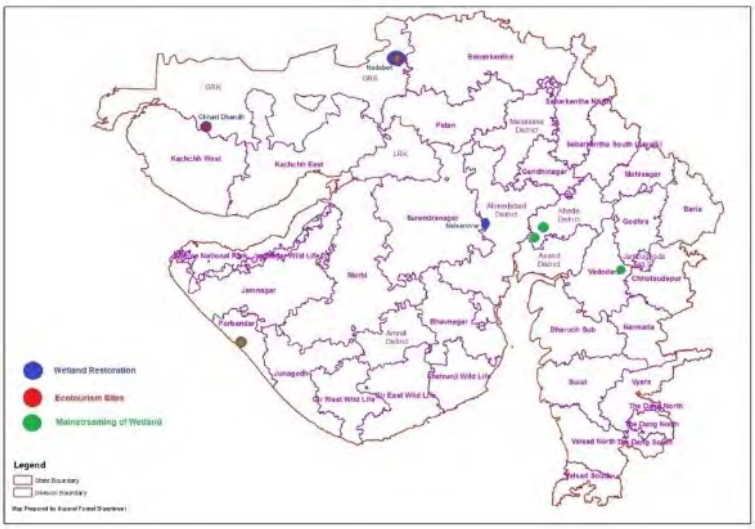
Research Topics	Durationin Years	Type
a) Testing effectiveness and environmental and health impacts of different methods of controlling weeds	2	Action Research
b) Piloting the use of low-cost technologies for improving livestock grazing system, grass cutting, transporting etc	3	
c)Assessment and valuation of ecosystem goods and services of grasslands in the State	3	Basic Research
d) Assessing the impact of livestock grazing on grassland productivity and biodiversity	3	
e) Prepare socio-economic and ecological atlas of vidis of Saurashtra region	2	
f) Preparing State Livestock Grazing Policy	2	Policy Research
g) Economic analysis of grass collection and distribution policy	2	
h) Documentation of good grassland and gaucher management practices in State	2	

Source: JICA Survey Team (2019)

8.3.2 Sub-Component 2.2 Restoration of Wetlands

(1) Rationale

Total of eight wetlands as in the table below are prioritized under this project. All eight wetlands are priority area for wetland restoration under National Wetland Conservation Plan as well as Prime Minister's 100 Wetland Rejuvenation Programme. Except Nadabet (Great Rann of Kutch) and Wadhwana wetlands all other six wetlands are Important Bird Areas recognized by Birdlife International and one of them is a Ramsar site. Of these eight selected wetlands Nalsarovar, Flamingo City, Chhari Dhandh and part of Nadabet wetlands are under the jurisdictions of Gujarat Forest Department, others are managed by Water resource department and Revenue Departments.



Source: JICA Survey Team (2019)

Figure 8.8 Location Maps of the Prioritized Wetlands

Table 8.14 Prioritized Wetlands for Project Interventions

No	Wetland	District	Division	Range/s
1	Flamingo City/ Greater Rann of Kutchh	Kutchh	Kutch-East	Bhuj-North
2	Nalsarovar	Ahmedabad, Surendranagar	Sanand	Nalsarovar, Nalsarovar West
3	Chhari Dhandh	Kutchh	Kutch-West	Nakhatrana West
4	Nadabet/ Kutchh Desert Wildlife Sanctuary	Banaskantha	Banaskantha	Tharad
5	Gosabara-Mokarsagar wetland	Porbandar	Porbandar	Porbandar Bird Sanctuary, Ranavav
6	Pariej Lake	Kheda	Nadiyad-Social Forestry	Matar
7	Kanewal Lake	Anand	Anand-Social Forestry	Tarapur
8	Wadhawana Lake	Vadodara	Vadodara-Wildlife	Shivrajpur

Source: JICA Sruvey Team (2019)

(2) Objectives

Under this component, the following objectives are to be achieved.

- To restore the selected wetland sites without altering their structure and functions
- To promote community participation for sustainable management of wetlands following wise use principles
- To mainstream key wetland sites as per existing legal framework

- To improve scientific knowledge base on the key wetland sites of Gujarat

(3) Activities of SC-2.2 Restoration of Wetlands

1) SC-2.2.1 Preparatory Works

a. SC-2.2.1 (1) Preparation of Landscape Map

In order to select the intervention area strategically for maximisation of ecosystem services, Landscape Map will be prepared. Any activities under the component shall be planned based on the Landscape Map. Mapping exercise will be conducted to integrate information on location and size of wetlands, level of their degradation, biodiversity, location of villages, number of cattle and other information which are required for prioritization into Landscape Map. Intervention areas will be identified in accordance with prioritization criteria.

Mapping exercise will be done in a phased manner, and batch-wise activities will be planned accordingly. No activities shall be commenced without preparing Landscape Map of the intervention area.

b. SC-2.2.1 (2) Site Selection and Verification including Mapping

Based on the spatial information derived from the mapping exercise, the site verification of the priority areas will be undertaken. The demarcation of the project area and the stakeholder identification will also be undertaken during this site verification. This process is undertaken by RMU/ PMC.

c. SC-2.2.1 (3) Stakeholder Consultation

As wetland management is concerned with diverse stakeholders in the locality, the Project places an importance in the stakeholder consultation and consensus building at the initial stage of the project. Community level institutions like EDCs or Biodiversity Management Committee shall also be identified and included as a stakeholder during the consultation. A series of consultation shall be undertaken to build common understanding on the project objectives and consent to actively take part in the project activities. The process of stakeholder consultation depicted in the manual developed under Component 4.1: Preparation of Manuals and Guidelines shall be followed. This process is undertaken by RMU/ PMC.

d. SC-2.2.1 (4) Re-constitution or Formation of POs (JFMC/ EDC)

Once the stakeholder consultation process is completed, final list of participating stakeholders' list shall be prepared for each project site. In case, the existing EDCs are found during the stakeholder consultation, they will be assisted to re-organise themselves as an active community institution. Where there is no community organization is found as a project partner, new EDC can be constituted. The process of re-constitution or formation of POs given in the manual developed under Component 4.1: Preparation of Manuals and Guidelines shall be followed. The process will be undertaken by RMU/ PMC.

e. SC-2.2.1 (5) Preparation of Micro Plan including Treatment Plan and Approval

As given in SC-2.1.2 (3), micro plan shall be prepared with each PO. The scope and thrust of the micro plan for wetland would be waste management, alternative livelihood enhancement, enhanced access to credit, ecotourism development, skill development plan for enhanced livelihood focusing

on migrants and poor/vulnerable/women, community development activities including access to schemes and services through convergence. The process shall be facilitated by RMU/ PMC.

f. SC-2.2.1 (6) Community Development Fund: Implementation of Community Development Based on the Micro Plan including Entry Point Activity

As depicted in SC-2.1.2 (4), community development activities including EPA shall be implemented with assistance of RMU/ DMU.

g. SC-2.2.1 (7) Selection and Engagement of Community Facilitator

As depicted in SC-2.1.2 (5), a community facilitator shall be identified in each site by the members of EDC and engaged for the duration of four years. Honorarium shall be paid by the project during the engagement. Thereafter, the concerned EDC shall meet the expenses of engaging the community facilitator.

Activities

Restoration works shall be implemented in accordance with micro plan as well as treatment plan. Target wetlands for restoration works are Nalsarovar, Chhari Dhandh and GRK-Nadabet.

2) SC-2.2.2 Reed/Weed Removal from Wetland Area

Nalsarovar wetland management authorities have identified reed and weed infestation as one of the major management issues and it has been taken as habitat management/improvement activities under the Management Plan 2014-15 to 2023-24. A total of 500 ha of the target for removal of reed has been set under the Nalsarovar wetland Management Plan. However, due to paucity of funds the same has not been taken up. It is therefore, the project will take up 500 ha of reed removal. In view of the intensity of the issue and to make up for the pending targets, total physical target of 500 ha is proposed in 5 years in the present project. The work is outsourced as per the GFD norms. In case the workers are required, local community members are given priority.

3) SC-2.2.3 Removal of Weeds (Prosopies and others)

A target of total 400 ha of *Prosopis juliflora* removal from these three wetland areas of GRK-Chhari Dhandh and GRK-Nadabet and Nalsarovar wetlands. The work will be carried out by outsourced agency as per the norms of the GFD. IN case, workers are to be engaged for the work, the priority shall be given to the local community members.

4) SC-2.2.4 Bank Restoration for Controlling Soil Erosion (Nadabet Wetland only)

To mitigate soil erosion, stop flood water affecting bets and to improve water retention, earthen bund will be created in the south western boundary of Nadabet wetland. The dimension of proposed creation and strengthening of earthen bund would be 15,000 meters long with 2.5 meters width and 2.0 meters height. Soil for creating of earthen bund shall be dug from the wetlands areas only so that the wetland gets desilted and its water holding capacities are increased, however, not more than 3 feet depth will be dug so that the ground water quality will not be affected by digging deep. The work is outsourced as per the GFD norms. In case the workers are required, local community members are given priority.

5) SC-2.2.5 Creation of Raised Earthen Platforms in Wetlands

Several earthen raised platforms constructed in between water spread in Nalsarovar provide crucial roosting, resting and breeding habitats to several species of birds. Such raised earthen platforms at regular distances improve landscape beauty. They also create roosting sites form birds which provides opportunity for birdwatching to tourists. It is also likely that such platforms could be used by two species of flamingos for breeding if found suitable in Chhari Dhandh and Nadabet wetlands. Such platforms also sometime provide raised sites for staff during surveillance. Such platforms some time also provides crucial safe rescue places for other fauna during flash flooding.

Raised earthen platforms of two different sizes are proposed. For Nadabet wetland, larger platform would be required as the area faces higher erosion incidences.

Table 8.15: Work Specification for Raised Earthen Platform

Type of Raised Earthen Platform	Stone Pitching	Sites	Location
(L) 25 m x (W) 25 m x (H) 2.5 m	1.5 m	10	Nalsarovar
	1.5 m	25	Chhari Dhandh
(L) 25 m x (W) 50 m x (H) 2.5 m	1.5 m	25	Nadabet

Source: JICA Survey Team (2019)

The precise locations for creation of such platforms shall be decided by the concerned DMU/ RMU and PMC based on Landscape Map. PMC will assist PMU in developing the site identification process and criteria prior to the implementation of the works. When selecting the sites, water depth, distance from shoreline, traditional use by birds, tourism zone, potential flooding and need for rescue habitats, requirements for surveillance etc. shall be considered. The work is outsourced as per the GFD norms. In case the workers are required, local community members are given priority.

6) SC-2.2.6 Plantation of Native Trees

Most of the wetlands are subjected to siltation and erosion due to runoff. Such processes gradually alter the wetland characteristics. Therefore, to mitigate the damage and degradation of wetlands due to such processes and maintain the characteristics of wetlands, tree plantation in immediate surrounding areas is practiced. The work is outsourced as per the GFD norms. In case the workers are required, local community members are given priority.

The project will plant *Salvadora persica, Salvadora oliodes, Acacia nilotica* etc. species for plantation in Chhari Dhandh and Nadabet wetlands while removing *Prosopis juliflora*. A small plantation of 1.0 ha will be established on islands of these wetlands.

7) SC-2.2.7 Develop Solid Waste Collection and Disposal System

The wetland ecosystems especially in Nalsarovar is affected by the human activities in the surrounding areas. One of the issues is the inappropriate plastic disposal. PMU officer in charge of private partnership shall facilitate the convergence with Swachh Bharat Mission and other local stakeholders to establish a community based solid waste management. The project will engage a subject-matter specialist for a short duration to initiate the process and also set aside a lump sum amount for facilitating the convergence and procurement of small equipment and tools which are required by the community to operate the system.

8) SC-2.2.8 Boundary Demarcation at Nadabet and Chharidand Wetlands

Chari Dhandh and Nadabet are relatively recently recognized protected wetland areas of Gujarat. In order to avoid any encroachments and for conducting day to day patrolling activities it is important to have boundary demarcation.

The project will establish pillars at both wetland sites. The salinity resistant pillars suitable for wetland use will be procured and used for the project intervention. The work will be outsourced as per the norm of GFD. In case, the workers are required for the work, the local community members shall be given priority.

9) SC-2.2.9 Mainstreaming of Wetlands

The Government of India formulated Wetland (Conservation and Management) Rules, 2017 which would mainstream the wetlands areas in to legal regime and ensure their sustainable management. The Wetland (Conservation and Management) Rules, 2017 provide opportunities for mainstreaming of non-protected wetlands in to country's legal framework to recognize, protect and halt further degradation. Though the rules are in existence from year 2017 and there are number of highly significant wetlands which are potential sites for conservation, no wetlands in Gujarat are notified under these rules.

The Ministry of Environment, Forest and Climate Change initiated National Plan for Conservation of Aquatic Ecosystems (NPCA). More recently, the Prime Minister of India has shortlisted 169 priority transformative ideas for governance in India, one of them include restoration of 100 wetlands. Out of such priority wetlands, several sites are identified in Gujarat, which are yet to be legally recognized as wetlands.

Therefore, in order to ensure protection, conservation and sustainable management, following sites are proposed to be taken for mainstreaming into legal frame work. Total 5 sites are identified which are 1) Nadabet, 2) Gosabara-Mokarsagar wetland, 3) Pariyej lake, 4) Kanewal, and 5) Wadhwana lake. These 5 sites are identified based on several criteria of size, Important Bird Areas, Biodiversity values and status etc.

a. SC-2.2.9 (1) Preparation of Brief documents and Model Integrated Wetland Management Plans

Overall, total 5 wetlands are proposed to be identified on pilot bases and preparation of their brief documents and model integrated plans for taking up management activities is suggested. The indicative list includes 1) Nadabet, 2) Gosabara-Mokarsagar wetland, 3) Pariyej Lake, 4) Kanewal and 5) Wadhwana lake. The preparation of brief document and integrated management plans will be assisted by the Project and shall be submitted to state and central governments to finally notify them as 'wetlands' as per Wetland (Conservation & Management) Rules 2017. Following documents are required to be prepared under this activity. Both the documents shall contain the information as given in the table below.

Table 8.16 Information and Sections required for Wetland Brief and Integrated Wetland Management Plan

Wetland Brief	Integrated Wetland Management Plan
1. demarcation of wetland boundary supported by accurate digital maps with coordinates and validated by ground truthing 2. demarcation of its zone of influence and land use and land cover thereof indicated in a digital map 3. ecological character description 4. account of pre-existing rights and privileges 5. list of site-specific activities to be permitted within the wetland and its zone of influence 6. list of site-specific activities to be regulated within the wetland and its zone of influence 7. modalities for enforcement of regulation	1. Preamble 2. Site description 3. Description and evaluation of ecological characters 4. Setting management objectives 5. Regulatory regime 6. Monitoring Plan 7. Action Plan 8. Budget

Source: JICA Survey Team (2019)

Preparation of above-mentioned documents would require exhaustive, systematic and scientific data and loads of information as per the guidelines of National Plan for Conservation of Aquatic Ecosystems (NPCA)[74]. This would require field visits, literature survey, consultation with various stakeholders, visits to research institutions, preparation of remote-sensing and GIS based maps, holding workshops, engagement of experts or institutions etc. Experienced subject matter experts or resource agency would be engaged for preparing such plans as required.

Required expertise are with the Gujarat Ecological Education and Research (GEER) Foundation, Wetlands International, Gujarat Institute of Desert Ecology, and etc. The plans will be prepared in the initial stage of the project implementation phase so that the adequate time can be kept for supporting the implementation of the plans.

b. SC-2.2.9 (2) Implementation of Integrated Wetland Management Plans

After preparation of brief documents and integrated management plans these wetlands would require to be notified and the plans would be approved by state wetland authority and National Wetland Committee. However, the NPCA guideline suggests that NPCA shall only provide the core funding required for triggering and supporting integrated management for prioritized wetlands, therefore, implementation of various activities would require funds through other sources and convergence.

Since Nadabet wetland major activities of boundary demarcation, habitat improvements, community development and eco-tourism activities are already proposed in the project, the implementation of Integrated Wetland Management Plan of four remaining sites of Gosabara- Mokarsagar wetland, Pariyej, Kanewal and Vadhwana wetlands will be supported by the project. Indicative list of activities that could be taken up in the prioritized and notified wetlands as per approved integrated management plans is as under.

- Boundary survey, mapping, demarcation
- Protection & surveillance
- Engaging ‘Wetland Mitra’

[74]National Plan for Conservation of Aquatic Ecosystems (NPCA) Guideline, Ministry of Environment, Forest and Climate Change Government of India. April 2019.

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- Community development activities (Entry point activities, livelihood, etic.)
- Basic amenities development (pathways, trails development and etc.)
- Tourist facilities (watchtowers, pathways/trails development, tourist huts, toilets, drinking water etc.)
- Bank restoration (bunding, stone pitching etc.)
- Desiltation (small scale dredging without altering function of ecosystem)
- Small scale restoration activities (Removal of reed/weed removal, *Prosopis* removal etc.)
- Catchment conservation (Plantation of native tree species beyond HFL/ supra littoral area, Small scale engineering structures (such as gully plugging, check dams, gabion structures, silt traps etc.)
- Research (Biodiversity assessment, problem based targeted research)
- Monitoring (Biophysical monitoring, bird census etc.)
- Sewage treatment plants (partial through convergence)

10) SC-2.2.10 Preparation of World Heritage Site Dossiers

The relationship of man and wetlands is ancient the first signs of human civilization are traced to wetland areas, and one of them is the flood plains of the Indus i.e. Great Rann of Kutch. It is one such wetland which lies in the flood plains of Indus River where a prominent Harappand civilization flourished between c 1450 to 2650BC. Today, the Great Rann of Kutchh is one of the major wetlands of the Gujarat. This wetland area and its surrounding landscape make a complex of rich natural, cultural and ancient archaeological heritage. It encompasses an ancient Harappan Civilization site, a traditional flamingo breeding site at Flamingo city, fossil deposits of Jurassic and cretaceous periods and unique saline desert. Owing to its high biodiversity values and significance this area also falls in Kutch Desert Wildlife Sanctuary and Kutch Biosphere reserve. This complex is a best candidate site for recognizing it as a "UNESCO Natural World Heritage Site". Ironically Dholavira Harappan civilization site relates to wetlands not only through its location on the bank of the Indus River but also it is one of the world's earliest and best planned water conservation systems. Therefore, proposing this wetland under the UNESCO world heritage sites and its surrounding rich archaeological and natural heritage through present project under wetland component fully justifies. The state government has initiated a process to get this site recognized under the UNESCO world heritage sites, but it lacks detailed information, specific skills to carry out research and prepare a dossier in prescribed format. Thus, the project shall support the on-going attempt of the state government by providing technical inputs. PMC will work closely with PMU and GFD to undertake the process. A resource organization may be engaged as deemed necessary. The ToR of such organization shall be drafted by PMC, which will also assist PMU in procurement process and providing technical guidance to the procured organization. The process of preparation of the dossier is given in Annexure 8.3-a

11) SC-2.2.11 Preparation of Ramsar Site Dossiers

The Ramsar Convention on Wetlands was developed as a means to call international attention to the rate at which wetland habitats were disappearing, in part due to a lack of understanding of their important functions, values, goods and services. Governments that join the Convention are expressing their willingness to make a commitment to reversing this history of wetland loss and degradation[75]. The act of designating (listing) under the Convention a wetland as internationally important is an appropriate first step along a conservation and sustainable use pathway, the endpoint of which is achieving the long-term wise (sustainable) use of the site[76]. It reflects the commitment of contracting

[75] An Introduction to the Ramsar Convention on Wetlands. Ramsar Handbook 5th Edition, 2016. Sub-series I: Handbook 1 International Cooperation on Wetlands.
[76] Ibid

parties towards the convention. Number of international conventions, national acts and rules mandates protection, conservation and sustainable management of wetlands.

India has designated total 27 wetland sites as Ramsar site under this convention. State of Gujarat despite, holding 22.7 % of India's wetlands has designated only one site as wetland of International importance i.e. Ramsar Site (Nalsarovar wetland). The Asian water bird Census data (1987-2007) suggests that Gujarat has 132 wetland sites that meets 1% species population criteria and more than 31 sites that meets 20,000 or more bird population criteria, and total 75 sites are fit for being designated as Ramsar sites as they meet all criteria[77]. Designations of a wetlands site as Ramsar site upscale its status and provides it a global recognition. Putting a wetland on global map as wetland of international importance has numerous direct and indirect benefits. It brings increased publicity and prestige for the wetlands designated for the List of Wetlands of International Importance, and hence increased possibilities of support for conservation and wise use measures[78].

Therefore, in the present project it is proposed to prepare documentation and dossiers for designating 3 of Gujarat's most important sites as Ramsar site. These are Chhari Dhandh, Nadabet and Gosabara-Mokarsagar wetlands. These are large wetlands and are already identified as Important Bird Area by Birdlife International. The work involves a series of stakeholder consultation and extensive data collection and thus, a resource organization will be engaged to carry out the work. PMC will prepare the ToR for the procurement of such organization and assist PMU in its process. The technical guidance will also be assured by PMC for this work. Process of preparation of dossier is given in Annexure 8.3-a.

12) SC-2.2.12 Livelihood Enhancement for Wetland Ecosystems

a. SC-2.2.12 (1) Promotion of Micro Enterprise in Wetland Ecosystem

Livelihood improvement activities comprise of two categories: Non-landscape-based activities, and Landscape based activities. At the initial stage of the project, SHG based livelihood activities will be promoted in the project areas with convergence with Gujarat Livelihood Promotion Corporation (GLPC), which is the state nodal agency for the Mission Mangalam to address the issues related to rural livelihood. PMU will be assisted by PMC to define the nature of assistance to be required from and to exchange MOU with the GLPC.

In this sub-component, two SHGs from each PO will be identified and selected during the micro planning according to the selection criteria defined by the Project, which shall be depicted in the manuals to be prepared by PMU and PMC under Component 4.1: Preparation of Manuals and Guidelines. The livelihood activities that can be promoted could be landscape specific or otherwise. The guidelines on micro enterprise development to be developed under Component 4.1: Preparation of Manuals and Guidelines will provide the process of enterprise identification, business planning and management, and organizational management and etc. The necessary technical guidance will be provided by GLPC. Indicative list of landscape specific livelihood activities is given in Annexure 8.3-b.

b. SC-2.2.12 (2) Community Based Revolving Fund for Micro Enterprise Promotion

As outlined in SC-2.1.9 (2) Community Based Revolving Fund, the Project will place a lump sum amount of community revolving fund to each PO which shall be accessed by SHGs for the fund requirement for starting up the livelihood activities.

[77] Li, Z.W.D., Bloem, A., Delany S., Martakis G. and Quintero J. O. 2009. Status of Waterbirds in Asia - Results of the Asian Waterbird Census: 1987-2007. Wetlands International, Kuala Lumpur, Malaysia.
[78] Ibid

c. SC-2.2.12 (3) Cluster Based Enterprise and value Chain development

As outlined in SC-2.1.9 (3) Cluster Based Enterprise and Value Chain Development, the cluster-based enterprise will be promoted by the project.

13) SC-2.2.13 Eco Tourism

As a landscape-based activities for wetland ecosystems, eco-tourism is proposed. Most of the selected wetland project sites have high potential for developing as eco-tourism sites particularly for bird watching tourism. Nalsarovar is one of the 26 Ramsar sites of India and an important bird area (IBA), Chhari Dhandh also is an important bird area, whereas Nadabet has reported highest congregation of birds. Such characteristics of wetlands provide opportunity for local community to create livelihood by providing, services related to accommodation, food, boating, guide services etc. to tourists.

The project site for eco-tourism promotion shall be identified based on the scoping and feasibility study, which will be undertaken at the initial stage of the project implementations. The process of eco-tourism promotion is detailed out in the Sub Component 3.6 under Component 3: Human-Wildlife Conflict Management.

14) SC-2.2.14 Awareness Program

Awareness creation for the importance of wetlands to our life and promotion of wise use of wetlands would be an integral part of the project intervention. The paper based and media-based materials will be designed by the project for wide circulation while the nature camps and eco club related activities as part of the activities proposed under Sub Component 3.4.1 Nature Education will be undertaken in the wetland areas.

In the eco-tourism site, the materials on responsible tourism and wetland ecosystems will also be distributed and the guide will also be trained to propagate the information on wise use of wetlands and conservation/ restoration activities of wetlands.

15) SC-2.2.15 Research & Monitoring:

The potential research topics to be looked into are as given below. The research findings shall inform the project implementation process and contribute to the knowledge base of the overall sustainable management of wetlands in Gujarat.

a) Impacts of Climate Change on Wetlands of Gujarat

Gujarat though falling mostly in semi-arid zone holds significant area of wetlands of the country. It holds 22.7% area of wetlands of the country. Gujarat has its 17.6% geographical area under wetlands which is much above the national average. Wetland systems are vulnerable to changes in quantity and quality of their water supply, and it is expected that climate change will have a pronounced effect on wetlands through alterations in hydrological regimes with great global variability[79]. According to the IPCC Second Assessment Report, changes in climate will lead to an intensification of the global hydrological cycle and could have major impacts on regional water resources. Climate change may also lead to shifts in the geographical distribution of wetlands and an increase in the severity and extent of coral reef bleaching and mortality[80].

[79] Erwin, K.L. (2009). Wetlands and Global Climate Change: The Role of Wetland Restoration in a Changing World. Wetlands Ecology and Management 17: 71-84.

[80] Bergkamp G. & B. Orlando. Wetlands and Climate Change Exploring collaboration between the Convention on Wetlands (Ramsar, Iran 1971) and the UN Framework Convention on Climate Change October 1999.

Due to climate change the frequency of cyclones, events of intense rainfall and draughts likely to increase. Gujarat on the west coast is more vulnerable to tropical cyclonic hazards[81]. A study on the potential impacts of climate change on wetlands of Gujarat to understand the patterns and scale of impacts would be relevant. Such information is crucial for managers and policymakers to manage wetlands and prepare climate change adaptation and mitigation strategies for the state. The study shall be assigned to a national level agency, institutions that have the required experience and qualifications to carry out such comprehensive scientific studies.

b) Economic Valuations of Key Wetlands of Gujarat:

Despite their immense eco-system services and benefits to mankind, wetlands continue to degrade and decline. Wetlands are being lost faster than the decline of forests across the globe. Wetlands are declining at a rate of 2-3% in India. Major drivers for their decline and degradation are priorities of development and food security. Often the policy decisions do not consider the values of eco-system services provided by the wetlands to society. This is also due to lack of knowledge and precise information that would help decision makers to carry out a cost-benefit analysis and set the priorities. Gujarat has number of wetlands that are of very high conservation significance and provides immense benefits to local communities. However, very few studies are available that provides information to the decision makers to carryout cost benefit analysis for setting the priorities for environmental investments. Therefore, in order to make informed decisions, baseline information on ecosystem services needs to be established. A study to evaluate the eco-system services of selected wetlands of Gujarat will be supported by the project. The details of wetlands sites and funds to be allocated shall be finalized during the preparatory phase of the project.

c) Detailed classification of Wetlands of Gujarat Based on Wetland (Conservation and Management) Rule, 2017.

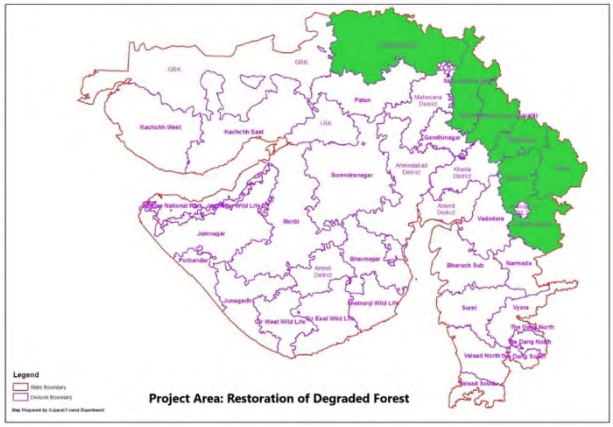
Wetlands are characterized by its two major physical and biological components such as soil and vegetation. Area composed of hydric soil and hydrophyte vegetation two are key characteristics of a wetland. Though, there are several definitions of wetlands, however, the two most relevant definitions in Indian context are Ramsar Convention definition as India is signatory to it and another as per Wetlands (Conservation and Management) Rules, 2017 of India. Wetland Atlas (SAC, 2011) provides most important baseline information on types of wetlands as per Ramsar definition. After the notification of Wetlands (Conservation and Management) Rules, 2017, the managers need to identify wetlands based on their types, ownership/tenure, and status (natural and artificial). However, the required information is not readily available through the wetland atlas prepared by SAC, 2011.
The information gaps are identified in the classification of Rann of Kutchh. A study to provide necessary information to enable accurate classification of wetlands as per Wetlands (Conservation and Management) Rules, 2017. Hence a research project shall be supported by the project to enhance the accuracy of the classification of wetlands of Gujarat based on Wetland (Conservation and Management) Rule, 2017.

8.3.3 Sub-Component 2.3 Restoration of Degraded Forest

[81] Mohapatra M, Mandal G S, Bandyopadhyay B K, Ajit Tyagi and Mohanty U C 2012 Classification of cyclone hazard prone districts of India; Natural Hazards 63 1601–1620.

(1) Rationale

The forest area of Gujarat is reported to be 21,909 sq. km (Gujarat Forest Statistics 2017-18 that constitutes 11.18% of the geographical area of state. The forests of Gujarat are largely located along the eastern hilly fringe of the state. However, forest cover is limited to 14,757 sq. km. This forest cover includes 10,250 sq. km of forest cover in recorded forest area and 4,507 sq. km of forest cover outside recorded area of forests. The forest cover in recorded forest area is reported to be only 10,250 sq. km as detailed in table 8.17.



Source: JICA Survey Team (2019)

Figure 8.9 Potential Project Divisions for Sub-Component 2.3 Restoration of Degraded Forest

Table 8.17 Forest Cover within Recorded Forest Area

Forest cover	Area sq. km	% forest cover	% of the total forest area
Very dense Forest	353	3.44	1.61
Moderately Dense Forest	4,741	46.25	21.64
Open Forest	5,156	50.30	23.53
Total	10,250	100.00	46.78

Source State of Forest 2017, Forest Survey of India, Dehradun

It may be seen that 50.30% of the recorded forest area is open forest and 46.25% is moderately dense forest. When considered with reference to total forest area the forest cover of all type in recorded forest area put together accounts for only 46.78%, very dense forests and moderately dense forests together account for only 23.25% and open forests accounting for 23.53%. It may be considered that 43.22% forest area is devoid of any forest cover. The table below presents the forest cover in the districts included in the project. These figures are for total forest cover. The State of Forest Report 2017 brought out by Forest Survey of India, Dehradun does not provide district wise forest cover separately for recorded forest area and outside recorded forest area.

The open forests in the districts of Dahod, Panchmahal and Vadodara districts are more than 70%. In Banaskantha and Sabarkantha districts the open forests are more than 50%. In absence of data of forest cover in Recorded Forest area for districts. It may be assumed that the trend would be similar or more pronounced in these districts being part of drier region of state. It indicates at large parts of the forests in these districts being degraded lacking suitable forest cover.

Table 8.18 Forest Area by Forest Density Class in Project Districts

District	Very Dense Forest		Moderately Dense Forest		Open Forest		Total	% of total forest cover of Gujarat
	Area sq. km	% of total	Area sq. km	% of total	Area sq. km	% of total	Area sq. km	
Vadodara	0	0.00	145	23.05	484	76.95	629	4.26
Panchmahals	0	0.00	219	29.72	518	70.28	737	4.99
Dahod	1	0.19	118	21.93	419	77.88	538	3.65
Sabarkantha	29	3.59	304	37.67	474	58.74	807	5.47
Banaskantha	0	0.00	372	43.87	476	56.13	848	5.75
Kheda	0	0.00	20	21.28	74	78.72	94	0.64
Gujarat	378	2.56	5200	35.24	9179	62.20	14757	24.75

Source State of Forest 2017, Forest Survey of India, Dehradun

The districts of Aravalli, Banaskantha, Chota Udepur, Dahod, Mahisagar, Panchmahal and Sabarkantha districts are showing high proportion of open areas. The forests are degrading in these districts in particular due to grazing, harvesting of fuelwood, land conversion and etc. by the local communities.

(2) Objectives

The objectives of this component include:

- Restoration of the degraded forests by Plantation works
- Preventing excessive grazing by restoring the grass vegetation (overlapping intervention with Sub-component 2.1)
- Reducing the vulnerability of the local communities through community development and livelihood enhancement

(3) Activities

1) SC-2.3.1 Preparatory Works

a. SC-2.3.1 (1) Landscape Mapping

In order to select the intervention area strategically for maximisation of ecosystem services, Landscape Map will be prepared. Any activities under the component shall be planned based on the Landscape Map. Mapping exercise will be conducted to integrate information on location and size of wetlands, level of their degradation, biodiversity, location of villages, number of cattle and other information which are required for prioritization into Landscape Map. Intervention areas will be identified in accordance with prioritization criteria.

Mapping exercise will be done in a phased manner, and batch-wise activities will be planned accordingly. No activities shall be commenced without preparing Landscape Map of the intervention area.

b. SC-2.3.1 (2) Finalisation of the Site Selection Criteria

PMU will finalise the site selection criteria. PMC may also assist PMU in doing so.

c. SC-2.3.1 (3) Scoping of the Project Sites and Site Verification

Based on the spatial information deriving from the landscape mapping, broad identification of the project areas shall be undertaken. Ground truthing will be undertaken to verify the field condition.

2) SC-2.3.2 Village/ Site Selection

a. SC-2.3.2 (1) Consultative Meetings with Candidate Villages

The consultation with the community shall be conducted to establish rapport and common understanding of the project interventions and objectives. The process as depicted in SC-2.1.2 (21 will be followed. In addition, the roles and responsibilities of the project and JFMCs are also to be discussed in detail so that the JFMCs are well aware and ready to contribute in management of the JFM plantation.

Table 8.19 Roles and Responsibilities of PMU and JFMCs in SC-2.3: Restoration of Degraded Forest

	Roles and Responsibilities
PMU	Selection of site. Contribute to preparation of micro-plan. Preparation of treatment plan in consultation with JFMC. Raising of nursery as per requirement of treatment plan. Implementing soil moisture conservation works as per treatment plan. Planting and tending of seedlings Attending to all the technical needs of the plantation raising.
JFMCs	Prepare micro-plan with support of GFD. It shall include village development plan, utilization of funds made available under project, treatment needs for forest area allocated to the JFMC. Selection of site for plantation. Participate in preparation of treatment plan for plantation on allocation of target. Provide inputs for selection of species after taking views of both men and women. JFMC members shall have first right over available employment opportunities. The JFMCs shall take up the responsibility of protection. If the JFMC is desirous of protecting the plantation in an organized manner. The plantation protection funds shall be made available to JFMC for undertaking the protection work. Take care of old plantation in their allocated areas. Grass and any other NTFP available from the plantation area shall be available to JFMC members for collection in consultation with Gram Sabha. Manage the JFMC account and the Revolving Fund allocated to it appropriately. Make rules and regulations related to protection of the JFM area in general and afforestation area in particular and enforce them with support from GFD. Work with Gram Panchayat (GP) and other line departments and institutions to implement other activities in the micro plan. JFMC shall participate in annual monitoring of the plantation to access the success status of plantation.

Source: JICA Survey Team (2019)

b. 2.3.2 (2) Formation and Re-formation of the JFMC

During the consultation, whether JFMC is already existing or not will be clarified. In case, there is already one and dormant, the project shall facilitate the JFMC to revive. Where there is no JFMC has been formed, the project shall assist the villagers to constitute one. The necessary registration process will also be followed. The process will eb undertaken by RMU.

c. SC-2.3.2 (3) Finalisation of the Project Sites/ Villages

Based on the results of the consultative meetings, final list of project villages is to be prepared.

d. SC-2.3.2 (4): Preparation of Micro Plan including Treatment Plan and Approval

The micro plan will be prepared as in SC-2.1.2 (3).

As part of a micro plan preparation, a treatment plan shall be prepared for each of the plantation sites. The site selected for plantation shall be mapped and treatment plan prepared a year ahead of the plantation. GFD has a standard format for preparation of treatment plan. As this is a technical exercise, RMU/ DMU will prepare the plan in consultation with JFMC. The steps of preparation of the treatment plan are listed below.

- Selection of site – Plantation site shall be identified on following considerations.
  i. As per sequence of working plan
  ii. Area requiring treatment according to principals of watershed. GFD has prepared a detailed plan for treating drainage lines. Degraded forest areas in such drainage line will be planted and accorded soil moisture conservation treatment.
  iii. Degraded forests not falling in sequence of working plan in next few years.
  iv. Priority will be given to degraded forest areas in villages where JFMC is active and willing to co-operate.
- Survey and demarcation – The selected site shall be surveyed by surveyor and site plan prepared. The plantation area shall be measured and demarcated on site.
- A meeting with JFMC shall be organized to obtain inputs on preference of species, site-specific soil moisture conservation works needed and protection measures.
- The Range Forest Officer shall prepare the treatment plan in standard GFD format that shall include the inputs obtained from JFMC as far as technically possible. GFD has circulated standard form for preparation of treatment plan. The format for treatment plan provides for dividing the plantation area into blocks based on natural features at site. The treatment plan format provides for following.
  i. The treatment plan provides for taking note of the existing conditions of each bock. These include:
     - Land type
     - Soil depth
     - Status of soil erosion
     - Slope
     - Existing vegetation, if any, species and density.
     - Issues involved in protection – status of grazing, illegal cutting, fire, etc.
  ii. Selection, location and quantum of soil moisture conservation measures for each block of plantation.
  iii. Tending operations needed for natural vegetation.
  iv. Selection of species for each block. This includes selection of species for top canopy, middle canopy and low canopy species with consideration for soil and slope.

v. Plantation design. The species mix requirements change with location within plantation area parts at various stages of drainage line and with slope.
vi. Size/kind of pits needed for planting.
vii. Tending operations needed that include weeding, soil working, support watering if possible and desired in different years of planting.
viii. Requirement of manure/fertilizers and pesticides if any.
ix. Protection arrangement, e.g., type and kind of fence, engagement of JFMC.
x. Fire prevention measures.
xi. It also includes estimate of fund requirement for various works required for raising plantation.

The draft treatment plan prepared by the RMU shall include the inputs provided by JFMC while preparing the micro-plan. The draft micro plan shall be discussed in a meeting with JFMC. RMU shall include inputs/wishes of JFMC on draft treatment plan. If it is technically not possible to include the suggestion of the JFMC in the treatment plan, then it shall be explained to the JFMC members in the meeting.

The draft plan so prepared shall be submitted to the DMU for approval. DMU shall approve the treatment plan after due scrutiny. If required DMU may ask for site inspection by ACF of the division or do so himself. Finally, the treatment plan shall be approved by the DCF. The approved treatment plan shall be shared with JFMC.

e. SC-2.3.2 (5) Community Development Fund: Implementation of Community Development Activities including Entry Point Activities

Community Development Activities including Entry Point Activities will be undertaken as in SC-2.1.2 (4).

f. SC-2.3.2 (6) Engagement of Community Facilitators

Community facilitators will be engaged as in SC-2.1.2 (5).

3) SC-2.3.3 Degraded Forest Plantation and Maintenance Work

GFD being technically competent agency of forestry operation shall take lead in undertaking the 1) advance action works, and 2) plantation. Maintenance works shall be undertaken in collaboration with JFMCs. Although the engagement of JFMCs are envisaged in this project intervention, advance action works, and plantation works are to be undertaken by GFD following the existing practices of the department. In case, the workers are required for the plantation activities, local community members are given priority.

The project shall draw a plan for the maintenance works to be undertaken by JFMCs and provide necessary technical backstopping.

Table 8.20 District Wise Forest Cover

Sl. No	District	Legal forest area[82]	Total forest cover[83]	Open forest Cover (40-10%)	Scrub (<10%)
1	Sabarkantha	815.03	807	474	130
2	Aravalli	448.57			
3	Mahisagar	619.45	737	518	57
4	Panchmahals	685.76			
5	Dahod	952.52	538	479	45
6	Chhota Udaipur	741.54	629	484	60
7	Banaskantha	1,107.20	848	476	208
Total		5,370.07	3,559	2,431	500

Source: Forest Statistics (2017-18), State Forest Department, Gujarat

A total of 10000 ha of forest area shall be undertaken for planting in these Divisions during the project period. The plantation area is distributed, in an indicative manner, among the Divisions, as given in table below based on:

- Availability of area for plantation
- Active JFMCs/potential for new JFMCs
- Preference for Divisions less covered during GFDP
- Not within the Protected Areas

Table 8.21 Indicative Allocation of Plantation Areas for Divisions

No.	Name of Division	Ranges	Indicative size of area allocated for plantation (ha)
1	Banaskantha	Dantivada, Iqbalgadh, Amirgadh, Ambaji North, Ambaji South, Danta West, Danta East	1,550
2	Sabarkantha	Risgubam RDF Poshina, Khedbrahma, Vadali, Dholwani, Vijaynagar, Raigadh	1,500
3	Aravalli	Bhiloda, Shamlaji, Megraj, Malpur, Modasa	1,400
4	Mahisagar	Khanpur, Munpur, Santrampur East, Santrampur West, Lunavada, Ditwas	1,300
5	Baria (Dahod)	Fatepura, Jhalod, Randhikpur, Sarjumi, Dahod, Rampura, Limkheda, Baria, Dhanpur, Garbada, Vansiya Dungri, Sagtala	1,400
6	Godhara (Panchmahal)	Shehara, Godhra West, Godhra East, Vejalpur, Halol, Raigadh, Morva (H)	1,300
7	Chhotaudepur	Vadodara, Nasvadi, Bodeli, Jeturpavi, Dolaria, Rangpur, Chotaudepur, Boriad, Panvad, Kawat	1,550
Total			10,000

Source: JICA Survey Team (2019)

[82] *Gujarat Forest Statistics2016-17*
[83] *State of ForestsReport byForest Surveyof India2017*

The plantation model followed will be of Restoration of Degraded Forests (devoid of root stock) and the implementation involving nursery raising and planting is undertaken by GFD. The plantation shall be of 50% timber and fuelwood species and 50% NTFP, fruit-bearing trees and bamboo. The treatment plan shall be made with the details including species selection, SMC structures etc. An indicative list of species for plantation is given in table below.

Table 8.22 Indicative List of Species for Plantation in Degraded Forest

Timru *(Diospyros melanoxylon)*	Desi Baval *(Acacia nilotica)*
Dhavdo *(Anogeissus pendulata)*	Shimdo *(Bombax ceiba)*
Khakharo *(Butea monosperma)*	Vans *(Dendrocalamus strictus)*
Kanaji *(Holopetela integrifolia)*	Sitafal *(Annona squamosa)*
Aniyar *(Acacia leucophloea)*	Asitro *(Bauhinia recemosa)*
Sag *(Tectona grandis)*	Khijado *(Prosopis cineraira)*
Sadad *(Terminalia crenulata)*	Umro *(Ficus racemosa)*
Bor *(Zizyphus mauritiana)*	Karmada *(Carissa caracadas)*
Amla *(Emelica officianalis)*	Khati Amli *(Tamarindus indica)*
Limdo *(Azadiracta indica)*	Bor *(Ziziphus mauritana)*
Salai *(Boswellia serrata)*	Sitafal *(Annona squamosa)*
Bili *(Aegle marmelos)*	Khakhro *(Buteo monosperma)*
Khair *(Acacia catechu)*	Tambat *(Grewia flavenscens)*
Kadayo *(Sterculia urens)*	Khakhro *(Buteo monosperma)*
Royan *(Soymida fevrifuga)*	Tambat *(Grewia flavenscens)*
Bahedo *(Terminalia bellerica)*	

Source: Compiled by JICA Survey Team (2019) based on the information provided by GFD.

The plantation model of GFD is to be followed. As per the norm of the GFD, 1,111 saplings shall be planted in one ha at a spacing of 3m x 3m and the pit size shall be of 45 cm x 45 cm x 45 cm. Support watering shall be provided where appropriate. Three weedings and soil workings will be done during first year, and two weedings and soil workings in the second and third years. Protection will be accorded in the fourth year. The technical specification of the works to be undertaken under this sub-component is given in Annexure 8.4-a and 8.4-b.

The plantation work shall be monitored and periodically evaluated using such criteria as survival rate of the plantations, appropriateness of species selected, change in forest cover in the intervention areas, participation level of the communities indicated by the frequency of meetings held, improvement in their income level and so on.

4) SC-2.3.4 Livelihood Enhancement

a. SC-2.3.4 (1) Promotion of Micro Enterprise for Degraded Forest Landscape

Livelihood improvement activities comprise of two categories: Non-landscape-based activities, and Landscape based activities. At the initial stage of the project, SHG based livelihood activities will be promoted in the project areas with convergence with Gujarat Livelihood Promotion Corporation (GLPC), which is the state nodal agency for the Mission Mangalam to address the issues related to rural livelihood. PMU will be assisted by PMC to define the nature of assistance to be required from and to exchange MOU with the GLPC.

In this sub-component, two SHGs from each PO will be identified and selected during the micro

planning according to the selection criteria defined by the Project, which shall be depicted in the manuals to be prepared by PMU and PMC under Component 4.1: Preparation of Manuals and Guidelines. The livelihood activities that can be promoted could be landscape specific or otherwise. The guidelines on micro enterprise development to be developed under Component 4.1: Preparation of Manuals and Guidelines will provide the process of enterprise identification, business planning and management, and organizational management and etc. The necessary technical guidance will be provided by GLPC.

Under this component, management activities of old JFM forests shall be promoted as a livelihood option. The process of implementing the activities are given in Annexure 8.4-c.

b. SC-2.3.4 (2) Community Based Revolving Fund for Micro Enterprise Promotion

As outlined in SC-2.1.9 (2) Community Based Revolving Fund, the Project will place a lump sum amount of community revolving fund to each PO which shall be accessed by SHGs for the fund requirement for starting up the livelihood activities.

c. SC-2.3.4 (3) Cluster Based Enterprise and value Chain development

As outlined in SC-2.1.9 (3) Cluster Based Enterprise and value chain development, the cluster-based enterprise will be promoted by the project.

5) SC-2.3.5 Awareness Program

Awareness programs for sustainable forest management and project activities will be undertaken for the local communities and through eco-clubs. The project will emphasise on the benefits deriving from forests and forest resources and thus, the importance/ relevance of conservation and management activities. Plantation events will be organised in collaboration with Gram Panchayats. CSR funds can also be solicited for designing and undertaking awareness programs. For instance, school plantation, road side plantation and afforestation campaign could be considered. PMU officers in charge of the private partnership, forestry and communication/ information will jointly mobilize the resources and prepare the plan

6) SC-2.3.6 Solar Energy Pilot Initiative

This is a pilot project to ameliorate one of the basic causes of forest degradation, namely, fuelwood collection, based on the strength of Gujarat as a leader in solar energy harvesting. The free LPG connection provided under the Pradhan Mantri Ujjwala Yojana (PMUY) in remote areas has not yielded the desired result as many of the beneficiaries could not afford to do the refill and the refill provision is not easily available in the forest villages.

Solar panel installation on roof top of houses in the forest villages, on a pilot basis is proposed as a way to harness technology to improve the living condition of the forest dwelling people and this can also at least partially offset the need for collecting fuelwood from the forest. It can also provide an additional income to the village households by selling excess energy to the state electricity grid. It can be a catalyst in the promotion of solar energy harvesting as a way to address the climate crisis as well.

This initiative is to seek convergence with the solar energy sector by making use of the government subsidy available for the installation of solar panels in houses. In line with the goal of reaching 100 GW of grid connected solar power in the country by 2022 the Government of India and the Gujarat government give a combined subsidy of INR 23,500 for the installation of one KW solar facility on

rooftop while the actual cost is INR 45,000 for the same. The remaining amount of INR 21,500 is to be met by the house owner. The proposal is to meet the owner's cost under the project. The installation works are carried out by contractors and the subsidy is provided by the Gujarat Energy Development Agency upon completion of the installation. The state electricity supply company will provide connection for the installation to sell excess energy.

This activity can be implemented in the selected villages of project areas under SC-2.3: Restoration of Degraded Forests. The selection criteria of the villages and the families shall be decided by PMU with technical inputs from PMC.

7) SC-2.3.7 Research

The dedicated research wing of the GFD conducts forestry related research which helps improve the silviculture practices. Their research is application oriented and the results are put to practical use in the field. The DPR has proposed a research component related to forestry but has given two different sets of focal topics in different places. After examining the research needs and their functional utility it is proposed to provide a provision for cost-effective forestry related research. The forestry research wing of the GFD is well equipped to undertake these studies, and the PMU can entrust this research component to them through a MoU.

The research topics preferred by the GFD are appropriate to the felt needs in the sector, and these are: a) Bio-degradable planting containers, aiming to develop alternative to the plastic containers which is important especially since GFD has recently issued an environment friendly order restricting the use of plastic bags in plantation operations. b) Root-shoot technologies for rare tree species, this is important for the propagation and cultivation of rare species of trees and provides a valuable service in restoring rare species. c) Soil-less nursery techniques, this is also important as it can potentially increase the total nursery output and circumvent some of the current difficulties if the technique is streamlined.

8.4 Component 3 Human Wildlife Conflict (HWC) Management

(1) Rationale

Large regions of Gujarat are beset with Human Wildlife Conflict (HWC). The state has diverse agro-ecological regions and rich bio-diversity. Conservation of nature is part of the rich culture and traditions of the state. The state is also known to be vibrant, progressive and for its high pace of growth of industry. The expanding human habitations with high pace of industrialization lead to increasing interactions with wildlife. The HWC is inevitable consequence of many such interactions especially with carnivores and crop raiding herbivore when they move in medium to large size groups. Major HWC in Gujarat is observed due to Leopard, Asiatic lion, sloth bear, crocodile, blue bull and wild boar. In addition, wild animals specially lion and leopard attack and kill large number of domestic livestock. It causes distress among local people and negates the wildlife conservation efforts. GFD has a program to compensate economic loss due to wild animals. The table below provides the data on the number of livestock killed by wild animals and compensation paid by the GFD to owners. A brief description of occurrence and HWC caused by this animal would put the efforts to be made in the project in perspective and provide justification for the project area and interventions.

Table 8.23: Compensation paid for livestock killed by wild animals

Year	No. of instances	Amount of compensation paid in INR million
2013-14	3526	12.44

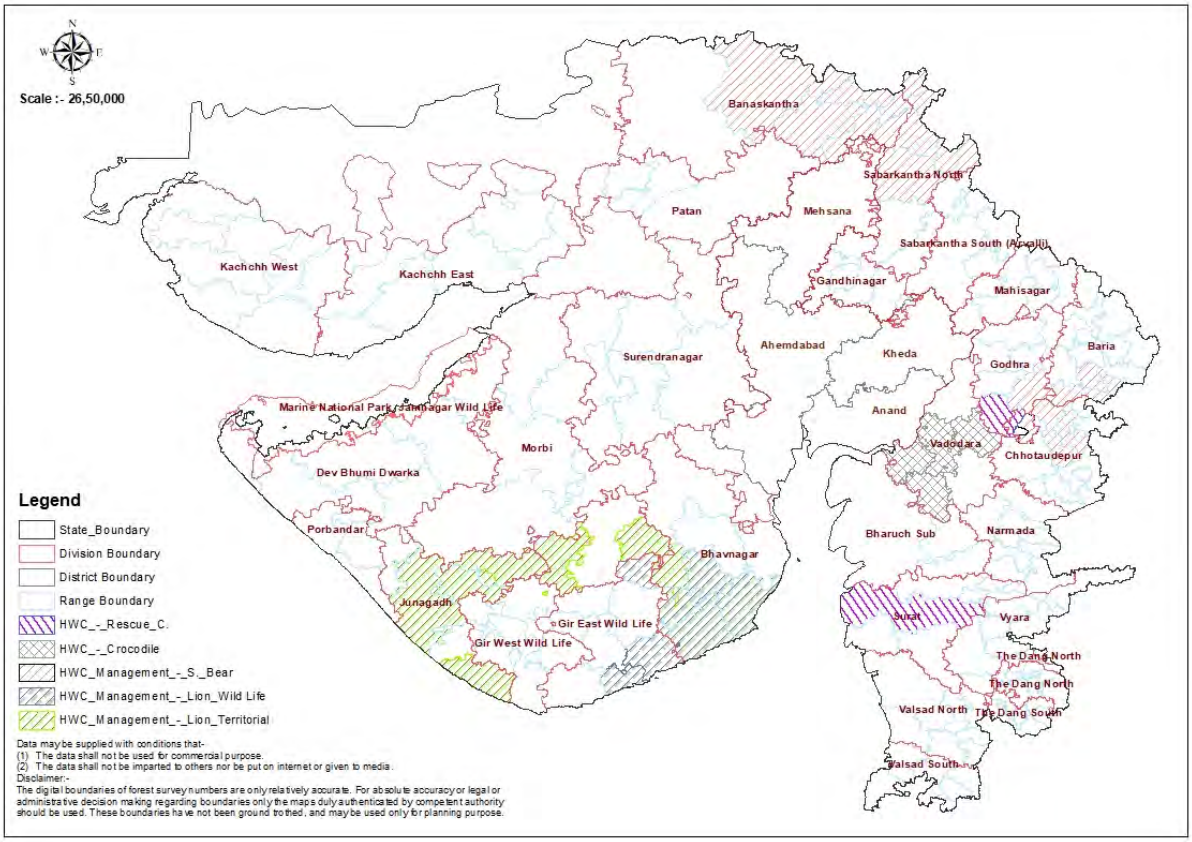
Year	No. of instances	Amount of compensation paid in INR million
2014-15	3211	15.52
2015-16	3254	15.87
2016-17	3652	23.12
2017-18	3429	28.99
2018-19	3218	23.22

Source Wildlife Wing GFD

(2) Objectives

The component aims at mitigating HWC with interventions through;

a. Improving habitat,
b. Creating safe corridors,
c. Raising awareness of the communities on human-wildlife conflicts
d. Improving efficiency of human wildlife conflict related interventions through research
e. Improving rescue and relief infrastructures.



Source: JICA Survey Team (2019)

Figure 8.10 Project Areas selected for Component 3: Human Wildlife Conflict Management

8.4.1 SC-3.1 Preparatory Works

(1) SC-3.1.1 Habitat Mapping

GFD has collected information on lion and sloth bear habitat that has been used to develop landscape maps in GIS system. The information available from the system includes siting of animals and

incidents of HWC that includes cattle kill. Present landscape estimates are gross and may need redefinition and scientific validation. In its present form there seem to be overestimations that may have been largely due to isolated and/or lone instances of siting rather than being part of regular habitat or migratory corridor. Detailed habitat studies shall be conducted under the project. The detail procedures of GIS mapping are provided in Component 4.5.1: Technology Based Monitoring – GIS application.

The habitat mapping studies will cover the lion landscape and sloth bear landscapes and the studies will include –

a. Delineation of landscape,
b. Vegetation mapping,
c. Niche detailing,
d. Corridor delineation, and
e. Habitat use pattern by the flagship species and various other species,
f. Seasonal patterns of movement of wild animals,
g. Areas affected by Human Wildlife Conflicts (i.e. based on the animal siting/ cattle kill location data), etc.

The project, therefore, provides for detailed studies using remote sensing and GIS tools together with field studies to detail the landscape habitats and prepare data bank for the same. The three landscapes together are estimated to be over 38,000 sq. km. However, this includes all village area. Actual area available and that may need to be mapped would be of the order of 30% of the total of PA area (8,000 to 10,000 sq. km of the PA areas). GFD field officials usually have information on movement of animals. However, it has not been put in any systematic and scientific format to help plan an organized effort to address the issue holistically. In recent years data on HWC incidents is collated for defining habitat and movement areas of lions.

The habitat mapping will be undertaken by outsourcing. The work involves assessment and review of the existing data with GFD, procurement of remote sensing data and analysis, ground truthing, and etc. As planned under Component 4.5.1 (4) Technology Based Monitoring – GIS Application, PMC will assist PMU in procurement of the agency and provide technical supervision to ensure the accuracy and usability of the outputs.

(2) SC-3.1.2 Identification of the Potential Sites for project Interventions and Site Verification

a. SC-3.1.2 (1) Finalisation of the Site Selection Criteria

PMU will finalise the site selection criteria. PMC may also assist PMU in doing so.

b. SC-3.1.2 (2) Scoping of the Project Sites and Site Verification

Based on the outputs of habitat mapping exercise, broad identification of the project areas shall be undertaken. Ground truthing will be undertaken to verify the field condition.

c. SC-3.1.2 (3) Village Selection

SC-3.1.2 (3) 1) Consultative meetings with candidate villages

The consultation with the community shall be conducted to establish rapport and common understanding of the project interventions and objectives. The process as depicted in SC-2.1.2 (2) will be followed.

SC-3.1.2 (3) 2) Formation and Re-formation of JFMC/ EDC

During the consultation, whether JFMC/ EDC is already existing or not will be clarified. In case, there is already one and dormant, the project shall facilitate the JFMC/ EDC to revive. Where there is no JFMC/ EDC has been formed, the project shall assist the villagers to constitute one. The necessary registration process will also be followed. The process will eb undertaken by RMU.

SC-3.1.2 (3) 3) Finalisation of the Project sites/ villages

Based on the results of the consultative meetings, final list of project villages is to be prepared.

SC-3.1.2 (3) 4) Preparation of Micro Plan including Treatment Plan and Approval

The micro plan will be prepared as in SC-2.1.2 (3).

As part of a micro plan preparation, a treatment plan shall be prepared for each of the plantation sites. The site selected for plantation shall be mapped and treatment plan prepared a year ahead of the plantation. GFD has a standard format for preparation of treatment plan. As this is a technical exercise, RMU/ DMU will prepare the plan in consultation with JFMC/ EDC.

The draft treatment plan prepared by the RMU shall include the inputs provided by JFMC while preparing the micro-plan. The draft micro plan shall be discussed in a meeting with JFMC/ EDC. RMU shall include inputs/wishes of JFMC/ EDC on draft treatment plan. If it is technically not possible to include the suggestion of the JFMC/ EDC in the treatment plan, then it shall be explained to the JFMC/ EDC members in the meeting.

The draft plan so prepared shall be submitted to the DMU for approval. DMU shall approve the treatment plan after due scrutiny. If required DMU may ask for site inspection by ACF of the division or do so himself. Finally, the treatment plan shall be approved by the DCF. The approved treatment plan shall be shared with JFMC/ EDC.

SC-3.1.2 (3) 5) Community Development Fund: Implementation of Community Development Activities including Entry Point Activities

Community Development Activities including Entry Point Activities will be undertaken as in SC-2.1.2 (4).

SC-3.1.2 (3) 6) Engagement of Community Facilitators

Community facilitators will be engaged as in SC-2.1.2 (5).

8.4.2 SC-3.2: Habitat Improvement

Habitat loss/degradation is one of the important causes of HWC. Animals from the habitat that is no longer available to them move out in search food, water and shelter. In the process they come in close contact with human population that often results in HWC. This sub-component has been planned to improve the habitat areas where the degradation has been observed to be severe.

(1) SC-3.2.1 Removal of Invasive Weeds

Invasive weeds that have little value to the locally occurring wildlife have invaded substantial areas of habitat and parts of corridors. They hinder growth of preferred species of habitat rendering the area unsuitable/unavailable for wild animals of the region. *Lantana camara*, *Prosopis juliflora*, *Parthenium hysterophorus* – also known as congress grass, *Casia tora* are known weeds of the forests of Gujarat. There are less known weeds *Nerocanthus spherostychys* (kubdo), *Sorghum helipus* (baru), Desmodium spp. (balsum), zinzadi etc.

The management plans of PAs mention occurrence of weeds and recommend their eradication as detailed in table 8.24.

Table 8.24 Weed Infestation and Provisions of Management in PA Management Plans

PA	Page numbers	Details about weeds	Provision
Gir PAs	149 Vol 1, Pages 142-145 Vol 2	1. Mentions occurrence of Cassia and Lantana. Large areas of Visavadar, Dedakdi, Devalia, Chhodavadi ranges are invaded by lantana. There is invasion of lantana in Jamwala, Sasan, Sarasia, and Dalkhania ranges too. Estimated areas affected by lantana camara are 14,249 ha in Gir West and 720 ha in Gir East (total 14,969 ha). 2. *Cassia tora* grows in grazing affected areas during monsoon. 3. Prosopis juliflora reported in Devalia range.	Recommends removal of Lantana over areas ranging from 2,125 to 3755 ha per year during 2011-12 to 2015-16.
Jessore	8, 35	Mixed forests of Butea, Khair, and Anogeissus are invaded by Prosopis juliflora. Such patches are seen in Kapasia, Sonwadi, Dabhela, Manpuria, Dharasar and Vaghodia areas	Cautious approach suggested. Provides for dividing the P.j. area in small patches. Intensive soil moisture conservation works suggested to accompany eradication followed by afforestation.
Balaram Ambaji	33, 34	Mentions occurrence of Prosopis juliflora in Chitrasani, Jethi, Khemrajia, Dhandha and south western parts of sanctuary. Lantana bushes are sporadically scattered over the area being more in moist areas and nallahs.	Recommends removal of unwanted species at an average rate of 300 ha per year.
Ratanmahal	page 28 vol2	Invasion of lantana camara reported.	
Jambughoda	43	Invasion of weeds, viz. Ipomea, Prosopis juliflora, Lantana camera,	

Source: Management Plan, Gujarat Forest Department

To contribute to the on-going effort of GFD, the project will undertake the removal of weeds from 2,000 ha. This will be in addition to ongoing program of GFD and also the works planned under Component 2: Development of Ecological Infrastructure in Inland Area, which will all together achieve over 4,000 ha of weed removal. Their treatment areas are in the lion landscape including

corridors of migration and sloth bear landscape. If need be, outside of these landscapes may also be considered for project intervention.

The weed removal may be done manually or by machineries. Depending on the field condition, the methods of removal shall be selected. The area so cleared of weeds would be rehabilitated with suitable vegetation using species preferred by flagship species and prey species. As the norm of GFD, the work may be outsourced. However, in case workers are required for the work, the local community members are given priority.

(2) SC-3.2.2 Follow up of Weed Removal of Subsequent Year

The weeds removed areas require proper maintenance and follow up removal in the following year, otherwise, the area may be subject to infestation. Thus, GFD shall work together with JFMC/ EDC or outsourced agency to undertake the work.

(3) SC-3.2.3 Groves of Preferred Species as Habitat

Small niche habitats in the form of groves of preferred species along the corridors of animal migration will help reduce HWC during the course of migration. Accordingly, 1,600 ha of groves will be created in both the lion and sloth bear landscape. This will be mainly in and along migratory corridors in the landscape region of lion and sloth bear. The areas covered would be in Junagadh, Gir East, Shetrunji, Bhavnagar, Banaskantha, Sabarkantha, Dahod, Panchmahal and Chotaudepur divisions.

The species for groves would be guided by preference of the animals and its prey. Trees that provide shade may be preferred in lion habitat. Suitable mix of fruit bearing, and forage species will also be included to favour ungulates. In sloth bearing habitat preference will be for fruit bearing plant species. The technical details and unit rates will be as per the degraded land afforestation model. However, species preference will be guided by the requirement of flagship animal species and its prey base. An indicative list of species for groves to be raised is given in Table 8.25.

Table 8.25 Indicative List of Species for Plantation in Groves

S.no.	Botanic name	Local name
	Trees	
1	*Zizyphus spp.*	Bor
2	*Syzygium cumini*	Jamun
3	*Diospyros melanoxylon*	Tendu
4	*Carissa carandas*	Karamda
5	*Butea monosperma*	Khakhra, Dhak
6	*Ficus glomerata*	Umaro
7	*Phyllanthus embelica*	Amla
8	*Tamarindus indica*	Ambli
9	*Mitragyna parviflora*	Kalam
10	*Ficus benghalensis*	Vad
11	*Acacia nilotica*	Baval
12	*Anogoises latifolia*	Dhavdo
	Grasses	
1	*Dichanthium annulatum*	Jinjavo
2	*Sehima sulcatum*	Shaniyar

S.no.	Botanic name	Local name
3	*Iseilema prostatum*	Moshti
4	*Apluda mutica*	Bhangoru
5	*Themeda cymbaria*	Ratad
3	*Iseilema prostatum*	Moshti
4	*Apluda mutica*	Bhangoru
5	*Themeda cymbaria*	Ratad

Source: JICA Survey Team (2019) compiled from information provided by GFD.

(4) SC-3.2.4 Soil Moisture Conservation

The process of degradation often accompanies soil degradation/loss and lack of ability of the ecosystem to retain moisture. Success of afforestation/regeneration and restoration of ecosystem depends on soil moisture conservation measures in such a situation. To reverse the cycle of degradation input of soil moisture conservation measures is essential. It not only helps establishment of seedlings planted but also helps re-establish the ecological processes promoting natural regeneration of species of the area. Thus entire ecological upgradation process is hastened.

The types of Soil Moisture Conservation Measures (SMC) would vary depending on the site condition. PMU shall provide the site selection criteria for the concerned DMUs to identify the priority areas and appropriate SMC works to be undertaken. PMC will assist PMU in preparation of the site identification procedures and criteria. The work may be outsourced as per the norm of GFD. However, in the case, the worker is required for the activity, local community members shall be given priority to take part.

(5) SC-3.2.5 Promotion of Orchard for Corridor Enrichment

Migratory corridors are essential components of wildlife habitat. Often these corridors are along Nallahs or rivers. The corridor regions are less attended and negatively affected by mining, encroachments for habitation and cultivation. There is a need to provide safe environment in such corridors with minimal disturbance.

One way is to promote orchards in the corridor region. This may facilitate the safe movement of animals. The farmers be preferably covered under component of Reforestation of Degraded Farm Land being implemented by the social forestry wing of the GFD. The ongoing scheme of GFD provides for seedlings, cost of planting and tending an incentive of INR 4,000 per ha for each of the first three years of plantation if the survival rate is greater than 50% for three year. Additionally this project will provide superior quality orchard species seedlings to the farmers desirous of planting the fruit species. Other benefits of the ongoing scheme of the GFD shall continue to be extended to the farmers with land in and along the migratory corridors of the animals. Planting of seedlings of superior quality orchard species be subsidized at a rate of INR 50 per seedling for a maximum of 200 seedling per farmer.

In selecting the farmers, PMU shall provide the selection criteria of participating farmers. PMC may assist PMU in finalising the criteria. Farmers who are already part of other similar intervention may not be eligible for this project intervention. The participating farmers list shall be prepared, and monitoring will be undertaken. The concerned DMU will discuss with the social forestry wing to identify the potential intervention areas and participating farmers.

(6) SC-3.2.6 Development of Water Point Facilities for Wild Animal

Water availability in summer months derives population concentration and movement of animals during summer months. Water points are scarce during summer and often animals move towards human habitation in search of water. GFD has a network of water points in Gir that are effectively managed with variety of methods for filling them. The methods include windmill, solar pumps, and manual filling using tractors/trucks, digging water holes in bed of rivers, manual filling from wells. There are over 400 water points that are operated at peak summer in the Gir PA region that is spread over 1,470.09 sq. km. It amounts to about one water point per 3.5 sq. km. Effectively water is available within 3 km from all areas in habitat. It is found satisfactory and effective in providing enough water to animals. Similar network of water points needs be developed in other parts of lion landscape and other habitat regions of wild animals.

Seeing the effective water supply network system in Gir PA, the Project will attempt to develop the similar network by creating new facilities and reinforcing the existing ones. Under this component three types of water point facilities will be established.

a. SC-3.2.6 (1): Windmill/ Solar Pump Driven Guzler

b. SC-3.2.6 (2): Manually Filled Water Points

c. SC-3.2.6 (3): Additional Hand Pump for Manually Filled Water Points

Location of water points and method of operating them needs to be carefully planned by PMU using habitat mapping and GIS to strategically locate the water points providing required cover to entire habitat with a view to make their operation with reasonable efforts possible. PMC shall provide the necessary technical support. The actual civil works and procurement of goods shall be undertaken by the concerned DMU as per the norm of GFD. In case, the workers are to be engaged for civil works, the local community members are given priority.

8.4.3 SC-3.3 Protection

(1) SC-3.3.1 Fireline

Forest fires adversely impact the habitat. Small animals and insects are often lost to fire. It retards growth of trees. Bushes and under storey get destroyed in fire. In some areas fire may promote grass development. But then it has to be controlled fire. GFD has been taking effective measures for fire control in Gir PA network. There is need to strengthen fire protection in sloth bear PA areas. Network of fire lines created at the onset of fire season and maintained through the season is provided for fire control.

Along the main roads on both sides there will be 15 m wide fire lines. Along footpaths and kutcha roads 8 m wide fire lines will be created. The project shall also provide for procurement of equipment for fire protection.

(2) SC-3.3.2 Establishment of Breeding Centre

Lack of prey base in the habitat region, infirmity of individual animal derives them towards human habitation where easy prey is available. Forests of Gujarat other than lion landscape have scarce prey base. Thus, the population of certain animal species require an attention for breeding. The Jambughoda wild life sanctuary management plan provides for establishing breeding centres for Spotted deer, four horned antelope, Grey Jungle fowl and Indian hare and the Project will provide

inputs to support the on-going intervention of GFD to enhance the breeding capacity. The activities include the construction of the facilities and thus, the work shall be outsourced. In case, the workers are required, the local community members shall be given priority to take part.
Three breeding centres will be established in Bhavnagar/Shetrunji, Panchmahal, Dahod and Vijaynagar in Sabarkantha.

a. SC-3.3.2 (1) Ungulate Centre

b. SC-3.3.2 (2) Hare Centre

c. SC-3.3.2 (3) Red Jungle Fowl Centre

The work shall be outsourced as per the norm of GFD. In case the workers are required, the local community members shall be given priority.

Sites will be selected close to the forest areas. It should be a good forest area of significant size. Animal bred at the centers will be released in the forests associated with the centre or similar areas nearby. It will provide for in-situ breeding/species conservation. Water availability or possibility of sourcing water has to be ensured at the site. Segregated prey base development centers for each species may be developed in a campus to save on water source, establishment, common facilities needed and supervision effort.

A model breeding centre for ungulate and hare require two-hectare area with leopard proof fencing. It may have compartments for segregation of animals during infighting and weaning of young ones as they grow. Separate facility for segregating sick animals and treatment would be required. Veterinary services may be provided part time initially. Requirement may increase as population builds overtime. Effort should be to allow minimal human interface but not to allow for imprinting of brain of animals. Detailed plan estimates will be prepared after selection of site as per site conditions.

Each site would need a bore well with pump room. There will be a beat guard in-charge for each of the campuses. Veterinary services will be availed on part time basis. Three animal keepers are required for each of the campuses. GFD shall be responsible for the Operation and Maintenance of these centres.

8.4.4 SC-3.4 Awareness Program

Conservation awareness has contributed to wildlife conservation in a major way. Gujarat has a major nature education program. Nature education and associated awareness activities are found to have significant positive impact on conservation efforts. The focal areas of this awareness program include the following.

- Educating communities regards importance of ecology and role of its various components including wild animals.
- Positives of PA and its ecological benefits to the local region.
- Animal behaviour
- Need and importance of corridors

(1) <u>SC-3.4.1 Nature Education</u>

GFD has been pursuing Nature education program for over three decades. About 1000 Nature Education camps are organized annually. About 50 participants attend each of these programs. Many

of the camps are organized for students but also camps are conducted for various interest groups. It would need adding of additional Nature camps targeted at HWC landscapes being addressed in the project.

a. SC-3.4.1 (1) Preparation of Modules

There is need to make modules that provide for varying interests and objectives. Site-specific modules need be developed to address landscape specific or animal specific inputs needed in the nature education camps. The development of modules shall be outsourced to a resource organization. The ToR for the resource organization shall be drafted by PMU/ PMC. The procurement process may be assisted by PMC.

b. SC-3.4.1 (2) Training of Trainers (ToT)

Based on the newly developed training modules, training of trainers shall be organised for the concerned staff of GFD. The ToT shall also be carried out by the same agency that develop the modules for nature education under SC-3.4.1 (1).

c. SC-3.4.1 (3) Nature Education Camps

The GFD staff trained under SC-3.4.1 (2) will carry out the Nature Education Camps in lion and sloth bear landscapes in northern and central Gujarat and crocodile landscape. The intended participants may include students and also various interest groups.

(2) SC-3.4.2 Distance Learning (Software)

Modules for distance learning will be developed in the field of nature education both for local communities and also for promoting nature education as a discipline. To begin with web-based modules for distance learning may be pursued that may over time develop into series that may lead to a certificate program. GEER foundation is running an ongoing radio program Haryalu Gujarat and is nodal agency for Green Corps program of Government of India in Gujarat. Thus, GEER Foundation may be suggested to take up this activity. In such case, MOU shall be exchanged between PMU and GEER foundation. The program may include:

a. General modules on ecology and environment
b. PA specific modules containing information on flora, fauna and on ecology of the area. It may contain the details of ecological services obtained from the PA/forest area and wherever possible its valuation.
c. Animal related module especially for the conflict species. It may also include modules for species of interest, i.e., rare and endangered species and progressively generate interest and include lessor known species of flora and fauna with high ecological significance.

This may start as a certificate program that may evolve over period of time to a diploma/degree program.

(3) SC-3.4.3 Van Chetna Kendras (Software)

GFD has established number of VCK including twelve under IFDP and GFDP II. Infrastructure is available at VCKs, but software part is missing. Under this component, audio-visual equipment will be procured for the existing Van Chetna Kendras and modules for extension services at VCKs shall be developed.

The modules will be adopted by VCKs for their use along with some modules developed under SC-3.4.2: Distance Learning. It may also include procurement of films of wildlife interest to diversity the educational materials. Furthermore, the capacity of the GFD staffs in VCKs needs to be enhanced. And thus, ToT will also be carried out using the developed modules and procured educational materials. The development of modules and ToT will be outsourced. The ToR shall be drafted by PMU/ PMC. The work of the contracted agency will be monitored by PMU/ PMC.

(4) SC-3.4.4 Promote Partnership of NGOs and Volunteers

NGOs and volunteers play multiple roles in addressing HWC and promoting conservation ethos in communities and civil society. Project identifies NGOs and volunteers as partners in rescue and relief and for extension services. In addition, to acknowledge their contribution to the wildlife conservation and further to motivate them to take part in the wildlife related activities, the project will set up a small grant scheme and awards for NGOs, volunteers and community members.

(5) SC-3.4.5 Eco-clubs

Eco-clubs promoted in schools in the lion PA network region have contributed to raise awareness in the region. Participating students with information and heightened inquisitiveness create an environment for absorption of education inputs provided through various means. Three hundred nature clubs were promoted in Gir PA network region. During consultation at Sasan also positive input on eco-clubs was received. The activities of eco club include lectures by experts, film shows/sharing of information and school level activities of essay writing and debating etc. Since Eco-club-based nature education activities are one of the core programs of GEER Foundation and thus, this sub-component will be undertaken by GEER Foundations. MOU shall be exchanged between PMU and GEER Foundation.

(6) SC-3.4.6 Botanical Gardens

There is a need to raise awareness for wide variety flora that occurs in Gujarat and also elsewhere, whereas the zoos are found in major cities in Gujarat. Thus, tow botanic parks will be developed with multiple objectives.

- Raise awareness towards large variety of flora that exists.
- Promotion of scientific understanding for range of floral variations.
- Provide local students opportunity for scientific learning.
- Contribute to ex-situ conservation.
- Opportunity for eco-tourism.

These two botanical gardens shall be placed strategically to attract the visitors. One could be located at Gujarat's northern end of the Delhi-Mumbai Economic corridor at the border to Rajasthan near Ambaji. The second could be east of Ahmedabad-Surat axis. The Botanic Gardens shall be developed over 5 ha area with possibility of expansion. During the preparatory phase of the project, a feasibility study may be undertaken by the project engaging a team of consultants and assess the possibility of the project formulation in PPP mode. ToR for the feasibility study shall be developed by PMC during the preparatory phase of the project.

8.4.5 SC-3.5 Wildlife Rescue

(1) SC-3.5.1 Development of Rescue Centre

HWC incidents due to carnivore especially when there is injury or fatality require immediate response

from GFD. In many cases there is need to rescue the animal that has moved too close to habitation. The animal may have moved in close vicinity of human habitation due to variety of reasons.

- It may be in search of territory for itself.
- It may be wandering in search of food or water.
- It may be in poor health.
- Animal may be old and infirm unable to hunt in forest looking for easy prey.
- There could be accidental encounter in the course of migration. or
- Disturbance in natural habitat of animals that may have caused it to leave its natural habitat.
- There are also instances of animal falling in well or ditch.
- It may have got trapped in a situation from where it is unable to relieve itself.

Any delay in responding to such calls or repeat of incident attracts ire of local communities. It leads to negative sentiment for wildlife conservation and negates all the efforts made to enlist the participation of communities in wildlife conservation. It requires expert team to assess the situation and arrange for its rescue. Suitable cages and equipment's are needed to capture it safely and move away from site of conflict. Equipment needed may include tranquilizing gun, animal handling equipment, e.g., rods, ropes, nets, ladders, cages, etc.

Since the Rescue centers receive animals involved in HWC, sick animals and orphaned animals. While requirement of each species is different, veterinary principles of management are common. The essentials of a modern rescue centre include following.

- Reception area where animal arrive and vehicle with animal are parked.
- Administrative building.
- Transport facility and parking areas for vehicles small and large. Large vehicles would include vehicles transporting animals in cages. Smaller vehicles may be for transport of food and supplies for the centre.
- Veterinary block - This would include diagnoses room/area, Operation theatre, store, etc.
- Laboratory for sample processing.
- Enclosures for holding animals. Enclosure designs and size will vary with species. Central Zoo Authority (CZA) has laid standards for enclosures for various species.
- Quarantine area – At times it is desired that new arrival is quarantined pending diagnosis and sometimes after that too if there is such a need for animals with infectious diseases.
- It will also need stores and processing area for food for animals.
- Post-mortem room and cremation area.
- Equipment and supplies are essential need for operating rescue centre. These may include cages, tranquilizing guns, diagnostic equipment's, lab equipment and many more.

Under this component, existing rescue centres will be upgraded to full capacity. The potential sites are given in the table below. The work will involve the procurement of the construction services and goods. Thus, the tender documents will be prepared by PMU for procurement. The work shall be supervised by the concerned DMU. PMC may provide technical inputs in site identification, design of the structure, and listing of the necessary equipment and designing the function/ operation of the centre.

Table 8.26 Potential Sites for Development of Rescue Centre

Location	Remarks
Pavagadh	Presently few enclosures have been constructed at Pavagadh. This centre may be upgraded with addition of infrastructure needed.
Khodamba	Inadequate facilities to respond to the incident
Vadodra Sub-Centre	The facility at Vadodara will be limited to crocodile, snakes and birds and may be small herbivore like monkey.

Source: JICA Survey Team (2019).

(2) SC-3.5.2 Quick Response Centre

a. *SC-3.5.2 (1) Development of Quick Response Centre*

Quick Response Centre will respond to call from site of HWC. Each centre will be equipped with appropriate wildlife cage, tranquilizer gun and medicine, vehicle for transporting cages and animal, first aid material for both human and animal needs, wildlife handling equipment as appropriate for the species that usually cause conflict in the region. A team consisting of a Forester and a tracker will manage the centre and additional staff may be augmented in times of emergency from local range unit. Six quick response centers will be established in the project. These centers will be located at as below.

- Vansda
- Khodamba, district Surat where the second major rescue centre is provided.
- Chotaudepur
- Suitably located in Baria division
- Suitably stationed in Banaskantha division
- Vadodara

PMU will prepare the tender document for procurement of goods and construction services. PMC may assist PMU in designing the structure, listing of the required equipment, functioning of quick response centre. Once the construction works are completed, GFD will be responsible for the Operation and Maintenance of the centres established.

b. *SC-3.5.2 (2) Trucks for Quick Response Centre*

To facilitate the prompt response to the incident, the project will procure the trucks for the quick response centre. The procurement of the trucks shall be handled by PMU. Once the trucks are procured, GFD shall be responsible for the Operation and Maintenance of the vehicles.

(3) SC-3.5.3 Capacity Building for Rescue Centre

The staff at the field units and also other staff in the region of conflict need be trained in handling HWC. The training will include animal behaviour, methods of rescuing the animals, handling of rescued animals, site management, crowd management, etc. Some staffs need to be trained in tranquilization. The following three types of the trainings will be conducted for the staff of the rescue centres. The Communication unit in TRC wing of GFD will conduct the training program. Expertise is available with GFD. During the preparatory phase of the project, training needs assessment shall be undertaken by PMU/ PMC/ GFD TRC wing and jointly draw the training modules. The training reports shall be prepared by GFD and submitted to PMU. The training progress shall be monitored by the project MIS and training outcome shall be assessed during the terminal evaluation.

Table 8.27 Training Planned for Rescue Centre Staff

Types of Training	Remarks
SC-3.7.3 (1): Training of Trackers	Trackers would need intensive on the job training in lion landscape area where there are experienced trackers working. It is therefore desired that tracker trainees be attached for a period of three months with experienced expert tracker team in lion landscape.
SC-3.7.3 (2): Training in Immobilisation of Animals	Some part of the above training will be carried out in the field. Crocodile related trainings might be best organized at Vadodara.
SC-3.7.3 (3): Training of Staff in Animal Rescue	

Source: JICA Survey Team (2019)

8.4.6 SC-3.6 Eco-Tourism Promotion

The diversity of landscapes and biodiversity available in nature/forests of Gujarat presents opportunity for promoting eco-tourism. GFD has been promoting eco-tourism for over a decade. Government of Gujarat formulated its first eco-tourism policy in 2007. Some infrastructure has been created under different program including the GFD II at few places.

Eco-tourism Development Society (ETDS) - Government of Gujarat has issued detailed instructions for constitution of Eco-tourism Development Society (ETDS) and formation of Eco-tourism Development Committees by them. The Government resolution dated October 13, 2008 details the process, sharing of responsibilities and sharing of proceeds of ecotourism. Eco-tourism Development Society is to be formed at village level, which shall have minimum of 80% of the families as members. The village level ETDS is to be registered as society under The Society Registration Act 1961. The resolution provides for formation of Eco-tourism Development Committee (ETDC) by the ETDS. ETDC is responsible for organizing eco-tourism in the area including providing hospitality and guide services and for day-to-day management of the eco-tourism infrastructure. The resolution also provides for Divisional Eco-tourism Committee at district/division level under the leadership of Dy. Conservator of Forest of the division. All the Chair Persons and Secretary of the ETDS of the division shall be member of the Divisional Eco-tourism Committee. The divisional committee shall fix the fee/charges for catering services, guide charges, parking fee etc for the eco-tourism site.

The revenue proceeds form eco-tourism is to be shared as below.

Table 8.28 Sharing Arrangement for Eco-Tourism Venue

Source of revenue	Divisional eco-tourism committee	ETDC
Stay facility	50%	50%
Catering	10%	90%
Sale of souvenir/ memorabilia	10%	90%
Guide charges	0%	100%
Entry fee	50%	50%

Source: Government of Gujarat resolution no.VPS-1180/692/W dated 13 October 2008.

The present provisions do not provide for linkage between EDCs and ETDS. However, it may be desirable to coordinate the efforts with EDC or JFMC wherever they are available. It is suggested that Government of Gujarat may consider providing that where EDC exists it may perform the role of ETDS by bringing necessary amendments to relevant resolution. This will reduce duplication of community organizations in villages.

GFD has developed three eco-tourism sites during GFDP II, viz., Iqbalgarh, Shoolpaneshwar, Kilad. Other sites developed by the GFD where eco-tourism is a success are Polo in Sabarkantha, Bhindol in Ratanmahal, Dahod, Dhanpuri Jambughoda wildlife sanctuary. Padam Dungri Vyara forest division, Work has been done to develop some other sites too. The overview of the existing sites is given in Annexure 8.5-a.

(1) SC-3.6.1 Identification of the Sites and Feasibility Assessment of Potential Sites

During the preparatory phase of the project, PMU shall engage a Resource Organization to undertake a scoping and feasibility study of the eco-tourism site development and identify the sites for investment. During the scoping and feasibility study, various PPP mode of construction- operation-maintenance model shall also be considered for their applicability. PMC will assist PMU in procurement of the consultants and supervision of the survey progress. Based on the results of the feasibility assessment, PMU shall identify the potential sites. Preliminary list of potential sites is as under.

Table 8.29 Potential Eco Tourism Development Sites

	Sites for New Development		**Existing Sites for Further Development**	
	Site	District/division		
Lion Landscape				
1	Ambardi	Amreli	Kaj nanavada wet land	Gir Somnath
2	Shetrunji division	Bhavnagar		
Sloth bear landscape				
3	Balaram	Banaskantha	Bindol	Dahod
4	Kevdi	Chotaudepur	Dhanpari	Panchmahal
5	Sukhi dam site	Chotaudepur	Polo	Sabarkantha

Source: JICA Survey Team (2019)

The indicative scope of the feasibility study includes the following survey items:

- Site suitability and sustainability
- Infrastructure requirement (accommodation, barracks, kitchen, lounge, reception, sourveniour shop, interpretation centre, nature trail, parking, etc.)
- Modalities for management
- Marketing arrangement for the site
- Suggest linkages and ways to operate the market linkages
- General and special training needs.
- Ways to initiate local community and arrangement for handholding the eco-tourism marketing and management to the ETDC.

(2) SC-3.6.2 Consensus Building and Formation/ Re organization of Eco Tourism Development Committee (ETDC)

Once the scoping and feasibility study is completed, PMU shall list the eco-tourism sites for consensus building. The concerned RMU/ DMU will contact the concerned local stakeholders to organise a meeting to explain the objectives of the project and propose the development of eco development site. Roles and responsibilities of the stakeholders must also be clarified and agreed upon at this stage. In case, ETDC is already organised in the locality, they must be the primary stakeholder in the developmental process. In case, the consensus cannot be obtained from the local

community, the project shall initiate the community consultation in another short-listed sites.

Once the consensus is established among the local stakeholders, the RMU shall assist the local community to organise ETDC, if no such organization existed or re-organise one if it has been dormant. ETDC will need to pass a resolution to take part in the project assisted eco-tourism activities and sign an MOU with PMU for undertaking the eco-tourism activities supported by the project.

(3) SC-3.6.3 Preparation of Eco Tourism Development Plan

Eco Tourism Development Plan is to be prepared by ETDC. The plan will include 1) site specific developmental activities (other than major infrastructure development); 2) capacity development; 3) operation and management; 4) business development activities, 5) convergence and partnership, and etc. The planning procedure will be provided in the as per the guidelines prepared under Component 4.1: Preparation of Manuals and Guidelines (SC-4.1.7: Community Based Eco Tourism Development Manual including Operation Manual for Corpus Fund). RMU/ DMU will facilitate the preparation of the plan. Resource organization/ person may be engaged to facilitate the planning process. The plan shall be approved by the concerned ETDS, DMU, CCSU and PMU.

(4) SC-3.6.4 Implementation of Planned Activities

Once the plan is approved, ETDC will implement the activities as per the plan. The implementation process will be assisted by a resource organization engaged by the project. PMU or DMU will procure such resource organization. ToR for procurement will be drafted by PMC. Technical inputs will also be provided by PMC specialists to the ETDCs.

(5) SC-3.6.5 Technical Training (Hospitality, Guide, catering etc.)

The ETDC members will be trained to provide services required to operate and manage the eco-tourism sites. Reception, guide, hospitality, improved site experience, souvenir availability, education of tourists for dos don'ts etc. are variety of tourist and tourism promotion needs. During the preparatory phase of the project, training needs assessment will be undertaken by PMU/ PMC. Accordingly, the training programm will be drawn. Indicative contents of the training are given in the table below.

Table 8.30 Indicative Training Outline for ETDC Members

Training Course	Topics
Training of the Guide	a broad understanding of botany and zoology and interplay of ecological forces, general information on Gujarat and its biodiversity. Site specific training on flora and fauna of the region, seasonal patterns in flora and fauna, information on local and migratory species especially migratory birds, habits and behavior of animal of the area. It may include contents related to history of site and neighboring region.
Hospitality	behavioral needs for hospitality persons, cooking, cleanliness needs and hygiene, organization of rooms and common service areas, serving manners along with some inputs about the ecology and environment and site-specific history, flora and fauna, etc.

Source: JICA Survey Team (2019)

The training program for hospitality will be organized by one of the Hotel and Tourism management institutes. The institute will have to develop a special program for eco-tourism. In past such a program was conducted by the Vivekanand Institute Hotel and Tourism Management, Rajkot. Guide training will need inputs from subject matter experts. The concerned institute may need to co-opt expert in

botany, ecology, zoology and site-specific information. There are experts whom the institute may co-opt for organizing such training. Short guide training was imparted by the GFD at Nalsarovar in past. However, it may be desirable to involve an institution for a more structured training program.

(6) SC-3.6.6 Support for Eco Tourism Related Micro Enterprise

From each of ETDC, two SHGs will be identified for the enterprise development that is associated to the eco-tourism site. The technical support will be provided by GPLC.

(7) SC-3.6.7 Support for Promotion and Marketing

Destination marketing is critical in maintaining the constant flow of the visitors and to create awareness on responsible tourism. Thus, a strategic promotion and marketing plan will be prepared by PMU/ PMC. Accordingly, the work will be executed. Main activities will include: web-site development and taking part in exhibitions. This may also be done by establishing a partnership with the private travel agency that is promoting sustainable/ responsible tourism.

(8) SC-3.6.8 Capacity Building for ETDCs

a. *SC-3.6.8 (1) Staff Support (ETDC Management)*

Initial stage of take-off, ETDC will require managerial support. Thus, the project will engage a resource organization and to place managerial support. ToR of the resource organization to be engaged will be drafted by PMU/ PMC. Technical guidance will also be provided by PMC.

b. *SC-3.6.8 (2) ETDC Fund*

ETDCs will receive a lump sum amount fund to be utilised for the implementation of Eco Tourism Development Plan. Out of this fund, administrative expenses shall be met. Minimum amount of 70% will be kept as a corpus fund of the ETDC, which will become operational after the completion of the project support. The Operation Manual of the corpus fund will be prepared under component shall be Component 4.1: Preparation of Manuals and Guidelines (SC-4.1.7: Community Based Eco Tourism Development Manual including Operation Manual for Corpus Fund).

c. *SC-3.6.8 (3) Partnership Facilitation Fund*

The eco-tourism sites intend to work with the local hotel management institute and other entities to develop the capacity. The site promotes the local hotel management institute to send students for internship. Some design institute students may also be engaged for developing souvenirs. Such partnership may be undertaken on cost sharing basis with the institute. Thus, the fund is set aside for the partnership development especially for ETDCs. This fund is parked with the concerned DMU and will be released as per the Eco Tourism Development Plan. The operation manual shall be prepared by PMU/ PMC.

8.4.7 SC-3.7 Livelihood Enhancement for Areas Affected by Human Wildlife Conflicts

(1) SC-3.7.1 Promotion of Micro Enterprise for the Areas Affected by Human Wildlife Conflict

Two SHGs will be identified from each JFMC/ EDC to be supported by the project. This sub component is undertaken through convergence with GLPC as in SC-2.1.9 (1).

(2) SC-3.7.2 Community Based Revolving Fund for Micro Enterprise Promotion

Community Based Revolving Fund will be provided for JFMC/ EDC as outlined in SC-2.1.9 (2).

(3) SC-3.7.3 Cluster Based Enterprise and Value Chain Development

Cluster based enterprise will be promoted as outlined in SC-2.1.9 (3).

8.4.8 SC-3.8 Strengthening GEER Foundation

GEER foundation shall be charged with research coordination for the wildlife research under the project. GEER foundation shall provide technical support to RAC for coordination and monitoring of the entire research program of the project. To be able to provide required technical support to the entire program it needs to be equipped. A small cell consisting of one senior scientist is provided by the Project. The scientist may be engaged on contract by the PMU and attached to GEER foundation.

8.4.9 SC-3.9 Research Projects

Wildlife management is a dynamic subject. Research is needed for continued improvement and monitoring of impacts of interventions and population dynamics and host of issues related to habitat, its ecological health, animal behaviour and animal health and related aspects.

(1) SC-3.9.1 Establishment of Research Platform – Research Advisory Committee

A Research Advisory Committee (RAC) shall be set up with the Principal Chief Conservator of Forests, Wildlife (PCCF WL) and Chief Wildlife warden in chair for research priority setting. It may include two independent wild life experts of repute, the CCFs in charge of Gir lion landscape, CCF/CF North Gujarat circle, APCCF wildlife at headquarter, APCCF TRC, Director GEER Foundation, Director Leogen laboratory with the proposed scientist research Coordination as Member Secretary. RAC would include experts of repute from institutes like Wildlife Institute of India, SACON, BNHS, etc. The RAC may hold annual meeting to decide on research priority. Suggestions may be invited from wide section that include officers of forest department, wildlife experts, researchers, and research institutions. The RAC would also decide on agency for pursuing the research project. The National institutes, universities and such other institutions of repute may be awarded research project through a process of invitation. Such institutions may even be encouraged to develop proposal. The RAC may decide on projects that may be pursued by different agencies. This includes in-house projects to be pursued by GEER or GFRF. The RAC may, considering individual interest and expertise, encourage individual officers to participate or take up some of the research projects. Research projects identified with expertise of institute of repute and universities may be assigned through invitation. Other research projects included in priority list may be assigned through a process of tendering. The research projects to be assigned by invitation and through non-tender process shall be approved by the RAC after detailed examination for their costs also. The committee may hold additional meetings as per need for this purpose or appoint sub-committee or constitute group to review and report on specific projects.

(2) SC-3.9.2 Research Studies

Research priorities would be set in a consultative process as detailed in the above section. However, an indicative list of broad areas of research is described here. The outline of each research topic is provided in Annexure 8.5-b.

a. HWC studies:
b. Monitoring and disease surveillance:
c. Identification and promotion of corridors of movement:
d. Crop damage by herbivore:
e. Wild boar (Sus scrofa) related Studies:
f. Vulture related studies:
g. Population Habitat Viability Assessment (PHVA)/ Conservation Assessment and Management Plan (CAMP):
h. Study on Status of Crocodile and Human conflict
i. Human-Wild Ass (Equus hemionus khur) Conflicts in the Fringe Areas and ESZ area of Wild Ass Sanctuary:
j. Status of Barking Deer and Four-horned Antelope - an important prey base species for large carnivores in some PAs:
k. Documentation for Heritage site:
l. Impact of Grazing:
m. Improvement of animal rescue equipment:

(3) SC-3.9.3 Management of the Research Studies and Monitoring

The PMU may manage the research with technical support of GEER Foundation under supervision of RAC. All the research would be in form of research projects. The funds may be released as per details and progress of project. The technical cell at GEER would be responsible for providing inputs on day to day issues of research management to PMU.

The RAC headed by the PCCF WL tasked with research prioritization and project assignment shall also be responsible to review progress of research projects. The RAC may meet twice a year to review the progress of research projects. Team leaders/researchers may be asked to make presentation, if needed, on the progress of their projects. GEER Foundation may provide technical support to PMU for day-to-day management of the research program. Appropriate strengthening of GEER has been proposed to provide for technical support to PMU as under SC-3.10.

(4) SC-3.9.4 Suggested Research Organizations for Undertaking Research

Two research-based organizations associated with GFD as under are proposed to undertake the above research projects. In case, the research topic is better studied by other institutions, PMU shall outsource the research project. PMC may assist PMU in drawing the ToR in such cases.

Table 8.31 Capacity of the Research Organizations Suggested for the Research Activities

Research Organizations	Research Capacity
Gujarat Ecological Education and Research Foundation (GEER)	Habitat studies Biodiversity studies Mangrove research Coral related studies Climate change studies Carbon sequestration assessment studies Communication program National Green Corps program Nature education
	Participatory management studies The equipment's include scanning electron microscope, High Pressure Liquid Chromatograph, Gas

Research Organizations	Research Capacity
	Chromatograph, Atomic absorption Spectrometer, total organic carbon analyzer, etc. Established to pursue research into subjects related to genetics of lion. Initially the leo-gen lab was associated with Gujarat State Bio-technology Mission (GSBTM) for incubation.
Gujarat Forest Research Foundation (GFRF)	Though an autonomous body it is seen to be associated with the research, training and orientation wing of the GFD. It outsources research studies on variety of subjects. Research subjects are selected by GFRF in consultation with various wings of GFD.

Source: JICA Survey Team (2019)

8.5 Component 4 Institutional Strengthening

8.5.1 SC-4.1 Preparation of Manuals and Guidelines

To facilitate the effective and efficient project implementation, manuals and guidelines will be prepared by PMU/ PMC. IN case specialized input is required, PMU shall engage a resource organization. PMU will be assisted by PMC in drawing the ToR for the resource organization. PMC will also provide technical guidance for the resource organization and monitor the work progress. To be noted that the SC-4.1.1: Operation Manuals for PMU shall be prepared immediately after the registration of PMU as an autonomous society. Other manuals can be prepared as per the implementation schedule. The list of manuals and guidelines are hereunder.

Table 8.32 Indicative List of Manuals and Guidelines to be Prepared by the Project

Sub-Component ID	Subject Area
SC-4.1.1	Operation Manuals for PMU
SC-4.1.2	Guidelines on Entry Point Activities
SC-4.1.3	Handbook for Community Facilitators
SC-4.1.4	Micro Planning and implementation Manual including formats for each ecosystem
SC-4.1.5	Community Organization Management Manual for JFMC/ EDC/ EDTC
SC-4.1.6	Community Revolving Fund for JFMC/ EDC
SC-4.1.7	Community Based Eco-Tourism Development Manual including Operation Manual for ETDC Fund
SC-4.1.8	Operation Manual for Cluster Development Fund
SC-4.1.9	Manual for Green CSR/ Partnership (Draft Manual – Annexure 8.6)
SC-4.1.10	Micro Enterprise Development and Cluster Development

Source: JICA Survey Team (2019)

8.5.2 SC-4.2 Capacity Development

Rationale and Objectives

GFD currently has more than one-third vacancy against the sanctioned strength across all positions. Thus, for project implementation the institutional arrangement relies more on hiring professionals and support staff from open market and considering minimum officers/ staff to be made available on deputation. Thus, a challenge is getting created for the project management to acquire right skills and experience at different level of project operation, and to build their capacities for efficient and

effective implementation of the project processes. Prior to that it will also be important to make a quick assessment of the training needs with all stakeholders upon developing sound understanding on the envisaged project processes. There is also scope for strengthening M&E capacities across all key stakeholders, especially for non-forestry activities. There is also a necessity to introduce/create forums for experience-sharing, learning and reflection, which can be beneficial in building capacities as well as making project operations more efficient.

Since, the fund flow arrangements under the society for project operation will be different from the procedures being followed in other JICA assisted forestry-sector projects, there will be urgency and utmost requirement to orient and train all the key staff within GFD, and those being hired from open market to fully understand the project account keeping for a society including registering with tax authorities, seeking tax exemptions and timely filing of tax returns. In addition, PMU also need to submit statement of expenditures (SoEs) for reimbursements of eligible expenditure from JICA.

Outsourcing will be one of the key methods for implementing project activities, and thus there will be continuous scope for contract management, viz., preparing specifications, preparing tender/ bidding documents, advertising tender/ RfP notice, floating requests for proposals, screening and evaluating proposals, award of contact/ work order, and monitoring deliverables and contract etc. Thus, procurement will be one of the key areas where capacities of the PMU and supporting offices needs to be strengthened.

Utilization of reserved as well as non-reserved grasslands for supporting livestock population, and in turn the dairy industry, require establishing sustainable management and good grazing/ grass extraction practices including adequate tenure rights and funds. Thus, capacities of key stakeholders and the community institutions needs to be strengthened for taking-up management responsibilities both of grasslands and institutions, grass resource sharing arrangements, agreements with migrant pastoral community for livestock grazing, funding arrangement, grass-based enterprises, etc.

Strengthening the mitigation of human wildlife conflicts by improving the ecological integrity of the habitat, enhancing the local community participation and by provisioning tangible socio-economic benefits with be one of the focus areas of the project. Thus, there is need for inter-sector integration for ecologically compatible development in the vicinity of wildlife PAs. However, there is an absence of mechanism to coordinate the work of different agencies. Thus, training needs to be well identified for human-wildlife conflict mitigation and associate activities, and sufficient capacities needs to be built for all key stakeholders.

The local communities depend on numerous wetlands across the state. Thus, capacities need to strengthen for preparing wetland management plan with community consultations, and more importantly for non-protected natural wetlands. Key stakeholders including community institutions need to be oriented and trained for protection, conservation and sustainable management of wetland ecosystem. There is an overall need for enhancing capacities of the GFD and associate stakeholders on coastal management.

The project will be working with community institutions like JFMCs, EDCs, ETDCs, and there are studies that suggest that capacities of such community institutions needs to be built for managing and sustaining operations and intuitions beyond the project life. This still remain as challenge as, and success of this project will depend on how well such institutions are capacitated for post project operation and maintenance. Relatively less local employment opportunities in forest areas, lead to seasonal migration. Thus, skill enhancement for taking up livelihoods with support from the project with also be one of the key interventions are for capacity development. Capacities for implementing Environment and Social safeguards protocols also needs to be identified and enhanced for efficient project management.

Thus, for institutional capacity development of the key stakeholders including GFD, a combination of learning and training methods and approaches will be adopted. The learning opportunities for the project staff will include orientations, training, workshops, exposure visits (national and overseas) etc. Knowledge material in form of guidelines, manuals and standard operating procedures will also be developed and disseminated. In addition, there will be continuous handholding/ field support and guidance by PMC experts and resource organization/ NGOs etc.

(1) SC-4.2.1 Training Needs Assessment (TNA)

Since, the project will introduce several intrinsic and technical/ scientific processes, thus at first place, rapid Training Need Assessment (TNA) exercise will need to be undertaken by PMU across all key stakeholder categories. Based on the findings of the TNA comprehensive Capacity Development Strategy (CDS) document will be prepared in time-scale of four years starting 2020. The PMU could develop this plan with support from PMC or by engaging some experienced and credible Resource Person/ Organization, in case PMC is not in place during first year/ preparatory phase.

(2) SC-4.2.2 Development of Capacity Development Strategy

Based on the Training Needs Assessment (TNA) foremost step will be to develop a comprehensive capacity development strategy document to help PMU for systematically developing capacities and skills of the project stakeholders, and this should lead for achieving the project results in a defined timeframe. The capacity development strategy (CDS) will provide road map for organizing trainings and associate interventions for all identified target groups on all important elements of the project components and processes in batches during initial 2-3 years of the project implementation. As required, the CDS document can be updated in fourth year or mid-term (whichever is earlier) of project operation. The CDS document could be approved by Executive Committee/GB and shared with JICA for information.

(3) SC-4.2.3 Preparation of Annual Training Calendar

Considering the CDS document, PMU should work on prepare Annual Training Calendar will be and get it approved as part of the Annual Plan of Operation (APO). Accordingly, budget allocations for the annual training calendar will be made by PMU. The topics of the training identified in the CDS document should be followed to the extent possible.

It is clarified that the CDS document should not act as deterrent to modify or change the training topics as per the emerging needs identified through various feedback, assessment reports, annual workshops etc. To keep track of the modifications being made in the training calendar, as a system of approvals for deviation from competent authority could be introduced. Such deviations/ change, if any, in topics of training should also get reflected in the Quarterly and Annual Reports.

The training modules designed for the target groups should be simple to comprehend at various level of operations and should be designed within the scope of the unit rate estimates. Option of annual price escalations can be applied on the unit rates, if desired. This plan will cater both for the national as well as the overseas capacity building initiative.

(4) SC-4.2.4 Training

Below is the brief description of some of the key activities to be included while preparing the annual training calendar. PMU will institute a system to seek feedbacks from trainees. A feedback form will be designed and provided by PMU. It will be expected from the participants to submit feedback as

well as prepare a brief report after training. Such feedback and learnings will be stored as knowledge document and will be utilized for future training.

a. *SC-4.2.4 (1) Orientations*

As the project rolls out, the project staff at all level of operations need to get acquainted with the project design and processes including the project objectives/ log-frame, processes and participatory approach for project implementation, M&E requirement and methods (MIS/ GIS), operation manual, guidelines and hand-books etc. Thus, series of orientations needs to be organized at all levels of project operations, viz., PMU, CCSUs, DMUs and RMUs, for all stakeholders during first-six months of the project initiation. Resource organizations or in-house as well as outside expertise can be utilized for the purpose. The PMC after its induction need to be involved in this process.

b. *SC-4.2.4 (2) Training*

Following the annual training calendar, the PMU will execute the plan for systematically capacitating the stakeholders. Qualified training institutions / resource organizations could be contacted for tailored trainings or for conducting regular courses. PMU will ensure uniformity in training content quality and information dissemination, and will facilitate in designing modules, training content, identification of resource persons and study material.

As a strategy, short duration trainings at local level (in-situ) could be planned more intensely to minimize long absence of staff from field and home. The scheduling of the trainings could be done adjusting with the priorities and implementation pace of the project.

To provide flexibility in identification of training topics and well as resources by PMU, areas of capacity development as examples are being proposed rather prescribing specific training topics and resources. Around these training areas topics must be identified in line along with the TNA exercise. The priority areas on which the key stakeholders could be trained are summarized in the table below. The training will be imparted for PMU/ CCSU/ DMU/ RMU.

Table 8.33 Suggested Areas of Training and Indicative Topics

Areas of training	Sample Topics
a) Managerial/ Skill Improvement	Project management; documentation/ writing reports including case studies; resolving group conflicts and communications skills; participatory tools and forest management Financial Management in externally aided projects; Double-accounting system and project accounting; internal audits, procurement and contract management
b) Technical/ Engineering	**Current Acts and Rules in forestry sector including protected areas, forest degradation and mitigation measures, habitat and wildlife management, nursery raising, indigenous species and management, wetlands and grassland management and preparation of plan, integrated watershed management, soil and water conservation methods etc.** **Designing and estimation of engineering/ SMC structures, forestry models etc.** **Ecotourism product development, hospitality, kitchen management, preparing and serving food, first aid, and guide training**
c) M&E/ MIS, GIS	Project Evaluation and data analysis using statistical tools and techniques; MRV based monitoring, Drone-based mapping and monitoring, Participatory tools and Community self-monitoring, Social Audits; Microplanning and preparing annual plan; MIS software utilities, Remote sensing and GIS application and spatial analysis

Source: JICA Survey Team (2019)

c. *SC-4.2.4 (3) Refresher Trainings for PMU/ CCSU/ DMU/ RMU*

Refresher training provides an opportunity to address new needs as well as refresh the project processes and learnings for the existing staff after working for some time in the project. If required, refresher training can also be planned and conducted after three years for project operation.

(5) SC-4.2.5 Overseas Study Tour for PMU/ DMU

Identification of participants for Overseas Study Tour will be carefully and rationally done by the PMU considering the ACR / performance report as well as contributions made by an individual for project achievements. It must be ensured that the person nominated should have served the project for at least one year and will not be transferred for at least next 3 years after receiving overseas exposure-cum-training.

Overseas knowledge and learning report will be prepared on standard template and submitted by the participants soon after the overseas study tour. The experiences and observations documented by the participants will be compiled at PMU along with the photographs/ video clips, and will be utilized as knowledge document, that can be further utilized for training purposes and publications. The PMU will also organize debriefing workshop to exchange and share learnings and experiences with other key stakeholders.

(6) SC-4.2.6 Exposure visit - National/ Outside State

The exposures will be planned to study & observe good examples and innovations in other states that are financially assisted by JICA as well as to study successful models in projects supported by other donors. Such exposures to the states would provide opportunity to the forest department to interact and coordinate outside forest department and with other line departments as well.

Selection of participants will be coordinated by PMU and will ensure that equal opportunity is given across all batches and category of stakeholders. The project circles and divisions will encourage participants to share learnings and experiences with other key stakeholders during project events.
To document the learning and create institutional memory, a report will be prepared on standard template by the participants soon after the exposure visits. Such, documents could be further utilized for training purposes and publications.

(7) SC-4.2.7 National Workshop

In consultation with JICA, one-time national annual workshop will be organized by PMU during project implementation, inviting key stakeholders from JICA supported forestry-sector projects in India along with key Project Staff and representatives of State/ GoI, other externally-aided project, donor agencies, NGOs etc.

(8) SC-4.2.8 Capacity Building for People's Organizations

a. *SC-4.2.8 (1) Training*

Table 8.34 Indicative Training Outline for People's Organizations

Area of Training	Outline	Trainee
(1) Training for Community Facilitator	Outline of the project, roles and responsibility of the community facilitator and other stakeholders, , forestry related laws and regulations, micro plan/ eco-tourism development plan, record keeping, dos and don'ts while interacting with the community members	All Community Facilitators
(2) Micro Planning/ Eco Tourism Development Plan	Objectives of micro planning/ eco-tourism development plan; Entry Point Activities process of planning; planning for convergence; forms; methods of data collection; how to compile data; M&E methods and schedule; roles and responsibilities of executive members in planning and M&E	JFMC/ EDC/ ETDC
(3) Organizational Management	Record keeping (financial books and minutes books); managing community revolving funds/ ETDC funds; operating bank accounts	All Community Facilitators/ JFMC/ EDC/ ETDC

Source: JICA Survey Team (2019)

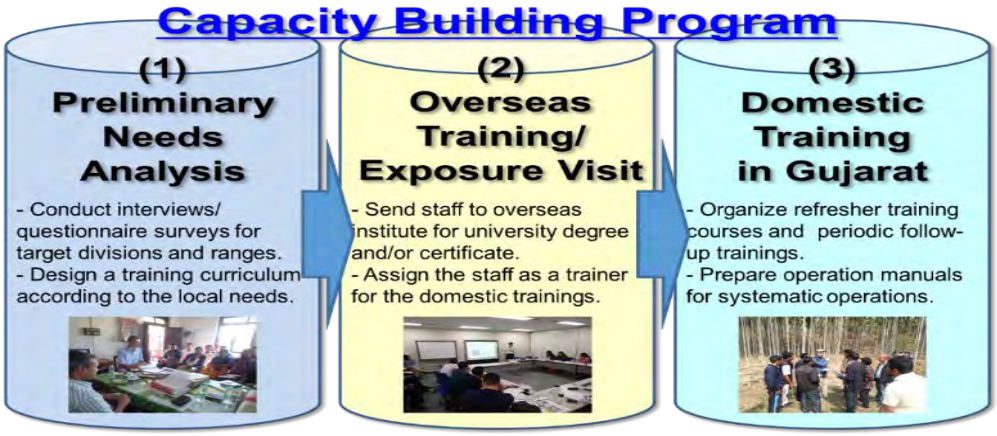
b. *SC-4.2.8(2) Exposure Visits for JFMC/ EDC/ ETDC*

Exposure visits outside of the states are planned for JFMC/ EDC/ ETDC members to learn from the successful community-based initiatives. Under this fund, visits for exhibitions and workshops will also be planned for networking and exposure.

8.5.3 SC-4.3 GIS Technical Upgradation Training including Overseas Study Tour

SC-4.3 GIS Technical Upgradation Training including Overseas Study Tour is as proposed in the section 6.3.1 of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

To efficiently improve the capacity of the GFD, consistent and comprehensive training programs need to be organized. In this regard, three major steps are described below (Figure 8.). To begin, in order to understand real needs at different sites, needs analyses will be conducted. Workshops will be also organized to explain the overall picture of the Project. Second, selected officers will be sent to overseas educational institutions to become trainers for other government staff members. Third, a systematic training program will be developed, and a series of training courses, led by the trainers just mentioned, will be provided to staff at the headquarters and local offices. The capacity development in the Project will primarily intend to improve not so much the GFD officers' specific operational skills for GIS analysis as their overall technical literacy and understanding about GIS. As a result of the capacity development activities, trained GFD officers will become able to validate deliverables from the Project, as well as establish a good technical communication with outsourcing companies and the PMC.



Source: JICA Survey Team (2019)

Figure 8.11 Image of Step-wise Training Program

(1) SC-4.3.1 Preliminary Needs Analysis

Although field staff members have received training for new devices, some of them found it difficult to use in their daily work and still tend to depend on conventional devices. For this, questionnaire surveys that target all ranges will be conducted to understand the current actual on-the-ground needs. The surveys will contain questions about the size of patrolling areas, distance, and frequency. This will make it possible to identify various local issues in different regions and persons, and appropriate training will be provided accordingly. Moreover, workshops will be organized in each division to share the overall picture of the Project.

(2) SC-4.3.2 Overseas Training/Exposure Visits

Prior to the domestic comprehensive and consistent training courses, overseas training or exposure visits will be organized. The purpose of having such an opportunity for the GFD is to give exposure to the latest technological and management interventions in GIS and MIS. During the implementation phase of the Project considering the preliminary needs analysis results, the PMC will determine the requirements and plan and organize the training/exposure visit accordingly. Participants in overseas training/exposure visits (e.g. young range officers with a good IT literacy) are expected to learn new technologies and practices, share their learning with the rest of the Project personnel and stakeholders upon their return as trainers, and put these into practice. Therefore, the participants should be selected from those who have been working for the Project on a full-time basis and have the willingness and commitment to remain at the position during the rest of the Project as trainers for the following domestic trainings in Gujarat.

a. *SC-4.3.2 (1) University Degree in Overseas Countries*

Tamil Nadu Forest Department (TNFD) can be a good model for overseas training for the Project. TNFD sent officers to the International Institute for Aerospace Survey & Earth Observation (ITC)[84] in the Netherlands for advanced technical training, and to national institutes such as NRSC, the Indian Institute of Remote Sensing (IIRS), and the Forest Survey of India (FSI). After the completion of training, they became master trainers and further trained the staff at the headquarters and field offices of the TNFD. The GFD will also consider sending staff to overseas institutions to enhance the internal capacity of the GFD enough to discuss technical matters with outsourcing agencies and understand international trends in the GIS and RS fields. This overseas training intends to include deputed two

[84] https://www.itc.nl/

range or division-level officers with a good level of IT literacy.

b. *SC-4.3.2 (2) Training at School Specialized for Drone Operation and Data Post-Processing*

Drone market in India is still developing, and it seems difficult to find schools that provide courses for not only drone operation but also data post-processing. Under these circumstances, participants will go overseas countries where relevant drone schools that provide courses of drone operation, safety management, and data post-processing exist. In Japan, for example, there are some drone schools that meet these project requirements. An indicative list of relevant drone schools in Japan is shown in Annexure 8.7.

(3) SC-4.3.3 Domestic Training in Gujarat

Based on the preliminary needs analysis results, appropriate training will be organized. The training courses will intend to improve the GFD's literacy in assessing GIS and RS data and ability to communicate with relevant agencies. The training also aims to improve consistency between the headquarters and field offices by involving not only technical officers but also non-technical officers who actually use the system. At the same time, rangers and foresters will also be involved in the basic GIS training courses. This will make it possible to standardize operating procedures and develop a common understanding within the GFD. Table 8.35 and 8.36 show possible training courses for GIS/RS and MIS, respectively.

Table 8.35 Indicative List of GIS and RS Training Courses

No.	Title	Contents	Type	Duration	Expected Participants
1	Basic GIS/RS	Basic GIS and RS analysis	Lectures and Exercises	1 week	6 GIS Operators at Headquarters 14 GIS Operators at Circle Offices 31 GIS Operators at Division Offices
2	Advanced GIS/RS	Imagery processing and analysis	Lectures and Exercises	1 week	6 GIS Operators at Headquarters
3	Field Survey (1)	Field data collection, photo capture using mobile tablet	Lectures and Exercises	5 days	6 GIS Operators at Headquarters 14 GIS Operators at Circle Offices 31 GIS Operators at Division Offices 232 Rangers at Range Offices
4	Database	Database, cloud server	Lectures and Exercises	5 days	6 GIS Operators at Headquarters
5	Field Survey (2)	Field data collection using drones	Lectures and Exercises	5 days	6 GIS Operators at Headquarters 14 GIS Operators at Circle Offices 31 GIS Operators at Division Offices 232 Rangers at Range Offices
6	Web GIS	Operation and	Lectures and	5 days	6 GIS Operators at

No.	Title	Contents	Type	Duration	Expected Participants
		maintenance of Web GIS	Exercises		Headquarters
7	Cloud RS Data Analysis	Remote sensing analysis using Google Earth Engine	Lectures and Exercises	5 days	6 GIS Operators at Headquarters

Source: JICA Survey Team (2019)

Table 8.36 Indicative List of MIS Training Courses

No.	Title	Contents	Type	Duration	Expected Participants
1	Basic MS Office & Internet (Introductory)	Software Word/Excel and Internet operation	Lectures (2 days) and Exercises (3 days)	2 days	6 GIS Operators at Headquarters
2	MIS (Introductory)	MIS application for data collection, entry and reporting	Lectures (2 days) and Exercises (3 days)	2 days	6 GIS Operators at Headquarters
3	MIS (Follow-up)	Module wise data verification and reporting	Exercises	2 days	6 GIS Operators at Headquarters
4	MIS (Follow-up 2)	Security and back up procedure for MIS data	Lectures (1 day) and Exercises (1 days)	2 days	6 GIS Operators at Headquarters

Source: JICA Survey Team (2019)

For each training course, operation manuals will be prepared for future systematic operations and shared within the GFD.

8.5.4 SC-4.4 CSR/ Partnership Development

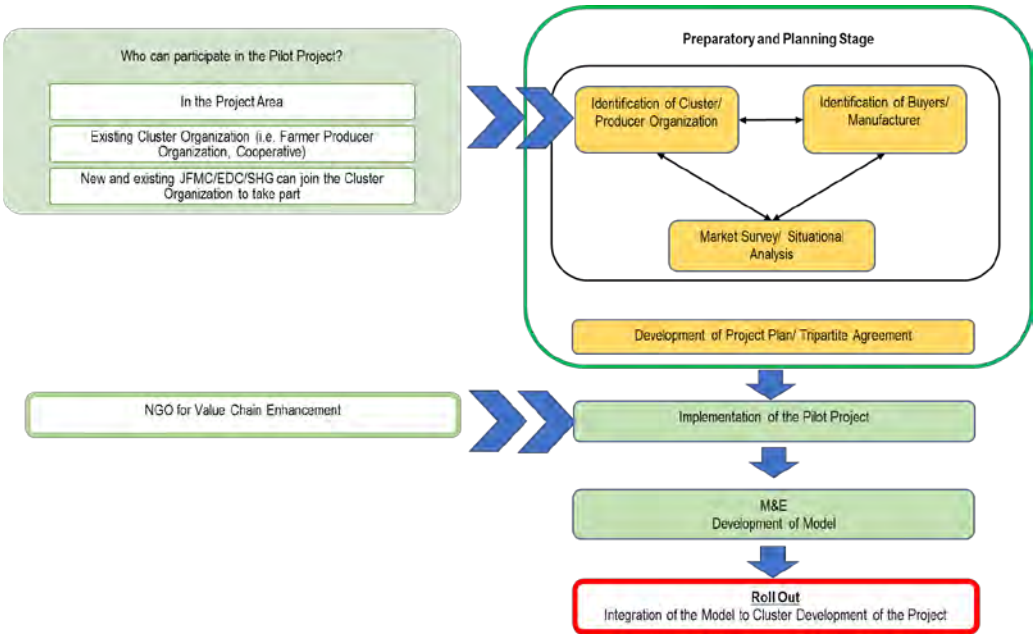
Rationale and Objectives for CSR/ Partnership Development

The project attempts to take advantage of the private sector resources such as CSR fund of the corporate houses and investment for PPP mode implementation. Not only because making social contribution is mandatory for corporate houses in India but also an increasing number of corporates are becoming more conscious of sustainability and its impact on their corporate value. For instance, the ESG rating for the company do affect the corporate value in the stock market. On the other hand, the project could benefit from the innovation, efficiency and financial resources available with the private sector. Since the project is situated in Gujarat known for the home for many corporates, such resources will be tapped into to amplify the project impact. Especially for afforestation and livelihood activities, such resources shall be sought. For that the project is required to undertake networking and publicity strategically.

The SC-4.4 CSR/ Partnership Development has been adopted from the section 6.3.4 of the Final Report of the Preparatory Study for Project for Ecosystem Restration in Gujarat (Jan., 2020).

Rationale and Objectives of Pilot Project for Responsible Supply Chain Development with Private Partnership

The objective of this pilot project is to develop a replicable model for responsible supply chain development to be adopted by the Project cluster development activity. The figure below provides the flow of the activities of the pilot project. During the preparatory and planning stage, the identification of cluster organization, potential partner company (buyers/manufacturers) and market/ survey and situational analysis will take place in parallel. Information gathered from each activity will inform each other to collect relevant information for development of the project. During the Project implementation stage, NGO will be engaged for the value chain enhancement. Towards the end of the pilot project, the information required for replication of the model will compiled, which document is to be used by the cluster development activity of the Project.



Source: JICA Survey Team (2019)

Figure 8.12 Flow of the Pilot Project for Responsible Supply Chain Development

(1) SC-4.4.1 Pilot Project for Responsible Supply Chain Development with Private Partnership

a. *SC-4.4.1 (1) Identification of Cluster and Cluster Organization*

Under this Pilot Project for Responsible Supply Chain Development with Private Partnership, existing farmer producer organizations or cluster organizations in the Project areas comprised of existing JFMC/EDC/SHG and those newly established by the Project will be identified to take part in the pilot project. For instance, Farmer Producer Organizations and cluster organizations promoted by GFDP II as listed in Annexure 8.8-a and cooperative societies[85] in the project area may be considered as candidates. Potential products could be spices like turmeric, chilies, coriander, and wild honey and herbs. In selecting a product cluster, the following criteria may be adopted.

- A cluster is constituted in a geographically contiguous area.
- It has a sizable production volume.
- It is already organized into a Farmer Producer Organization or any other form of registered body comprised of the members from the Project-assisted JFMC/EDC/SHG with a history of valid business transactions in the past three years.
- There is a collective willingness to make changes in production and processing practices as per the requirement of the buyer.
- No child labour is involved in production and processing.

[85] In Gujarat, 75,967 cooperative societies including 9,402 primary agriculture credit cooperative societies (FY 2016-17). (Registrar of Cooperative Societies, Gujarat. https://rcs.gujarat.gov.in/Images/ccrcs/pdf/31-march-17-info-3.pdf)

b. *SC-4.4.1 (2) Market Survey*

A market survey shall take place before finalizing the cluster and cluster organizations. While identifying the potential cluster/cluster organizations, the produce that they deal with shall be assessed from the market potential point of view. A market can be identified at different levels, such as local, regional, national and overseas. As for this pilot project, produce suitable for the overseas market shall be identified. Points for examination are not only about the potential business opportunities but also the scope for becoming a player in the responsible value chain. Once the potential marketing channel is identified, the scope for obtaining certification(s) and its economic implication shall also be assessed. The ToR of the market survey shall be prepared by PMC in consultation with PMU.

c. *SC-4.4.1 (3) Situational Analysis*

Once the potential product clusters are identified, the relevant production data will be collected. The indicative survey items include: production related data; current market situation and marketing; quality of produce; relevant laws and regulations when exporting produce; and number of families engaged. A subject matter specialist in agricultural marketing may be engaged to undertake this situational analysis. A report shall be prepared based on the findings.

d. *SC-4.4.1 (4) Identification of the Buyer/Manufacturer*

Based on the report, PMC specialists will approach the potential buyers including those in the overseas market. Potential buyers can be approached directly or through participation in an exhibition like Broach, if aiming for the organic market. As the process takes time, buyer identification can start simultaneously as cluster identification and situational analysis. At this stage, producers may visit partner companies for negotiation and discussion. A list of potential partner companies is given in Annexure 8.8-b.

e. *SC-4.4.1 (5) Development of the Project Plan & Signing of Tripartite Agreement*

Once a buyer is identified, a project plan will be jointly worked out with it. The roles and responsibilities shall be clearly depicted, and a tripartite agreement shall be exchanged between the Project, Farmer Producer Organization (cluster organization), the Project and the partner company. The pilot project shall be for a duration of two years.

f. *SC-4.4.1 (6) Procurement and Engagement of NGO for Supporting Producer Organization*

Once the implementation begins, an NGO will be engaged to monitor the production process, provide help in organizational management, such as record keeping, holding meetings, and liaising with the Project. The NGO shall be procured through competitive local bidding. The cost of engaging the NGO shall be borne by the Project. The procurement of the NGO shall begin three months before the commencement of field activities. The indicative ToR of NGO is given in Annexure 8.8-c.

g. *SC-4.4.1 (7) Implementation of the Pilot Project*

(i) Development of Infrastructures for Production, Storage, Processing and Transportation

In strengthening value chain, infrastructures for production, processing and marketing need to be developed or improved. Although major investment is expected to be made by the partner company, the Farmer Producer Organization shall make its own effort to develop small scale/minor infrastructure through convergence. For instance, the Director of Horticulture, Government of

Gujarat provides subsidies for spice cultivation and pest management, and organic farming and certification. CSR resources could also be considered for development of micro infrastructures such as temporary storage, water harvesting and micro irrigation facilities, procurement of farm implements and machineries. Some of the government schemes are given in Annexure 8.8-d. National Bank for Agriculture and Rural Development also has loan facilities including the organizational capacity building and market linkage to support Farmer Producer Organization[86], which can be considered for strengthening the value chain as a whole. In GFDP II, resources were mobilized from KVK and Tribal Sub Plan, which can also be considered in this pilot project. The Farmer Producer Organization can also access the fund established under the Project for cluster development, which could also be utilized for the equity capital required to take loan from financial institutions. Facilitation for resource mobilization will be done by the NGO and PMU officer in charge of livelihood/community development and concerned division and range-level project implementation unit. When such resources are mobilized, records must be kept to ensure accountability and transparency, and O&M mechanism shall be defined for the assets created.

(ii) Technical Guidance for Production, Processing and Marketing

The NGO engaged for the pilot project implementation will provide the Farmer Producer Organization the technical guidance for production, processing and marketing to respond to the requirement of the partner company. It will also liaise with the PMC supply chain specialists, PMU officer in charge of livelihood/community development and concerned division and range-level project implementation units and also with the local government/stakeholders.

(2) SC-4.4.2 Development of Green CSR Fund Raising and Monitoring Platform

SC-4.4.2 Development of Green CSR Fund Rainsing and Montoring Platform is as proposed under the section 6.2.6 (2) 5) of the Final Report of the Preparatory Study for project for Ecosystem Restoration in Gujarat (Final Report, Jan., 2020).

Establishing Web-Based Gateway for Raising Fund for Green CSR/Private Partnership

With the intention of effectively interacting with the corporates, a gateway will be established as part of the Project web-site. This gateway should have the investable project proposals prepared by the officer in charge in PMU and should also receive proposals from the corporates. In addition, it should provide free guidance to those corporates that are interested in investing or require technical guidance for forest ecosystem management. It should also provide an option to receive donations as seen in websites such as Swachh Bharat Kosh and Nature Club (in Surat). The maintenance of the gateway shall be done by the M&E/MIS section of the Project.

Establishment of CSR Monitoring - Web-Based Platform

PMU officer in charge of Green CSR will undertake monitoring and evaluation of the projects in coordination with the PMU M&E/ MIS section and concerned division and range. As each of the Green CSR/Private Partnership projects will have its own unique monitoring indicators, having a web-based platform would enable timely monitoring by the PMU and facilitate the reporting process. All of the CSR project sites shall be geo-coded.

Drones will be used to take the images of the project sites on a quarterly basis. These images will be made available on the website for each sponsoring company along with the description of the areas and synopses of site observations.

[86] https://www.nabard.org/auth/writereaddata/File/Annexure%20I%20-%20Support%20available%20under%20PODF.pdf

(3) SC-4.4.3 Networking Seminars for Green CSR

SC=4.4.3 Networking Seminars for Green CSR os as proposed under the section 6.2.6 (3) 4) of the Final Report of the Preparatory Study for project for Ecosystem Restoration in Gujarat (Jan., 2020).

The Project will organize seminars in Ahmedabad and Surat to identify corporate partners. The indicative seminar program is given in the table below.

Table 8.37 Indicative Outline of the Green CSR/Partnership Seminar

Particulars	Description
Venue	Ahmedabad, Surat, Vadodara
Frequency	Once in every six months
No of participants	100 persons (CSR persons in the corporate houses, NGOs, local government officers, etc.)
Program	Sharing of the details of the Project (objectives, Project area, implementation, funding options, etc.) Response from the corporates Sharing of experience by the JFMC/EDC/SHG/CBO (the second year onwards)

Source: JICA Survey Team (2019)

(4) SC-4.4.4 Publicity Video Preparation CSR/ Partnership Development/ Business Development

SC-4.4.4 Publicity Video Preparation CSR/ Partnership Development/ Business Development has been adopted from the section 6.2.6 (3) 5) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

Video shall be prepared as part of the process documentation for CSR based afforestation and for Pilot Project for Responsible Supply Chain Development with Private Partnership. The video can be used for awareness creation for the community level institutions and also for the corporates who may be interested in partnering with the project. The work will be outsourced by PMU.

(5) SC-4.4.5 Public Awareness Creation on CSR/ Private Partnership

SC-4.4.5 Public Awareness Creation on CSR/ Private Partnership has been adopted from section 6.2.6 (2) 5) and 6.3.4 (5) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan, 2020).

The project will take part in various CSR/ Private Partnership seminars and exhibitions from time to time to showcase the project intervention.

(6) SC-4.4.6 CSR/ Supply Chain Evaluation:

SC-4.4.6 CSR/ Supply Chain Evaluation has been adopted from section 6.2.6 (3) 6) and 7) and 6.3.4 (10) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan, 2020).

PMU will undertake the evaluation of the CSR based interventions undertaken by the project including CSR based afforestation activities – Green CSR. Further, it is important to undertake the

process and outcome of the pilot project for responsible supply chain development with private partnership as it will provide the basis for the subsequent cluster-based enterprise development.

PMC Specialists will take the lead in undertaking the assessment and compile a report and prepare recommendations for replication. The PMU officer in charge of livelihood shall review the report and decide what courses of action to be taken. If the replication is deemed relevant, a further project plan will be prepared for 1-3 products and the work will be initiated.

8.5.5 SC-4.5 Monitoring & Evaluation

(1) Rationale and Objectives

Landscapes have a wide range of qualities and perform numerous services for human beings. Changes such as settlement and forest development alter landscapes – not only physically, but also in the way that people perceive them. To ensure targeted management and sustainable development of the landscape, its qualities must be monitored and compared on a regular basis. Concurrent landscape monitoring offers multiple benefits, including the following, among others:

- Regular periodic monitoring of the entire landscaping resource, including soil, shrubs, trees, and irrigation systems;
- Detect and identify issues before they can become value-threatening problems by sampling and technically competent field diagnoses;
- Report to the project management/ authorities, offering status updates and recommended courses of action;
- Lessen burden on the managers from time-consuming task of landscape site inspections; and
- Coordinate with landscape stakeholders to help them stay on track and enhance the effectiveness of maintenance efforts.

The project also follows landscape approach to further strengthen various ecosystems.

Table 8.38 Project Landscape and Focus

Landscape	Focus
Coastal ecosystem	Strengthening coastal areas for protection from high velocity winds, salt sprays and also from devastations like cyclones and storms through strengthening of coastal shelterbelts, as well as undertaking plantation of mangrove and mangrove associated species that may result in increased costal carbon sequestration and improvement in aquatic/ marine ecosystem.
Inland ecosystem	Restoration of grassland with expected increase in productivity levels, reduced incidences for fire and enhanced support to livelihoods, skill development and benefit sharing with local communities; restore wetlands to enhance habitats and hydrological service capacity; and restore forest ecosystem through plantation thereby increasing carbon sequestration as well as reducing soil erosion by increase of vegetative cover and enriching quality of forests.
Protected Areas -Human-wildlife Conflict management	Improving wildlife habitats, corridors and strengthen measures to reduce human-wildlife conflicts; improve on the animal rescue and animal care infrastructure; and creating livelihood opportunities by way of income generation activities, eco-tourism activities, skill development and benefit sharing with local communities

Source: JICA Survey Team (2019)

However, monitoring landscapes not only require resources, but also skills to have holistic understating of landscapes and its elements. For the purpose of the project, a minimal framework will

be drawn within the framework of the project considering its objectives and intensity of interventions specific to targeted sites.

(2) M&E Arrangements

PMU will regularly monitor and keep record of the physical and financial inputs and outputs of project activities. To facilitate this, following the agreed institutional arrangements for the project, PMU will deploy a full-time senior forest officer having relevant experience and skills in monitoring and evaluation, and also acquire required skill and recruit IT professionals having experience in MIS and GIS systems. PMU would procure all relevant resources and would also strengthen existing GIS units of the forest department for the project purpose. During project implementation, main responsibility to manage and analyse data would be with the IT/GIS Cell of the forest department, and such data would be utilized for generating various project reports/ maps.

PMU will coordinate with all institutions according to the institutional arrangements, in monitoring the activities on day-to-day basis. CCSUs will further supervise and coordinate with the divisions, and Resource Organizations/ NGOs to keep track of the project implementation. The field facilitator at the village level along with the community organizer at the range level will be involved for monitoring and reporting activities at the village level. The representatives from various community institutions (e.g. JFMCs/ EDCs, Eco Clubs, ecotourism committee, SHGs) will be trained to use simple tools to monitor project progress and impacts and discuss its implications as well.

PMU will work to modify existing web-enabled monitoring information system (MIS) and would tailor the software to meet the requirements of the project. The modified MIS will be utilized to consolidate and manage primary data reported by various implementing units or received from various other agencies. The MIS software should have feature to integrate data with GIS platform for undertaking spatial analysis. Data from MIS will be used to update the operation and effect indicators of the project to input into the monthly, quarterly, and annual progress reports. Use of GIS and other modern information tools will help collate, compare, analyse, and visualize the information.

For financial management, a separate module could be developed for extracting information from IFMS for preparing reimbursement claims efficiently and timely manner. Such module will also minimize the time taken for reconciliation of financial data as well as minimize errors in reporting. The accounts staff at all levels also needs to be well oriented and trained on managing society accounts, and properly responding to the statutory requirements under Goods & Service Tax as well and Income Tax, and other associated taxes as applicable. For getting exemption on the income, the society also need to get registered under applicable section, and accordingly file returns.

As per the requirements under society function, if required, PMU will also adopt standard accounting software for fund management and project accounting and will customize the accounting software for generating statement of expenditures at all operational levels viz., PMU and forest divisions/ ranges.

For monitoring of prescribed social and environmental protocols and safeguards, a person in-charge for M&E at PMU will coordinate and regularly update the status. The PMU will receive information and feedback from the respective heads at circle, division and range, who in addition to main responsibilities as defined under roles and responsibilities given in the institutional arrangements, will be responsible to monitor the social and environmental protocols.

Specialists in PMC team will assist to review the existing M&E framework for the project as well as help PMU in establishing proposed M&E system and MIS/ GIS applications for the project. PMC will also assist PMU in developing measurable indicators (both operation and effect) based on logical

framework and protocols including preparing M&E guidelines and reporting formats for the project and help in modifying/ redesigning computerized MIS/ GIS facilities for different components of the project.

(3) Reporting Requirement

PMU will prepare quarterly reports on prescribed reporting structure, and timely furnish to JICA to apprise on the project implementation progress. PMU will also publish annual report along with updated project implementation schedule after getting approval from the Governing Body/ HPSC at completion of each fiscal year. The reports will be available both in print forms as well as in digital form and will also be shared by way of publications and project website to facilitate further information dissemination.

PMU will develop templates for quarterly and annual reporting during first year of project operation. If required, the reporting templates be shared to obtain concurrence from JICA. These reports will include: (a) physical progress and financial expenditure by components/ sub-components against annual plan along with analysis, maps, photographs and graphs to support claimed achievements; (b) project operation and effect indicators; (c) problems/ constraints encountered during the reporting period, with suggested remedial actions, (d) observation and recommendations of PMC and; (e) updated status on social and environmental safeguard requirements of the project.

Annual Plan of Operation (APO) will be prepared for each fiscal year. PMU will get the APO approved from GB and HPSC, preferably by March, for each financial year, and will share with JICA for information. PMU will also establish a system of preparing need-based annual plans, involving key stakeholders. PMU will provide all necessary guidance and support and will regularly follow-up with stakeholders to get APO compiled and is approved well on time. Preparing need-based annual plans will require enhancing current capacities of the project staff and institutions at each operational level. PMU will ensure to provide necessary training to all key stakeholders for the purpose. Following table provides key reporting requirement for the project.

Table 8.39 Key Reporting Requirement at Various Level

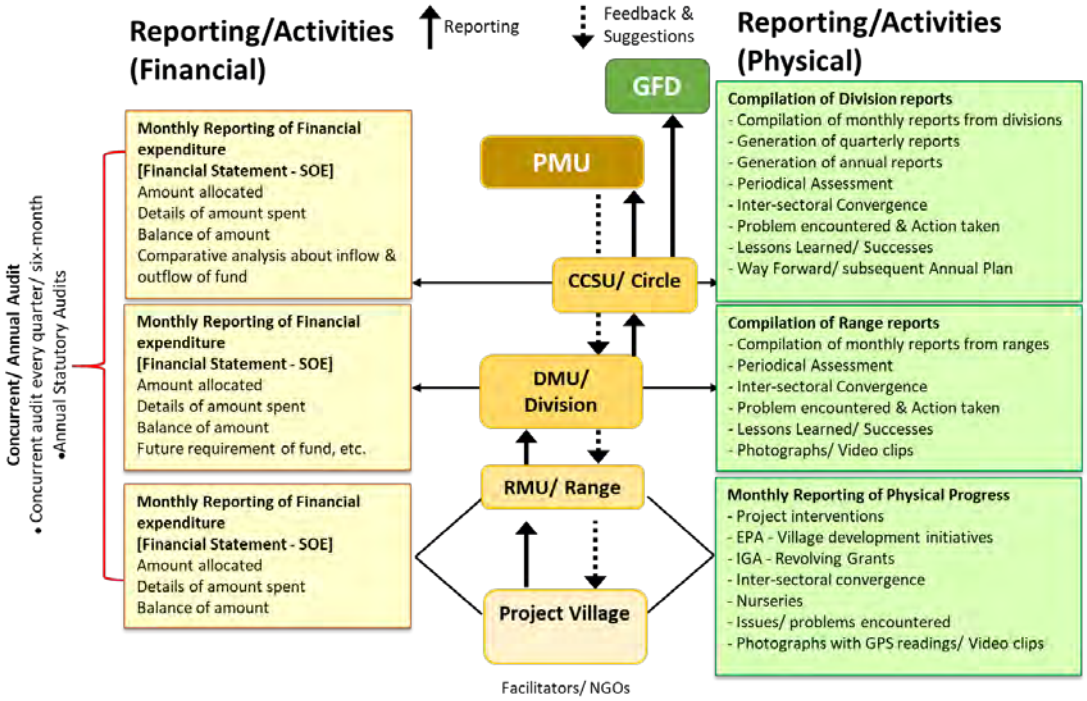
S. No.	Type of Report	Responsibility to generate Report	Submission Level	Circulation / User	Remarks/ Likely Contents
1)	Annual Report	PMU	GB	HPSC, State Govt., MOEF&CC/ GoI, JICA, GFD	▪ Achievement (physical and finance) and status against the annual plan, and reasons for shortfalls, if any ▪ Operation & Effect indicators, Updated Social and Environment Safeguards ▪ Successful cases and innovations ▪ Inter-sectoral Convergence efforts ▪ Lessons learnt and Way forward ▪ Maps, Photographs, graphs etc.

S. No.	Type of Report	Responsibility to generate Report	Submission Level	Circulation / User	Remarks/ Likely Contents
					(To be published and uploaded on website and kept in public domain)
2)	Quarterly Report	PMU	JICA	GB, Executive Committee (EC), JICA, State Govt. (EAP)	▪ Achievement (physical and finance) and status against the annual plan on prescribed format, and reasons for shortfall, if any ▪ Inter-sectoral Convergence efforts ▪ Problems and constraints, and corrective actions/ measures taken ▪ Photographs, graphs etc.
3)	Statement of Expenditure (SOE)	PMU	JICA	JICA/ CAAA, MOEF&CC/ GoI, DEA, State Govt. (EAP)	▪ Reimbursement claims based on financial reporting and consolidated expenses against the annual plan ▪ The SOE to be prepared based on the entries made in the accounting software
4)	Annual Plan of Operation (APO)	PMU	HPSC	PMU, project circles, divisions/ ranges, District Administration; GFD	▪ Planning activities as per Overall Implementation Plan (OIP), ▪ Plan for backlog/ delayed activities, and Strategy; ▪ Component-wise and activity-wise fund requirement/ budget allocation
5)	Statutory Audit Report	PMU	GB	JICA/ GFD	▪ Confirming the SOEs and eligible portions ▪ Annual Audit Report on standard/ prescribed format
6)	Monthly Reports	Project Division	Circle	PMU, GFD	▪ Achievement (physical and finance) and status against the annual plan, and reasons for shortfall, if any ▪ Inter-sectoral Convergence efforts ▪ Problems and constraints ▪ Maps, Photographs, graphs etc.
7)	Back-to-Office Report (BTOR)	By visiting officers	as applicable	All concerns	▪ Observations on the project implementation progress vis-à-vis annual plan, identifying the issues/ areas of concern, status on action points etc.

Source: JICA Survey Team (2019)

(4) Information Flow

For continuous tracking of project implementation, information and communication system needs to be in place with clear roles and responsibilities, including frequency of data compilation and reporting. It is expected that from divisional level onwards the information would flow electronically. Range offices will be responsible for information compilation as per the frequency of reporting and transmit to division, and from there the consolidated information would get transmitted to the Circles. The Circle offices will further consolidate the information as required and transmit it to respective superior as well as to PMU. Paper-based reporting or if possible, mobile based applications could be adopted for capturing information at village level. Data compilation and reporting of activities will be facilitated by project/ forest staff and Resource Organizations/ NGOs. PMU will ensure connectivity and requisite infrastructure/ equipment during the preparatory phase of the project. The information from lowest operational level to the PMU will be utilized to generate various reports and publications. Figure below illustrates the flow of information and use at different level of operations.



Source: JICA Survey Team (2019)

Figure 8.13 Information Flow and Reporting Arrangement for the Project

To make information generation and reporting efficient, PMU would create systems to address information needs of sectoral heads within GFD as well as for external sharing with other agencies and state/ central governments. Discipline in accessing information from the lower levels will be established to avoid multiple channels for seeking information that may otherwise burden divisions and functionaries below to respond to day-to-day information needs of various sectoral heads at the headquarter/ PMU. For issuance of project guidelines and instructions the Chief Project Director will carry the authority to communicate with the Circles/ Divisions and at the same will also keep the departmental sectoral heads in loop, and thus can avoid multiple channel for providing guidance on the project implementation.

(5) M&E System for the Project

Following the M&E system, activities for tracking project progress and performance will be systematically carried out during the project implementation. M&E system will enable the project to

take remedial actions based on the lessons learnt. M&E system for the project will have following key elements grouped into a) Monitoring, b) Impact Assessment, and c) Audits and Transparency, and d) Operation and Effect Indicators. PMU will ensure to put the system in place during preparatory phase of the project and develop M&E guidelines and manual with the help from PMC. PMU will also take necessary steps to build capacities of the project staff at all level of operations on M&E aspects.

SC-4.5.1 M&E System

a. *SC-4.5.1 (1) Long-Term Landscape Monitoring*

Monitoring ecosystems not the same as measuring key results. Measuring biological indicators provides a snapshot of biodiversity at the time of measurement, whereas monitoring is a continuous process which allow managers to identify changes and trends over time so that they can assess whether interventions are achieving biodiversity goals and adapt management accordingly. It would be good approach for the short duration project to focus on monitoring trends rather than measuring absolute values. Thus, the project will undertake a comprehensive biodiversity baseline survey engaging a qualified and credible institution/ agency during the preparatory phase of the project.

Most threats to biodiversity result from human activities which, in turn, depend on social and economic factors. Monitoring of socioeconomic factors, therefore, is an important part of biodiversity monitoring. Similarly, a range of institutional factors can impact on biodiversity health and the effectiveness of landscape management and should also be monitored.

Thus, a meaningful and operationally relevant monitoring system will encompass a broad range of subjects to be monitored, including landscape or species dynamics, socioeconomic factors, community involvement and institutional and regulatory factors. It will also be important to define the spatial and temporal scales of monitoring activities, as landscape management deals with ecological processes which are generally long-term changes (e.g. changes in population of a key species) resulting from management interventions may be slow to emerge, sometimes beyond the project timeframe. Adequate equipment and human resources also need to be arranged to execute the landscape monitoring plan.

The methods to be developed for monitoring purposes should aim for ensuring that no major change in landscapes and protected areas can go undetected. Under the project, establishing Long-term Ecological Monitoring (LTEM) permanent plots could serve as an indicator for measuring changes in the biodiversity over a period of time. Measurements aids like data loggers, cameras, automated weather stations (AWS), drone, satellite data etc. could be utilized for the purpose of data recording and analysis. The methods should have scope for involving local people, equipment and funds. In addition, the methods should be backed up by satellite-based monitoring of land-use on a regular basis as well as in-depth monitoring of selected habitats and species. This exercise would be undertaken once every 2 years from project initiation.

Monitoring of landscapes should be able to answer questions such as: a) Are habitats and ecosystems being degraded or getting improved? b) Are the populations of threatened species of plants and animals declining? c) What are the causes? d) Has management intervention had the intended impact on the ecosystem? e) Are there increased benefits to local communities from sustainable natural resource use? In other words, monitoring should be able to answer if the management interventions in the area are effective in addressing landscape conservation.

b. *SC-4.5.1 (2) Concurrent Monitoring and Periodic Reviews*

For the project components concurrent monitoring would be the key approach to bring in transparency and efficiently track the project implementation. The monitoring will be undertaken following multiple approaches – field visits, periodic reviews, reporting, assessments and feedbacks etc. Regular monitoring will be an in-house routine affair. Standard checklist, semi-structured questionnaire and set of indicators will be developed by the PMU with assistance from PMC for undertaking concurrent monitoring. If required, monitoring could also be undertaken by hiring independent credible monitoring agency from time-to-time. The planned activities will be monitored against the approved Annual Plan of Operation (APO). A set of Operation & Effect indicators will be identified and necessarily be updated on annual basis by PMU.

PMU will create a system for undertaking field visits by PMU officials at regular intervals and feedback the project management by way of structured 'Back-to-Office Reports'. IT/ GIS Cell will be made responsible to facilitate generation of analytical maps & reports based on the data captured through various GIS/ MIS modules at different level of project implementation. The analytical reports will be utilized by PMU as well as sectoral heads in GFD for identifying critical gaps, and such issues will be transmitted by the Chief Project Director along with action points to all the divisions through Circle offices at a regular interval.

Periodic Reviews will be undertaken at all levels of project operations. The key institutions that will be responsible for periodic reviews are: Circles, PMU, and stakeholders/ agencies that will be interested in keeping regular track of the project implementation and performance, e.g. state/ central government, JICA. Following would be the frequency of monitoring & review by various stakeholders/ agencies:

Table 8.40 Frequency of Monitoring and Review Meeting

Frequency of Monitoring & Reviews	Stakeholders/ Agency
Monthly	Project Circle
Quarterly	PMU/ Executive Committee
Six-monthly	GB
Annually	HPSC members, JICA representatives

Source: JICA Survey Team (2019)

c. *SC-4.5.1 (3) MIS and Reporting System*

MIS will be utilized for capturing the progress and achievements on day-to-day basis. MIS will be planned till range-level from where the data will get integrated upwards. This would be done in phased manner. Paper-based formats or mobile based app system could be used to capture information initially. The output reports generated by the MIS will give status of project progress and performance.

The existing MIS software will be modified by GFD/ PMU for the purpose of the project within first year of the project initiation. In-house capacities of the forest department will be utilized to design or modify MIS modules as per the project requirements considering the project logical framework and proposed M&E system.

PMC will also guide PMU to strengthen the progress reporting. IT/ GIS Cell within the GFD will also have mandate to provide technical back-stopping to project divisions and ranges during the project implementation. Training manual will be developed for the project specific MIS modules prior to commissioning and will be utilized to train the project staff at all level of operation.

d. *SC-4.5.1 (4) Technology based Monitoring - GIS applications*

Through the project, IT/ GIS Cell will be further strengthened for undertaking GIS/ MIS operations. All the project sites and treatment areas will be geo-coded and plotted on digitized maps to be utilized for planning and analysis. It will also be important to record geographical location (GPS based coordinates) of each individual asset created under the project for closely monitoring the work progress. Location specific inventory of assets with geo-codes will be created and photographs taken on timeline will be tagged to better manage the assets in future.

In addition, the IT/ GIS Cell will also be capacitated of undertaking technology-based analysis and related assessments utilizing both MIS and GIS tools.

SC-4.5.1 (4) Technology based Monitoring – GIS applications has been adopted from the section 6.1.1 of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

e. *SC-4.5.1 (4) 1) Prioritization of Target Mangrove Plantation Areas*

SC-4.5.1 (4) 1) Prioritization of Target Mangrove Plantation Areas is as proposed in the section 6.1.1 (3) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan. 2020).

In Gujarat, mangrove plantations exist widely in coastal areas of the state, and plantation sites are often selected based on local knowledge and expertise developed from the past research projects. One foreign species is widely planted because of its tolerance to high salinity and turbulence as well as its growth speed. To select suitable plantation sites and appropriate species for the selected sites, satellite RS will be used. The use of satellite RS will make it possible to identify the location and extent of mudflats and intertidal zones and examine appropriate tree species and planting methods in the selected areas. Moreover, using location data such as creeks and shorelines along with RS analysis results in GIS, the selected areas will be subdivided into zones for the prioritization of plantations. Table 8.41 illustrates the workflow of this RS/GIS-based mangrove plantation site selection.

Table 8.41 Workflow of RS/GIS-based Mangrove Plantation Site Selection

No.	Criteria (Tentative)	Data/Method used
1	Select target forest divisions (refer to the main Survey Team report.)	N/a
2	Extract coastal zones from satellite imagery observed at low tide by automatic classification	Satellite imagery
3	Separate intertidal zones (IZ) from mudflats (MF) by visual interpretation	Satellite imagery
4	Prioritize MF and IZ by proximity to shoreline and creeks respectively (e.g. X m from edge of creeks or shoreline. The closer, the higher priority.)	Creek data, Shoreline data
5	For MF, check the mud conditions (soft mudflat (SF) or hard mudflat (HM))	Physical Verification
6	Select planting method and species	Consultation

Source: JICA Survey Team (2019)

To achieve this workflow, RS and GIS analysis are required. The following shows expected specific tasks through the workflow.

Preparation of Satellite Imagery

Satellite imagery for the target areas will be selected for the site selection. In the context of Gujarat, it is said that February and March are often preferred because of favorable cloud conditions. At the same time, to interpret coastal zones, including mudflats and intertidal zones, satellite imagery observed at low tide needs to be selected. The selected satellite imagery will be appropriately processed prior to the following classification.

Automatic Classification

Using the selected satellite imagery, classification analysis will be conducted. In object-based classification, neighboring pixels of satellite imagery are grouped to create segments, which are used as a minimum classification unit. As a result, coastal zones will be automatically extracted from the neighboring different land cover areas.

Manual Interpretation

It is assumed that coastal zones can be relatively easily extracted from satellite imagery. On the other hand, it is difficult to automatically separate intertidal zones from mudflats. For this, visual interpretation of satellite imagery will be conducted to separate between mudflats and intertidal zones. In addition to the base satellite imagery, very-high-resolution satellite imagery available in Google Earth will be also used to check the classification results.

Buffer Analysis

Buffers with determined distance from creeks will be created. Selected polygons of mudflats will be overlaid with the creek buffers in GIS, and polygons within the buffers will be selected for the prioritization of plantation sites. In the same manner, buffers with determined distance from shorelines will be created. Selected polygons of intertidal zones will be overlaid with the shoreline buffers in GIS, and polygons within the buffers will be selected for the prioritization of plantation sites. Thresholds in distance from creeks and shorelines will be further examined.

One key consideration is that mangrove forests do not grow in dry land, and it is not suitable to conduct mangrove plantations in those lands. For this reason, lands without floods should be excluded. If applicable, this criterion will be additionally set based on time series of satellite imagery.

Physical Verification

With the classification maps, physical verification that is led by experts in coastal forests and mangroves will be conducted. At the selected sites, soil type and conditions will be examined, and tree species and plantation methods will be determined. For the selection and prioritization of mangrove plantation sites, the GEER Foundation has experience with mangrove management. Consultation and information exchange with the GEER Foundation will play a key role in the development of an appropriate selection and monitoring system.

SC-4.5.1 (4) 2) Habitat Mapping

SC-4.5.1 (4) 2) Habitat Mapping is as proposed in the section 6.1.1 (1) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

One kind of key thematic maps for the Project is a habitat map. To produce habitat maps, individual data layers that meet the technical specifications, such as scale and target area, are developed. Key

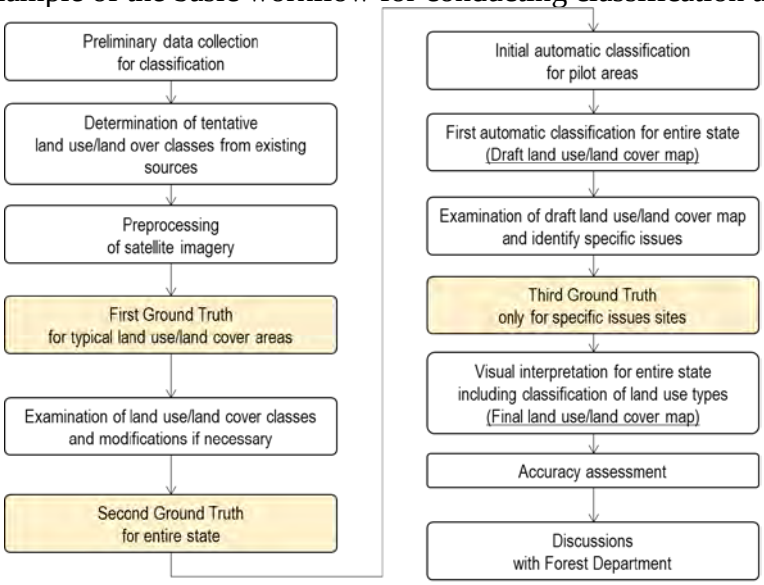
individual data layers required involve land use and land cover types, including mangrove forest areas, forest density, slope, contour, water bodies, roads, and villages and settlement (Table 8.42). These data layers constitute an integral part of the habitat maps in the Project.

Table 8.42 Expected Maps/Data Layers Necessary for Habitat Maps

No.	Data Layer Type	Target Area	Scale
1	Land use and land cover	State	1:10,000
2	Mangrove	State (Coastal Area)	1:10,000
3	Forest density	State	1:10,000
4	Slope	State	1:10,000
5	Contour	State	1:10,000
6	Water bodies	State	1:10,000
7	Roads	State	1:10,000
8	Villages/Settlement	State	1:10,000

Source: JICA Survey Team (2019)

To produce the land use and land cover map, the following activities need to be completed. Figure 8.13 illustrates an example of the basic workflow for conducting classification analysis.



Source: JICA Survey Team (2019)

Figure 8.14 Example of Basic Workflow for Classification Analysis

Procurement and Preprocessing of Satellite Imagery

To produce maps/data layers, appropriate satellite imagery will be procured. For most maps, multispectral satellite imagery with spatial resolution of 5m or higher will be procured while topographic maps including slope and contours will need the data of a digital elevation model (DEM). Cloud cover needs to be minimized, and considering the time series analysis, observation months will be consistent through the Project period.

Ground Truth Surveys

To collect sample data for land use and land cover classification, ground truth surveys will be conducted. In ground truth surveys, foresters and/or persons who are familiar with local forestry will accompany RS/GIS specialists.

Classification

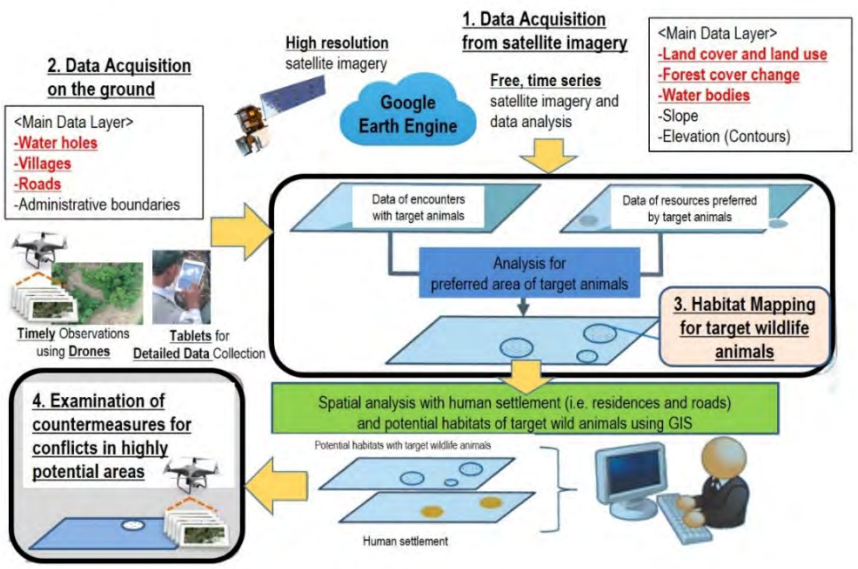
Procured satellite imagery will be appropriately processed, and necessary analysis will be conducted. For the land use and land cover map and mangrove map, in particular, automatic classification and visual interpretation will be conducted to classify the area into required classes. For the rest, visual interpretation will mainly be conducted to extract specific features.

Accuracy Assessment

Using sample data collected during the ground truth surveys, accuracy assessment will be conducted to examine the classification analysis. If the accuracy is not sufficient enough, the maps will be corrected until the minimum requirements are cleared.

In the Project, the entire target area will be divided into two groups by forest division, and the series of above activities will be conducted in two phases. Maps for the first group will be completed by the end of the second year, while those for the second group will be completed by the end of the third year. The grouping and prioritization of forest divisions will be determined after the start of the Project in consultation with the GFD.

Finally, Figure 8.15 illustrates the overall workflow to address human and wildlife conflicts. As discussed above, first, data will be acquired from satellite imagery and ground surveys. Second, habitat maps will be created based on the combination of the developed data layers. Third, suitability analysis will be conducted using the habitat maps and other relevant spatial information to identify potential habitats of target wild animals. Lastly, countermeasures for human and wildlife conflicts will be examined using the habitat maps and the results of suitability analysis.



Source: JICA Survey Team (2019)

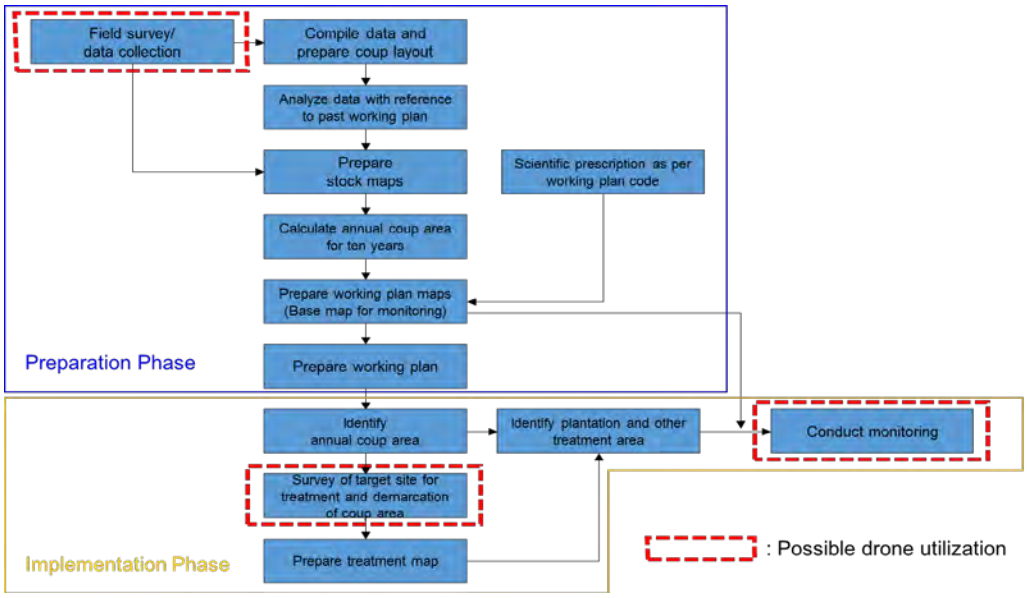
Figure 8.15 Overall Workflow of Habitat Map Making

SC-4.5.1 (4) 3) Drone Based Plantation Monitoring

SC-4.5.1 (4) 3) Drone Based Plantation Monitoring is as proposed in the section 6.1.1 (4) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

Monitoring is required for plantations. Before engaging in activities, working plans (or management

plans or micro plans) are prepared, and the target sites are surveyed to examine ground conditions. In this regard, drones will be used to capture the entire target site, instead of using existing satellite imagery or a GPS survey map. Figure 8.16 illustrates the entire workflow of plantations and possible use cases of drones within the workflow.



Source: JICA Survey Team (2019)

Figure 8.16 Basic Workflow for Plantation Monitoring

In addition to the utilization of drones for preparation, drones will be also used for conducting monitoring. For instance, aerial photos taken by drones will be used as reference for cross-checking physical verification data. Moreover, while random sampling monitoring with physical verification and the TPM will be conducted as it is presently conducted, very-high-resolution aerial photos taken using drones will be used for monitoring the rest of sites at a later stage. Table 8.43 shows examples of present and future monitoring methods.

Table 8.43 Future Drone-based Monitoring

No.	Present		Future	
	Method	**Description**	**Method**	**Description**
1	Physical Verification Monitoring	All individual trees are checked by physical verification.	Physical Verification Monitoring	All individual trees are checked by physical verification.
2	Random Sampling Monitoring	Some individual trees are checked by physical verification, and the rest are unchecked.	Random Sampling Monitoring + **Drone-Based Monitoring**	Some individual trees are checked by physical verification, and **the rest are checked by drones.**
3	Third Party Monitoring (TPM)	Some individual trees are checked by physical verification, and the rest are unchecked.	Third Party Monitoring + **Drone-Based Monitoring**	Some individual trees are checked by physical verification, and **the rest are checked by drones.**

Source: JICA Survey Team (2019)

To implement drone-based surveys and monitoring, three implementation structures will become availableTable 8.44 shows the three possible implementation structures for drone-based surveys and monitoring and the division of roles. In the context of the Project, considering the current capacity of GFD as well as required high technical knowledge and skills, the first or second options appear

appropriate.

Table 8.44 Possible Implementation Structure for Drone-Based Surveys and Monitoring

No.	Equipment	Operation	Maintenance
1	Outsourcing company	Outsourcing company	Outsourcing company
2	GFD/PMU	Outsourcing company (Leasing equipment)	Outsourcing company (Leasing equipment)
3	GFD/PMU	GFD/PMU	GFD/PMU

Source: JICA Survey Team (2019)

In case of the first option, it is not required for GFD/PMU to register drones and obtain flight permits from relevant agencies because all procedures will be done by outsourcing companies. On the other hand, the second or third options will require GFD/PMU to go through all procedures on its own.

Outsourcing Company Selection

Drone operation will be outsourced to a private company. The Project will require the outsourcing company to support the GFD in the following ways:

- Provide regional operation centers/hubs within the state to minimize travelling time and cost.
- Support the GFD completing registration procedures before the start of drone-based monitoring.
- Maintain drones and relevant equipment properly during the lease period.

Registration

The general steps required for drone registration are shown below. For government use, the requirements may be different from those discussed above. The PMU and the PMC will further examine actual requirements in advance.

- Step 1: Register operators
- Step 2: Check for an Original Equipment Manufacturer (OEM) certificate from the manufacturer and National Physical Laboratory (NPL) letter
- Step 3: Register drones through the web platform called “Digital Sky”
- Step 4: Obtain Unique Identification Numbers (UIN) from Digital Sky
- Step 5: Attach the UIN to the Unmanned Aircraft or drone to be registered
- Step 6: Apply for Unmanned Aircraft Operator Permit (UAOP) License through Digital Sky
- Step 7: Receive appropriate training
- Step 8: Install No Permission, No Take-off (NPNT) application on drones to be registered

Of all the required steps, (1) operator registration (Step 1), (2) drone registration (Step 3 and 4), (3) flight permit (Step 6), and (4) training (Step 7) are described in detail below.

Register Operators

Before the registration of drones, the operator and pilot need to be registered. The Director General of Civil Aviation (DGCA) in the Government of India issued the guideline “Civil Aviation Requirements” (“CAR”) vide F. No. 05-13/2014-AED Vol. IV on August 27, 2018 and became effective in December 1, 2018 for Remotely Piloted Aerial Systems (RPAS) or drones and also

launched the online portal called "Digital Sky" for registration of drones, pilots, operators and manufacturers. As per the guidelines, the drones, Unmanned Aerial Vehicles (UAVs), or Remotely Piloted Aircrafts (RPAs) are categorised into five types based on the weight of aircraft (Table 8.45).

Table 8.45 Types of Drones and Weight of the Aircraft

No.	Category	Weight
1	Nano	Less than or equal to 250 grams
2	Micro	Greater than 250 grams and equal to 2 kg
3	Small	Greater than 2 kg and equal to 25 kg
4	Medium	Greater than 25 kg to 150 kg
5	Large	Greater than 150 kg

Source: DGCA Guideline "Civil Aviation Requirements"

For flying and operating Nano category drones, neither registration nor permission is required. For those in Micro or above categories, on the other hand, drone operators are required to register via the Digital Sky portal.

Register Drones

After registration of user with Digital Sky, the user needs to register drones. To register drones, a UIN for Drones needs to be obtained with the submission of the following documents:

- Equipment Type Approval from the Wireless Planning and Coordination (WPC) Wing
- OEM Certificate
- Security documents from the Ministry of Home Affairs (MHA) or copies of any two IDs (Passport, Driving License, Aadhaar ID number)
- Specification of Unmanned Aircraft System (UAS) and applicable manuals.
- Any other supporting documents deemed necessary

Source: DGCA RPAS Guidance Manual

The user needs to fill the form with valid credentials and make the payment for obtaining UIN. The user also needs to inscribe fire resistant identification plate with UIN affixed to drones. In case the drones are damaged, DGCA should be informed for cancellation of UIN, and the change of operator or contact details specified in UIN should be immediately notified to DGCA and all other concerned agencies. Fees required for UINs are shown below (Table 8.46):

Table 8.46 Fees Required for UIN

No.	Item	Amount (in INR)
1	UIN	1,000

Source: DGCA RPAS Guidance Manual

Receive Training

Drone operators will get appropriate training to understand the core requirements of drone operations as well as to improve operation skills.

Acquire Flight Permit

After drones and the operators are ready, an Unmanned Aircraft Operator Permit (UAOP) is obtained through the Digital Sky portal by seven days before actual commencement of drone operations/flights. For this, documents similar to what is required for the UIN are submitted. Fees required for UAOPs are shown below (Table 8.47):

Table 8.47 Fees Required for UAOP

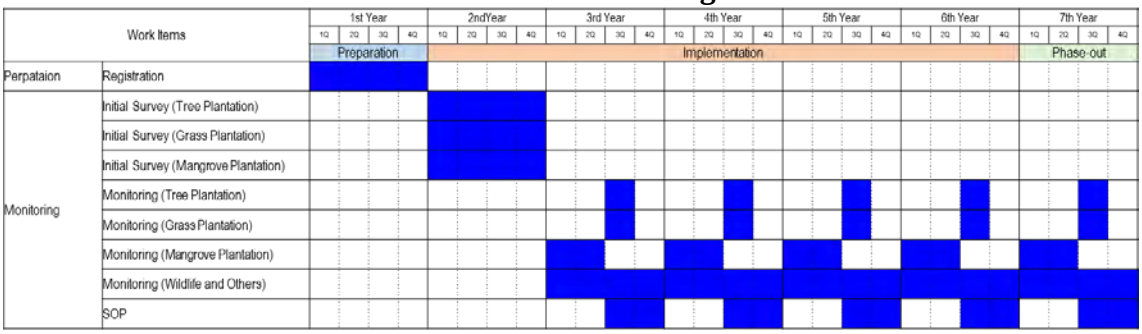
No.	Item	Amount (in INR)
1	UAOP License	25,000
2	Renewal of UAOP License	10,000

Source: DGCA RPAS Guidance Manual

Drone-Based Monitoring

After all of the preparation work is completed, drone-based surveys will be implemented periodically to understand spatial changes over the Project period. Data or images collected by a sensor mounted on drones will be orthorectified and superimposed on the base dataset for change/progress monitoring. The monitoring team will be composed of the drone expert (the leader), division-level GIS operator, and range-level officers. The drone expert and division-level GIS operator will prepare monitoring reports after each visit for future reference. Drone-based surveys will be conducted at first at the preparation phase of monitoring; after the monitoring has started, drone-based surveys will be conducted every November over the Project period. For the mangrove plantation, to fix the baseline for future monitoring and evaluation, an initial survey will be carried out, especially between August and September. After the initial survey, the target mangrove plantation sites will be periodically surveyed every six months. Besides, drones will be used for monitoring such objects/activities as wildlife animals and their habitat, forest fires, illicit felling, and encroachment as needed on a trial basis. Table 8.48 illustrates a tentative drone-based monitoring schedule for three types of plantations (tree plantation, grass plantation, and mangrove plantation) as well as on-demand monitoring activities throughout the entire Project period.

Table 8.48 Tentative Drone-Based Monitoring Schedule for Plantations



Source: JICA Survey Team (2019)

For other activities, such as the monitoring of illegal activities and patrolling, drones will be operated on demand. In addition to drone-based surveys, satellite RS will be also utilized. Satellite imagery with high spatial resolution will be supplementary to classifying target land cover and land use types, as well as temporal changes. Because it is not always easy for surveyors to cover wide target sites using only drones, this will help surveyors narrow down the target areas for drone-based surveys.

To complete the above Project activities, drone-based surveys will be implemented in different places across the state, and this will require a lot of travel. To minimize travelling time and cost and increase the efficiency of operation and maintenance, it is important to select an appropriate implementation structure. Table 8.49 summarizes the pros and cons of establishing regional hubs for drone operation and maintenance. This implies that outsourcing companies that can set up regional operation centers will be preferred.

Table 8.49 Characteristics of Establishment of Regional Hubs for Drone-Based Surveys

		With Regional Hubs	Without Regional Hubs
Operation	Pros	• Traveling time is minimal, and surveys can be started quickly. • Localized operations can be conducted at demand. • Cooperation with other monitoring systems (e.g, the high-tech monitoring unit in Sasan Gir) can be established. • Opportunity to operate drones (including test flights) may increase.	• Data management can be centralized. • Qualified drone operators can work at the headquarters.
	Cons	• Qualified drone operators need to stay in each region separately. (Private vendors cannot be stationed in a remote office for long time.) • Command structure becomes complicated.	• Traveling time can be long, and surveys are started late.
Maintenance	Pros	• The amount of maintenance work can be shared.	• New office space is not required. • Drones can be repaired easily because of closeness to vendors.
	Cons	• New office space is required, and related costs increase. • The number of unused drones may increase depending on the work load.	• All maintenance work needs to be conducted at the headquarters.

Source: JICA Survey Team (2019)

Standard Operating Procedures (SOP)

The collected data and information will be organized in the form of a Standard Operation Procedure (SOP). The SOP will be used as a manual for Project interventions to provide systematic training for different officers. The SOP will be also developed to monitor the progress of Project activities and understand the outcomes from the Project. The SOP will include not only observations and information of target sites, but also photos taken on site at least at the beginning and end of the Project. The template will be discussed between key stakeholders in advance in order to maintain the usability of the SOP.

SC-4.5.1 (4) 4) Cloud Based Data Management and Monitoring

SC-4.5.1 (4) 4) Cloud Based Data Management and Monitoring is as proposed in the section 6.1.1 (2) of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2011).

At present, cloud services are commonly used for efficient data management in various sectors. In order to introduce cloud services and effectively manage data, it is important to understand characteristics of both on-premise and cloud-based environments. Table 8.50 shows the pros and cons of an on-premise server and cloud-based server.

Table 8.50 General Comparison of On-Premise and Cloud-Based Servers

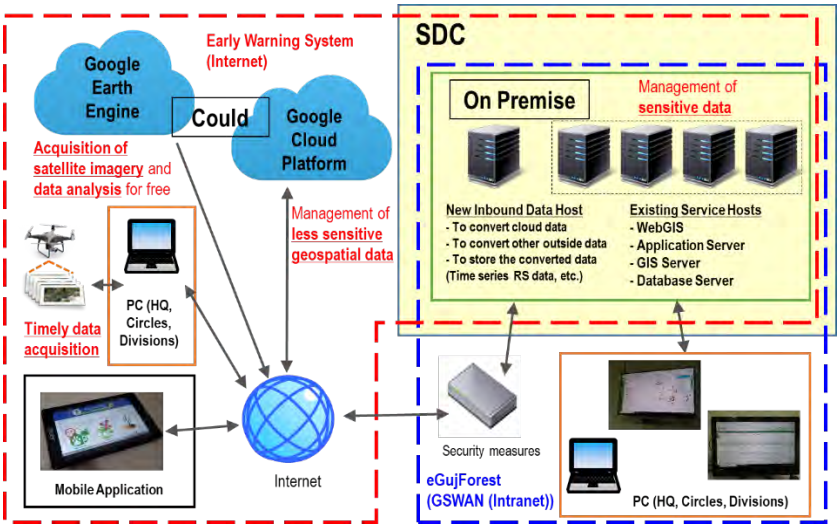
	On-Premise	Cloud-Based
Pros	• Data files can be managed by specified server (inside the GFD).	• It is not necessary to purchase hardware, including servers, and software. • Operational costs, including costs of human

	On-Premise	Cloud-Based
	• It does not depend on the conditions of the Internet environment (it can be used even in offline state.).	resources and electricity for maintaining and managing hardware and software, hardware management expenses, and security countermeasures, can be reduced. • Because it is ready-made and can be used for common purposes, development (customization) of the software may be unnecessary. • The latest software is always available, and the workload for maintenance, including upgrading software, can be reduced.
Cons/ Difficulties	• Software and hardware need to be purchased.	• A stable internet environment at all locations is essential. • Data files are managed by servers on the Internet (outside the GFD). • Depending on usage, high-spec PCs or memory capacity are needed. • Because it is ready-made, it is difficult to customize. • Payments need to be made periodically regardless of usage status.

Source: JICA Survey Team (2019)

All GFD data and applications are hosted at the SDC under the DST[87]. Currently four servers that are running are hosted at SDC, while eGujForest is run within the intra-network of GSWAN. While official data are maintained on the on-premise servers at SDC, cloud services will be additionally utilized for the Project. In particular, Google Earth Engine (GEE) will be introduced to search open source satellite imagery, process and analyze the imagery, and output the analysis results to be downloaded at later time. At the same time, Google Cloud Platform will also be introduced to manage data downloaded from GEE, and these large volumes of less sensitive data will be stored in the cloud separately from sensitive data at SDC. To convert the cloud-based data into data usable in the on-premise environment and store the converted data, a new inbound data server will be installed. For monitoring, relevant data at SDC and on Google Cloud Platform will be used in combination through the internet, and necessary information distributed to PCs and tablets at local offices. This will allow field staff to monitor urgent issues in a timely manner. Figure 8.17 illustrates the overview of cloud-based data management and monitoring.

[87] Draft IT Action Plan for the GFD



Source: JICA Survey Team (2019)

Figure 8.17 Introduction of Cloud-based Data Management and Monitoring

To achieve this data management system, the following activities need to be completed. In this regard, the following case example of GEE illustrates the basic work items.

Registration of Google Cloud Services

To utilize Google Cloud Services including Earth Engine and Cloud Platform, it is first required to create a user account and sign up. For this, users will go to a designated web page (Signup for Earth Engine[88]) to become an authorized user. Once authorized, the user will start Code Editor[89] to write codes for calling the Earth Engine API on GEE.

Import Data for Analysis (Satellite Imagery and Statistical Data)

Satellite imagery will be acquired by searching through the Earth Engine Data Catalog[90]. Other existing feature datasets, such as international census, watersheds, and protected area boundaries, are also available through the Data Catalog. At the same time, users will upload imagery data or other geo-referenced raster datasets in GeoTIFF format, up to 10 GB in size, from their local storage to the designated folders in the Google environment.

Develop and Run Data Processing Programs

Algorithms for georeferenced imagery and vector data stored in the Google environment will be developed and run in the Earth Engine. The Code Editor is available as an interactive environment for developing Earth Engine applications. Users will develop and run Earth Engine applications using the Code Editor.

Setting up of Server for Data Conversion

In order to share the data of cloud-based analysis results in the on-premise environment, a separate server exclusively for data conversion and sharing will be installed. This separate server plays an important role to convert the file type of cloud-based data in accordance with the existing system setting, store the converted data, and distribute the data to the existing system. This will also make it possible to reduce the cost for storing cloud-based data and further accept data managed by external

88 https://signup.earthengine.google.com/
89 https://code.earthengine.google.com/
90 https://developers.google.com/earth-engine/datasets

organizations.

Download Analysis Results Data to SDC Servers

Processed data and analysis results data will be downloaded to servers hosted in the SDC in order to make the data available in the existing system. For the SDC side, a new module for the visualization of GEE analysis results data will be developed, and the training for its operation and maintenance will be provided. On the other hand, while maintenance fees are not required for GEE, cloud management fees for storage space to save GEE analysis results data will be required. Because this will vary depending on the volume of data, the cost will be estimated in advance by the Project Management Consultant (PMC) in consultation with the PMU.

Maintenance and Support

The first year of the Project will be regarded as the trial period for a prototype system. At the time of introduction, introductory training for developers will be organized, and system introduction manuals and user manuals will be prepared. The duration of maintenance and support period will be discussed with the GFD. When a problem with the system occur during the maintenance and support period, the system will be fixed immediately. At the end of the period, based on the outcomes from the initial training and results of the system operation, future improvement plans will be organized.

SC-4.5.1 (4) 5) GIS/ MIS Enhancement

SC-4.5.1 (4) 5) GIS/ MIS Enhancement is as proposed in the section 6.1.2 of the Final Report of the Preparatory Study for Project for Ecosystem Restoration in Gujarat (Jan., 2020).

Equipment Procurement

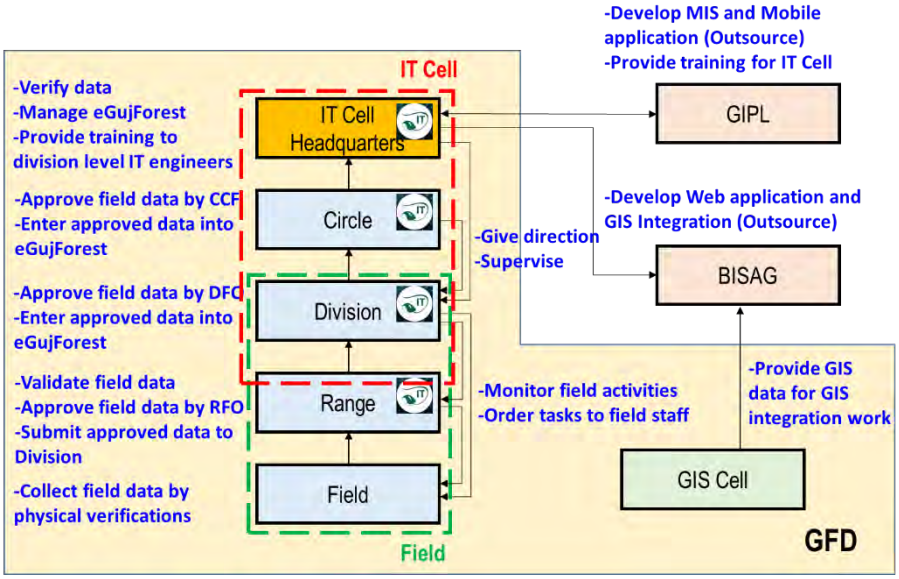
Although GIS and MIS play a key role in the proposed Project activities and their objectives such as spatial visualization, documentation of progress, and long-term impact assessment, the internal GIS capacity of the GFD is limited, and it is not feasible to smoothly implement the activities and also achieve the objectives under the current infrastructure conditions. To increase its GIS capacity, the GIS Unit will be set up with some additional hardware and software for the smooth implementation of Project activities. For instance, drones will be purchased for plantation monitoring and leased to outsourcing companies. Tablets will be distributed to field staff members at range levels or below. High-spec workstations will be used by GIS/RS operators to process the large volume of data. Other equipment such as Differential GPS (DGPS), GPS, plotters, scanners, MFP, and ADF will be also the part of equipment proposed for the GIS Unit. In the context of the Project, because of the current policy made by the PCCF, it is possible that cost-free GIS and RS software and satellite imagery will be also procured as necessary.

In order not to delay the commencement of Project activities, it is important to examine the time required from the order of equipment to its delivery and start the procurement at the initial stage of the preparatory phase. The GFD used to inform Gujarat Informatics Ltd. (GIL), the nodal agency for IT development in the state established by the Government of Gujarat, of the quantity of equipment, and then GIL used to prepare specifications for bidding. In the Project, however, the set of equipment will be also procured from the Government e-Marketplace (GeM). GeM is the National Public Procurement Portal and an end-to-end online marketplace for the central and state government ministries/departments, Central and State Public Sector Undertakings (CPSUs and SPSUs), autonomous institutions, and local bodies, for the procurement of common use goods and services. The portal is run by the GeM Special Purpose Vehicle (SPV), which is a Section 8 (Non-Profit) Company registered under the Companies Act, 2013. The GeM SPV operates, monitors, and

supervises all of the business transactions on the portal through the managed service provider, as per roles and responsibilities defined in the legal framework document available on the GeM portal. The Government of Gujarat signed a Memorandum of Understanding (MoU) with GeM on 11 July, 2017[91] for the use of GeM facilities by state government offices.

Expansion of eGujForest Operation

As of October 2019, eGujForest operation by the IT Cell is conducted between the divisions, circles, and headquarters, while field data collection is conducted between ranges and divisions. At the same time, GIPL and BISAG are involved in the development work for eGujForest. The current relations between these agencies, as well as their roles and responsibilities, are summarized in Figure 8.18.

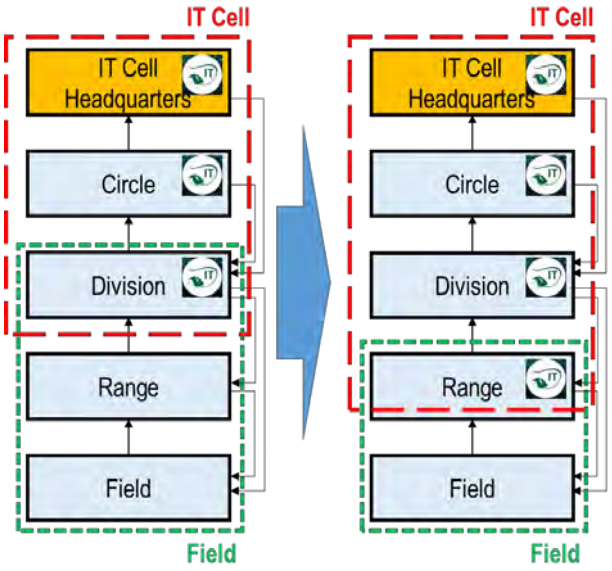


Source: JICA Survey Team (2019)

Figure 8.18 Current Operation Flow and Roles and Responsibilities for eGujForest

In the Project, the operation flow will be modified. While divisions are a data entry point for eGujForest at present, ranges will become a data entry point as long as GSWAN connectivity is available (Figure 8.19). As a result of this shift, paper-based data flow from ranges to divisions will be reduced, and the efficiency of the entire system will be improved. This shift further supports the expansion of GIS operation down to division offices and tablet-based monitoring by range and field officers.

91 https://gem.gov.in



Source: JICA Survey Team (2019)

Figure 8.19 Before (Left) and After Shift (Right) of eGujForest Operation Flow

Development of New Modules for eGujForest

A total of 21 modules have already been developed in eGujForest, and new modules are also currently under development on demand. Annexure 8.9 provides existing modules and sub-modules in eGujForest, as well as their purposes, in detail. In the Project, new GIS modules for eGujForest and eVan, an ICT tool, will be developed.

New GIS Modules for eGujForest

From the point of view of GIS, considering the requirements for Project activities, the following modules will be added to the existing system (Table 8.51). For this, it is required to thoroughly review the existing system and ensure compatibilities between the existing system and new modules.

Table 8.51 Indicative List of Proposed New GIS Modules for eGujForest

No.	Module Name	Descriptions
1	GPS data processing	• A module for the downloading of GPS data and post processing for the standardization of data can be added to application. These data can be used for preparing such maps as plantation area maps, Project area maps, and maps for location of interventions.
2	Image repository	• In place of open image repository, an ortho-rectified satellite image repository can be added to application with a function to superimpose the GPS data and in-built time series data for uniformity in maps at field level and time series analysis. • Repository of NDVI images and change analysis images for user-defined analysis for specific area/project site can be added.
3	Map composition	• A module for map composition can be added to the application for high quality maps, with labels, legends, scale, index map, grids, and texts.
4	Visualisation of cloud-analyzed data	• A module for preprocessing and loading cloud-based analysis data to eGujForest

Source: JICA Survey Team (2019)

Improvement of Mobile Applications

In the Project, eVan, a type of ICT tool, will be developed based on the existing mobile applications. eVan is an application for Android-based mobile phones and intends to connect local people and GFD officers in a timely manner. This will also connect local rescue and wildlife experts with local people and GFD officers to address emergency situations together by exchanging and sharing information and eventually improve the overall forest management. Table 8.52 shows indicative eVan features. Considering existing features of the current mobile applications, these features will be further discussed with the GFD after the start of the Project.

Table 8.52 Indicative List of eVan Features

No.	Indicative Features
1	One-time registration (free of cost)
2	Access to educational material
3	Attendance facility
4	Voice call facility
5	Message facility
6	Location capturing
7	Emergency call service
8	Rescue service connection
9	Toll free service

Source: DPR

SC-4.5.1(5) Annual Strategy Planning & Review Workshops

The strategy planning and review workshops will be organized annually at Circle and State-level. At several stages during project implementation, it will be necessary to have consultations on various generic issues and areas where project may require views, collaborations and for sharing successes as well. This will also provide a good opportunity to PMU to listen to learning and best practice from outside experts, engage with like-minded people with shared interests, inspire and generate ideas and new thinking, to form new partnerships and networks, to get results and disseminate messages face to face, to initiate action and collectively bring about change, to encourage public-relation and media coverage, and to celebrate achievements.

At Circle level one day event will be organized, whereas at state it would be a two days event. PMU will be responsible to organize state level annual workshop every year and will also follow-up with the Circles for proposing Circle Annual Planning and Review Workshops every year. PMU will also guide Circles to prepare structure and agenda for the workshops.

Responsibility to organize this annual event at Circle level will be with the CF/ CCF and will be assisted by subordinate staff as well as the CCSU staff. These events will be planned preferably during January/ February in which representatives of community institutions, Resource Organizations, NGOs, PMU and PMC representative and divisional/ range level project and forest staff will participate. The event at Circle level would be chaired by the CF/ CCF.

During the Circle level workshops, Circle heads will review the annual progress. Representatives of divisional/ range offices will make presentations on achievements vis-à-vis annual plan. Performing community institutions will share their experiences and achievements vis-à-vis annual implementation plan. The efforts of performing community institutions will be recognized by way of some citations/ awards system. The workshop will also discuss next year project planning and will take inputs from participants for preparing subsequent annual plans. The Circles will prepare and submit a report on the template circulated by the PMU within a reasonable timeframe soon after

completion of the event.

State level event will be organized after the Circle-level workshops are concluded. Synthesis and learnings of the workshops will be compiled by the PMU and published.

SC-4.5.2 Impact Assessment

SC-4.5.2 (1) Socio Economic Survey

a. *SC-4.5.2 (1) a Baseline/ SC-4.5.2 (1) b: Impact Surveys*

Baseline survey will be undertaken in the project areas prior to initiation of intervention to capture the socio-economic profile of the beneficiaries residing in project villages. Information from representative target groups and project areas on identified parameters and variables will be collected by a qualified and credible agency. Based on the actual situations and after studying the field conditions, the Terms of Reference for baselines and impact surveys will be developed by PMC in consultation with PMU. The ToR and procurement details will be shared with JICA for information and feedbacks. The baselines should necessarily be completed during the preparatory phase of the project.

Randomized sampling design will be followed for selection of project sites/ areas or target groups. Baseline will also capture situations in control villages/ sites, and data will be utilized as reference for making comparisons during evaluations exercise. The baseline should get completed for all batch sites during first year of project initiation.

This baseline data set will be utilized for future comparisons to know the performance and impact on the socio-economic profile due to the project investments. The impact survey will be planned at terminal stage of the project.

b. *SC-4.5.2 (2) Thematic and Short Studies*

While the robust monitoring system planned under the project will be helpful to provide alerts or flagging concerns to the project management during implementation, however, there will be some areas where in-depth analysis will be required to further understand the causes/ factors responsible for some situations or for getting not so satisfactory results through defined processes as envisaged. It may also happen that some project areas could be innovating and exceptionally performing well, and in-depth study will be desired to learn about the factors of success that could be utilized for further replication, adoption and dissemination. All such areas of interest could be identified from time to time by PMU based on the reviews and feedbacks from the field.

Thematic/ Short studies will be undertaken as and when required to understand the issues and impact of certain interventions/ processes during the project implementations as well as document best practices and innovations identified in the project. These studies will be for 3-4 months durations and could be planned from 2nd year onwards. In all 5 such studies could be undertaken during the project duration. The ToR and procurement details should be shared with JICA for information and feedbacks.

SC-4.5.3 Audit

a. *SC-4.5.3 a Statutory Financial Audits*

Project will provide support to undertake annual statutory financial audits of the funds provided to various implementing agency during a financial year. As applicable, the annual audits of PMU could

either be undertaken by CAG or through a by qualified and credible CA firm.

b. *SC-4.5.3 b Concurrent Audits*

Beside the annual Statutory Audits, PMU will also institute a system of undertaking concurrent audits every six-months to keep close track of funds and its utilization, and also capacitate various project offices to maintain systematic and proper records as per the JICA norms. Either, it could be carried through the in-house capacities in PMU or a qualified and credible CA firms experienced in auditing externally aided projects can be engaged for concurrent audits.

SC-4.5.4 Grievance Redressal, RTI and Public Disclosure

In a democratic set-up it is obvious to receive grievances, and thus during the project implementation there may be instances where there are disagreements and dissatisfactions at various level of operations. To ensure proper redressal of grievances under the project there will be a system 'public hearing' at circle office. A register will be placed at the Circle level to record the grievances and timely provide adequate solutions.

Right to Information Act (RTI) has created additional opportunities for enhancing transparency and accountability. Thus, the key elements of strategy that PMU will work on must include:

- Enhance disclosure of information utilizing project website;
- Facilitate NGO/ civil society involvement for social intermediation and other support;
- Develop a credible system to handle comments, suggestions and grievances;
- Define clearly incentives, benefits and remedies available; and
- Develop monitoring indicators for compliance to the above.

8.5.6 SC-4.6 Environment and Social Consideration

SC-4.6.1 Preparation of E&S Manual and Monitoring Plan

PMU will engage an environment and social consideration specialist for a short term during the preparatory phase of the project to develop an Environment and Social Consideration Manual and Monitoring Plan.

SC-4.6.2 Monitoring

Concerned project staff will undertake environment and social monitoring as per the monitoring plan.

SC-4.6.3 Training

Training for the concerned project staffs at all levels on social and environmental consideration will be carried out by the resource person engaged for undertaking SC-4.6.1.

The topics to be covered will include: project policy and safeguards, National Environmental Policy and Acts, planning and conduction of environmental assessments; environmental monitoring and auditing; cultural and socio-economic environments; project management with a social consciousness; and protecting the economic livelihood of local communities

8.5.7 SC-4.7 Strengthening of Project Implementation System

As per the institutional arrangement of the project, the number of personnel to be placed at PMU, CCSU, RMU are estimated. Taking into consideration of the technical and administrative requirement, the qualification of the personnel was taken into consideration in estimating the unit rate. In case, the GFD officer is to be placed on deputation basis, the official rate was adopted to arrive at the cost.

The mobility facilities are also adequately budgeted for since the project areas are spread all across the state.

8.5.8 SC-4.8 Publicity and Communication

SC-4.8.1 Communication and Publicity

The project will make sufficient efforts for developing knowledge material, undertaking awareness amongst the target group and stakeholders, strengthening communication, education, publicity and cost-effective means for information dissemination and wider circulation. Communication and publicity will be very important and integral element of the project design, as it will be very vital for creating awareness environment as well as for sharing knowledge and information with the stakeholders for efficient implementation, and to facilitate delivery of planned results.

Training, Research and Communication (TRC) wing of the GFD is responsible for forestry research, education, training, awareness, orientation, etc. It has units/divisions for research with field station in various parts of state. TRC also manages training institutions for Range Forest Officers and Junior field staff of GFD. It has a campus at Gandhinagar with training facilities and a hostel. Short refresher and orientation program are conducted at the facility. TRC also has a unit for communication and publicity. For the entire forest department publicity & communication is looked after by a Deputy Conservator of Forests, Publicity & Liaison and Deputy Conservator of Forests, Communication reporting to Additional PCCF Training, Research and Communication. It has support of a Range Forest Officer.

Thus, the PMU will make efforts engaging TRC to refine and firm-up communication and publicity strategy during preparatory phase. The Communication and Publicity Plan (CPP) will be prepared by the TRC and will serve as roadmap for undertaking communication and publicity activities during the project implementation period. The communication strategy of the project will incorporate lessons learnt from GFDP II and will serve as a pathway to achieve project goals, objectives and results. The key strategies that will be adopted in the project are:

- Information, education and communication (ICT) methods for public awareness;
- Engaging NGOs/ civil societies and volunteers for nature conservation including wildlife;
- Engaging school children through Eco Clubs for working on nature conservation and learning;
- Establishing Bio- Parks and associate knowledge material for mass awareness; and
- Strengthening of TRC and associate institutions e.g. GEER Foundation, to steer these initiatives.

Approach for Interventions planned under Communication and Publicity

The awareness activities will be implemented by multiple agencies. The communication unit of the GFD will coordinate the entire program under supervision of the APCCF, TRC. Some activities will be implemented by the field functionaries while other activities will be by the communication unit and by the GEER Foundation. Expert agencies will be engaged as required for implementing the activities.

Table 8.53 Key Strategies for Communication and Publicity

Interventions	Key activities/ purpose	Key responsibility
Awareness generation		
Information, education and communication	Newsletter in local language, rallies/ road show, web-based information dissemination, webinars/ seminars, short films/ video, local competitions – quizzes, painting, posters etc., use of social media – Facebook, Twitter, Instagram etc.	PMU and associate field offices/ institutions
Nature education camp	Developing of modules, training of trainers, Camps	PMU/ Resource Organizations/ NGOs
eVan	Digital mobile app for human-wildlife conflict management and nature conservation	PMU/ GFD-TRC
Distance learning	Modules on ecology, flora and fauna etc.	PMU/ GEER Foundation
Van Chetna Kendra	Digital distance learning tool for nature conservation	PMU/ GFD-TRC
NGOs/ Volunteers	Awareness generation/ awards for exemplary contribution for nature / wildlife conservation or small grants	PMU and associate field offices/ institutions
Eco-clubs	School children to work on awareness generation on nature conservation; will get orientations through talk by experts, film shows, essay writing and debating etc.	PMU/ GEER Foundation
Botanical Gardens	Raising public awareness on flora/ nature conservation	PMU/ GFD-TRC
Strengthening of TRC	Support for human resources and equipment/ mobility	PMU/ GFD

Source: JICA Survey Team (2019)

SC-4.8.2 Support for GFD on Information, Education and Communication

Set of activities that offer information and education and raise awareness among common masses is proposed to propagate the cause of conservation. These may include:

- Web based information dissemination
- Road shows
- Local state level competitions i.e., quiz, poster making, debating etc may be promoted as part of awareness campaign. This may be for landscape communities in the HWC landscapes and also for civil society at state and district levels.
- Publication of newsletters in Gujarati: A quarterly newsletter for wide circulation amongst rural communities including forest staff is proposed.
- Opportunity for webinars from experts for information dissemination, discussion and education.
- Use of social media platforms like Facebook, twitter, Instagram etc. to provide for dissemination of information and raise curiosity and meet the information need.
- Use of audio-visual media as detailed in component of Van Chetna Kendras.

CHAPTER 9. INSTITUTIONAL STRENGTHENING

9.1 Institutional Arrangements

The overall goal of the project is to conserve ecosystems in the state by sustainably managing the coastal systems, critical inland ecosystems that includes wetlands, grasslands and degraded forests, and strengthen measures for human-wildlife conflicts mitigation. Project area considers contiguous landscapes where ecosystem properties and the underlying ecological and socio-economic share common characteristics. Thus, the logical approach for evolving the institutional arrangements for the proposed project flows from the project goals, purpose/ objectives and planned activities to be implemented.

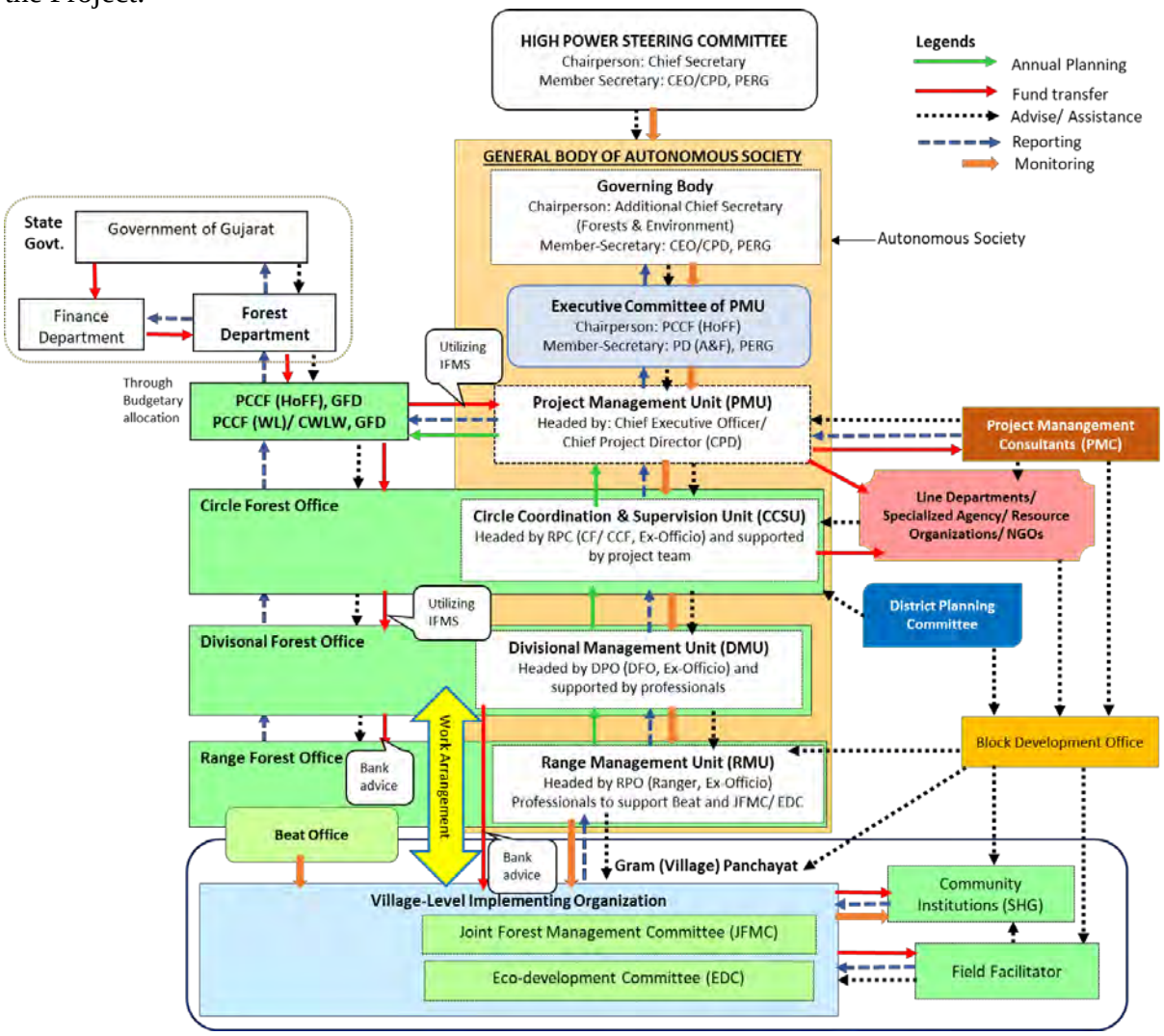
The proposed arrangements consider the institutional frameworks adopted in the on-going JICA projects as well as the JICA project that has been implemented by the forest department in the past. In addition, for having synergy with the Gujarat Forest Department (GFD), the arrangements have been further adjusted and harmonized with the regular departmental functioning and systems. Views and suggestions from forest officials, the survey team members, and other stakeholders are also considered for the proposed arrangements. The table below shows the detailed key institutions and stakeholders considered for the institutional arrangement.

Table 9.1 Key Institutions/ Stakeholders

Organization	Description	Level
HPSC	High Power Steering Committee	State government
GB	Governing Body	PMU
EC	Executive Body	PMU
PMU	Project Management Committee – autonomous society to be established for the project	GFD HQ
CCSU	Circle Coordination & Supervision Unit	Circle
DMU	Divisional Management Unit	Division
RMU	Range Management Unit	Range
PMC	Project Management Consultants	PMU
DPC	District Planning Committee	District
BDC	Block Development Office	Block
GFRF	Gujarat Forestry Research Foundation	
GEER	Gujarat Ecological Education and Research Foundation	
TRC	Training, Research and Communication Wing of GFD	
GFD	Gujarat Forest Department	
GP	Gram Panchayat (village level)	
PS	Panchayat Samities (Taluka level)	
PO	Peoples Organization	
JFMC	Joint Forest Management Committee	
EDC	Eco-development Committee	
SHG	Self-help Group	
RO	Resource Organizations	
NGO	Non-governmental Organization	

Source: JICA Survey Team (2019)

The figure below shows the detailed institutional arrangement envisaged for the implementation of the Project.



Source: JICA Survey Team (2019)

Figure 9.1 Institutional Arrangements for PREG

The Project Management Unit (PMU) of the project will operate as autonomous registered society within the Gujarat Forest Department (GFD), 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 Steering Committee (HPSC) created for the project will act as highest decision-making body for the project at state government level, and will not form part of the autonomous society. The Governing Body (GB) and General Body of the project will be the decision-making bodies for the project within the Society as per the provisions under the Societies Registration (Gujarat Amendment) Act, 1965 as applicable in Gujarat.

To support project implementation at the field level, PMU will create and coordinate with set of offices viz., Circle Coordination & Supervision Units (CCSUs), District Management Units (DMUs) and Range Management Units (RMUs) those will work as extended arms for the PMU under society mode. The Beat Office with its in-charge will work as a link office for RMU and contact between the project and village level institutions. The Beat Offices are in proximity with the JFMCs/ EDCs, and could be further strengthened for efficient coordination and follow-up/ supervision.

The PMU including CCSUs/ DMUs and RMUs will assist and play facilitative roles, and will source funds for project implementation. The main responsibility for project implementation will remain with the regular structure of the forest department, and in no way the project offices created within autonomous society will duplicate or substitute roles and responsibilities of the forest department. The existing circle/ divisional and range offices will operate within their respective jurisdictions for the project implementation. The key institutions in the arrangements will be the divisional forest offices and the JFMCs/ EDCs. PMU will regularly coordinate with the Chief Wildlife Warden for implementing the wildlife component activities through the established institutional arrangements under the project. In addition, as a part of project design, PMU will also be supported by team of professionals engaged by PMU as Project Management Consultants.

As required, Resources Organizations/ Support Agency and the NGOs will be engaged by PMU or by the CCSUs to support divisional and range offices that will be equipped with set of professionals to support respective offices and village level institutions in field implementation. The village level community institutions will also be supported by field facilitators, to be identified from within the respective project villages by the village level institutions.

The statutory institutions – Gram Panchayats and Panchayat Samities will be involved during community mobilization and planning processes, and will be shared with project information for bring in more synergy and transparency in project operations.

For facilitating convergence, the project teams at respective levels of operations will coordinate with state/ district administration and line departments as well as block development office. At district level, District Planning Committee (DPC), and at block level Block Advisory Committee (BAC) will be the institutions to facilitate convergence and coordination.

PMU as a society will have a comprehensive Operation Manual that will prescribe guidelines, policies, protocols, procedures and rules on finance, accounting, administration, management for implementation of the Project. The project level procedures and protocols will be required for staff on deputation, as well as for measuring the project results. The Operation Manual will necessarily policy on the revolving funds. The Operation Manual will convey the internal policy of the PMU to manage the project and will be approved first by the Governing Body (GB) and subsequently by High Power Steering Committee (HPSC) during first year of operations of the project prior to adoption. PMU will evolve mechanism for tracking the project implementation, reporting and fund flow, for the project interventions.

The GFD and PMU will have a formal arrangement to vest the project management responsibilities to society (i.e. PMU), and after project completion GFD will own responsibility of project assets and institutions to further support and maintain under routine forest department functioning. Later, 1½ years prior to completion, Phase-out plan will be developed and agreed between the two entities.

9.2 A. Key Managerial Features of Institutional Arrangement

Following are key managerial features to be adopted and adhered by the Project Management Unit (PMU) - as society, and by the Gujarat Forest Department (GFD)/ state to make the institutional arrangement effective, and to function within the framework of government systems.

<u>Budgetary Provision</u>

GFD will take all necessary measures to secure the funds required for smooth implementation of the project, and there will not be any delay in implementation due in insufficient budgetary provisions of

the annual project cost including state share. For fund allocations, a sub-budget line already created in the state budget line of GFD during earlier Japan International Cooperation Agency (JICA) assisted project could be utilized for this project.

Auditing

According to the existing financial procedure (read General Financial Rules 2005) the state grants to any registered society extended from the consolidated funds of state/ GoI are liable to Comptroller and Auditor General (CAG) audits. The Comptroller and Auditor General of India (CAG) derives such powers from the Constitution and the CAG's Duties, Powers and Conditions of Services (DPC) Act, 1971, and its subsequent amendments. Offices of the Accountants General in the states form the part of these formations.

As per the rules, Utilisation Certificates (UCs) should be submitted within 12 months of the closure of the financial year by the institution or organization concerned to the Head of Department concerned and after verification, these should be forwarded to the Accountant General. Therefore, financial audits will be carried out for each financial year by the Comptroller and Auditor General (CAG).

Also, according to the Society Registration Act, a society is required to have a statutory annual audit conducted by a Chartered Accountant (CA). Thus, annual statutory audits by CA will be carried out for the accounts of PMU, and may further investigate the project accounts at other operational levels as required. To establish internal financial discipline and control, concurrent audits will be instituted by the PMU – quarterly or biannually. Such concurrent audits will be regularly reviewed by the Governing Body (GB) of the PMU.

Compliances of General Financial Rules and General Rules of Business

In order to have smooth compliances with General Financial Rules (GFR) and General Rules of Business (GRB) of Government of Gujarat, PMU must induct experienced Finance Officer from the Directorate of Accounts & Treasuries (DAT) cadre who should have exposure and orientation of managing externally-aided funds. In case state government is not able to provide such eligible officer, equally competent and experienced person from GFD could be deputed.

The personnel in position will facilitate submission of Statement of Expenditures (SOEs) to JICA through Central Aids, Accounts and Audit Division (CAAA) under Ministry of Finance, Department of Economic Affairs (DEA) and Ministry of Environment, Forests and Climate Change (MoEF &CC), and to the state government. S/he will ensure better coordination with the state Finance Department for smooth project implementation, as well as with the CAAA and JICA for getting clearance on reimbursement claims in timely manner. Female candidate in state cadre or GFD will be encouraged to join on the position.

Fund Flow and Accounting Procedures

The PMU will be utilizing Integrated Financial Management System (IFMS) already established and operational at state level. IFMS is an integrated solution which provides consolidated and consistent information about the state government expenditures and receipts across the state. IFMS integrates the major functions carried out by Finance Department, Directorate of Accounts and Treasury, Directorate of Pension and Provident Fund, Treasury and Sub Treasury offices, Examiner Local Fund district offices and Drawing & Disbursing offices spread across the state. IFMS solution addresses the issues of time lag and information asymmetry present in the treasury system. It also helps in consolidation and aggregation of state finance data with effective information dissemination in a cost-effective and sustainable manner. IFMS solution has been developed and maintained by Tata

Consultancy Services Ltd. (TCS).

The budget allocations will flow from the State Government to GFD to provide the funds further to PMU as well as to the project divisions through respective Circles in the project without any delays as per the annual budget and plan approved by the GB and subsequently by the High-Power Steering Committee (HPSC) adopting IFMS. As per the institutional arrangement, the funds received by the GFD from the state will be given to the PMU for each financial year.

Following the approved Annual Plan of Operation (APO), the GFD through its sectoral heads as per the advice from the PMU will also ensure transfer of the funds to the Divisional Management Units (DMUs) through Circle Coordination & Supervisions Units (CCSUs) that will further provide the funds to the Range Management Units (RMUs), and the JFMCs/ EDCs – the key implementing institutions through bank transaction.

The PMU/ GFD will have no rights to divert the funds received for the project for any other purposes or other projects.

PMU will open a bank account exclusively for the project, and will be managed by the CEO/ Project Director as per the bye-laws and Rules & Regulations of the society. Since, the PMU will adopt the IFMS to receive funds for its own expenditures as well, PMU may have choice to adopt a unified accounting procedure based on double accounting system, if there is a requirement under JICA assisted project. If required, PMU may create finance and accounting procedures for its operation.

Process of putting forward budget request, fund flow and submission of Statement of Expenditures (SOE)/ Utilization Certificates (UC) by various levels spending the project funds will need to be well established. If required, sufficient capacity will be built for the relevant project staff.

Operation Manual and Annual Plan of Operation (APO)

To facilitate uniform and smooth implementation of the project across all level of operation, PMU will prepare Operation Manual to list its business rules and protocols. PMU will ensure its approval from GB/ HPSC during preparatory phase, and will conduct series of workshops for dissemination and public disclosure. If need arise, the approved Operation Manual could be reviewed by PMU at mid-term of the project (after 4th year), and amended Operation Manual could be utilized for remaining project period. JICA will be informed for such amendments in the Operation Manual.
PMU will prepare Annual Plan of Operation (APO) for each financial year starting from first year, and get it approved by the HPSC prior to commencement of new financial year. PMU will provide guide, facilitate and capacitate the project staff at all levels, and make efforts to ensure that the plans are prepared in timely manner through a consultative process starting from the lowest level of project implementation.

Structural Integrity

The basic purpose of the society (PMU) is for the implementation of the JICA assisted project, and thus there is no intention of creating a dual administrative structure within the forestry sector in the state. The existing charges and authorities of GFD will remain intact regardless of the creation of PMU as an autonomous society. In case, the function of the PMU ceases after project completion, the assets and infrastructure created under the project will be transferred to GFD, or any other institution as decided by the state government through provisions in the bye-laws of the society as well as following the Phase Out strategy agreed with the GFD/ state government. This will ensure the organizational integrity of the PMU (Society) with the GFD.

Procurement

Procurement of goods and services for the Project shall be implemented in accordance with the "Handbook for Procurement under Japanese ODA Loans" dated April 2012 and selection of consultants shall be in accordance with "Guidelines for Employment of Consultants under Japanese ODA Loans" dated April 2012. The PMU may make use of the state procurement rules, but JICA's guidelines shall overrule whenever such procurement rules are in conflict.

The procurement plan for the first year of the project implementation has been indicated in the Project Implementation Plan. The procurement plan will be updated at least annually or as required, to reflect the actual project implementation needs and improvements in institutional capacity.
In case vehicles are not procured, the allocations for purchase of vehicles could be utilized for hiring vehicles during the project implementation period.

Revolving Fund

PMU will develop elaborate policy and system of accessing and utilizing of revolving funds, if created under the project. The policy will also spell to deal with the interests earned out of such revolving funds. The guidelines based on the approved policy will be published and disseminated amongst stakeholders, to facilitate access to these funds.

Inter-sectoral Convergence: District Planning Committee (DPC)

Inter-sectoral linkages will be ensured through the existing institutions in place at state, district and block level. The 74th Constitutional Amendment Act mandated to establish of District Planning Committees (DPCs) for consolidating plans prepared by Village Panchayats and ULBs in the district into the draft district plan.

The idea is to strengthen existing institutional mechanism rather creating an additional system at district. DFO in a division is already coordinating with district administration on regular basis for issues related with Forest Conservation Act (FCA), Forest Rights Act (FRA), forests related issues, MGNREGS program etc.

Adopting the system in place for inter-sectoral linkages, PMU at state level will coordinate with the Planning Department, whereas at the district level the officer at Circle Coordination and Supervision Unit (CCSU) will assist and coordinate with the steering committee chaired by District Collector. The officer at DMUs will closely coordinate and interact with the district administration for inter-sectoral convergence. Similarly, officer at Range Management Units (RMUs) will assist and coordinate with Block Level Planning Committee whose Member-Secretary is Block Development Officer.

9.3 High-Power Steering Committee (HPSC) of the Project

High Power Steering Committee (HSPC) will be established within the State Government at the initiation of the project implementation, and will act as the highest decision-making body for the project at the state level. HPSC will be outside the autonomous structure of the Society established at state level for project implementation.

The Chief Secretary will chair the HPSC meetings, while Secretaries in-charge of line departments will be member to the committee, whereas the Chief Project Director of the Project for Ecosystem Restoration in Gujarat will be the Member-Secretary. As per the current responsibilities of the state government Secretaries, the composition of HPSC is given in the following table:

Table 9.2 Composition of High-Power Steering Committee (HPSC) for the Project

Sl. No.	Position in HPSC	Rank of Officers and Department
1	Chairperson	Chief Secretary
2	Member	Additional Chief Secretary, Finance Department
3	Member	Additional Chief Secretary, General Administration Department
4	Member	Additional Chief Secretary, Forests & Environment Department
5	Member	Additional Chief Secretary, Revenue Department
6	Member	ACS/ Principal Secretary, Agriculture & Cooperation
7	Member	ACS/ Principal Secretary, Water Resources Department
8	Member	Principal Secretary, Panchayats, Rural Housing and Rural Development
9	Member	Principal Secretary, Tribal Development
10	Member	Secretary, Science and Technology
11	Member	PCCF & HoFF, GFD
12	Member	Chief Wildlife Warden, GFD
13	Member Secretary	Chief Project Director PERG
14	Special Invitee	Representative of MOEF & CC
15	Special Invitee	Representative of JICA, India

Source: JICA Survey Team (2019)

1) Frequency of Meeting and Representation

HPSC will meet at least once in six months or more frequently if the situation arises in a year, particularly during preparatory phase of the project. In case the members are not available on the day of the HPSC meeting, they may nominate senior rank officers in the state government/ state department as their representatives to attend the meetings with authorization for decision making.

2) Agenda Circulation & Quorum

A minimum of 2/3rd members will form the quorum for the HPSC meetings. Agenda of the meeting and Proposals will be circulated by the Member-Secretary well in advance to all members, at least seven days ahead of the meeting date. The proceedings of the HPSC meetings will be circulated to all the members/ attendees within reasonable timeframe, after the meeting is concluded.

3) Roles & Responsibilities

HPSC will regularly oversee and review the performance of the project implementation and will be responsible for giving directions to the PMU for ensuring smooth and efficient implementation of the project. HPSC will pursue the matters relating to policy with the state government, and also facilitate inter-departmental coordination and convergence. HPSC will also be responsible to facilitate coordination amongst various line departments of the state and other agencies to help achieving the project goals. The roles and responsibilities of the HPSC will be as follows:

- Approve the Operation Manual including Financial Rules and Accounting Procedures, policies and guidelines etc.;
- Endorse annual plan of operation (APO) and annual budget of the project;
- Advise/resolve issues and problems related to financial flow from the state government to the

project, and with other government departments that are detrimental to the success of project;
- Facilitate convergence and coordination of project with other government departments;
- Suggest and endorse measures and actions to resolve issues raised by JICA, DEA, MOEF& CC or any other agencies related to the project;
- Take up policy related matters of the project;
- Will accord administrative and financial approvals/ sanctions of all individual procurement of goods & services amounting to INR 25 million & above.

9.4 Society mode for Project Implementation

For efficient management of a time-bound project a society will be created under the Societies Registration (Gujarat Amendment) Act, 1965. The autonomous society will be established during the preparatory phase of the project.

The Society: Project Management Unit (PMU)

The society will address and respond to the requirements of the project by framing bye-laws, memorandum of association, and constitution of the Governing Body and General Body. The bye-laws will necessarily include the clause on the amalgamation/ dissolution of society and asset transfer after the project completion.

The bye-laws of the Society will specify the frequency and the manner in which the meetings of the Governing Body and General Body shall be held. The Governing body should meet at least once in every three months, and General body should meet at least once in a financial year. Provision for convening special General Body meetings will also be made.

The GFD being main executing agency will first receive funds from the state government through budgetary provision, and pass on to the society (PMU - implementation unit of the project), as well as to the project divisions through circles as per the project's institutional arrangements.

Management of the Society: Project Management Unit (PMU)

The management of the society will be vested with the Governing Body that exercise and functions as may be conferred or imposed by the Act, the rules or the bye laws. The Society will have the General Body that will include all members of the Society.

4) Governing Body

The Governing Body will be highest decision-making body within the society. The Additional Chief Secretary (Forests & Environment) will chair the GB meetings, while sectoral heads and associated organizations will be member to the committee, whereas the Chief Project Director, PERG will be the Member-Secretary. PCCF & HoFF, GFD will be Vice chairperson in the GB. The composition of the Governing Body is given in the table below:

Table 9.3 Composition of Governing Body for PMU

Sl. No.	Position in GB	Rank of Officers and Department
1	Chairperson	Additional Chief Secretary, Forests & Environment Department
2	Vice Chairperson	PCCF & HoFF, GFD
3	Member	Chief Wildlife Warden/ PCCF (Wildlife)
4	Member	PCCF (Working Plan)

Sl. No.	Position in GB	Rank of Officers and Department
5	Member	Managing Director, Gujarat Livelihood Promotion Company (GLPC) Ltd.
6	Member	Head, Gujarat Ecological Education and Research Foundation (GEER)
7	Member	Head, Gujarat Forest Research Foundation (GFRF)
8	Member	APCCF (D&M)
9	Member	APCCF (Social Forestry)
10	Member Secretary	Chief Project Director, PREG
11	Special Invitee	PCCF & Chairperson, Gujarat Biodiversity Board
12	Special Invitee	Managing Director (GSFDC)
13	Special Invitee	Head, Gujarat Environment Management Institute (GEMI) Board
14	Special Invitee	Head, Gujarat Pollution Control Board (GPCB) Societies
15	Special Invitee	Head, Gujarat Ecology Commission (GEC)

Source: JICA Survey Team (2019)

5) Frequency of Meetings

The Governing Body (GB) will meet at least once every six-months (starting April) in a year, or more frequently if the situation arises, particularly during preparatory phase of the project.

6) Agenda Circulation & Quorum

A minimum of 2/3rd members will form the quorum for the GB meetings. Agenda of the meeting and Proposals will be circulated by the Member-Secretary well in advance to all members, at least seven days ahead of the meeting date. The proceedings of the GB meetings will be circulated to all the members/ attendees within reasonable timeframe, after the meeting is concluded.

7) Roles & Responsibilities

GB will rigorously review the project progress vis-à-vis annual plans, and will also monitor the status of disbursement. It will review the functioning of the PMU (society) regularly and guide PMU to prepare proposals for the HPSC, whenever necessary for the smooth implementation of the Project. The key roles and responsibilities of the GB will be as follows:

- Play a supportive role to PMU functioning and ensure smooth project implementation;
- Empower PMU to disburse funds for project implementation as per annual plans, as well as delegate financial authority to the Chief Project Director required for day-to-day functioning;
- Guide and approve/ forward the Operations Manual for the project
- Decide and approve proposals on procurement of Goods & Services as required under the project;
- Endorse APO and annual budget of the project which is approved by the Executive Body
- Monitor physical and financial progress of the project regularly
- Appoint an auditor of the Society.
- Approve contractual posts, remuneration, and allowances etc., submitted by the Executive Body;
- GB will accord administrative and financial sanctions of all individual procurement of goods & services amounting to INR 7.5 million & above, but not exceeding INR 25 million.

8) General Body

General Body will be a decision-making body of the Society on all matter as required under the Societies Registration Act, and applicable in Gujarat. The General Body of the Society will comprise of the members of the Governing Body, Executive Committee, heads of offices in Circles (CCSU), Divisions (DMUs) and Ranges (RMUs) of all the project. The General Body will meet once in a year to conduct the Annual General Meeting (AGM) of the Society. Proceedings of the AGM meetings will be circulated to all the members/ attendees within reasonable timeframe, after the meeting is concluded.

Management of the Project

Since the GB of the society will meet on half-yearly basis, the Executive Committee (EC) will be instituted for efficiently managing operations, ensure collective and quick decision making, as well as for close supervision, guidance and follow-ups. The PCCF & HoFF, GFD will chair the EC meetings, whereas Chief Project Director, PREG will be Vice chairperson. The EC, constituted at the state level within PMU may entrust day-to-day responsibilities with the Chief Project Director that will head the PMU. The composition of the Executive Committee (EC) is given in the following table.

Table 9.4 Composition of Executive Committee of PMU

Sl. No.	Position in EC	Rank of Officers and Department
1	Chairperson	PCCF & HoFF, GFD
2	Vice Chairperson	Chief Project Director, PREG
3	Member	Chief Wildlife Warden/ PCCF (Wildlife)
4	Member	PCCF (Working Plan)
5	Member	PCCF & Chairperson, Gujarat Biodiversity Board
6	Member	Managing Director (GSFDC)
7	Member	Managing Director, Gujarat Livelihood Promotion Company (GLPC) Ltd.
8	Member	APCCF (Admin & IT)
9	Member	APCCF (D&M)
10	Member	APCCF (Social Forestry)
11	Member	APCCF (Land)
12	Member	APCCF (Monitoring)
13	Member	APCCF (MNREGA)
14	Member	APCCF (Training, Research & Communication)
15	Member	Regional Project Coordinators (*14 nos. to be invited as per requirements)
16	Member Secretary	Project Director, Administration, Finance, Budget & Audits, PREG

Source: JICA Survey Team (2019)

Project Director, Administration, Finance, Budget & Audits, PREG will act as Member-Secretary for EC, and be responsible for circulation of agenda and organizing EC meetings as per the requirements and instructions from the Chief Project Director. Other key project staff will participate as 'Special Invitees' in the EC meetings for providing insights and/or to share views or concerns in the interest of the project implementation.

1) Frequency of Meetings

The Executive Committee will meet at least once every quarter (starting April), or more frequently if

the situation arises, particularly during preparatory phase of the project.

2) Agenda Circulation & Quorum

As far as possible efforts will be made that meetings are organized when maximum of the members can participate in EC meetings, however minimum of 2/3rd members will form the quorum of the EC meetings. Agenda of the meeting and proposals will be circulated by the Member-Secretary well in advance to all members, at least three days ahead of the meeting date. Proceedings of the EC meetings will be circulated to all the members/ attendees within reasonable timeframe, after the meeting is concluded.

3) Roles & Responsibilities

EC will provide enabling environment for sharing proposals on any areas of project functioning, and will encourage the members to provide new ideas, views, and concerns. Member-Secretary of EC will keep systematic records and the proceedings of all such meetings. Following will be the key roles and responsibilities:

- Develop Operation Manual including Financial Rules and Accounting Procedures, policies and guidelines etc.;
- Decide and approve proposals on procurement of Goods & Services as required under the project;
- Prepare APO in consultation with field level offices of PMU;
- Closely monitor the physical and financial progress of the project by organizing regular meetings with field level offices and suggest next plan of actions;
- Prepare modifications and/or changes in components/subcomponents of the project (as described in M/D) with justification, when required, and submit to Governing Body for onward submission to JICA/DEA, GoI for concurrence and approval.

A designated officer in PMU will systematically maintain records of all meetings (HPSC, GB, EC and AGM), and will make it available to reviewing authorities as per requirements. Falling in line with the authorities entrusted by the GB, Executive Committee (EC) may accord administrative and financial sanctions of all individual procurement of goods & services not exceeding INR 7.5 million, and above INR 2.0 million.

Whereas, PMU under guidance from EC will keep track of the project implementation regularly, and will be responsible to provide day-to-day guide, issue instructions, prepare guidelines and manuals, develop and execute capacity development plan, establish and operate M&E, GIS/ MIS and project accounting systems, undertake field visits, bring out publications to highlight achievements, disseminate project information, maintain project website and provide-hand holding support in field, in almost all respect to ensure efficient implementation of the project.

The PMU will also be responsible for timely submitting reimbursement claims, and institute concurrent audits as well as statutory audits on regular basis. The Chief Project Director may accord administrative and financial sanctions of all individual procurement of goods & services not exceeding INR 2.0 million.

9.5 Structure of Project Management Units (PMU)

The autonomous society i.e. the Project Management Unit (PMU) will be headed by Chief Project Director (CPD) in the rank of APCCF or above. S/he will also act as CEO of the society and will act as Vice chairperson in the Executive Committee of the society. S/he will be Member-Secretary to the Governing Body of the society as well as to the High-Power Steering Committee (HPSC) constituted

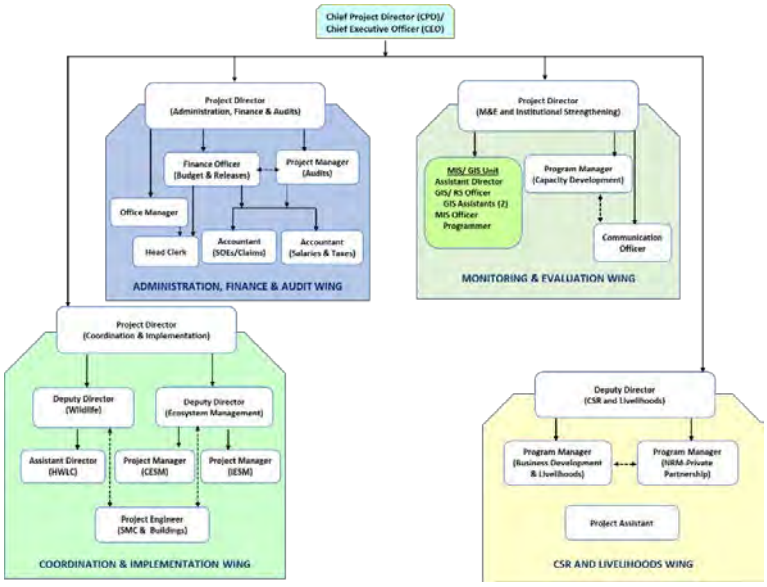
for the project at state level.

At the state level CPD will be supported by a team of officers and professionals that will include Project Directors in the rank of CF/ CCF, Deputy Directors in the rank of Sr. DCF/ DCF, Assistant Directors in the rank of ACF, Finance Officer, Project Managers, MIS and GIS/ Remote Sensing professionals and support staff including software programmers, accountants and ministerial staff. To augment various skill sets, PMU will further be supported by a team of experts constituted as Project Management Consultants (PMC). The existing MIS and GIS facility established in the GFD will further be strengthened and supported.

As a part of the society, PMU will also establish Circle Coordination & Supervision Units (CCSUs), Divisional Management Units (DMUs), and Range Management Units (RMUs) that will work as extended arms of PMU, and support project implementation and supervision while working along with the departmental functions, and with the JFMCs/ EDCs as well.

The PMU will manage the project funds, extend funds to the implementing units, guide and supervise project implementation to achieve results within stipulated timeframe adopting the prescribed processes, collate and consolidate the expenditure statements from field offices, and prepare Statement of Expenditures (SOEs) for getting reimbursement of claims from JICA.

The officers in PMU will either be on deputation from the State Forest Department/ other government organizations for minimum of 3 years or as per existing deputation tenure specified in government rules, or directly hired on contract from open market or recruited through a qualified and reputed placement/ govt. outsourcing agency. PMU will adopt the existing government orders on outsourcing staff for ministerial staff (computer operators, drivers, security/ utility persons etc.). Female candidates will be encouraged by PMU to join at different operational levels of the project. The structure of PMU is given in the figure below.



Source: JICA Survey Team (2019)

Figure 9.2 Structure of PMU

The composition of the PMU will be as follows:

Table 9.5 Proposed PMU Staffing

Sl. No.	Position	Rank	Mode	Source	Engagement	Qty	Remark
Key Staff						**28**	
1	Chief Project Director	APCCF & above	Deputation	GFD	Full Time	1	
A.	**Administration, Finance & Audits**					**7**	
2	Project Director	CF/ CCF	Deputation	GFD	Full Time	1	
3	Finance Officer		Deputation	GFD/ Directorate of Accounts & Treasuries (DAT)	Full Time	1	Sometimes arranged by State Finance Department for autonomous Society like PMU
4	Project Manager (Audits)		Contract	Open Market	Full Time	1	Chartered Accountant
5	Office Manager		Contract	Open Market	Full Time	1	
6	Head Clerk		Deputation	GFD	Full Time	1	
7	Accountants		Contract/ Deputation	Open Market/ GFD	Full Time	2	On deputation in case GFD could deploy, else on Contract
B.	**M&E and Institutional Strengthening**					**9**	
8	Project Director	CF/ CCF	Deputation	GFD	Full Time	1	
9	Assistant Director (GIS/ MIS & Monitoring)	ACF	Deputation	GFD	Part-time	1	Already working in GFD; will additionally work on project
10	GIS/ RS Officer		Contract	Open Market	Full Time	1	
11	GIS Assistant		Contract	Open Market	Full Time	2	
12	MIS Officer		Contract	Open Market	Full Time	1	
13	Programmer		Contract	Open Market	Full Time	1	
14	Project Manager (Capacity Development)		Contract	Open Market	Full Time	1	
15	Communication Officer		Contract	Open Market	Full Time	1	
C.	**Coordination & Implementation**					**7**	
16	Project Director	CCF	Deputation	GFD	Full Time	1	
17	Deputy Director (Wildlife)	Sr. DCF	Deputation	GFD	Full Time	1	
18	Assistant Director (HWCM)	ACF	Deputation	GFD	Full Time	1	
19	Deputy Director (Ecosystem Management)	DCF	Deputation	GFD	Full Time	1	
20	Project Manager (CESM)		Contract	Open Market	Full Time	1	
21	Project Manager (IESM)		Contract	Open Market	Full Time	1	
22	Project Engineer		Contract	Open Market	Full Time	1	
D.	**CSR and Livelihoods**					**4**	
23	Deputy Director (CSR & Livelihoods)	Sr. DCF	Deputation	GFD	Full Time	1	
24	Project Manager (Business Dev. & Livelihoods)		Contract	Open Market	Full Time	1	
25	Project Manager (NRM-Pvt. partnership)		Contract	Open Market	Full Time	1	
26	Project Assistant		Contract	Open Market	Full Time	1	
Supporting Staff						**34**	
27	Personal Secretary			Outsourcing	Full Time	1	
28	Personal Assistant			Outsourcing	Full Time	3	
29	Computer Operators			Outsourcing	Full Time	10	
30	Drivers			Outsourcing	Full Time	15	
31	Peon			Outsourcing	Full Time	5	
Total Staffing PMU						**62**	

Source: JICA Survey Team (2019)

Tentative responsibilities for the key staff positions in the PMU is given in the following table.

Table 9.6 Responsibilities of Key Staff in Project Management Unit (PMU)

	Position	Rank	Nr	Key Responsibilities	Remarks
	Key Staff				
1	Chief Project Director	APCCF & above	1	Overall technical, financial and administrative; ensure Time-Bound Action Plan, Overall project Implementation Plan; Executive Committee, GB, HPSC and Inter-sectoral convergence meetings; annual budgets, releases and Reimbursement Claims	Full Time; From FD on deputation for minimum 3 years
A. Administration, Finance and Audit Wing					
1	Project Director (Administration, Finance and Audits)	CF/ CCF	1	Overall supervision, administration & finance aspects; managing contracts - human resources, outsourcing, procurement of goods & services; annual budget & releases, expenditure; claims and fund disbursement, facilitate statutory and concurrent audits; RTI and Grievance	Full Time; From FD on deputation for minimum 3 years

	Position	Rank	Nr	Key Responsibilities	Remarks
				redressal issues; in addition will assist CPD to prepare agenda for EC, GB, HPSC, AGM meetings;	
2	Finance Officer	Sr. Officer	1	Supervising Accountants, implement accounting software based double-entry system; bank operations, reconciliation of funds, ensure timely budget/ releases, utilization and SOEs/ claims & tax returns and assist audits, coordinate with CCSUs, DMUs and other stakeholders;	Full Time; From FD/ DAT on deputation for minimum 3 years or contract
3	Project Manager (Audits)	Sr. Manager	1	Assist in establishing financial control systems, establish financial management and project accounting systems, monitoring financial progress and expenditures, facilitate statutory audits, conduct/ supervise Internal/ Concurrent audits, capacity development of stakeholders, coordinate with CCSUs, DMUs and other stakeholders;	Full Time Chartered Accountant; Open Market
4	Office Manager	Manager	1	Assist in logistics and protocols; O&M of vehicles, office, equipment, security, store; organizing meetings & events;	Full Time; Open Market
5	Head Clerk		1	Manage communications, document and maintain proceedings, letters & all records and contracts,	On deputation
6	Accountant (SOEs/ Claims)	Clerical Staff	1	Assist in day-to-day accounting activities; prepare and maintain SOEs; prepare claims for submission to CAAA/ JICA; reconciliation of annual budgets and disbursements; facilitate and assist audits	Full Time; Open Market
7	Accountants (Salaries & Taxes)	Clerical Staff	1	Assist in day-to-day accounting activities; prepare and maintain salary/ remunerations details and payments; computation and deposit of taxes; assist audits	Full Time; Open Market
B. M&E and Institutional Strengthening Wing					
1	Project Director (M&E and Institutional Strengthening)	CF/ CCF	1	Overall project planning in coordination with project directors, M&E – GIS/ MIS; study contract management, environment & social safeguards, develop and supervise ToRs for studies; guidelines and overall capacity building, progress tracking and reporting on performance indicators; preparing quarterly and annual reports; preparing M&E guidelines and manuals; assist in progress tracking and reporting on performance indicators and annual plans, guide project publicity and information dissemination; coordinate with CCSUs, DMUs and other stakeholders	Full Time; From FD on deputation for minimum 3 years
2	Project Manager (Capacity Development)	Sr. Manager	1	Assist in preparing master training plan (both nation and overseas), guide and supervise training needs assessment, prepare annual training calendar coordinating with all project wings and field	Full Time; Open Market

	Position	Rank	Nr	Key Responsibilities	Remarks
				units, develop training modules and material, plan and facilitate exposure trips, facilitate nomination of participants for training and exposure visits, coordinate for training through inter-sectoral convergence, guide and plan impact assessment from trainings, design templates, guidelines and manual, monitoring & reporting, coordinate with other stakeholders	
3	Assistant Director (GIS/ MIS & Monitoring)	ACF	1	Guide and support GIS and MIS Officers/ Specialists in operations, assist in monitoring annual plans and implementation, coordinate with DMUs/ RMUs for data collection (spatial and non-spatial), facilitate M&E and GIS/ MIS initiatives, follow-up for reporting, coordinate with all stakeholders	Full Time; From FD on deputation for minimum 3 years
4	GIS/ RS Officer	Manager	1	Conduct needs assessment on the GIS-based systems, assess available data (availability in geographical extent, frequency, etc.), Supervise GIS/RS operations, plan and design outsourcing works for mapping agencies and ensure map preparation works, provide GIS trainings, prepare GIS operation manual, provide technical advice, assist in GIS based M&E, maintain GIS systems and equipment, software inventory & maintenance, procurement of imageries and spatial analysis, map production for planning & decision making, monitoring & reporting; establish GIS operations at all levels; coordinate with GFD; coordinate for progress tracking and reporting; coordinate with other stakeholders	Full Time; Open Market
5	MIS Officer	Manager	1	Coordinate with MIS Software development agency to monitor the progress of outsourced works (web enabled software application), roll out and implement the MIS software throughout project, maintenance of MIS system, coordinate with GIS Officer in data/information integration, prepare and provide updated information related to the project, perform data analysis for generating reports on periodic basis, assist in end user training and supporting documentation, capacitate DMUs/RMUs in MIS operations, support database management and programmers for Integrated Report System (IRS) and system maintenance, data validation using SQL Server, facilitate the purchase of the software and hardware systems, troubleshoot any kind of systems related	Full Time; Open Market

	Position	Rank	Nr	Key Responsibilities	Remarks
				problems and maintain security of the systems, project website management	
6	Communication Officer	Manager	1	Assist in project publicity and information dissemination, implement communication strategy and plan; organize events/ workshops; develop knowledge material, publish newsletters, reports; design publicity and awareness campaigns, maintain digital library; coordinate with other stakeholders	Full Time; Open Market
7	Programmer	Support	1	Assist and support MIS/ GIS Officers and software operations, update modules and developed software code, assist in identifying operational bottlenecks and facilitate smooth running of the system, assist in MIS/ GIS system maintenance, assist in maintaining website and digital repository, software inventory & maintenance; generate reports, coordinate with other stakeholders	Full Time; Open Market
8	GIS Assistant	Support	2	Support and assist in production of maps and spatial analysis, undertake creation of spatial database and other GIS/ MIS related works	Full Time; Open Market
C. Coordination & Implementation Wing					
1	Project Director (Coordination & Implementation)	CCF	1	Overall planning, coordination & implementation of interventions for forest management, ecosystem management in coastal and wetlands as well as human-wildlife conflict management and grassland development issues; forest research, guide on microplanning, budget and approvals, technical guidance, developing manuals and guidelines; supervision and coordinate with CCSU/ DMUs and RMUs and other stakeholders	Full Time; From FD on deputation for minimum 3 years
2	Deputy Director (HWLC)	Sr. DCF	1	Assist in annual planning and implementation of plans for human-wildlife conflict, biodiversity conservation, eco-development and ecotourism, rescue centers, establishing quick response teams, prey breeding centers, micro planning, guide on habitat improvement, guide on establishing ecotourism development organization, marketing of ecotourism products, guide on upgrading bio parks, guide on developing new ecotourism destinations, design templates, guidelines and manual, monitoring & reporting and capacity building; coordinate with other stakeholders	Full Time; From FD on deputation for minimum 3 years
3	Assistant Director (HWLC)	ACF	1	Assist in Deputy Director (HWLC) in annual planning and implementation of the HWLC activities, assist in steering and following-up with field including	Full Time; From FD on deputation for

	Position	Rank	Nr	Key Responsibilities	Remarks
				handholding, capacity development etc. and compilation of information from field level, monitoring & reporting and capacity building; coordinate with other stakeholders	minimum 3 years
4	Deputy Director (Ecosystem Management)	DCF	1	Assist in overall planning, coordination & implementation of interventions for forest management, ecosystem management in coastal and wetlands as well as human-wildlife conflict management and grassland issues; forest research, guide on microplanning, budget and approvals, technical guidance, developing manuals and guidelines; assist in annual planning and operationalizing JFM and Non-JFM Models; coordinate with nurseries for raising need-based species and supplies, guidance on model layouts and techniques and on maintaining plantation and nursery journals, guidance on forest research, design templates, guidelines and manual, monitoring & reporting and capacity building; coordinate with other stakeholders	Full Time; From FD on deputation for minimum 3 years
5	Project Manager (CESM)	Sr. Manager	1	Assist in Deputy Director in planning, implementing and monitoring coastal ecosystem management plans; work on developing guidelines and manuals for JFMCs/ EDCs, and capacity building/ information dissemination; coordinate with CCSU/ DMUs and RMUs and other stakeholders	Full Time; Open Market
6	Project Manager (IESM)	Sr. Manager	1	Assist in Deputy Director in planning, implementing and monitoring inland ecosystem management plans; work on developing guidelines and manuals for JFMCs/ EDCs, and capacity building/ information dissemination; coordinate with CCSU/ DMUs and RMUs and other stakeholders	Full Time; Open Market
7	Project Engineer (SMC & Buildings)	Manager	1	Assist in designing and preparing site specific estimates for SMC structures and buildings/ infrastructure, technical guidance for site selection, construction supervision, quality check, preparing technical specifications for tendering and assist procurement of contractors, design templates, guidelines and manual, monitoring & reporting and capacity building; coordinate with other stakeholders	Full Time; Open Market
D. CSR and Livelihoods Wing					
1	Deputy Director (CSR and Livelihoods)	DCF	1	Overall planning & implementation of CSR and livelihoods; initiating partnerships to tap CSR funds, inking MoUs for CSR, technical guidance and supervision, livelihoods promotion and coordinate for inter-sectoral convergence; support to	Full Time; From FD on deputation for minimum 3 years

	Position	Rank	Nr	Key Responsibilities	Remarks
				leverage funds; strategize gender mainstreaming and women/ vulnerable group empowerment, develop partnerships & networks; and coordinate with CCSUs, DMUs and RMUs and other stakeholders	
2	Project Manager (Business Development & Livelihoods)	Sr. Manager	1	Assist in annual planning and implementation of livelihood promotion; guide on micro plan and microplanning process, support value chain and market analysis, facilitate rural financing, design small business/ enterprise for community institutions for income generation, guide cluster promotion, livelihoods as well as for inter-sectoral convergence, capacity building and trainings, design templates, guidelines and manual, monitoring & reporting, coordinate with other stakeholders	Full Time; Open Market
3	Project Manager (NRM-Private Partnerships)	Sr. Manager	1	Assist in annual planning and implementation of forestry operations CSR lands, guide, supervise and coordinate for demarcation and identification of beneficiaries/ community institutions, facilitate partnerships & networks; coordinate for CSR and or inter-sectoral convergence, coordinate for capacity building and trainings, design templates, guidelines and manual, monitoring & reporting, coordinate with other stakeholders	Full Time; Open Market
4	Project Assistant	Support	1	Assist the tasks for CSR and livelihoods; assist in documentation and plan preparation; compilation of information and production of various reports etc.	Full Time; Open Market
	Total Key Staff		28	Deputation/ Direct Hire	Full Time
	Total Support Staff		34	Outsourcing	Full Time
	Total PMU Staff		62		

Source: JICA Survey Team (2019)

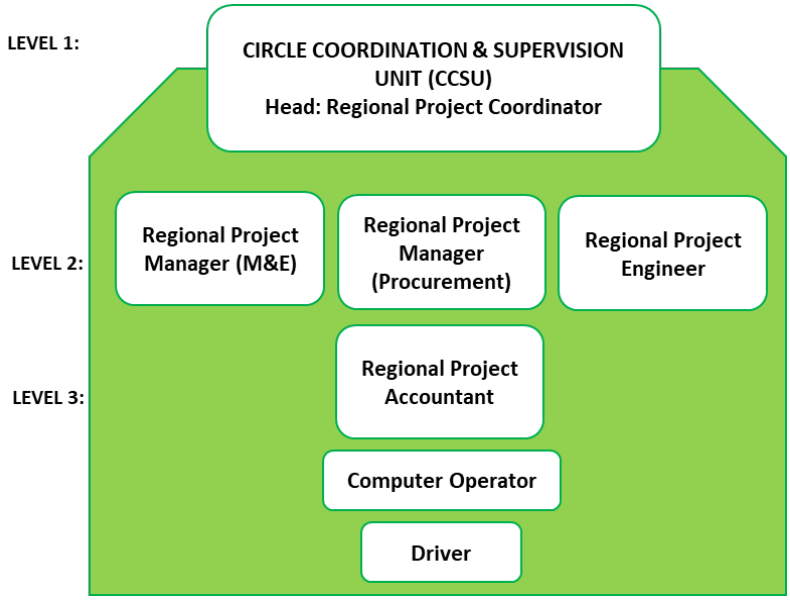
9.6 Structure of Circle Coordination & Supervision Unit (CCSU)

Circle Coordination & Supervision Unit (CCSU) will be established at circle level, and will function as the dedicated and extended wing of the PMU for coordination and supervision of implementation and as a subordinate office of the autonomous society.

CCSU will be headed by a CF/ CCF rank officer, designated as Regional Project Coordinator (RPC), and supported by professional staff to be hired from open market and deployed by PMU at circle level. This office will function as a link between the PMU and DMUs that will have the main responsibility for implementing the annual plans, and will extend all technical inputs and guidance on day-to-day basis to the DMUs. This office will be equipped with skills and resources, mainly to support DMUs for planning, technical drawing specifications and estimates, preparing and facilitation procurement of goods and services including preparing tender/ bid documents as well as compilation of information and monitoring. The RPC will also take initiatives to prepare plans with support and contributions from the DMUs every year, and will also facilitate fund flow for execution of plans in

timely manner. The RPC will also be responsible for supervising and guiding the works carried out by specialized agencies/ resource organizations or NGOs, and facilitate convergence at the district level.

The CCSU will facilitate project funds for regular operation of the DMU as well as for RMUs and JFMCs/ EDCs. The DMU will operate and report expenses to the CCSU, and will act as the controlling and supervising unit for the project implementation. The CCSU with compile the information and will share the reposts with their sectoral heads as well as with the PMU. The structure of CCSU is given in the figure below:



Source: JICA Survey Team (2019)

Figure 9.3 Structure of CCSU

The composition of the CCSU will be as follows:

Table 9.7 Proposed CCSU Staffing

Sl. No.	Position	Rank	Mode	Source	Engagement	Qty
Key Staff						**5**
1	Regional Project Coordinator	CF/ CCF		GFD	Part-time	1
2	Regional Project Manager (M&E)		Contract	Open Market	Full Time	1
3	Regional Project Manager (Procurement)		Contract	Open Market	Full Time	1
4	Regional Project Engineer		Contract	Open Market	Full Time	1
5	Regional Project Accountant		Contract	Open Market	Full Time	1
Supporting Staff						**2**
	Computer Operators			Outsourcing	Full Time	1
	Driver			Outsourcing	Full Time	1
Total Staffing Circle						**7**

Source: JICA Survey Team (2019)

9.7 Structure of Divisional Management Unit (DMU)

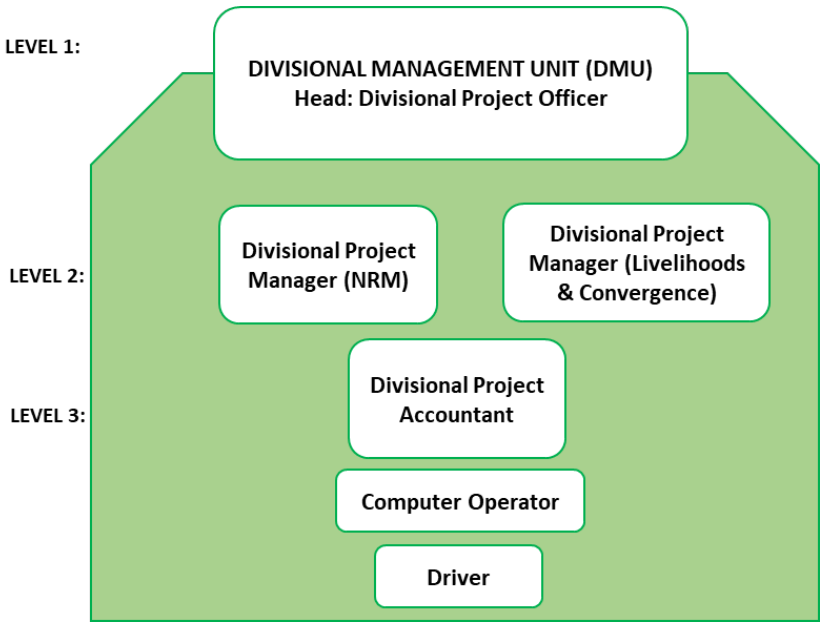
Divisional Management Unit (DMU) will be established at circle level, and will function as the dedicated and extended wing of the PMU for planning and implementation the activities, and as a subordinate office of the autonomous society.

DMU will be headed by a Divisional Project Officer (DPO) who is in the rank of DCF in the Forest Department. S/he will facilitate project implementation at the divisional level, and will also extend

all technical inputs and guidance to RMUs within their jurisdiction and at field level on day-to-day basis. DPO will be responsible for supervising and guiding the works carried out by specialised agencies/ resource organizations or NGOs, and facilitate convergence at the district level.

The Divisional Project Officer (DPO) at DMU will coordinate with the district administration for inter-sectoral convergence, organize and participate in DPC meetings at district level, extend support for preparing annual plans, estimates etc. The DPO will also monitor, supervise and follow-up with the subordinate offices, and provide guidance on documentation and reporting the physical and financial progress. DMU office will be guided by the project Operation Manual as well as PMU.

DPO will be supported by two project managers, as well as accountant to be hired from open market and deployed by PMU at divisions. The DMUs and subordinate RMUs will assist in maintaining the project accounts adopting, and timely prepare SOEs for onward submission. Female candidates will be encouraged to join the project at various positions. In addition, DMU will also be involved to channelize funds to JFMCs/ EDCs through as system of 'Fund Advice Note' to be prepared and recommended by RMU and forwarded by RPO to DMU for releasing funds to JFMCs/ EDCs. The structure of DMU is given in the figure below.



Source: JICA Survey Team (2019)

Figure 9.4 Structure of DMU

The composition of the DMU will be as follows:

Table 9.8 Proposed DMU Staffing

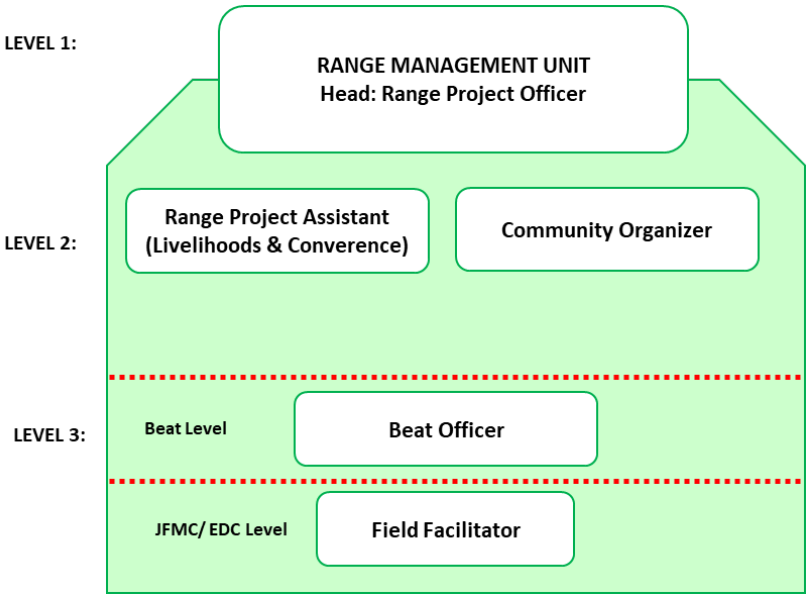
Sl. No.	Position	Rank	Mode	Source	Engagement	Qty
Key Staff						**4**
1	Divisional Project Officer	DCF		GFD	Part-time	1
	Divisional Project Manager (NRM)		Contract	Open Market	Full Time	1
	Divisional Project Manager (Livelihoods & Convergence)		Contract	Open Market	Full Time	1
	Divisional Project Accountant		Contract	Open Market	Full Time	1
Supporting Staff						**2**
	Computer Operators			Outsourcing	Full Time	1
	Driver			Outsourcing	Full Time	1
Total Staffing Division						**6**

Source: JICA Survey Team (2019)

9.8 Structure of Range Management Unit (RMU)

Following the forest department structure RMU will be created as an extended arm of the DMU and as a part of the autonomous society i.e. PMU. RMU will be headed by Range Project Officer (RPO) in the rank of Ranger or above in the Forest Department. S/he will facilitate project implementation at the range level, and will also extend all technical inputs and guidance to Beat Officers within their jurisdiction and at field level on day-to-day basis. RPO will be responsible for supervising and guiding the works carried out by the Beat Officers as well as JFMCs/ EDCs, and facilitate convergence at the block level.

RPO will be supported by set of personnel viz., Range Project Assistant (Livelihoods & Convergence) and Community Organizer. S/he would be further supported by Beat Officers and Field Facilitators engaged at the JFMC/ EDC level. Female candidates will be encouraged to join the project at various positions. The structure of RMU is given in the figure below:



Source: JICA Survey Team (2019)

Figure 9.5 Structure of RMU

The composition of the RMU will be as follows:

Table 9.9 Proposed RMU Staffing

Sl. No.	Position	Rank	Mode	Source	Engagement	Qty
Key Staff						**3**
1	Range Project Officer	Ranger		GFD	Part-time	1
	Range Project Assistant (Livelihoods & Convergence)		Contract	Open Market	Full Time	1
	Range Community Organizer		Contract	Open Market	Full Time	1
Total Staffing Range						**3**

Source: JICA Survey Team (2019)

9.9 Other Implementing/ Facilitating Institutions

Project Management Consultants (PMC)

As a part of the project design and institutional arrangements, a team of experienced professionals will be procured and deployed at state level as project management consultants (PMC) to assist PMU in managing the project and to extend required technical guidance for limited number of years. The

team composition of PMC will carry skill set and experience to complement and supplement PMU initiatives, provide technical support in preparing guidelines and procedures as well as provide an independent view on project implementation.

Training, Research and Communication (TRC)

The wing is headed by Additional Principal Chief Conservator of Forests, Research & Training, and looks after research, training and communication & publicity requirements of the department. For the intensive research, Gujarat Forestry Research Foundation has been established and APCCF Research & Training is Director of GFRF.

Gujarat Ecological Education and Research (GEER)

GEER Foundation is autonomous body, to raise public awareness and promote knowledge of ecology, ecosystems, environment and natural history. The foundation also initiates and facilitate scientific researches & studies.

Specialized Agencies/ Resource Organizations

For undertaking Baseline surveys, Impact assessments, training needs assessment (TNA), institutional trainings and capacity building, skill training for JFMCs/ EDCs and SHGs members, cluster level enterprises etc. will require to engage specialized and credible organizations having proven record of undertaking specified tasks. The specialized agency/ resource organizations will be procured by PMU through a local competitive bidding process, conforming to the applicable procurement guidelines. These organizations could be engaged at PMU or Circle level.

NGOs

NGOs will be engaged at divisional level to support and guide the JFMCs/ EDCS and SHGs/ cluster institutions for the field level implementation of the project activities. The landscapes and the geographical distribution of the village/ community institutions will be taken into account for deploying the NGO staff. The works of the NGOs will be supervised by RMU who will guide the NGOs and ensure that the works are performed as per the Terms of Reference (ToR). PMU would take lead role in selection of the NGOs. Female staff of NGOs would be encouraged to join the project at various positions.

Peoples Organizations - JFMCs/ EDCs

The Joint Forests Management Committees (JFMCs) and Eco-development Committees constituted in project areas will be engaged. Wherever necessary, new JFMCs/ EDCs will be constituted to work in different landscapes in the project areas.

In addition to the NGOs/ Resource Organizations, JFMCs/ EDCs will identify local person who can qualify to act as Field Facilitator for the project duration. S/he will be guided by the project teams to handhold and extend support to these community institutions for project implementation and reporting.

CHAPTER 10 PROJECT IMPLEMENTATION SCHEDULE

The project implementation schedule will guide the key stakeholders to prepare annual plans, as well as keep track of the pace so that management can learn in advance if there is timeover run. Assuming that the loan agreement (L/A) will be signed during fourth quarter of Year 0, i.e. financial year 2019/20, a project implementation schedule is tentatively planned between the second quarter of Year 1 and goes till first quarter of Year 10. However, prior to loan effectuation, some of the activities will get initiated from first quarter of Year 1 on a retroactive reimbursement basis given an understanding between the JICA and the state government. The project duration is 10 years, starting from year 2020/21. The key project activities will be carried out in 3-5 batches at varying timeline.

Not later than first quarter of Year 1, PMU and its implementing Units (CCSUs, DMUs and RMUs) will be constituted within a society through a government order (GO). GFD will start identifying key personnel to be deployed in PMU, as well through notifications will make responsible the heads of circle, division and ranges to take-up responsibilities as per the institutional structure viz., CCSUs, DMUs and RMUs. Chief Project Director will be the first appointment at PMU, and will take lead to complete all necessary GOs/ notifications required as per the time bound action plan soon after a pledge has been made. Notice for procuring of consulting services will also be announced withing three months for constitutions of PMU after signing of the L/A.

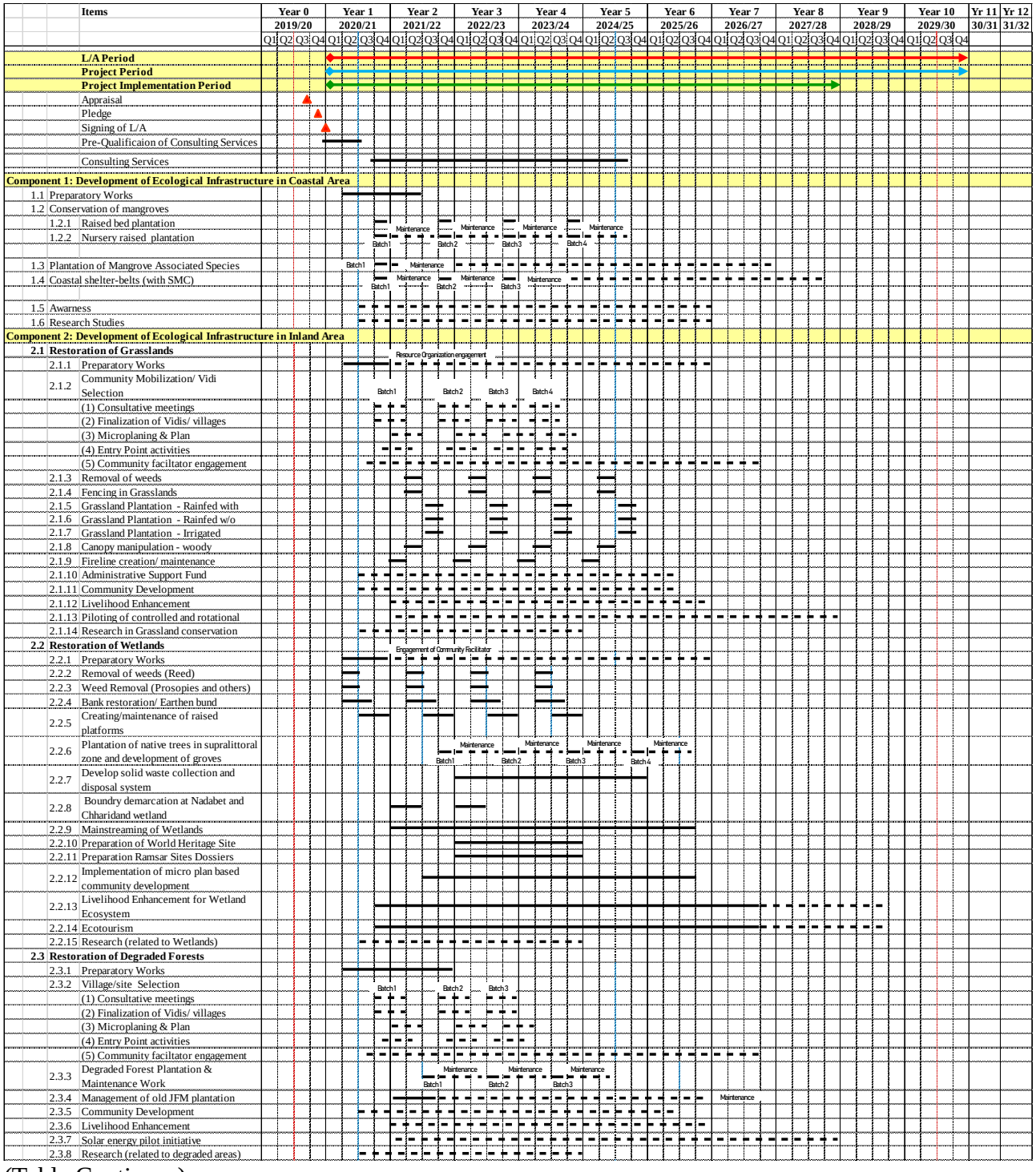
The preparatory phase is assumed for around one year i.e. Year 1 that may get extended to second year, however utilizing the past experience of project implementation of JICA assisted projects, PMU will expedite and advance on the planned activities as much as possible. It will be necessary for the PMU to ensure that while expediting initial activities, envisaged steps and processes do not get diluted. During first quarter of Year 1, PMU will start preparing the tenders and contracts to be floated for procuring required goods & services, and for initiating construction/ extension of civil works as well. PMU will follow the procurements guidelines and processes envisaged as per the Minutes of Discussions (MoD).

PMU will also start working on the preparation of operation manual for the Project based on experiences by GFD during GFDP II, and similar loan projects in other states. PMU may also start working on preparation of other guidelines and manuals. Project guidelines and manuals will be most critical and important activity including orientation of the key project staff on the project processes. Thus, timely hiring of the consulting services would be of immense importance. The duration of the project management consultant (PMC) will be 48 months, and is tentatively planned from January 2020.

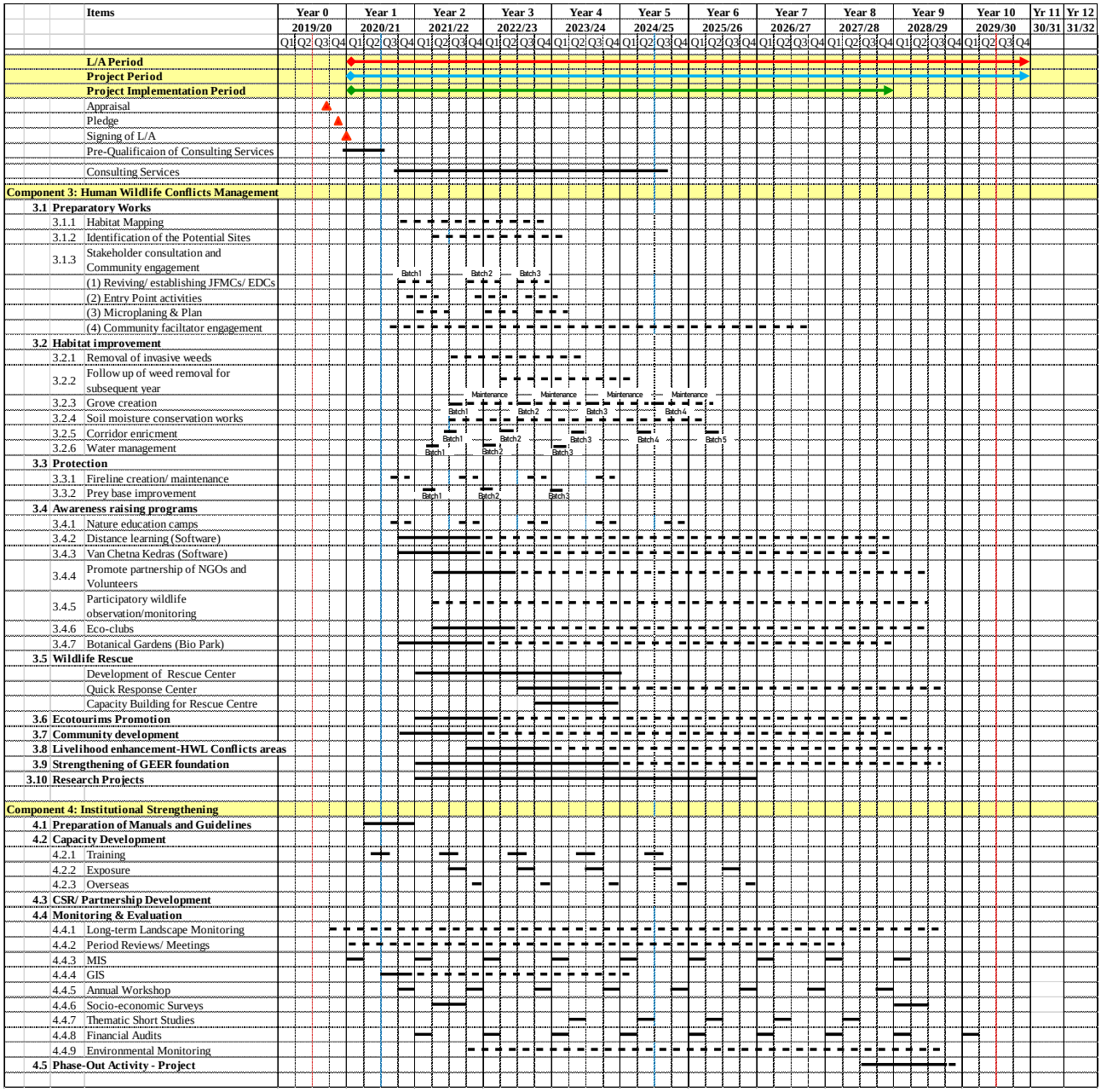
Besides setting up offices, initiating building extension/ renovation, hiring of vehicles, purchasing of furniture and fixtures, hiring of human resources (direct hiring as well as outsourcing), focus of PMU will also be on identification of potential intervention areas as well as potential Peoples Organizations viz., JFMC, EDCs, ETDCs, SHGs etc. Shortly after, identification preparatory activities like survey and mapping, mobilisation of potential communities, selection of target communities, and planning by target communities will get initiated. These activities will get aligned with the annual batch-wise planning and implementation.

PMU will make efforts to complete all critical and important preparatory activities that are linked with the initiation of landscape management and livelihood interventions, and will be prerequisite for works in forest areas as well. Other component activities will get aligned with the pace of the preparatory phase progress. It will also be important to initiate the capacity development interventions as scheduled to prepare the project staff and other stakeholders well to execute the planned interventions. A summary of the proposed project implementation schedule has been prepared and is presented in Table 10.1 Proposed detailed project implementation schedule is given in Annexure 10.

Table 10.1 Summary of Project Implementation Schedule



(Table Continues)



Source: JICA Survey Team (2019)

CHAPTER 11 PROPOSED IMPLEMENTATION AND PROCUREMENT METHODS

The project components of PERG is either directly implemented by the project in partnership with GFD, through outsourced agency, and community level institutions such as JFMC/ EDC/ ETDC. Accordingly, appropriate methods of procurement shall be adopted. In this project, procurement through 1) direct contract by quotation, 2) local competitive bidding and 3)single source hiring by MOU is envisaged. All procurement shall be undertaken in accordance with the applicable laws and regulations of the Government of Gujarat. The highest level of transparency in all aspects of procurement must be ensured by PMU.

Table 11.1 Types of Implementing Unit and Procurement Methods

Implementing Unit	Procurement Methods
1) PMU with GFD (Outsourcing)	Direct Contract by Quotation Local Competitive Bidding
2) Outsourced Agency	Single Source Hiring by MOU/ Contract Local Competitive Bidding
3) Community Based Institutions (JFMC/ EDC/ ETDC/ SHG/ Cluster Organizations)	MOU

Source: JICA Survey Team (2019)

Single source hiring with MOU will be applicable to resource agencies which are engaged to undertake specialised tasks such as research and livelihood related activities. This may be applied to the engagement of GEER Foundation, GEC, and GLPC. With these organizations, PMU shall exchange Memorandum of Understanding (MOU). In other cases, depending on the scale of contract, either the agency can be procured by adopting the single source hiring by contract or through local competitive bidding.

The procurement of PMC shall be conducted through international competitive bidding as per the JICA guidelines. The detailed implementation and procurement methods are given in Annexure 11.

CHAPTER 12 PROJECT COST

12.1 Summary of Cost Estimates

The total project cost is estimated at 12,308 million INR (or 18,709 million JPY), out of which the eligible portion is 10,724 million INR (or 16,300 million JPY), whereas the base cost (i.e. costs for the project components) is estimated at 8,145 million INR (or 12,380 million JPY). The summary of the project cost estimate prepared based on the JICA cost estimation tool is shown below.

Table 12.1 Summary of Cost Estimates

Breakdown of Cost	Foreign Currency Portion (million INR)			Local Currency Portion (million INR)			Total (million INR)		
	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others
Development of Ecological Infrastructure in Coastal Area	0	0	0	1,315	1,315	0	1,315	1,315	0
Development of Ecological Infrastructure in Inland Area	0	0	0	3,520	3,520	0	3,520	3,520	0
Managing Human Wildlife Conflicts	0	0	0	1,121	1,121	0	1,121	1,121	0
Institutional Strengthening	0	0	0	2,189	2,189	0	2,189	2,189	0
Civil Works Sub Total				8,145	8,145	0	8,145	8,145	0
Price Escalation	0	0	0	1,535	1,402	133	1,535	1,402	133
Physical Contingency	0	0	0	517	477	40	517	477	40
Consulting Services	281	281	0	419	419	0	700	700	0
Interest during Construction	257	0	257	0	0	0	257	0	257
Front End Fee	21	0	21	0	0	0	21	0	21
Land Acquisition	0	0	0	0	0	0	0	0	0
Administration Cost	0	0	0	670	0	670	670	0	670
VAT/GST	0	0	0	463	0	463	463	0	463
Import Tax	0	0	0	0	0	0	0	0	0
Other Taxes	0	0	0	0	0	0	0	0	0
Total									

*Source: JICA Survey Team (2019). *Total consultancy cost is 699.8 million INR*

12.2 Conditions and Assumptions

For arriving at the project cost estimates, the following assumptions were taken into account.

a) The cost estimate for the project duration of 8 years[92] is based on November 2019 constant prices in Indian Rupees.
b) Exchange rate of 1 INR= JPY 1.52, USD 1= 109 JPY , USD 1= 71.5 INR is adopted. The exchange rates as above are provided by JICA as Pre-Conditions.
c) Following figures have been drawn into analysis as per details provided as per JICA's Preconditions
    1) Adopting the appraisal parameters for JICA ODA loan applicable for India, the price escalation is considered at 3.53% per annum for the local currency portion and at 1.72% per annum for the foreign currency portion.
    2) Billing rates for consultant as provided in JICA's Precondition has been drawn in to project cost estimation for consultancy services.
    3) A physical contingency at 5% is applied on the sum of base cost including price escalations.
    4) Interest During Construction (IDC) is applied at 0.95% for construction works and Consulting Services.
    5) The Front-End Fee (FEF) is calculated by multiplying the loan amount by 0.2%.
d) Several factors like physical conditions of the identified project areas, timeframe of the Project, priorities, gaps, current capacities, fund cap etc. are considered to work out the quantity of each component, sub-component and activities to be invested through the Project.
e) The unit cost for each sub-component and activity is estimated on the basis of detailed cost-breakdown for each unit cost. In principle, costs are estimated as Work Quantities x Unit Cost.
f) Schedule of rates from GFD, Public Works Department (Roads& Building Departments) and rates derived through discussion with GFD officials were referred to in estimating unit costs. In addition, market prices/ quotations were from reliable sources were also considered.
g) For detailed cost estimation, taxes as applicable for goods, materials and consumables is applied, whereas for professional services/ contracts, Goods & Services Tax (GST) 18% is applied. However, for annual cost estimation, in the JICA cost estimation tool, GST was applied at 4.9% (Derived by comparing total cost with GST and Total cost without GST) which is applied on the base project costs.

12.3 Cost Component

The cost components consist of eligible portion and non-eligible portion.

The eligible portion for JICA ODA loan financing comprises of 1) base cost for implementing the project activities, 2) price escalations, 3) physical contingencies, and 4) consulting services. On the other hand, non-eligible portion comprise of 1) administrative cost, 2) taxes and duties, 3) interest during construction (IDC), and 4) front end fee (FEF).

Subsequent sections outline a) cost components and project components, b) consulting services, and c) administrative cost.

[92] *Few maintenance activities may be extended for 9th year having lower costs.*

12.3.1 Cost Per Project Component

The total project cost is 12,337 million INR. The major part of the cost (around 66%) is towards the proposed activities across the cost components. Being a forest sector project, land acquisition is not foreseen for any of the proposed project activities, and thus its cost has not been estimated. Below table provides project cost by cost components.

Table 12.2 Cost Components

	Cost Component	Cost (million INR)	%
1	Base Cost	8,145	66.2%
2	Price Escalation	1,535	12.5%
3	Physical Contingency	517	4.2%
4	Consulting Services	700*	5.7%
5	Administration Cost	670	5.4%
6	Tax	463	3.8%
7	Interest during construction	257	2.1%
8	Front End Fee	21	0.2%
	Total	**12,308**	**100.0%**

*Source: JICA Survey Team (2019). *Total consultancy cost is 699.8 million INR*

The project cost by components is presented in the table below. The cost of Component 1: Development of Ecological Infrastructure in Coastal Area is estimated around 16.1% of the base cost, Component 2: Development of Ecological Infrastructure in Inland Area has 43.2% share in the base cost, whereas Component 3: Managing Human Wildlife -Conflicts has 13.8% share and the Component 4: Institutional Strengthening has 26.9% share of base cost.

Table 12.3 Project Component-wise Cost Ratio

	Cost Component	Cost (Million INR)	%
1	Development of Ecological Infrastructure in Coastal Area	1,315	16.1%
2	Development of Ecological Infrastructure in Inland Area	3,520	43.2%
3	Managing Human Wildlife Conflicts	1,121	13.8%
4	Institutional Strengthening	2,189	26.9%
5	**Total Base Cost**	**8,145**	**100.0%**

Source: JICA Survey Team (2019)

12.3.2 Cost of Consulting Services

The Project will employ a team of consultants (Project Management Consultants: PMC) to assist Project Management Unit (PMU) in implementing the project activities and processes. The indicative scope of work and requirements of the Consulting Services is given in Annexure 10**.**

The cost estimate for the consulting services has been prepared in accordance with the scope of work, tenure of consultancy services (5 years) and project implementation schedule. The unit remuneration rates for International experts, local experts and support staff are adopted as per the rates provided in JICA's preconditions. The cost of consulting services is estimated at 700 million INR that includes the remuneration, per diem, price escalation and physical contingency but excludes the taxes and duties. The summary is given in Table below.

Table 12.4 Cost for Consulting Service

Item	Foreign Currency (1,000 Yen)	Local Currency (1,000 INR)
International Consultants (Pro-A)	3,47,970	0
National Consultants (Pro-B)	0	1,55,758
Supporting Staff	0	18,720
Total (1)	**3,47,970**	**1,74,478**
Direct Cost	37,201	1,77,972
Total (2) (Total (1)+Direct Cost)	**3,85,171**	**3,52,450**
Price Escalation	21,521	46,520
Physical Contingency	20,335	19,949
Total (3) (Total (2)+Price & Physical Contingencies)	**4,27,026**	**4,18,919**
Grand Total in JPY	**1,063,783**	
Grand Total in INR*		**6,99,857**

Source: JICA Survey Team (2019).
**Rounded off to 700 million INR*

12.3.3 Administrative Cost

Administrative costs consist of costs towards salaries of Department's personnel deployed at PMU, 11 CCMU, 27 DMU, 114 RMU/FMU as well as the direct costs that includes vehicle purchase cost, fuel and maintenance of vehicles, office supplies/ consumables etc. Together with other expenses (i.e. taxes and duties, interest during construction, front end fee) which are non-eligible for JICA Yen Loan, it constitutes 11.5 % of total project cost. **This makes loan coverage of 88.5% exceeding 3.5% from eligible loan coverage of 85%.** This could be adjusted by reviewing the number of DMUs and RMUs to be established.

12.4 Annual Cost Schedule

The project implementation schedule provides the duration for each of the activities. The annual cost schedule is prepared in accordance with the project implementation schedule. The summary is shown in the table below.

Table 12.5 Annual Cost Schedule Unit: million INR

Cost Component	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9*	Total
	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	(million INR)
Direct Cost	563	858	1,190	1,449	1,481	1,194	813	531	66	8,145
Price Escalation	22	65	137	228	300	301	253	204	25	1,535
Physical Contingency	32	49	69	88	94	80	59	42	5	517
Consulting services	91	157	112	123	115	102	0	0	0	700
Administration Cost	51	53	59	79	101	109	109	107	2	670
Taxes and Duties	30	47	63	79	84	72	49	35	4	463
Interest During Construction	7	17	32	49	68	84	0	0	0	257
Front End Fee	21	0	0	0	0	0	0	0	0	21
Total	**818**	**1,247**	**1,662**	**2,095**	**2,242**	**1,941**	**1,283**	**919**	**101**	**12,308**
% against the total cost	**6.6%**	**10.1%**	**13.5%**	**17.0%**	**18.2%**	**15.8%**	**10.4%**	**7.5%**	**0.8%**	**100.0%**

Source: JICA Survey Team (2019)
** Few maintenance activities may be extended for 9th year having lower costs (only 0.8% of total project cost)*

12.5 Financing Plan

The JICA ODA loan policy categorize administration cost, taxes and duties, interest during construction (IDC) and front-end fee (FEF) as 'Non-eligible' for financing by JICA, and thus will be borne by the Gujarat state government. The non-eligible portion of the Project is 2,146 million JPY (1,585 million INR) whereas the eligible portion is 16,563 million JPY (10,724 million INR). Non eligible portion constitutes 11.5 % of total project cost. **This makes loan coverage of 88.5% . This is exceeding 3.5% from eligible loan coverage of 85%.**

Breakdowns of the financial plan is shown in the table below.

Table 12.6 Summary of Project Fund Requirement in JPY

Breakdown of Cost	Foreign Currency Portion (million JPY)			Local Currency Portion (million JPY)			Total (million JPY)		
	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others
Development of Ecological Infrastructure in Coastal Area	0	0	0	1,999	1,999	0	1,999	1,999	0
Development of Ecological Infrastructure in Inland Area	0	0	0	5,350	5,350	0	5,350	5,350	0
Managing Human Wildlife Conflicts	0	0	0	1,703	1,703	0	1,703	1,703	0
Institutional Strengthening	0	0	0	3,328	3,328	0	3,328	3,328	0
Civil Works Sub Total	**0**	**0**	**0**	**12,380**	**12,380**	**0**	**12,380**	**12,380**	**0**
Price Escalation	0	0	0	2,333	2,131	202	2,333	2,131	202
Physical Contingency	0	0	0	787	726	61	787	726	61
Consulting Services	427	427	0	637	637	0	1,064	1,064	0
Interest during Construction	390	0	390	0	0	0	390	0	390
Front End Fee	33	0	33	0	0	0	33	0	33
Land Acquisition	0	0	0	0	0	0	0	0	0
Administration Cost	0	0	0	1,019	0	1,019	1,019	0	1,019
VAT/GST	0	0	0	704	0	704	704	0	704
Import Tax	0	0	0	0	0	0	0	0	0
Other Taxes	0	0	0	0	0	0	0	0	0
Total	**850**	**427**	**423**	**17,859**	**15,873**	**1,986**	**18,709**	**16,300**	**2,409**

Source: JICA Survey Team (2019)

CHAPTER 13 PROJECT EVALUATION

The viability of the Project was evaluated from economic point of view by estimating the economic internal rate of return and Net Present Value. Financial analysis was not considered since the Project, in general, does not produce direct incomes to the implementing agency nor produce other revenues such as fees/tolls from the project implementation.

13.1 Basic Assumptions for Cost-Benefit Analysis

The Cost benefit analysis was conducted under the following basic conditions and assumptions.

1) The economic life of the project is assumed to be 50 years since this type of forest management project take a longer time to deliver returns than ordinary infrastructure development projects.
2) The project costs in the project period are estimated based on 2019 constant prices in Indian Rupees.
3) For the estimation of the economic project cost, each item of the financial cost is converted into economic cost by applying a standard conversion factor (SCF) at 0.9 which is generally used in many projects in India. Manual of Economic Evaluation and of Highway Projects in India (2009) mentioned that as an approximation in many of the projects taken up in India, a factor of 0.8 -0.9 has been used to convert financial cost of road works to economic costs.
4) The price contingencies, taxes, interest during construction, front end fee, and other kinds of transfer payments are excluded from the estimated financial costs in order to estimate the economic costs.
5) The O&M cost (including the replacement cost) is estimated at the 1% of the total of base cost, referring to the O&M cost set for other similar forestry projects and also based on empirical assumptions of forestry activities[93].
6) "Without-project" case was used as a base of the economic analysis. It may so happen that the condition of forest vegetation in the Project area "without project" might get degraded further by uncontrolled human interventions. However, it is assumed that the present vegetation status will not be affected through the Project life for a conservative estimate.
7) All major plantation activities are expected to be completed by 7th years and hence it is assumed that the benefits shall start accruing from 8th year.
8) Discount Rate of 8.5% has been applied in estimating NPV, which is the present interest rate of NABARD for long term refinance assistance to state governments in india[94].
9) Exchange Rates: INR 1 = 1.49 JPY; USD 1= 71.1 INR; USD 1= 106 JPY[95]

13.2 Economic Cost of the Project

a) Cost

The economic cost of the project was estimated based on the conditions mentioned above. The financial cost and estimated economic costs are summarised in table below.

[93] Source : Preparatory Study on Himachal Pradesh Forest Ecosystems Management and Livelihoods Improvement Project
[94] Source : https://www.nabard.org/interestrate.aspx?cid=502&id=24
[95] *Source : Preconditions provided by JICA*

Table 13.1 Financial and Economic Cost by component

Item	Financial Cost (million INR)	Economic Cost (million INR)
Component 1. Development of Ecological Infrastructure in Coastal Area	1,315	1,183
Component 2. Development of Ecological Infrastructure in Inland Area	3,520	3,168
Component 3. Managing Human Wildlife Conflicts	1,121	1,009
Component 4. Institutional strengthening	2,189	1,970
Sub Total	8,145	7,330
Price Escalation	1,535	0
Physical contingency	517.5	466
Consultancy Services	700	630
Administrative cost	670.2	603
Tax	463	0
Interest during Construction	257	0
Front end Fees	21	0
Total	12,308	9,029

Source: JICA Survey Team (2019)

b) Operation and Maintenance Cost

It is assumed that the major portion of the O&M cost would emerge after the completion of project. The O&M cost (including the replacement cost) is estimated at the 1% of the total of base cost, referring to the O&M cost set for other similar forestry projects and also based on empirical assumptions of forestry activities, Based on above following annual O&M cost has been estimated for the economic analysis.

Table 13.2 Annual O&M costs for the economic analysis

(INR million)

Item	Details
Economic Capital Cost	9285
Annual O&M cost	93

Source: JICA Survey Team (2019)

c) Replacement Cost

The replacement costs were estimated to reoccur every 20 years for the civil work/building work. The replacement cost is applied as the same amount of the construction cost as shown below.

Table 13.3 Replacement Cost

Civil Work/ Building work Item	Financial Cost (million INR)	Economic Cost (million INR)
Manually filled water points	3.6	3.2
Prey base Improvement components		
Ungulate center	16.8	15.1
Hare center	25.2	22.7
Red Jungle Fowl center	11.7	10.5
Bio-parks creation (Bio parks)	15.34	13.8

Civil Work/ Building work Item	Financial Cost (million INR)	Economic Cost (million INR)
Wildlife Rescue Centers	40	36.0
Quick Response Center	7.2	6.5
Eco Tourism Infrastructure	240	216.0
Total	359.84	323.9

Source: JICA Survey Team (2019)

13.3 Benefit Evaluation

Various project interventions are expected to bring potential economic benefits through the project implementation. These are listed below.

a) Reducing the impact of wave action, erosion in the coastal areas, preventing salinity and seawater ingress into the inland agricultural areas, and also providing protection to the coastline from the impact of cyclones through improvement of coastal ecosystem management.
b) Better shoreline protection and enhanced storm flood resistance build up through plantation of mangrove and mangrove associated species.
c) Protection of coastal areas from high velocity winds, salt sprays and also from devastations like cyclones and storms through strengthening of coastal shelterbelts. The shelterbelts also serve the purpose of sand binders and prevent sand erosion.
d) Increased costal carbon sequestration by mangrove, mangrove associated species and coastal shelterbelts without putting strain on forestry's overall water footprints.
e) Restoration of grassland with expected increase in productivity by two times in three years and three times in seven years.
f) Reducing the risks of grassland and forest fires and minimise fire damage.
g) Restoration of forest ecosystem through plantation in 9,000 ha of forest land and thereby increasing carbon sequestration.
h) Prevention of soil erosion by increase of vegetative cover.
i) Five wetlands restored to enhanced habitat and hydrological service capacity.
j) Interventions in and around protected area for wildlife habitat improvement and measures to reduce human-wildlife conflicts will contribute to ease human-wildlife conflict
k) Improving animal rescue and animal care infrastructure across the state.
l) Improving livelihood opportunities through planned income generation activities, eco-tourism activities, skill development and benefit sharing pursuant to forest produces with local communities.

Of all above benefits, following economic benefits have been quantified. The benefits other than the quantifiable benefits are described in qualitative manner above because such benefits are either difficult to estimate in monetary terms, or lack of detailed data for estimation.

Table 13.4 Quantified Economic Benefits

Benefits	Details
Co2 sequestration / Emission reduction	CO2 sequestration by strengthening of Coastal ecosystem. Mangrove and Mangrove associated species Coastal shelterbelts CO2 sequestration by afforestation/ prevention of forest degradation

Benefits	Details
Coastal ecosystem -stock value	Increased net growing stock value of coastal resources Mangrove and Mangrove associated species Coastal shelterbelts
Benefits from Grassland production	Expected increase in productivity by two times in three years and four times in seven years.
Benefits from Forestry production	Teak Timber Other Timber Fuelwood Fruits and NTFP
Benefits from reduction of Human Wildlife Conflicts	Project interventions are expected to reduce Human Injuries, Human Death and cattle injuries and Death of Cattle and thereby saving the amount of costs/ compensation to be paid cattle owners.
Livelihood Benefits	Following activities are expected to increase livelihood opportunities. Development of 4 existing and 8 new eco-tourism sites. Development of 2 existing and 6 new clusters.

Source: JICA Survey Team (2019)

The benefit evaluation is specified below.

The project interventions propose significant plantation component leading to significant carbon sequestration benefits, benefits due to increase of net growing stock value and benefits from grassland and forestry productions. Total plantation area proposed as part of project interventions are specified below.

Table 13.5 Plantation component Area and Costs

Sr. No.	Component	Area (ha)
1	Plantation of mangroves	8,000
2	Plantation of Mangrove Associated Species	500
3	Plantation of Coastal shelter-belts (with SMC)	3,700
4	Grassland Plantation	8,500
5	Afforestation in degraded forest	9,000
6	Plantation of trees around wetland	150
7	Plantation for grove creation in HWC area	1,600
	Total	22,950

Source: JICA Survey Team (2019)

A. Carbon sequestration benefits

The carbon sequestration benefits have been estimated based on guidelines of "JICA Climate -Fit version 2.0 (March 2014) 01. Forest and Natural Resources Conservation/Afforestation"

The calculation formula is shown below:

$$\Delta C = N * (\frac{44}{12})$$

Where:

ΔC = actual net CO_2 sequestration per year (t CO_2 –e/year)

N = (AGB + BGB) x CF
Where: AGB: above ground biomass at time t (t C/ha),
BGB: below ground biomass at time t (t C/ha),
BGB = AGB * RBA
RBA: ratio of below to above ground biomass

The incremental growth of AGB , ratio of BGB to AGB provided in Good practice guideline of IPCC (2006 IPCC guidelines for National Greenhouse Inventories) is adopted for various types of plantation. Detailed calculation based on guidelines of "JICA Climate -Fit version 2.0 (March 2014) 01. Forest and Natural Resources Conservation/Afforestation is provided in Annexure 13 (section 1).

B. Benefits from Coastal ecosystem -net stock value

The coastal ecosystem (mangrove, mangrove associated species along with shelterbelts) plays an important role in enhancing the fishery resources and reducing the impacts of natural disasters like tsunami and cyclones. It is an important spawning site for several marine species and also provide breeding and nursery grounds and ideal habitats for a variety of plant and animal species. For example, India's mangroves are home to 4,011 species (the highest in the world), many of which are edible fish and shellfish – providing sufficient and nutritious food directly to local communities. Poor and vulnerable populations can especially benefit from these readily available sources. It also helps in preventing salinity and seawater ingress into the inland agricultural areas and thereby increasing the productivity of agriculture and forest produces. It provides (coastal shelterbelts) the local communities with fuel wood, fodder, timber. In order to take into account above benefits, coastal ecosystem service benefits has been attempted by assigning value to net growing stock/AGB. The detailed assumptions of benefit flow from the coastal ecosystem is provided in Annexure 13 (section 2).

C. Benefits from Grassland production

Under the irrigated condition 300 ha and under rainfed condition 8,200 ha grassland plantation will be done under the project. The project intervention is expected to increase yield by two times in three years and four times in seven years in rainfed area. Details of inputs/assumptions for estimating benefit flow from the restoration of Grassland is provided in Annexure 13 (section 3).

D. Benefits from Forestry production

The tangible benefits such as Teak timber production, Other timber production, fuelwood production, Fruits & NTFP production have been ascertained. Details of inputs/assumptions for estimating benefit flow from afforestation of degraded forests are specified in Annexure 13 (section 4).

E. Benefits from reduction in incidents of Human Wildlife Conflicts

The incidents of HWC causes (i) human injuries (ii) human deaths and (iii) injuries /death of the cattle. Such incidents also reduce productivity and as a consequences GFD pays compensation amount to victims to compensate for loss of productivity. Analysis of the past data points to significant compensation paid by GFD amounting to INR 48.4 million and INR 42.2 million in 2017-18 and 2016-17 respectively for incidents pertaining to HWC[96]. While number of HWC incidents have been reduced but compensation amount has increased. The Project interventions are expected to reduce Human Injuries, Human Death and cattle injuries and Death of Cattle and thereby saving the amount of costs/ compensation to be paid cattle owners. Details of inputs/ Assumptions for

[96] *Source : Gujarat Forest statistics 2017-18 and 2016-17*

estimating benefits from reduction of HWC incidents are specified in Annexure 13 (section 5).

F. Benefits from Livelihood activities

Livelihood benefits have been estimated from (i) Eco-Tourism and (ii) cluster development activities**.** Development of 4 existing and 8 new eco-tourism sites have been proposed for eco-tourism. Owing to project interventions, tourists visiting all 12 sites shall be expected to increase. Tourist would also likely spend on different activities which will contribute to local economy. Similarly, cluster organizations engaged in different commercial activities use local produce and provide employment to local people. It has been observed that cluster activities contribute enormously to local economy by providing income generation avenues to local people. Details of Inputs/ Assumptions for estimating benefits from livelihood activities are specified in Annexure 13 (section 6).

Total benefits over as project period of 50 years are provided in table below.

Table 13.6 Total benefits over a period of 50 years

Benefits	Component	Amount (INR million)
Co2 sequestration / Emission reduction	Mangrove Plantation	1,377
	Mangrove associated species	108
	Coastal shelterbelts	1,598
	Afforestation/ prevention of forest degradation	3,697
Coastal ecosystem -stock value	Increased net growing stock value of coastal resources	
	Mangrove Plantation	3,900
	Mangrove associated species	297
	Coastal shelterbelts	2,0915
Benefits from Grassland production	Better productivity of grass Grassland	5,859
Benefits from Forestry production	Teak Timber	95,172
	Other Timber	9,305
	Fuelwood	266
	Fruits and NTFP	10,320
Benefits from reduction in incidents of Human Wildlife Conflicts	Reduction in; • Human Injuries, • Human Death • cattle injuries • Death of Cattle	199
Benefits from Livelihood activities	Benefits from Eco Tourism activities	2,090
	Benefits from Cluster related activities	525
Total		155,628

Source: JICA Survey Team (2019)

13.4 Calculation of EIRR and ENPV

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

results of NPV and EIRR are summarised below. EIRR at 11.9% is higher than the economic opportunity cost of capital at 8.5 % indicating that the Project is economically viable.

Table 13.7 Result of Economic Analysis

Parameter	Result
EIRR	11.9%
NPV (INR million)	5807

Source: JICA Survey Team (2019)

Project economic cash flow is shown in Annexure 13 (Section 7).

13.5 Sensitivity Analysis

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 13.8 Sensitivity Analysis by EIRR

Change of Cost	Change of Benefit		
	0%	-10%	-20%
0% (Base cost)	11.9%	11.28%	10.61%
+10%	11.79%	11.18%	10.51%
+20%	11.68%	11.07%	10.41%

Source: JICA Survey Team (2019)

All sensitivity parameters provide more than 8.5% EIRR (which is higher than opportunity cost of capital). Thus, the project is economically viable. Additionally, the Project activities will generate employment opportunities over a period of time in the target areas.

CHAPTER 14 OPERATION & MAINTENANCE

The assets created during the project implementation will be managed by the respective offices created under the project as a part of institutional arrangements; however, after the project completion, the overall responsibility of opearation and maintenance (O&M) will rest with the GFD. Similarly, other assets like buildings, vehicles, computers and other equipment/ gadgets will also be maintained by the concerned offices of GFD after the project completion.

O&M responsibility for some of the assets/ infrastructure created at the community level will be with JFMCs/ EDCs or ETDCs/ cluster organizations or individual households. Other associate organizations like GEER Foundations will be responsible for assests supported through the project. The plantations established during the project will later be managed by the GFD as per the working plan norms and JFM regulations in force through departmental schemes under regular departmental operations.

Summary table on O&M after the completion of the Project is given below:

Table 14.1 Operation & Maintenance of PERG

Item/ Institutions	Operator	Maintenance Mechanism
Mangrove Plantation	GFD	GFD will make budgetary allocation and undertake maintenance works.
Coastal Shelter	GFD	GFD will make budgetary allocation and undertake maintenance works.
Vidi (Reserved)	GFD/ JFMC/ EDC	GFD will make the budgetary arrangement for maintenance activities. JFMC/ EDCs will take part in the maintenance activities.
Vidi (Non-Reserved)	JFMC/ EDC	JFMC/ EDC will undertake the maintenance works using the Community Revolving Fund.
Protection Wall for Vidi protection	JFMC/ EDC/ GFD	JFMC/ EDC will undertake the maintenance works using the Community Revolving Fund. In case the protection wall is heavily damaged, the assistance from GFD may be sought.
SMC works for grassland restoration	GFD/ JFMC/ EDC	GFD will make the budgetary arrangement. JFMC/ EDC will undertake the maintenance work, in case of the minor maintenance. Major maintenance will be undertaken by GFD.
Community Assets created by EPA and Micro Plan	JFMC/ EDC/ ETDC	The cost of O&M of such assets will be met by the JFMC/ EDC/ ETDC by the Community Revolving Fund or by the contribution of the members. Users' fees shall also be charged and spent for O&M, if applicable.
Community Development Fund	JFMC/ EDC	JFMC/ EDC will operate and maintain the fund to undertake catividies planned in Micro Plan and EPA as per the operation manual of Community Development Fund. The operation begins during the project with assistance of the RMU/ DMU.
Community Revolving Fund	JFMC/ EDC	As per the operation manual of Community Revolving Fund, the respective JFMC/ EDCs will maintain the fund.
Areas where the weeds are removed by the project.	GFD/ JFMC/ EDC	GFD will be responsible for the maintenance and shall make the budgetary arrangement for maintenance of the areas.

Item/ Institutions	Operator	Maintenance Mechanism
(Nalsarovar/ Chhari Dhandh)		JFMC/ EDC may take part in the maintenance activities.
Earthen Bund (Nadabet)	GFD/ JFMC/ EDC	GFD will be responsible for the maintenance and shall make the budgetary arrangement for maintenance of the areas. JFMC/ EDC may take part in the maintenance activities.
Habitat Enrichment Area	GFD	GFD will be responsible for the maintenance and shall make the budgetary arrangement for maintenance of the areas.
Waste Disposal Facilities	Gram Panchayat	The concerned gram panchayat shall be responsible for operation and maintenance of the waste disposal facilities after the installment of the facilities.
Integrated Wetland Management Plan	GFD	GFD will be responsible for the maintenance of the plan. In case, wetland management committee is organized in the planned area, the committee shall be responsible for the continuity of the management plan.
World Heritage Site	GFD	GFD will be responsible for the Operation and Maintenance.
Ramsar Site	GFD	GFD will be responsible for the Operation and Maintenance.
Assets created and human resources allocated for the Eco Tourism Sites	GFD/ ETDC	GFD and ETDC will share the responsibilities of Operation and Maintenance of the eco-tourism sites. ETDC will be responsible for minor maintenance and day to day operation. Major maintenance work shall be undertaken by GFD. Retention of the human resources will be the responsibility of ETDC. During the phase out period, the responsibilities of ETDC and GFD shall be documented as a Memorandum of Understanding.
Corpus Fund for ETDC	ETDC	Corpus Fund for ETDC will be given for the Operation and Maintenance in the post project period. The maintenance will be done by ETDC as per the operation manual provided by the Project.
Partnership Facilitation Fund	ETDC	The fund is created for facilitating the convergence to promote convergence for the activities of ETDC. ETDC will be responsible for operation and maintenance of the project as per the operation manual prepared by the Project. During the project period, operation will begin under the guidance of RMU/DMU.
Plantations in the degraded areas	JFMC/ GFD	GFD will make the budgetary allocation for maintenance activities. JFMC will undertake the maintenance activities.
Solar Panels	Owner Household	Each household took part in the pilot project will be responsible for operation and maintenance after the installation of the solar panel.
Improved Habitat and Assets created for the purpose	GFD	GFD will be responsible for the operation and maintenance of the habitat and assets created.

Item/ Institutions	Operator	Maintenance Mechanism
Assets and Human Resources for Communication Unit of GFD	GFD	GFD will make necessary budgetary arrangement to retain the assets and human resources provided by the project. GFD will be responsible for the operation and maintenance of the assets and continuity of the human resources.
Breeding Centre	GFD	GFD will make necessary budgetary arrangement to operate and maintenance the centre. GFD will undertake operation and maintenance of the centre.
Modules for Nature Education	GFD	GFD will utilize the modules and continue with the nature education in the post project period. The necessary budgetary and human resource arrangement shall be made by GFD.
eVan mobile Apps	GFD	GFD will utilise and maintain the application. The necessary budgetary and human resource arrangement shall be made by GFD.
Distance Learning Course	GEER Foundation	GEER Foundation will operate and maintain the course. Necessary budgetary arrangement shall be made by the foundation.
Van Chetna Kendra	GFD	Operation and maintenance of the Van Chetna Kendra will be undertaken by GFD. Necessary budgetary arrangement shall be made by GFD.
Botanical Gardens	GFD	GFD will make necessary budgetary arrangement to operate and maintenance the centre. GFD will undertake operation and maintenance of the centre.
Rescue Centre	GFD	GFD will make necessary budgetary arrangement to operate and maintenance the centre. GFD will undertake operation and maintenance of the centre.
Quick Response Centre	GFD	GFD will make necessary budgetary arrangement to operate and maintenance the centre. GFD will undertake operation and maintenance of the centre.
Facilities/ Equipment/ Scientist provided for GEER Foundation	GEER Foundation	GEER Foundation shall make the necessary budgetary arrangement to maintain the facilities and equipment provided by the project. Geer Foundation shall also make the budgetary arrangement to ensure the continuity of engagement by the scientist.
Cluster Organizations	Cluster Organizations	Cluster Organizations developed by the project will be established as a legal entity such as a cooperative, a farmer producer organization and etc. They will start operating on its own during the phase out period of the project (from 4th quarter of FY 2025 onwards). The Project will necessary arrangement for the continuity of the cluster organizations by linking them to GPLC, any other supporting organizations (e.g. NGOs) or private companies.
Assets Created and	Cluster	Cluster organizations will be responsible for the operation

Item/ Institutions	Operator	Maintenance Mechanism
Human Resources for Cluster Organizations	Organizations	and maintenance of all the assets created for cluster organizations. Retention of the human resources should also be the responsibility of the cluster organizations.
Cluster Development Fund	Cluster Organizations	Cluster Development Fund held by the Project shall be distributed to each cluster organization for their corpus fund. The operation and maintenance manual of the corpus fund of the cluster organizations shall be prepared by the project during the phase out period of the project.
GIS and Personnel	GFD	GFD will be responsible for the maintenance of the infrastructure and retention of the human resources. During the phase-out stage of the project, PMU will discuss with GFD on the operation and maintenance of the GIS and concerned personnel.
MIS	GFD	GFD will be responsible for the maintenance of the infrastructure and retention of the human resources. During the phase-out stage of the project, PMU will discuss with GFD on the operation and maintenance of the MIS and concerned personnel.
Green CSR Program	GFD	PMU shall discuss with GFD to retain the Green CSR program (Afforestation with CSR/ Private Partnership).
Assets of PMU/ CCSU/ DMU/ FMU	GFD	Inventory of asset and buildings created to be maintained and shared with OFD after securing completion certificate Once the project is completed, they will be transferred to GFD, which would take responsibilities of maintenance.
Human Resources Engaged on Contract Basis	PMU/ GFD	As per the contract, the employee shall be dismissed by the end of the contract ending date. As the need arises, GFD may engage the staff as required.
PMU	GFD	As per the memorandum of association and the decision taken by the General Body of PERG.

Source: JICA Survey Team (2019)

CHAPTER 15 OPERATION AND EFFECT INDICATORS

To have the basis for evaluation of effects of the interventions that may produce substantial measurable results towards end of the project, continuous monitoring and assessment is required in the project areas, which spreads over project divisions of the state. While tracking the physical and financial progress on an on-going basis will be a critical project management requirement, monitoring the project progress towards the project goals/ objectives, and sustainability dimension of the project intervention will be of immense strategic importance.

As per JICA Operation Indicator and Effect Indicator Reference in ODA loan projects (Evaluation Department, JICA, July 2014) "Operation indicator" is used to quantitatively measure the operation of the project, and "Effect indicator" is used to quantitatively measure the effects of the project. In other words, when equipment, facilities, etc. (outputs) are installed or established by the project, (1) 'operation' indicator is used to measure whether or not the outputs are appropriately run and used, and (2) 'effect' indicator is used to measure the effects which the outputs had on the recipients and the project area.

PMU will adopt 'operation' and 'effect' indicators for tracking project progress, and update status on the indicators in the Quarterly and Annual Reports following the Results Monitoring Framework in the table 15.1 given below. Key Operation and Effect Indicators are given in the Table 15.2:

Table 15.1 Result Monitoring Framework

		PMU/GFD	JFMC/ EDC	SHG
Outcome/ Impact	1	Quality of forest and ecosystems improved in targeted divisions	Improved tree cover in open/ degraded forest - enhanced quality of forest	Improved quality of life and living standard
	2	SMC and project interventions works resulted in mitigating soil erosion and improvement in ecosystem services	SMCs results in recharging of water bodies/ ground water	Income from IGAs
	3	Livelihood needs of the forest dependent communities addressed satisfactorily	Income from grass/ NTFP sale and ecotourism activities	Enhanced capacities / skills
	4	Improved wellbeing and enhanced income generation opportunities	JFMC/ EDC practicing sustainable forest management	
	5	Capacities of the GFD enhanced for sustainable forest management	Enhanced capacities / skills	
Outputs	1	PMU, DMUs, SDMUs and RMUs are established and operational	JFMC/ EDC organized/ engaged	SHGs organized/ engaged
	2	Survey and demarcations works accomplished and maps produced as planned	Micro Plan prepared for all targeted JFMCs/ EDCs	Business Plans prepared for seeking loans
	3	Targets achieved as planned	Plantation works achieved as planned	IGAs initiated by SHGs utilizing loan support from JFMC/ EDC
	4	Saplings raised as per desired quality and number	Trainings & Exposure visits organized as planned	Trainings & Exposure visits organized as planned
	5	Trainings & Exposure visits organized as planned	Revolving fund utilized to extend loans to SHGs	Number for families benefited
	6	Surveys and Studies are conducted as planned	EDC engaged in and ecotourism activities	
	7	Ecotourism destinations identified and established	JFMCs engaged in maintenance of plantations	

		PMU/GFD	JFMC/ EDC	SHG
	8	Number for families benefited	Wage employment and income generation from forestry operations	
	9	Budgets are released as per Annual Plan of Operation (APO) for each financial year		
Inputs	1	Plantation interventions in degraded areas	Eco development activities	IGA grants and loan
	2	Habitat improvement interventions and HWL conflict management	Training & Exposure visits	Skill Training & Exposure visits
	3	Interventions in Grasslands, Wetlands and coastal areas	Micro planning	Inter-sectoral convergence
	4	Ecotourism development	Revolving Fund	
	5	Training & Exposure visits	Enterprise / Cluster development	
	6	GIS & MIS facilities		
	7	Infrastructure & mobility		
	8	Institutional & Human Resources		
	9	Annual planning and M&E activities		
	10	Project fund		

Source: JICA Survey Team (2019)

Table 15.2 Operation and Effect Indicators

Component / Sub-component / Activity / Sub-activity	Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
1 Deveopment of Ecological Infrastructure in Coastal Area	**Gulf of Khambhat, South Gujarat, Western coast of Saurashtra**						
1.1 Restoration of Mangroves							
1.1.1 Nursery raising	@2500 per ha	Nr.	2,00,00,000	seed collection (Jun-Nov & Mar-Jun) and raising saplings	2021	Required quality saplings are raised	Nursery record
1.1.2 Plantation of saplings	Jan-Feb						
a) Raised bed plantation		ha.	5,000	one-time	2021	Plantation acomplished as per plan	Utilization Certificate
b) Nursery raised plantation		ha.	3,000	2 batches	2022	"	"
1.2 Plantation of Mangrove Associated Species							

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
	1.2.1	Plantation of saplings of associate species		ha.	1,000	one-time	2021	Plantation acomplished as per plan	Utilization Certificate
1.3	**Plantation of Coastal shelter-belts**								
	1.3.1	Shelter-belt plantation with SMC works	multi-value tree species (MVTS)	ha.	5,000	3 batches	2023	Plantation acomplished as per plan	Utilization Certificate
1.4	**Community Development and Livelihood**								
	1.4.1	Engaging Peoples Organizations		Nr.				Peoples Organizations are engaged as per plan	Quarterly Report
1.5	**Research**								
	1.5.1	Establishment of Research Centre	Gandhinagar			one-time	2021		
	1.5.2	Establishment of Marine Interpretation Centre	South Gujarat			one-time	2023		
2	**Development of Ecological Infrastruture in Inland Area**								
2.1	**Restoration of Grasslands**		**Bhavnagar (T), Gir East (WL), Gir West (WL), Junagadh (T), Morbi (T)**						
	2.1.1	Preparing operational protocols and manuals		Type	5	one-time	2020	Manual/ protocols published and disseminated	Document
	2.1.2	Identification of Peoples Organizations							
		a) Reserved Vidis		Nr.	32	one-time	2020	JFMCs/ EDCs identified with sites as planned	Quarterly Report
		b) Non-reserved Vidis		Nr.	58	one-time	2020	"	"
	2.1.3	Treatment Plan		Nr.	100	4 batches	2022	Treatment plan developed for	Quarterly Report

Component / Sub-component / Activity / Sub-activity		Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
							project sites	
2.1.4	Grassland restoration							
	a) Reserved Vidis		ha.	6,000	4 batches	2023	Vidis developed in reserved areas	GIS map
	b) Non-reserved Vidis		ha.	9,000	4 batches	2023	Vidis developed in reserved areas	GIS map
2.1.5	Removal of weeds							
	a) by use of machines		ha.	3,000	4 batches	2023	Project sites in grasslands are weed free	MB record
	b) by manual methods		ha.	2,000	4 batches	2023	"	"
2.1.6	Protection Wall around project supported Vidis							
	a) Stone rubble wall		km	360	4 batches	2023	Protection wall constructed as planned	MB record
	b) Barbed-wire		km	120	4 batches	2023	"	"
	c) Protection trench		km	120	4 batches	2023	"	"
	d) Management-roads-cum-fire-lines		km	50	4 batches	2023	"	"
2.1.7	Plantation works							
	a) Rainfed areas with SMC works		ha.	5,000	4 batches	2023	Plantation works accomplished as planned	Utilization Certificate
	b) Rainfed areas without SMC works		ha.	10,000	4 batches	2023	"	"
	c) Irrigated areas		ha.	300	4 batches	2023	"	"
2.1.8	Develop controlled and rotational grazing system		ha.	2,000	4 batches	2023	The rotational system with herders develope	Study Report

Component / Sub-component / Activity / Sub-activity	Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
						d and implemented	
2.1.9 Research Areas							
a) Bacis research		topics	3	one-time	2023	Researches are completed in timeframe	Final Report
b) Action research		topics	2	one-time	2023	"	"
c) Policy research		topics	3	one-time	2022	"	"
2.2 Restoration of Wetland							
2.2.1 Removal of Prosopis juliflora and weeds							
a) Nalsarovar		ha.	400	3 batches	2023	Wetlands free from weeds	Study Report
b) Chhari Dhandh		ha.	400	3 batches	2023	Wetlands free from weeds	"
2.2.2 Creation and strengthening of earthen bund							
a) Nadabet wetland	2.5 m wide and 2.0 m height	m	14,000	3 batches	2023	Earthen bund created as planned	MB record
2.2.3 Habitat enrichment							
a) Earthen mounds construction							
a.1) Earthen mounds - Nalsarovar	25m x 2.5m x 2m	Nr.	10	2 batches	2021	Earthen mounds created for birds roosting	MB record
a.2) Earthen mounds - Chhari Dhandh	25m x 2.5m x 2m	Nr.	10	2 batches	2021	"	"
a.3) Earthen mounds - Nadabet	50m x 50m x 2m	Nr.	4	2 batches	2021	Earthen mounds created for birds roosting	MB record

Component / Sub-component / Activity / Sub-activity	Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
a.4) Earthen mounds - Nadabet	100m x 100m x 2m	Nr.	2	2 batches	2021	"	"
b) Tree Plantation in supralittoral zones	Salvadora persica, Salvadora oliodes, Acasia nilotica, etc.						
b.1) Nalsarovar		ha.	50	3 batches	2023	Plantation works accomplished as planned	MB record
b.2) Chhari Dhandh			100	3 batches	2023	"	"
b.3) Nadabet			100	3 batches	2023	"	"
2.2.4 Improving Management Infrastructure							
a) Construction of tourist huts - Van Kuteer		Nr.	15	3 batches	2023	Tourists huts constructed and operational	Utilization Certificate
2.2.5 Strengthening Protection activities							
a) Creation and maintenance of patrolling channel	Nalsarovar	km	10	2 batches	2022	Patrolling channel created	MB record
b) Boundary demarcation - Installation of pillars	Chari Dhandh and Nadabet	Nr.	300	2 batches	2022	Demarcation pillars installed at sites	MB record
2.2.6 Preparation of integrated wetland management plan							
a) Focus wetlands	Nalsarovar, Chari Dhandh and Nadabet	Nr.	3	one-time	2021	Wetlands Management Plans	Documents
b) Priority wetlands	7 priority wetlands	Nr.	7	2 batch	2022	Wetlands Management Plans	Documents

Component / Sub-component / Activity / Sub-activity		Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
2.2.7	Preparation of World Heritage Site Dossiers	Flamingo City-Khadir and Gosabara-Mokarsagar wetlands	Nr.	2	one-time	2021	Dossier is prepared	Document
2.2.8	Research & Monitoring							
	a) Impacts of climate change on wetlands		Nr.	1	one-time	2022	Study completed	Final Report
	b) Economic valuations of key wetlands		Nr.	1	one-time	2027	"	"
	c) Classification of wetlands based on Rule, 2017		Nr.	1	one-time	2023	"	"
2.3	**Restoration of Degraded Forests**	**Chota Udaipur, Godra (Panch Mahal), Baria (Dahod), Mahisagar, Aravalli, Sabarkhantha, Banaskantha**						
2.3.1	JFMC engagement							
	a) New plantations		Nr.	200	4 batches	2024	JFMCs engaged maintenance of plantations	Quarterly Report
2.3.2	Preparation of Micro Plan/ Treatment Plan		Nr.	200	4 batches	2024	Micro Plans/ Treatment Plans prepared and utilized	"
2.3.3	Plantation on degraded forest lands							
	a) Plantation - timber & fuel wood species		ha.	5,000	4 batches	2024	Plantation accomplished as per prescribed models	Utilization Certificate
	b) Plantation - NTFP & fruit/ bamboo species		ha.	5,000	4 batches	2024	"	"
2.3.4	Forest Research							
	a) Bio-degradable planting containers		Nr.	1	one-time	2025	Research completed as planned	Final Report
	b) Root-shoot technologies for rare tree species		Nr.	1	one-time	2025	"	"

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
	c)	Soil-less nursery techniques		Nr.	1	one-time	2025	"	"
2.3.5	Pilot Solar Energy Initiative		3 villages in division selected for pilot; around 100 hhs per village						
	a)	Installation of 1 KW Solar facility		Nr.	300	3 batches	2023	Households benefited from solar facility	Installation Certificate
2.4	**Community Development and Livelihood**								
2.4.1	SHG engaged			Nr.				SHGs are engaged for livelihoods	Quarterly Report
2.4.2	Establishing entreprise Clusters			Nr.				Clusters are established as per Plan	"
3	**Human Wildlife Conflict Management**								
3.1	**Habitat Mapping**								
	a)	Outside PAs		ha.	11,40,000	one-time	2021	Delineation of boundaries completed and thematic maps are prepared	GIS map
	b)	PAs		ha.	10,000	one-time	2021	"	"
3.2	**Habitat improvement**		**Lion and Sloth Bear landscapes**						
3.2.1	Removal of invasive weeds			ha.	10,000	5 batches	2024	Invasive weeds cleared (ha.)	GIS map
	a)	Follow up cost of weed removal		ha.	10,000	5 batches	2025	Invasive weeds cleared	GIS map

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
								permanently (ha.)	
	3.2.2	Grove for Habitat		ha.	2,500	4 batches	2024	Grove area developed with identified species (ha.)	GIS map
	3.2.3	Soil Moisture Conservation (SMC) works		ha.	1,250	5 batches	2024	Area covers with SMC works (ha.)	MB records
	3.2.4	Corridor enrichment	engaging farmers	Nr.	1,250	5 batches	2024	2 million saplings planted on degraded farm lands	MB records
	3.2.5	Water management							
		a) Wind mill/ Solar pump driven Guzzler		Nr.	20	3 batches	2023	Guzzlers installed and operational (Nr.)	Installation Report
		b) Manually filled water points (Capital Cost)		Nr.	180	3 batches	2023	New water points created (Nr.)	MB records
		c) Additional hand pump for manual points		Nr.	40	3 batches	2023	New hand-pumps installed and operational (Nr.)	Installation Report
3.3	**Grassland improvement**								
	3.3.1	Plantation of grass species	Lion landscape & peripheral region of PAs	ha.	2,500	4 batches	2024	Area covered with preferred grass species plantation (ha.)	Utilization Certificate
3.4	**Protection**								
	3.4.1	Fireline Creation	Sloth Bear landscape						

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
	a)	15 metre wide		km	2,010	5 batches	2024		Utilization Certificate
	b)	8 metre wide		km	3,060	5 batches	2024		"
3.5	**Prey base Improvement**								
3.5.1	Establishing prey breeding centre		Panchmahal/ Ratanmahal/ Jambughoda/ Vijaynagar						
	a)	Ungulate centre		Nr.	1		2021	New breeding centres established & operational for release of prey	Utilization Certificate
	b)	Hare centre		Nr.	1		2021	"	"
	c)	Red Jungle Fowl centre		Nr.	1		2021	"	"
3.5.2	Bore well with pump room at new centres			Nr.	3		2021	Borewell with pump room created & operational	"
3.6	**Participation of local communities in wildlife management**								
3.6.1	Engagement of Pos								
	a)	JFMC		Nr.	235	one-time	2021	JFMCs identified and engaged	Quarterly Report
	b)	EDC		Nr.	390	one-time	2021	EDCs identified and engaged	"
3.7	**Eco-tourism infrastructure and Promotion**								
3.7.1	Eco-tourism site development		Wildlife/ PA areas	Nr.	9	one-time	2023	Site facilities created and operational	Utilization Certificate

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
3.7.2	Trainings for Ecotourism								
	a)	Guides	ETS members	Nr.	160	as per plan	2023	Members trained and skills enhanced	Quarterly report
	b)	Hospitality	"	Nr.	400	as per plan	2023	"	"
3.8	**Strengthening of Communication unit of GFD**								
3.8.1	Awareness raising programs								
	a)	Preparation of modules for nature education	Lion, Sloth Bear and Crocodile landscapes	Nr.	10	one-time	2020	Modules developed	Contract deliverables
	b)	Training of trainers for nature education		Nr.	1,250	as per plan	2022	Persons trained	Quarterly report
	c)	Nature education camps							
		i) Lion landscape		Nr.	500	as per plan	2024	Camps organized	Quarterly report
		ii) Sloth bear landscapes		Nr.	400	"	2024	"	"
		iii) Crocodile landscape		Nr.	100	"	2024	"	"
	d)	eVan mobile app		Nr.	1	one-time	2021	Mobile app developed and utilized	Contract deliverables
	e)	Distance learning certificate course		Nr.	1	GEER Foundation	2021	Mobile app developed and utilized	Contract deliverables
	f)	Van Chetna Kedras strengthening		Nr.	1	one-time		Audio-visual aids procured and modules are developed for information dissemination	

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
	g)	Promote partnership of NGOs and Volunteers	Nature education						
		i) Small grants		Nr.			2026	NGOs that received grants	Quarterly report
		ii) Awards and recognition		Nr.			2026	NGOs that received awards & recognition	"
	h)	Eco-clubs	Schools around PA network	Nr.	600	2 batches; GEER Foundation	2022	Schools where Eco-clubs are operational	Quarterly report
	i)	Bio-parks creation	Near highways around Ambaji & Surat	Nr.	2	one-time	2023	New bio-parks established and operational	Utilization Certificate
3.9	**Wildlife Rescue Infrastructure**								
3.9.1	Establishing Rescue Centre		Khodamba, Pavagadh & Vadodara	Nr.	3	one-time	2021	Rescue Centers established and operational	Utilization Certificate
3.9.2	Establishing Quick Response Centre			Nr.	6	one-time	2021	Quick response centres established and equipped	"
3.10	**Capacity Building and Research**								
3.10.1	Research								
	a)	Establish Research Center for Wildlife Management (RCWM)		Nr.	1	one-time	2022	Centre established and operational	Government Order/ Utilization Certificate
3.10.2	Capacity Building								

Component / Sub-component / Activity / Sub-activity			Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
	a)	Strengthening TRC for communication & publicity		Nr.	1	one-time	2021	TRC strengthened as envisaged	Quarterly Report
3.10.3	Training for Rescue centre								
	a)	Trackers		Nr.	12	as per plan	2021	Persons trained	Quarterly report
	b)	Immobilisation of animals		Nr.	80	"	2022	"	"
	c)	Animal rescue		Nr.	200	"	2023	"	"
3.11	**Community Development and Livelihood**								
3.11.1	SHG engaged			Nr.				SHGs are engaged for livelihoods	Quarterly Report
3.11.2	Establishing entreprise Clusters			Nr.				Clusters are established as per Plan	"
4	**Institutional Capacity Enhancement**								
4.1	**Capacity Enhancement**								
4.1.1	SHG members trained			Nr.				Members trained	Quarterly Report
4.1.2	JFMC/ EDC members trained			Nr.				Members trained	"
4.1.3	Community facilitators trained			Nr.				Members trained	"
4.1.4	GFD staff/ officers trained			Nr.				Members trained	"
4.2	**Monitoring & Evaluation**								
4.2.1	Monitoring								
	1)	Long-Term Landscape Monitoring	all landscapes	times	4	as per plan	2028	Survey conducted as per plan	Final Report
	2)	Concurrent Monitoring and Periodic Reviews							

Component / Sub-component / Activity / Sub-activity	Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
a) Project Circle	project circles	Nr.	1,344	monthly	2028	Reviews/ meetings conducted as per plan	Meeting Minutes
b) PMU/ Executive Committee		Nr.	32	quarterly	2028	"	"
c) GB		Nr.			2028	"	"
d) HPSC		Nr.			2028	"	"
3) MIS and Reporting System			1	one-time	2021	Established and operational	Quarterly report
4) Technology based Monitoring - GIS applications			1	one-time	2021	"	"
5) Annual Strategy Planning & Review Workshops							
a) Circle	project circles	Nr.	98	annual	2028	Reviews/ meetings conducted as per plan	Report
b) State		Nr.	8	annual	2028	"	"
4.2.2 Impact Assessment							
1) Socio-economic Survey							
a) Baseline Survey		Nr.	1	one-time	2020	Baseline created	Study Report
b) Terminal Impact Survey		Nr.	1	one-time	2028	Impact survey completed	"
2) Thematic and Short Studies		Nr.	5	as per plan	2026	Studies condcuted as per identified themes	Final Report
4.2.3 Audit							
1) Statutory Audit		Nr.	9	annual	2029	Audits conducted as per plan	Audit Certificate
2) Concurrent Audit		Nr.	18	six-monthly	2028	"	Audit Report
4.3 Communication and Publicity							

Component / Sub-component / Activity / Sub-activity		Scope/ Spatial coverage	Unit	Quantity	Proposed approach	Target Completion year	Indicator	MoV
4.3.1	Newletters		Nr.	48	qaurterly	2028		

Source: JICA Survey Team (2019)

CHAPTER 16 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

16.1 Introduction to Environmental and Social Considerations Policy

JICA is committed to addressing environmental and social considerations wherein, policy has been framed taking into consideration the vulnerable section of the society along with the various disparities within the society in which the project is proposed to be implemented. JICA takes into consideration the fact that with minimum social and environmental impacts maximum development should be achieved. This kind of sustainable development can be achieved by incorporating within the project planning and implementation the principle of inclusion of environmental and social costs in development costs and the social and institutional framework that makes such inclusion possible are crucial to the project.

Another major principal that JICA policies address is democratic decision-making, wherein it is important to have stakeholder participation, information transparency, accountability, and efficiency in the decision-making process. In order to achieve this and to have human rights honoured while implementation of the project, steps should be taken to have meaningful stakeholder participation and transparency in decision-making. It is also expected that maximum information disclosure should be achieved in the planning and implementation process.

16.2 Requirements by the JICA Guidelines

As per the JICA guidelines, JICA will examine the following conditions in relations to the project implementation, which the Implementing Agency (IA - Gujarat Forest Department) will be required to comply with:

a) IA will take appropriate measures as per the environmental and social considerations guidelines.
b) IA will provide sufficient institutional capacity in order to confirm with environmental and social considerations requirements, or take adequate measures required to be taken to strengthen the same.
c) IA will examine the potential positive and negative environmental impacts of interventions and take the necessary measures to avoid, minimize, mitigate, or compensate for any potential negative impacts, and IA will also take measures to promote positive impacts if found.
d) JICA will disclose the results of environmental reviews on its website after concluding agreement documents.
e) Over a certain period of time, JICA will confirm with the project proponents etc. the results of monitoring the items that have significant environmental impacts. This will be done in order to confirm that the project proponents are taking steps to meet with the requirements of the environmental and social considerations for projects that fall under Categories A, B, and FI.

16.3 Environmental and Social Management System Framework (ESMSF) and Scheduled Tribe and Forest Dependents Plan Framework (STFDPF) Objectives

Primary objective of both the frameworks is to identify a process for environmental and social safeguard which will assist the Implementing agency of the Project to identify, assess and mitigate the environmental and social impacts of the proposed interventions. The other broad objectives are:

1) To identify, manage and monitor potential environmental and social impact arising from the implementation of the Project;
2) To avoid or in case of unavoidable circumstances minimize any adverse impact arising from the project.
3) To earmark and enhance the positive impacts due to the project implementation.

4) To ensure that the rights and needs of forest dependents and their communities affected by or involved in the Project, are respected and considered in the design and execution of project interventions; and
5) To ensure the conservation and protection of local ecosystems and natural resources in the design and execution of project interventions.

16.4 Structure of ESMSF and STFDPF

The ESMSF and STFDPF are divided into nine major sections. They are as mentioned below:

1. Summary of the Project
2. Environmental and Social Safeguard Policies of JICA.
3. Definitions and Selection of Safeguard Frameworks
4. Beneficiaries Identification
5. National and State Environmental and Social Management Systems
6. Environmental and Social Risks and Mitigation Measures
7. Frameworks and Procedures for ESMSF
8. Detail Procedures of STFDP
9. Institution Strengthening and Capacity Building for ESMSF and STFDP Implementation

Detailed procedures and frameworks have been described in the subsequent paragraphs. Environment and Social Considerations have been also mentioned as environmental and social safeguards as the two are used in interchangeable manner.

16.4.1 Summary of the Project

The survey team has confirmed the project components and identified the target areas for the projects, as outlined below. The goal of the project is to conserve ecosystems in Gujarat state through the sustainable management of the coastal system, critical inland ecosystems and enhancement of measures against human wildlife conflicts, thereby contributing to improving the ecosystem services in the State. The objectives of the key components of the projects are as follows:

Table 16.1 Objectives of the Project Components

S. No.	Key Component	Objectives
1.	Development of Ecological Infrastructure in Coastal Area	To improve the coverage of mangroves and associated species thereby strengthening the ecological services, including the mitigation of climate change, from this vital coastal system. The coastal shelter belt development seeks to restore the landscape and has a function in climate change mitigation and adaptation, besides the protection of crops against salt laden wind.
2.	Development of Ecological Infrastructure in Inaland Area	To arrest and reverse the degradation of critical ecosystems through landscape wide approaches so as to improve the biodiversity, ecosystem services as well as social benefits, and to be able to strengthen the carbon dioxide sequestration potential
2.1	Restoration of grasslands	To improve the biomass production capacity of the grasslands with a view to enhance the local biodiversity and to improve the livelihood condition of the pastoral communities.
2.2	Restoration of wetlands	To improve the ecological integrity of selected wetlands and strengthen their functions as habitats for birds, especially migratory birds, develop conservation partnership with the local communities through community

S. No.	Key Component	Objectives
		development activities.
2.3	Restoration of degraded forests	To restore degraded forests in the hillscape, improve its biodiversity and ecosystem services and address the livelihood concerns of the forest development communities.
3.	Human Wildlife Conflict Management	Strengthening the mitigation of human wildlife conflicts by improving the ecological integrity of the habitat and enhancing the level of local community participation by provisioning tangible socio economic benefits, using means designed for long term as well as proximate results.
4.	Institutional Strengthening	To develop and strengthen the capacities of the GFD and the community based organization at the field level in the sustainable management of the natural resources and to deliver the implementation of the designed interventions

Source: JICA Survey Team (2019)

The target area identified comprises of the following divisions.

Ahmedabad SF, Amreli SF, Anand SF, Aravalli, Banskantha WL, Baria, Bharuch Sub-division, Bhavnagar, Botad SF, Chhota Udeipur, Gandhinagar, Gir East WL, Gir West WL, Godhra, Godhra SF, Junagadh, Kutch East, Mahisagar, Morbi, Nadiyad SF, Nalsarovar WL, Porbandar, Sabarkantha, Shetrunji WL, Surat, Vadodara SF and Vadodra WL.

The project area identified for the various intervention under the project are marked in the MAP-1.

The project areas are selected based on the following principles:

- Contiguous landscape unit where the ecosystem properties and the underlying ecological and socio economic issues share common characteristics
- Recognizing the interconnectedness of the ecological problems at hand and the socio-economic issues.
- Emphasizing areas where the shared problems are acute and seeking resolutions within the larger landscape units.
- Potential of markedly improving the ecosystem functions and services and the mitigation of climate change and the adaptation to the same.
- Management coherence in project implementation for GFD
- Matching the priorities set in the state's policy instruments.

Component wise site prioritization critera and process are given in Chapter 7.

The current project attempts to sustain the momentum generated by GFDP phase II and to enhance the ecosystem management regime of the state. It follows and ecosystem approach and it is expected to yield tangible ecological benefits in terms of enhanced eco system services and contributing to mitigation and adaptation to climate change. It also envisages to use modern technology in the implementation and monitoring of the project which would make PERG a model fourth generation projects of JICA. The project is also in line with the environmental treaties such as the Conventional Biological Diversity and UN Framework on Climate Change as well as UN's Sustainable Development Goals.

The project implementatoin perod is planned for eight year with a preparatory phase of one year, implementation phase of five years and phase out stage of two year.

The project will be implemented by a project management unit as an autonomous society within the forest department. Community organizations will participate in the implementation of the project wherever feasible. A total of 915 Joint Forest Management Committee and Eco-development Committees are targeted to be covered under the project.

16.4.2 Environmental and Social Safeguard Policies of JICA

(1) Principles

In order to fulfil JICAs commitment to respecting human rights and environmental and social safeguards in its investments, JICA projects and programs are to follow the JICA Guidelines for Environmental and Social Considerations (2010), which incorporates the following two set of broad principles:

I. General

- Assessment of wide range of environmental and social impacts will be carried out in the JICA projects/programs.
- Environmental and social issues should be taken into consideration during the initial design and planning stages throughout the project cycle.
- JICA is responsible for accountability and transparency in project execution.
- Stakeholder consultation/participation is required in consideration of environmental/ social issues.
- Proper information disclosure systems should be prepared.
- Considering the guidelines in project planning and execution should contribute to institutional capacity building of the implementing agencies for proper implementation of environmental and social safeguards as envisioned in the JICA Policy.
- JICA is committed to addressing environmental and social issues in a prompt/ timely manner.

II. Indigenous People

These considerations address the issue of indigenous People in the project area. They are as mentioned below:

- Avoiding implementation of interventions that may have adverse impacts on indigenous peoples in the planning stage itself.
- Ensuring that there is minimum impact and all steps are taken to mitigate any adverse impact that may arise in case of an unavoidable situation.
- Taking all steps possible to uphold all the rights of the indigenous people pertaining land and resources in accordance with the respective international declarations and treaties like the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).
- Implementing the process of free, prior and informed consultation for obtaining the consent of indigenous peoples for implementation of the project.
- Preparing an Indigenous Peoples Plan in order to achieve the above stated objectives, for which JICA guidelines prescribe the World Bank Safeguard Policy OP 4.10 Annexure B as the appropriate policy document.

(2) Key Process Elements

JICA’s key process elements for environmental and social considerations is summarised below:

1) Information Disclosure and Consultation:

JICA requires that GFD disclose information on the environmental and social impact of the project both to JICA as well as to the local stakeholders well in advance prior to its implementation. Hence, it is required that the respective frameworks for consultation and information disclosure should be developed and agreed upon in the initial stages of the project.

2) Project Categorisation

Projects are categorized according to the scope/severity of the environmental and social impacts or risks, as follows:

Table 16.2 Project Categorisation by JICA Guideline

Category	Description
Category A	Significant adverse impacts e.g. Large-scale development/ infrastructure Large-scale involuntary resettlement, projects in sensitive areas e.g. National Park
Category B	Generally site-specific impacts, few impacts are irreversible, normal mitigation measures can be designed
Category C	Minimal/little adverse impact
Category FI (Financial intermediary)	Substantial selection and appraisal of intervention after JICA approval of funding

Source:JICA Guidelines for Environmental and Social Considerations 2010

3) Impacts Assessment

In order to assess the impacts a wide range of environmental and social considerations are taken into account with view towards both enhancing positive benefits and avoiding/ mitigating negative impacts.

Table 16.3 Types of Environmental and Social Impacts

Type of Impact	Impact on
Environmental Impact	Natural Environment - air, water, land Systems - water usage, climate change, ecosystems, Scale – local, regional, boundary/ global scale impacts
Social Impact	On community/people's - lands, economies, livelihoods, employment, natural resources; - resettlement, local conflicts - gender, vulnerable groups, indigenous peoples, children; - social institutions, health, cultural heritage, existing social infrastructures and services, equality of benefits and losses, local conflicts, working conditions, etc.

Source: JICA Survey Team (2019)

4) Compatibility with International Standards

JICA Policy on environment and social considerations are in concurrence with the World Banks Safeguards Policies for the Project implementation. It refers as a benchmark to the standards of international development agencies; to internationally recognized standards, or international standards, treaties, and declarations and to the good practices of developed nations as appropriate.

In order not to have many different standards, JICA refers to international policies, procedures and standards such as those of the World Bank in part. For the current project in spite of the fact that JICA has special concerns for the Indigenous Peoples, it does not have a separate detailed policy, but refers to the World Bank Operational Policy 4.10 (OP4.10) on Indigenous Peoples. Thus, the contents and format of the safeguards framework elaborated for the Project follows that indicated in the World Bank OP 4.10, as required by JICA for the preparation of the Project.

(3) Project Categorisation by the JICA Guidelines

I. Project Categorization

Current project falls under the 'FI' Category in accordance with the JICA Guidelines (2010). The defining criteria for the classification are as follows:

1) JICA's funding of projects will be provided to a financial intermediary or executing agency.
2) The selection and appraisal of the intervention will be substantially undertaken by the executing agency only after JICA's approval of the funding, so that the interventions cannot be specified prior to JICA's approval of funding.
3) Intervention will be selected in participatory mode by communities and as such cannot be specifically defined at this stage.
4) Intervention projects with significant adverse environmental or social impacts requiring environmental clearance will be eliminated through screening procedures. However, certain potential environmental and social impacts are perceived, and there is the potential that the Project may damage protected plants and involve forest dependents (Scheduled Tribes (ST), Scheduled Castes (SC), Other Backward Classes (OBC), forest dwellers and other forest dependents).

The Project is overall expected to have a mainly positive impact on the environment given that its primary objective is:

The overall goal of the project is to conserve ecosystems in Gujarat state by the sustainable management of the coastal system, critical inland ecosystems and enhancement of measures against human wildlife conflicts, thereby contributing to improving the ecosystem services in the State.

The key interventions and their respective objectives are described in the below.

Component 1: Development of Ecological Infrastructure in Coastal Area

To improve the coverage of mangroves and associated species thereby strengthening the ecological services, including the mitigation of climate change, from this vital coastal system. The coastal shelter belt development seeks to restore the landscape and has a function in climate change mitigation and adaptation, besides the protection of crops against salt laden wind.

Component 2: Development of Ecological Infrastructure in Inland Area

To arrest and reverse the degradation of critical ecosystems through landscape wide approaches so as to improve the biodiversity, ecosystem services as well as social benefits, and to be able to strengthen the carbon dioxide sequestration potential

Sub-Component 2.1: Restoration of grasslands

To improve the biomass production capacity of the grasslands with a view to enhance the local

biodiversity and to improve the livelihood condition of the pastoral communities.

Sub-Component 2.2: Restoration of Wetlands

To improve the ecological integrity of selected wetlands and strengthen their functions as habitats for birds, especially migratory birds, develop conservation partnership with the local communities through community development activities.

Sub-Component 2.3: Restoration of degraded forests

To restore degraded forests in the hillscape, improve its biodiversity and ecosystem services and address the livelihood concerns of the forest development communities.

Component 3: Human Wildlife Conflict Managemement

Strengthening the mitigation of human wildlife conflicts by improving the ecological integrity of the habitat and enhancing the level of local community participation by provisioning tangible socio economic benefits, using means designed for long term as well as proximate results.

1. Livelihood support and community development

To promote livelihood support activities for the constraints of the ecosystem dependent local communities so as to turn than into partners in conservation.

2. Institutional capacity building

To develop and strengthen the capacities of the GFD and the community based organization at the field level in the sustainable management of the natural resources and to deliver the implementation of the designed interventions

Although it is not possible to precisely detail where the interventions will be implemented with respect to the location and scale, the Project will exclude “Category A” interventions with a significant environmental impacts or risks.

At the time of selection, finalisation and approval of interventions, respective interventions will have to be categorised as either “Category B” or “Category C” according to the scope/ severity of the environmental and social impacts or risks.

II. Definition of Intervention

In this document, the word of intervention is used to represent a bunch of the activities of the Project which are integral components of the direct plans sanctioned at Division Level by PMU or micro plan at village level or the Other Plan independently sanction by PMU under its own supervision. Screening and categorisation will be carried out for each intervention and the result will be submitted to JICA. The definitions of the interventions are shown as below:

1) Division Action Plan
2) Micro Plan giving details of each of the interventions
3) Others Plans (As per the planning of the different components)

16.4.3 Definitions and Selection of Safeguard Frameworks

(1) Social and Environmental Vulnerabilities

1) Social Vulnerability:

Social vulnerability is the status of a group of people, who are not at par with other members of the society due to the social disadvantage they suffer arising from discriminatory social practices and / or are unable to access the benefits of development and/ or opportunities arising from development programs. Many a times this is a result of the social characteristics such as culture, identity, economic systems and social institutions. These groups due to their standing often also become environmentally vulnerable as their land-based subsistence and livelihood may be at risk due to change in landuse practices, degradation of the environment, etc.

2) Environmental Vulnerability:

Whenever an ecological integrity is threatened or is at risk due to manmade or natural hazards this condition is termed as Environmental vulnerability. This could happen over spatial or temporal scales of ecosystems. Factors that impact the environment negatively and thereby reduce the resilience of the environment to sustain varies spatially. Vulnerability may be directly proportionate to the intensity and frequency of human interventions and/or natural hazards.

(2) Defining Terms

1) "Indigenous People" in the Context of "Scheduled Tribes and Forest Dependents Plan Framework (STFDPF)" for the Project

STFDPF is prepared referring to the format provided in the World Bank's OP 4.10 Annex C on Indigenous Peoples Plan Framework (IPPF). In consideration of the Word Bank's OP 4.10, the Forest (Recognition of Rights) Act 2006, and the Indian/ Gujarat contexts, following categories of the people who will be affected, particularly adversely affected, by project activities to be regarded as the target of IPPF for the Project.

- Scheduled Tribes (ST)
- Scheduled Castes (SC)
- Other Backward Classes (OBC)
- Forest Dwellers and
- Forest Dependants

"Indigenous Peoples" definition has been adopted as per the Word Bank, "Forest Dwellers" is a broad definition to be taken as per the Forest (Recognition of Rights) Act 2006. Since the proposed Project will be implemented in the forest areas these communities will be the stakeholders and hence the decision makers and implementers at village level.

The proposed Project regards both tribal and non-tribal communities that reside within and on the fringes of the forest areas as project affected people to be the target of the IPPF. Since the targets of IPPF for the Project are not exclusively "Indigenous Peoples" but also "Forest Dwellers/ Dependents", the term the "Indigenous Peoples Plan Framework (IPPF)". Has been interchanged with "Scheduled Tribes and Forest Dependents Planning Framework (STFDPF)".

There are issues related to how tribes, castes and other minorities are defined, which have a very real life implications in terms of who or which groups are actually safeguarded by the policy and statutory

frameworks. It further defines their eligibility for various social welfare benefits and programs. Recognizing the historical discrimination and deprivation, list of caste and tribe were identified in government schedule as a target group for reservation policies. Persons who does not find mention in the list of ST (in terms of Article 342 of the Indian Constitution) are considered as non-tribe and vice-versa. This is a vital issue for this Project as by purely following the definition of the Government of India's classification system, some of the disadvantaged and marginalized groups may be left out.

2) Scheduled Tribes (ST):

The Constitution of India, Article 366 (25) refers to scheduled tribes (ST) as those communities who are scheduled in accordance with Article 342 of the Constitution. According to this Article, 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.

As per the 2011 census, the total population in the State was 60.439 million of which the tribal population, accounting for 14.76% of the total population, was 8.917 million. The literacy rate has increased to 62.5% in ST population. Since 2001, literacy rate has improved for the tribal communities. The gap reduced from 21.4% to 15.4%. Therefore, it is imperative to increase literacy rate amongst STs, particularly ST females. There are 26 Scheduled Tribe groups in the State. The major tribal communities are Bhils, Bhil, Garasia and Dholi Bhils, Talavia, Halpati, Dhodia, Rathwa, Naikada, Nayaka, Gamit, Gamata. Tribal communities including Kathodi, Padhar, Siddi, Kolgha and Kotwalia belong to the Primitive Tribal Groups.

In Gujarat, Scheduled Tribes are mostly concentrated in the areas along the State's eastern border. The tribal region consists of 48 tribal talukas, 15 pockets and 4 clusters covered under the 14 Integrated Tribal Development Projects. For administration and implementation of the Tribal Sub Plan, the tribal area is grouped under 14 Integrated Tribal Development Projects in 14 districts.

Table 16.4 Scheduled Tribes and Primitive Tribes of Gujarat

Scheduled Tribes	Primitive Tribes
Barda	Kathodi
Bawcha	Kolgha
Bharwad	Kotwalia
Bhil	Padhar
Charan	Siddi
Choudhuri / Choudhury	
Chodhara	
Dhodia	
Gamit	
Gond	
Halpati	
Kukana	
Kunbi	
Naikda	
Patelia	
Pomla	
Rabari	
Rathwa	
Warli	
Tadvi	

Source: TRTI, Tribal Development Dept, GoG

3) Scheduled Castes (SC):

The varna or Jati system segregated the Indian society into 4 main categories or castes; however, one category of the society falls outside the caste system and occupy the lowest rank in the ritual hierarchy of Indian society, due to the age-old practice of untouchability resulting due to engagements in offensive vocations, thus leading to social, educational, and economical backwardness.

The Census Report of 2011 states that Gujarat has population of 60.4 million, an increase from figure of 50.7 million in 2001 census. Total population of Gujarat as per 2011 census is 60,439,692 of which male and female are 31,491,260 and 28,948,432 respectively.

4) Other Backward Classes (OBC):

OBC is a collective term used by Government of India to categorize caste groups which are socially and economically backward and disadvantaged, which includes the SCs and STs. The Indian Constitution describes the OBCs as 'socially and educationally backward classes'. Gujarat has 104 communities under the OBC recognised by the Government of India. There are other classifications under this categories, but in order to have uniformity and federal adherence for the purpose of the project the Government of India's list is considered.

This shall also include all the communities that are socially and educationally Backward Classes declared by Gujarat State. These castes are listed by the Office of Director, Developing Castes Welfare, Dept of Social Justice and Empowerment, Govt. of Gujarat.

5) "Forest Dwellers" in Recognition of Forest Right Act

The Forest (Recognition of Rights) Act 2006 defines "the Forest Dwelling Scheduled Tribes and the Other Traditional Forest Dwellers" as members or communities, who primarily reside in and who depend on the forests or forest lands for bona fide livelihood needs (Section 2 Part C of the Act). It is noteworthy to mention that the term "Forest Dweller" has a specific meaning in the context of the Indian forest legislation.

6) "Forest Dependents" in Project for Ecosystem Restoration in Gujarat

The current project has a novel concept of addressing the issue from ecosystem perspective with inclusion of fragile ecosystems like degraded forests, grasslands, wetlands and coastal ecosystems. In the current project the definition of "Forest" is being extended to grasslands, wetlands and coastal plantations and with this extension of definition of forests, the forest dependent communities will be required to be extended to those communities which are not listed under conventional forest dependents viz. schedule tribes and forest dwellers.
It was observed from the field visits and discussions with the experts (Annexure 5) that some of the indicative Forest Dependent community in the aforesaid additional ecosystems other than the degraded forests are as given in the following table. The following list is not exhaustive and during Social Assessment if any additional target Forest Dependents are identified they may be included in the STFDPF.

Table 16.5 Indicative Forest Dependent Communities in the Study Area

Indicative Forest Dependent Communities in the Study Area	
Ecosystem	**Identified Forest Dependent Communities**
Grasslands	Local landless pastoralist, migratory pastoralist
Wetlands	Local fisherman, local dependent on natural resources obtained from wetlands viz. reeds, tubers, fodder etc.
Coastal	Pagadia fishermen, local fishermen using dingy, fishing communities dependent on crabs and mollusc harvested from tidal mudflats.

Source: JICA Survey Team (2019)

16.4.4 Selection of an Appropriate Frameworks for Environmental and Social Considerations

It is proposed that all steps will be taken to ensure that there are maximum positive and no adverse environmental impacts, and there will be a guarantee of efficient implementation of the social safeguard measures. Considering these points, for the purposes of developing a safeguards framework suitable to the Project and the local context, ESMSF and STFDPF are found to be most appropriate. These frameworks are applicable to a broad range of socially marginalized, vulnerable and forest-dependent community groups. The ESMSF explains for a broad environmental and social framework, while the STFDPF is specifically applicable to the ST, SC, OBC, forest dwellers, and other forest dependents found within and in vicinity of the Project area.

(1) Beneficiaries Identification

The proposed ESMSF and STFDPF will be applicable to all people who live in and around the Project implementation areas and are considered to be forest dependents. The frameworks will also apply to all the project components identified within the Project area. The Project must provide its benefits equally to the all affected people. During execution of the project and implementation of the framework criteria within the above defined vulnerable communities special consideration will have to be given to the follow types of people as they are considered to be most vulnerable:

- Below Poverty Line People/ Households
- Women Headed Households
- Landless People
- Other Vulnerable People/ Households
- Forest Dependents including ST, SC, OBC, forest dwellers, other forest dependents

Target groups will have to be identified at the time of preparing the Plan in which the Schedule Tribes and Forest Dependents are to be identified and their inputs are to be taken. Care should also be taken that at the time of constituting the Executive Committees of the POs ST and FD communities have a representation in the same. Beneficiary identification procedure will take into consideration the details mentioned in the following paragraphs.

Table 16.6 Proposed Beneficiary Selection Criteria

Activity	Proposed Beneficiary Selection Criteria	Responsible Institution
Forest Management Activities	1. Basic Criteria (all to be fulfilled): ➢ To have a keen interest in addressing the issues/ problems or developing the potentials to utilize the benefits derived from ecosystem services.	Range Office and POs

Activity	Proposed Beneficiary Selection Criteria	Responsible Institution
	➢ To have a willingness to work as a team member in the PO and participate wholeheartedly in the Project activities. 2. Subsidiary Criteria (at least one should be applicable): ➢ To be located in village / settlement in the vicinity of the forest land where interventions are planned or there are likelihoods of development and improvement in the utilization of the ecosystem services. ➢ The distance between the community and the intervention location should be in principal walkable and easily accessible. ➢ There is likelihood of a direct impact on the lives of the community due to the intervention proposed in the project.	
Livelihood / Community Development Activities	Underlying principles of beneficiary selection for livelihood and community development activities are as below: 1. Underlying Approach: The beneficiaries shall be identified keeping in mind of equity. 2. Inclusion Criteria Marginalised population within the community shall be given priority to join the livelihood activities. 3. Exclusion Criteria: Beneficiary of other similar projects at the time of the beneficiary identification of PERG	POs and SHG

Source: JICA Survey Team (2019)

16.5 Environmental and Social Management Systems

16.5.1 Legal and Policy Framework for Environmental and Social Considerations in India

Overall, environmental and social safeguards policies and related implementing legislation in India do not deviate from the requirements of JICA Guidelines. The following tables outline key legislation and policy in India and Gujarat and relevant to the Project.

Table 16.7 Existing Legal and Policy Framework for E & Social Consideration in India

Legal Instrument	Salient Features	Institution responsible for implementation
Environment Protection		
Environment (Protection) Act, 1986 and Amendment 1991	It is an umbrella national legislation which was enacted for overall protection and conservation of the environment including air, water, noise and land. This Act empowers the Government of India vide its Ministry of Environment Forests and Climate Change (MoEF&CC) to enact rules and regulations which are the framework for implementing various issues that the government desires to address for conservation and protection of the environment, which are consequently implemented by CPCB and other institutions of the Ministry at Central level and the Environment Departments and SPCB in various States.	MoEF&CC, State Environment Department, Gujarat Pollution Control Board (GPCB)
Environment (Protection) Rules 1986 as	These rules provide standards for emissions air and water effluents, of environmental pollutants, prohibitions / restrictions on the location of industries and on carrying-out processes and	MoEF&CC, CPCB and GPCB

Legal Instrument	Salient Features	Institution responsible for implementation
amended from time to time	operations in different areas, procedure for taking samples and submission of samples for analysis and the form of laboratory report, providing information to authorities and agencies in certain cases, prohibition and restriction on handling hazardous substances in different areas and submission of environmental statement.	
EIA Notification 2006 and Amendments	Under the E(P)Act, 1986, EIA rules have been formed which defines the procedures for conditions required for environmental clearance (EC) including screening and scoping, impact assessment, mitigative measures, public consultation and related issues for various projects that have a substantial impact on the environment on being executed. It also specifies through a Schedule a list of projects that attract the provisions of this rules.	MoEF&CC Environment Dept, Govt. of Gujarat
The National Green Tribunal Act 2010	In order to redress promptly environment and forests related judicial issues the Govt. of India through this Act provides for the establishment of a National Green Tribunal. This Act also includes enforcement of any legal right relating to environment and providing relief and compensation for damages caused to people or property due to violation of environmental laws or conditions specified while granting permission.	National Green Tribunal (NGT), Govt. of India
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.	CPCB GPCB
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.	CPCB GPCB
Rules and Notifications framed under the Environment (Protection) Act 1986	The Hazardous Waste (Management & Handling) Rules, 1989 amended in 2000 The Manufacture, Use, Import, Export, Storage of Hazardous Microorganism, Genetically Engineered Organisms or Cells Rules, 1989. The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989, amended in 2000. The Environment Audit Notification, 1993 The Coastal Regulation Zone Notification, 1991 The Chemical Accidents (Emergency Planning, Preparedness & Response) Rules, 1996 The Biomedical Waste (Management & Handling) Rules, 1998 The Municipal Solid Wastes (Management & Handling) Rules, 2000 Recycled Plastics Manufactures and Usage Rules, 1998 amended in 1999 Notification on Flyash (14th September 1999)	CPCB GPCB

Legal Instrument	Salient Features	Institution responsible for implementation
	The Noise Pollution (Regulation and Control Rules, 2000 Ozone Depleting Substance (Regulation) Rules, 2000 Batteries (Management & Handling) Rules, 2001	
Forest and Wildlife		
The National Forest Policy 1988	In order to achieve national goal of tree cover and other afforestation related issues. Various other geophysical and ecosystem related issues have also been included in the Policy. 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, GFD
Indian Forest Act, 1927	This law is the current forest legislation for regulating forest management throughout the country. It provides three categories of forests - Reserved Forests, Village Forests and Protected Forests. It empowers the government to impose duty on forest produce including timber and provides rules for regulating cutting of trees, collection of forest produce, etc. It provides for penalties for violations of this law.	MoEF&CC GFD
Forest Conservation Act, 1980 (Amend1988)	It restricts and controls the conservation of forests for non-forest purposes. It requires prior approval of the central government for de- reservation of any reserved Forest or conversion of any forest for non- forest purposes. It provides for the need for any permission given for forest conversion is based on environmental impact assessment and subject to compensatory afforestation.	MoEF&CC GFD
Compensatory Afforestation Fund Act, 2016	It is enacted for the establishment of funds from the money received towards compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, NPV and other amounts recovered under the Forest Conservation Act, 1980. It enables formation of National and State Authority for utilization of these funds	MoEF&CC GFD
Compensatory Afforestation Fund Rules, 2018	It details the operational aspect of utilization of the funds under the above Act and with the approval of the National/State Authority.	MoEF&CC GFD
Gujarat Amendments to Indian Forest Act 1927	The 1984 Amendments was made to exempt from issuing of transit passes for timbers for *Saru*, *Subabul*, eucalyptus, etc. in specified areas to facilitate transport of timber of this species raised by farmers vide agro forestry practices. The amendments of 1953, 1960 and 1983 covers changes in regard to seizure confiscation and compounding of offences. The 2005 amendments exempts the need of a transit pass for *Prosopis* charcoal from the areas outside forests.	GFD
Saurashtra	This is one of the first State laws made in Saurashtra State in	

Legal Instrument	Salient Features	Institution responsible for implementation
Felling of Trees (Infliction of Punishment) Act, 1951	1961, which was later amalgamated into the great Gujarat State when the Forest was under State List to control indiscriminate felling of trees. Under this Act 26 trees species including five reserved species are protected from felling. It controls the felling of five reserved tree species that require the permission of GFD, while the Gram Panchayat can give permission for felling the other 21 tree species. It further controls felling of trees on private land, an application giving specific information about ownership, land and trees is to be given to the collector or Gram Panchayat who may refuse or grant permission. Amendment of 1993, authorized the Sarpanch of the village in non- forest area to issue transit passes up to nearest forest check depot.	GFD, ULB, Panchayat Raj Institutions
Wildlife (Protection) Act 1972 and Amendments	This Act provides for protection of wild animals, birds and plants, prohibition on hunting any wild animal specified in Schedule I, II, III and IV, 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. The Act also empowers certain officials to investigate and impose penalties.	MoEF&CC, GFD
Gujarat Minor Forest Produce Trade Nationalization Act, 1979	This Act is to provide for the nationalization of trade in certain minor forest produce (MFP) in Gujarat. The Act aims to eliminate exploitation of the tribal people who collect timru (*Diospyrous melanoxylon*) leaves, mahua (*Madhuca indica*) gums and other MFPs by private traders. The Act imposes restriction on sale, purchase or transport of MFPs on all persons other than the Gujarat State Forest Development Corporation Ltd as the sole trading agent for MFPs.	GFD
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	The Act, commonly known as 'Forests Right Act'. The Act seeks to recognize and bestow the forest rights and occupation in forest land among the forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations. 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 and Tribal Development Dept., GFD
Biological Diversity Act 2002	This is umbrella legislation aimed at conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process.	National Biodiversity Authority and State Biodiversity Board
The Indian Forest	The bill will consolidate laws relating to forests, transit of forest-produce and the duty to be levied on them under the Act, the	MoEF&CC,

Legal Instrument	Salient Features	Institution responsible for implementation
(Amendment) Bill, 2017	definition of tree includes palms, bamboos, stumps, brush- wood, and canes and excludes bamboos felling or transportation of bamboos growing in non- forest areas will not require any permits.	GFD
Tribes		
Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006	This is an Act to recognize and bestow 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. Thus, the recognized 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.	GFD, TDD, Govt. of Gujarat
Scheduled Caste and Scheduled Tribes (Prevention of Atrocities) Act 1989	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.	Ministry of Social Justice and Empowerment, TDD
National Policy on Safety, Health and Environment at Work Place	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. This Policy is devised based on the Directive Principles and international instruments. The Directive Principles described in the Constitution are as follows: Securing the health & strength of employees, men and women Tender age of children are not abused Citizens are not forced by economic necessity to enter any vocation unsuited to their age or strength Just & humane conditions of work and maternity relief are provided Govt. shall take steps to secure participation of employee in the management	Ministry of Labour and Employment, Social Justice and Empowerment Dept and Labour and Employment Dept, Govt. of Gujarat
Social Audit Policy	Social audits were made statutory in a 2005 Rural Employment Act and government also issued the Social Audit Rules in 2011 under the MGNREGA Act. The Social audits are normally supervised by autonomous bodies consisting of government and non-government representatives. Gram Sabha's were empowered to conduct Social Audits, after the 73rd Amendment of the Constitution, in addition to their other functions.	Rural Development Dept, Govt. of Gujarat, PRI

Legal Instrument	Salient Features	Institution responsible for implementation
	No central policy or regulation exists that makes accounting audit and social audit mandatory.	

Source: Compiled by JICA Survey Team (2019) based on various sources

Since there will be no land acquisition, resettlement or diversion of forest land for non-forest activities instruments like National Resettlement and Rehabilitation Policy (NRRP) 2007, The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 are not discussed in detail in this report.

16.5.2 Environmental Related Clearance Procedures in India

The proposed Project may not require any environmental / forest clearances as it does not proposed construction activities that attract Prior EC rules provisions and there is no diversion of forest / protected area land for non-forest activities. However, the general processes of the environmental clearance and the forest clearance are described hereunder

(1) Environmental Clearance

Under EIA notification 2006, all projects and activities requiring "Environmental Clearance" (EC) are broadly categorized into two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man-made resources.

Category 'A' projects/ development activities necessarily have to carry-out EIA studies along with conducting the "Public Hearing" as per the procedure stipulated in the notification, and the environmental clearance is needed from the Central Government or MoEF&CC.

Category 'B' projects goes to the state authority as mentioned in EIA notification 2006 and decentralized procedure is done. The Government of India has constituted the State Expert Appraisal Committee (SEAC) and State Environmental Impact Assessment Authority (SEIAA) committee for decentralized procedure of environmental clearance. The category 'B' projects are further divided into category 'B1' (projects that require submitting an EIA report) and 'B2' project activities which don't require EIA report.

Following table shows the example of the list of projects or activities which require prior EC.

Table 16.8 List of Projects or Activities Requiring Prior Environmental Clearance

Project or Activity	Category with threshold limit		Conditions
	A	B	
1. Mining, extraction of natural resources and power generation			
1(c) River valley projects	(i) >50mw Hydroelectric power generation; (ii) >10,000ha of culturable command area	(i) <50MW > 25MW hydroelectric power generation; (ii) < 10,000ha of culturable command area	General Condition shall apply
7. Physical Infrastructure including Environmental Services			
7(f) Highways	(i) New national High ways;	(i) New national High ways;	General Condition shall apply

Project or Activity	Category with threshold limit		Conditions
	A	**B**	
	(ii) Expansion of National High ways > 30km, involving additional right of way > 20m involving land acquisition and passing through more than one state.	(ii) Expansion of National/State High ways > 30km, involving additional right of way > 20m involving land acquisition.	
8.Building/Construction projects/Area Development projects and Townships			
8(a) Building and Construction Projects		>20,000 sq. m and <150,000 sq. m of built-up area#	# built-up area for covered construction; in the case of facilities open to the sky, it will be the activity area
8(b) Townships and Area Development projects		Covering an area > 50ha and or built-up area > 150,000 sq. m #	#All projects under item 8(b) shall be appraised as Category B1
General Condition: Any project or activity specified in Category B will be treated as Category A, if located in whole or in part within 10km from the boundary of (i) Protected Area notified under the Wildlife (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.			

Source: EIA Notification, 2006

The Project may construct check dams, bunds, road and buildings, however, these interventions will not be listed as projects which require EC under the EIA Notification. If any buildings as a part of the interventions proposed in the project has an area greater than 20,000 m^2 prior EC shall be required. But the administration buildings are supposed to be much smaller than the 20,000 m^2. For the reference, the detailed stages prior to environmental clearance are mentioned in the Annexure to this report.

(2) Forest Clearance

Under the Forest Conservation Act 1980, Forest Clearance from the statutory authority will be required if forest area is to be used for non-forest purposes. For this purpose, application is submitted to the State Government, which in turn recommends the case to MoEF&CC.

The Forest Conservation Act stipulates the definition of non-forest purpose as –

"the breaking up or clearing of any forest land or portion thereof for;
(a) the cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural crops or medicinal plants;
(b) any purpose other than re-afforestation;

But does not include any work relating or ancillary to conservation, development and forest and

management of forests and wildlife, namely, the establishment of check-posts, fire lines, wireless communications and construction of fencing, bridges and culverts, dams, waterholes, trench marks, boundary marks, pipelines or other like purposes."

The Project shall construct check dams and buildings, however, these interventions will be carried out for the forest conservation and management under the GFD. Thus, forest clearance may not be required. For the reference purpose the process of forest clearance is mentioned in the Annexure to this report.

(3) Wildlife Clearance

Section 29 and 35 of Wildlife Protection Act 1972 stipulates that "No person shall destroy, exploit or remove any wildlife including forest produce form a sanctuary or destroy or damage or divert the habitat of any wild animal by any act whatsoever or divert, stop or enhance the flow of water into or outside the Sanctuaries/national Parks, except under and in accordance with a permit granted by the Chief Wildlife Warden, and no such permit shall be granted unless the State Government being satisfied in consultation with the Board that such removal of wildlife from the Sanctuaries/National Parks or the change in the flow of water into or outside the Sanctuaries/National Parks is necessary for the improvement and better management wildlife therein, authorises the issue of such permit".

GFD informed that, if such activities have included the management plan for the Sanctuaries/National Parks, the wildlife clearance is not required.

Hence, if the Project implements some activities in and around the Sanctuaries or national Parks and the activities are not included in the management plans, the discussion with the PCCF WL and Chief Wildlife Warden, Gujarat to understand whether Wildlife Clearance might be required or Following timelines will be adhered by all the officials responsible for the activities indicated.

Table 16.9 Wildlife Clearance Process

1	DFO/ Wildlife Warden	Initial scrutiny in 5 days of receipt of the proposal 30 days after receipt of complete proposal for site inspection, consultation with Conservator of Forests/Chief Conservator of Forests/Addl. Principal Chief Conservator of Forests and forwarding to the Chief Wildlife Warden
2	Chief Wildlife Warden	20 days from receipt of proposal for scrutiny and recommendation to the State Government for placing before the State Board for Wildlife.
3	Consultation with State Board for Wildlife and recommendation of State Government	The activity involves decision of the State Government, consultation with State Board for Wildlife and thereafter, recommendation of State Government to Ministry of Environment, Forest and Climate Change enclosing the copy of the minutes of the State Board for Wildlife. Therefore, this stage may take up to 90 days (3 months), as the State Board for Wildlife is chaired by Hon'ble Chief Minister.
4	Ministry of Environment, Forest and Climate Change	Initial scrutiny in 5 days of receipt of the proposal 30 days after receipt of complete proposal for Standing Committee of National Board for WL.
5	Consultation with Standing Committee of National Board for Wildlife	Meetings of Standing Committee of National Board for Wildlife are ordinarily convened once in 3 months.

Source: Guidelines for seeking NOC of NBWL for activities in protected areas.

16.5.3 Environmental and Social Management System Implementing and Executing Agencies

GFD, as the Implementing Agency (IA), is responsible for entire project implementation, while the village level execution of works which are part of the interventions proposed in the project will be done by the Peoples Organizations (PO).

(1) Gujarat Forest Department

While certain safeguard elements/ procedures are included in on-going government programs in accordance with Indian legislations, GFD does not have a comprehensive ESMS in place for the screening, management and monitoring of environmental and social risks of its standard operations and programs. There is participation of communities in implementation of various activities, and there is some evaluation of programs including covering the involvement of communities.

According to the various PO formation rules derived by the GFD vide various General Resolutions (GR), a micro plan is developed by community level and approved by DMU. This micro plan than is incorporated into the Working Plans of the GFD. GFD has been implementing the community participation principles in forest management for more than three decades now and has various GR in place to implement the concept, wherein the micro plans are prepared by the PO and thereafter get the approval of the respective DCF. However, in micro planning there is no consideration of the environmental and social impacts. Hence, the capacity to review the micro plan and avoid adverse social and environmental impact should be built in the GFD.

(2) Peoples Organization

There are basically three types of POs to be established to meet with the Social Considerations of JICA guidelines wherein it is clearly stipulated that there should be community participation in decision making and execution of the projects. The details of which are clearly outlined in the ESMSF and STFDPF. It has been suggested in the project proposal that two types of POs will be formed depending on the type of intervention and the area in which intervention is to be executed. These are:

(i) Joint Forest Management Committee (JFMC)
(ii) Eco-Development Committee (EDC)
(iii) Eco-Tourism Development Societies (ETDS)
(iv) Wetland Development Committees (WDC)
(v) Gram Panchayat
(vi) Cluster Level Organizations

It is further recommended that wherever the execution of works is to be done either directly at Division Level or at Range level over and above the POs at village level other respective Panchayati Raj Institution viz. District Panchayat / Taluka Panchayat/ Gram Panchayat may be involved to have a good extent of community participation.

16.5.4 Key Gaps and Shortfalls between JICA Guidelines and GFD Standards on E&S Considerations

Key gaps and shortfalls identified in each institution in comparison to international standards as indicated in the JICA Guidelines are as below.

Table 16.10 Gaps and Shortfalls JICA Guidelines and GFD Standards on E &S Considerations

S. No	Executing Agency	Key Gaps and Shortfalls	Recommended Gap Filling Measures
1	GFD	Lack of formal environmental and social safeguard policy and procedures	Use of ESMSF and STFDPF
		Person in charge of environmental and social considerations not there	Assignment of Environmental and Social Consideration Expert(s) / Specialist
		Limited procedures for environmental screening and subsequent management of environmental risks associated with small-scale construction and other activities with potential adverse impacts	Implementation of Capacity Development Plan for Environmental and Social Safeguards
		Weak monitoring of safeguard processes and procedures	Prepare and implement an Environmental and Social Safeguards Implement. Plan
		Free, Prior and Informed Consultation not being done at village level	Conduct training programs for GFD staff and assist them in preparing tools and arranging for FPI consultation at village level before commencing micro planning
2	PO	Limitation in addressing the concerns of women or vulnerable people.	Inclusion of vulnerable section of the society by efficient implementation of ESMSF and STFDPF
		Limitation in awareness of potential adverse environmental impacts	Increase awareness at the time of providing FPI Consultation at village level and proper implementation of the ESMSF and STFDPF
		Limitation in understanding of safeguard processes and procedures.	Implementation of Capacity Development Plan for Environmental and Social Safeguards
		Limitation in conflict management and benefit sharing	Implementation of Capacity Development Plan for Environmental and Social Safeguards

Source: JICA Survey Team (2019)

16.5.5 Environmental and Social Risks and Mitigation Measures

Since the proposed project is related to forestry and does not have any major anthropological interventions it will have major positive impact. Some of the major positive environmental and impacts are as mentioned below:

(i) Forest / Natural and Physical Environment Impacts
- Increase in Tree Cover and forest quality
- Increased vegetative growth and MFP production
- Enhanced environmental services derived from forests viz. improved watershed protection, reduced soil erosion, increase in grass productivity
- Construction/Improvement of community infrastructure and facilities
- Better awareness toward forest protection

(ii) Social Impacts
- Community Institutions capacity building and strengthen.
- Improved connections and networks for SHGs
- Empowerment and reduced drudgery of women and vulnerable communities
- Careful use of land, water, and etc. due to the project interventions safeguarding the environment
- Gender empowerment

(iii) Financial Benefits
- Increase in incomes
- Increase in direct and indirect employment opportunities
- Reduced financial risk due to diversification of income sources
- MFP value addition and better marketing

(iv) Human Benefits
- Enhancement in technical capacity for sustainable management of forests
- Enhancement in entrepreneurial and business management skills of SHGs
- Reduction in Casualties due to HWC

(v) Improved Structures and Processes
- Participation in community development planning and activities will increase
- Participation of local people in forest management will be more
- Improved capacity of government departments and extension service delivery
- Incorporating of Environmental and Social safeguards in project planning and execution.

Notwithstanding the above there will also be a number of adverse environmental impacts. Some of these along with social risks and mitigation measures to be taken by GFD are enumerated below:

Table 16.11 Summary of Anticipated Adverse Impacts of the Project and Proposed Mitigative Measures

Activities / interventions	Anticipated Impacts		Recommended Mitigation Measures
	Environmental	Social	
Planning (Project Planning, PO formation, micro planning)		Community level conflicts Conflict in use of natural resources due to micro planning Alienations of women from planning process	Major impact to be avoided by adopting efficient participatory procedures for micro planning, screening and selection of interventions. Ensure inclusion of vulnerable groups in free prior consultation and in micro planning Ensure women's contribution to the micro plans. Selection of best suited participatory approaches practices in the

Activities / interventions	Anticipated Impacts		Recommended Mitigation Measures
	Environmental	**Social**	
			microplanning Prioritization of vulnerable groups as beneficiaries
Afforestation Interventions and Biodiversity Conservation	Introduction of invasive species may lead to a loss of indigenous species and biodiversity, and have other adverse impacts on forest ecology	Training of communities in formal management practices and standard technical silvi cultural practices may lead to loss of customary/ religious/ traditional knowledge/ resource usage management/practices Loss of customary and religious land/ resource access and use Increased developmental dependency	Only native and local species should be selected for plantation and forest restoration In case if any invasive species are all care should be taken to contain them within the plantations and it should be seen that they do not harm the local species dynamics and ecology. Strict protocols to be formulated along with long term plans for sustainable development in plantation areas.
Infrastructure Development (check dam, facilities for ecotourism, etc.)	No significant environmental impacts are anticipated, check dams will have positive environmental impact.	Potential loss of customary/religious/traditional knowledge as communities are trained in formal management approaches Loss of customary and religious land/resource access and use Resource use conflicts e.g. over wells and other water supply/sanitation facilities Increased developmental dependency Possibility of loss of access to customary lands and resources	Participatory planning and prior consultation to be adopted for community involvement in implementation of the intervention with minimum adverse impact.
Livelihoods / Community Development (NTFP cluster development, Agroforestry, livestock and fish farming)	Unsustainable exploitation of NTFP may be possible		sustainable harvesting control measures through participatory planning
	Water quality deterioration by livestock wastes Water quality deterioration by fish farming		Proper disposal methods or recycle as fertilizer etc. Proper control of feeding and population control
		Denial of basic rights Increased dependency	Community involvement and employment in all

Activities / interventions	Anticipated Impacts		Recommended Mitigation Measures
	Environmental	**Social**	
		Loss of traditional livelihood Loss of traditional knowledge/skill Social exclusion/elite capture Inequitable benefit sharing Resource use conflicts e.g. over wells and other water supply/sanitation facilities Increased developmental dependency Gender issues	aspects of construction, operation and maintenance Corpus fund to ensure sustainability of investment Clear and equitable beneficiary selection and prioritizing forest dependent poor and vulnerable households Selection of female beneficiaries with deliberate attempts to empower women Documentation and utilization of traditional knowledges/ practices
	Encroachment Loss of common property resources Loss of property, houses and other physical assets Loss of other customary land/resource access and use Disempowerment of customary institutions		Strict delineation and survey of forest boundaries Stringent action against encroachment Increased awareness programs Participatory procedures for screening of subprojects and avoidance of major impacts Ensure members of the community participation in Gram Sabha

Source: JICA Survey Team (2019)

16.6 Framework and Procedures for ESMSF

The framework and procedures for ESMSF are described in the subsequent paragraphs.

16.6.1 Overview of the ESMSF Procedures

Following table enumerates tha overall ESMSF procedures:

Table 16.12 Overview of ESMSF Procedures

S. No.	Project Stage	Safeguard Activity	Proposed Procedure to be Developed	Responsible Person
1	Area and PO	Beneficiary Selection	PO Management	PMU will

S. No.	Project Stage	Safeguard Activity	Proposed Procedure to be Developed	Responsible Person
	selection, and preliminary consultation	Ensuring no deserving communities are left out Information Disclosure and Free Prior Informed Consultation Establishment of broad community support	Manual Note to ensure social and environmental safeguard inclusion in planning. Social-environmental safeguard to be included in the selection criteria Selection of the area to be done in presence of the PO in public meeting Prior free consultation and participatory approach (This is to be done before microplanning)	develop required guidelines documents with assistances of the assigned environmental and social officers in PMU PMU will have a provision to engage an expert on Social and Environment
2	Baseline Surveys	Social Assessment Biodiversity Assessment (On site in case of construction)	Social Assessment Plan Biodiversity Assessment Plan	
3	Intervention Planning	Micro plans to be made by participatory process to reflect on the views of the community. Screening and selection of the activities with reference to the interventions exclusion criteria. Subproject categorisation as per the JICA Guidelines. Participatory environmental and social assessment for confirmation of the screening results and finalization of the activities to be undertaken by PO	Environmental and Social Considerations Manual. Participatory Environmental and Social Assessment (ESA) Plan Screening criteria	
4	Approval of Interventions	Activities in interventions will be reviewed by Range Level from the viewpoints of environmental and social safeguard and submit to Divisional Level for approval.	Screening criteria Guidelines to ensure social and environmental safeguard	
5	Intervention	Community participation in	Guidance Note to	

S. No.	Project Stage	Safeguard Activity	Proposed Procedure to be Developed	Responsible Person
	Execution	project activities	ensure social and environmental safeguard.	
6	Monitoring and Reporting	Through participatory monitoring mechanism the impact of the project activities will be monitored by the executing agency	Participatory Monitoring Guidelines Monitoring Sheet	
7	Grievance Procedures	Through the project's institutional structure	Institutional responsibilities for addressing grievances	

Source: JICA Survey Team (2019)

16.6.2 Institutional Framework for ESMSF

ESMSF shall be implemented through existing institutional structure of the Project. The table below highlights institutional structure for ESMSF with key environmental and social management roles and responsibilities.

Table 16.13 Institutional Structure for ESMSF

Institution	Role in the Project	Role and/or Responsibility in ESMSF
High Powered Steering Committee (HPSC)	➢ Highest decision making body	➢ Approve the Operational Manual prepared by the PMU for E&S ➢ Endorse Annual Plan of Operation (APO) and annual budget of the Project which approved by the GB ➢ Suggest and endorse measures and actions to resolve issues raised by JICA, Government of India or any other agencies related to the project
Governing Body (GB)	➢ Decision making body	➢ Facilitation and coordination with various line departments and other agencies ➢ Review functioning of PMU, with regards to implementation of environment and social assessments, management plans and monitoring programs ➢ Approve APO and annual budget prepared by EB ➢ Approve/ change/modification/revision in project components/sub components on the proposal prepared and submitted by EB before submission to JICA for concurrence
Executive Body (EB)	➢ Supervision and monitoring of all activities	➢ Develop Operational Manual for the Project which describes and provides guidelines for ESMSF and STFDPF. ➢ Prepare APO in consultation with field level offices of PMU ➢ Closely monitor the physical and financial progress of the Project by organizing regular meeting with field level offices ➢ Prepare modifications and/or changes in components/sub components of the Project with

Institution	Role in the Project	Role and/or Responsibility in ESMSF
		justification, when required, and submit to GB for onward submission to JICA, GoI for concurrence and approval
Project Management Unit (PMU)	➢ Project implementation, supervision and monitoring of all activities. ➢ Documentation and reporting.	➢ Owner and implementer of the ESMSF/ STFDPF ➢ Report to concerned departments in the State Government as well as to JICA in relation to environmental and social consideration in Annual Report (Annexure) ➢ Information disclosure including elaboration of project information brochures and project homepage. ➢ Provide advice and guidance to CCSU/ DMU, and field level officers on information disclosure and consultation. ➢ Arrange for and ensure free, prior and informed consultation. ➢ Development of approach and guidance for ESMSF and STFDPF implementation. ➢ Training on ESMSF and STFDPF to field level officers. ➢ Technical guidelines for beneficiary selection, design of component technical approaches, safeguard checks for interventions (wherever required) ➢ Development of monitoring forms, review of monitoring data, reporting, assistance with evaluations for ESMSF and STFDPF implementation. ➢ Review of participatory Environmental and Social Assessments ➢ Performance of due diligence follow-up ➢ Guide, instruct, prepare guidelines, establish and operate Monitoring, GIS/ MIS, dissemination of project information, hand-holding support in the field for all project activities
CCSU	➢ Assist PMU in implementation of project activities	➢ Supervise project activities of DMU ➢ Supervise works carried-out by partner NGOs and Resource organizations ➢ Report the result of categorization of subprojects by the monitoring form, to PMU ➢ Facilitate convergence at divisional level
DMU	➢ Implentation and monitoring of the project activities	➢ Implement project activities ➢ Undertake project monitoring and reporting, provide logistical support for independent evaluations. ➢ Coordinate with Gram Sabha to select interventions with screening procedures and to conduct participatory Environmental and Social Assessments (ESA). ➢ Support and encourage POs for ESMSF and STFDPF planning at village levels, finalization of environmental and social plans.

Institution	Role in the Project	Role and/or Responsibility in ESMSF
		➢ Conduct free, prior and informed consultation, and due diligence checks
RMU	➢ Guide PO and implementing bodies for implementation of project activities. ➢ Guide PO with organization of project activities, ensuring appropriate beneficiary selection, promotion of convergence, etc.	➢ Support POs with project monitoring and reporting, logistical support for independent evaluations. ➢ Assist POs to select interventions with screening procedures. ➢ Support POs to conduct participatory Environmental and Social Assessments (ESA). ➢ Support POs for micro planning at village levels, finalization of micro plans. ➢ Support free, prior and informed consultation, and due diligence checks.
Village PO	➢ Assist the Project in selecting target beneficiaries ➢ Clarify local needs and expectations on the Project	➢ Conceive and raise local awareness on environmental and social considerations. ➢ Provision of support in E & S Consideration planning activities at village level. ➢ Participating in Environmental and Social Assessments (ESA). ➢ Supporting free, prior and informed consultation, and due diligence checks at village level.

Source: JICA Survey Team (2019)

Overall coordination and support for ESMSF will be provided through the PMU at IA level and information related ESMSF will be centrally managed by the PMU. PMU will be responsible to report to concerned departments in the State Government as well as to JICA in relation to environmental and social consideration.

Within the Project, the Project Director (PD) M&E and Institutional Stremgthening will serve as Environmental and Social Safeguard Director and hold central responsibility for ensuring ESMSF in the Project. The aggregation of the data will be undertaken as part of the regular MIS/ M&E system of the project. DPD level project officer shall be made in charge to assist Environment and Sofial Safeguard Director.

At Circle Coordination and Support Unit (CCSU) headed by CF/ CCF as a Regional Project Coordinator will serve as Environmental and Social Safeguard Manager of each circle and conduct overall management of ESMSF monitoring and ESMSF related information for the Project at the PMU level.

Divisional Management Unit (DMU) officer in charge will serve as Divisional E & S Officer (DEO) for the project implementation at Division level. DEO will be responsible for implementation of the

ESMSF and STFDPF within the division. DEO shall be assisted by an SDO level officer who will be earmarked to coordinate the planning and implementation of the E&S Consideration.

Range Management Unit (RMU) shall be responsible for guideing POs and other community level institutions to comply with the E&S consideration. Necessary field level data shall be collected by RMU, which will be reported to DMU and aggregated at CCSU.

In addition, an Environmental and Social Consideration Expert is planned to be deployed by PMU to provide necessary technical inputs to PMU on environmental and social consideration issues of the Project. Further throughout the project a social safeguards expert will be appointed for identification and preparation of plans for STFDPF and its implementation monitoring.

The description of roles and responsibilities of each level of project management unit is given in the table below.

Table 16.14 Individual Role and Responsibility for ESMSF

Organization	Position	For ESMSF	Role and Responsibility
PMU	Project Director	Project Director (E&S)	Overall coordination and promotion of ESMSF compliance Overall responsible for ensuring ESMSF in the Project. Responsible to centrally manage information related to ESMSF. Responsible to report to concerned departments in the State Government as well as to JICA in relation to environmental and social consideration
PMU	Project Coordinator	Coordinator (E&S)	Responsible for implementation of ESMSF for their activities in each designated work field. Responsible for monitoring all the field level activities relating ESMSF. Responsible for examination of safeguards compliance.
CCSU	DCF (E&S)	Divisional E&S Officer (DEO)	Responsible for conducting overall management of ESMSF monitoring and ESMSF related information within the Circle. Responsible for regular collection of ESMSF information as a part of MIS format.
DMU	ACF (E&S)	Sub Divisional E&S Officer (SDEO)	Responsible for regular collection of ESMSF information as a part of MIS format at DMU level Providing hands-on assistance to SHGs and POs and Working Groups regarding ESMSF. Closely communicating with the Environmental and Social Safeguard Focal Person for timely action if necessary.
Range Office	RFO (E&S)	Range E&S Officer (REO)	Responsible for regular collection of ESMSF information as a part of MIS format at RMU level Providing hands-on assistance to SHGs and POs and Working Groups regarding ESMSF. Closely communicating with the Environmental and Social Safeguard Focal Person for timely action if necessary.

Organization	Position	For ESMSF	Role and Responsibility
Peoples Organization	PO Leader	E&S Focal Person	Support the Project for compliance of ESMSF from the perspective of PRI. Encourage beneficiaries to participate in activities relating ESMSF.

Prepared by Survey Team based on GFD and JICA Reports

The project's Management Information System (MIS) will include collection of safeguards-related data and the Project will also be subject to periodical evaluation and review, which will include examination of safeguards compliance. Through the Environmental and Social Safeguard Officers at Division level, information will have to be regularly collected as a part of MIS format by the Environmental and Social Safeguard Manager who will be responsible for management of ESMSF monitoring and ESMSF related information of the Project.

16.6.3 ESMSF Procedures

(1) Free, Prior and Informed Consultation

Free, Prior and Informed Consultation is the essence of participatory planning and community involvement in projection execution. Primary selection of beneficiaries, areas and interventions will be done by the GFD field staff based on the predefined selection criteria. Participation of the beneficiaries and area in the Project will be confirmed through a consultation process that is

- Free from any kind of pressure or obligation and done
- Prior to deciding on which villages are to be selected within the Range and which is
- Informed in the form of disclosure of all the salient features of the sub components especially the benefits, rights and duties of the department and the villagers.

If there is an absence of majority in support of the intervention or activity and/or the village actively does not desire to participate in the Project, then alternative village will be selected.

Table 16.15 Consultation for Broad Community Support

Purpose/Objective	➢ Establishing broad community support for the project implementation
Consultation Topic	➢ Basic information about the Project including area, location, purpose/ objectives, key activities, stakeholders involved, target beneficiaries. ➢ Expected role and involvement of communities. ➢ An overview of possible environmental and social risks. ➢ Necessity of Scheduled Tribe and Forest Dependent Plan
Participants	➢ Members of POs, SHGs and Working Groups ➢ Gram Panchayat members ➢ Other important individuals
Process	➢ Following beneficiary group formation, community meeting will be held using simple language in Gujarati. ➢ Opportunities for open discussion of the Project should be provided. ➢ Opportunities and facilities to facilitate participation of women, elders and other vulnerable. ➢ Adequate time should be provided following the meeting for the participants to digest the information. ➢ Field level officers will visit individuals who have expressed their criticism on any aspect of project implementation.

Purpose/Objective	➢ Establishing broad community support for the project implementation
	➢ Decide if they do not wish to participate. ➢ Presentation and discussion with POs ➢ Field level officers will participate in general community meeting to discuss concerns.
Material Required	➢ Provision of simple/easy to read project brochures in Gujarati. ➢ Consultation and Participation Monitoring Sheets

Source: JICA Sruvey Team (2019)

Table 16.16 Individual Responsibilities of Environment and Social Safeguards Officials for Stakeholders Meetings

Designation	Tasks
Project Director PMU	To call a meetings and ensure that ESMSF procedures are followed. To prepare agenda for the meeting and ensure that the E&S Officers include the E&S Safeguard issues in the process.
CCSU	To propose and organize meetings for the concerned Circle
DMU	To present the Project for the villages under his/ her Division
RMU	To record participants and meeting minutes.
E & S Focal Person (Village Level)	To encourage participation of local communities.

Source: JICA Sruvey Team (2019)

(2) Social Assessment

(i) Purpose of Social Assessment

Social Assessment is a tool to help understanding key social issues and risks, and to determine social impacts on the target population of the proposed intervention. There are many social variables that potentially affect the impacts and success of projects and policies such as gender, age, language, displacement, and socioeconomic status. Through data collection and analysis, social assessment enables the Project in consultation with other stakeholders to prioritize critical issues and determine how to address them. The social assessment will serve a number of purposes:

a. Establish the baseline socio-economic situation of "the Scheduled Tribes and Forest Dependents" in the project area to act as a reference for measuring project impact;
b. Assess and opportunities to avail of basic social and economic services,
c. Provide a basis for identifying appropriate community development and livelihoods interventions under the Project
d. Determine the short and long-term, direct and indirect, and positive and negative impacts of the Project on the socio-cultural and economic status of particular vulnerable groups, including women, poor households, female-headed households, landless, SCs/STs and others as may be considered relevant
e. Highlight key social issues present, particularly those that are underscored in the JICA guidelines (e.g. relating to human rights, involuntary resettlement, loss of livelihoods, indigenous peoples, gender, etc.)
f. Provide a basis for developing recommendations for addressing the various concerns and issues of projects that affect them

In case of areas where ST and Forest Dependent communities are involved Social Assessment will be part of the STFDP. However, if there are no such targets groups, but certain adverse social impacts are anticipated, the implementation of the social assessment will be conducted.

During the microplanning process, gathering of socio-economic related information will be conducted using similar methodologies as the social assessment described in this document. Information of the social assessment can be used for the microplanning process and additional information will be taken if it is required.

If the socio-economic baseline survey is carried out in the any activities of the Project at the target area, the social assessment for the ESMSF/STFDPF can be omitted.

(ii) Social Assessment Approach and Task

The social assessment involves the participation of the members of the community to determine their needs and priorities, to obtain their views on the design and proposed implementation mechanisms of a particular project, and also to build capacity and involvement. It assists the executing agency in reaching the vulnerable and the poor and ensures that the project objectives are acceptable to the intended beneficiaries. The social assessment can be included in the micro planning process.

The social assessment plan will be prepared by EA to provide a reasonably detailed outline of the objectives, contents, methods and implementation schedule. ST, SC, OBC, forest dwellers and other forest dependents will be identified as target group and consulted independently in the social assessment and micro planning process. The table below specify key tasks for the social assessment.

Table 16.17 Tasks for Social Assessment

S. No.	Tasks	Descriptions
1	Description of the socio-cultural, institutional, historical, and political context	It will explain the extent of socio-cultural fragmentation or homogeneity. It will also address the macro-policy context of the Project. Broader questions such as the traditional and cultural norms regarding the use of the resources and how these relate to relations between and among stakeholder groups to be determined. Forest Dependent communities to be identified and documented.
2	Consideration of the legal and regulatory environment	It will look at the legal and regulatory environment of the Project, especially in relation to standing ownership and access arrangements and what their implications are for different stakeholder groups, especially the poor and vulnerable.
3	Relevance of core aspects of social development to the Project	It will describe the potential outcomes of the proposed project in terms of social opportunities, constraints, impacts, and risks, such as socio-cultural diversity, gender, institutions, rules, stakeholder's interests, social risk and vulnerability.
4	Development of a strategy to achieve social development outcomes	It will analyse the opportunities for community involvement in project preparation and implementation, the existing and proposed framework for property rights/access to resources, and sustainable management alternatives to achieve the desired social development outcomes.
5	Recommendations for project design and implementation arrangements	It will review proposals for project design and provide guidelines to the implementing agency on participatory alternatives and institutional strengthening measures appropriate to the socio-cultural characteristics of the project area(s). This will provide a basis for integrating the social analysis of the core elements into a proposal for implementation arrangements.
6	Development of a monitoring plan	The monitoring system will require to have local participation in the generation and refinement of indicators over the project cycle in order for the affected communities to be involved in balancing their

S. No.	Tasks	Descriptions
		own interests in the management of resources for conservation and productive purposes.

Source: Social Analysis Guidelines in Natural Resource Management (2005), World Bank

(iii) Reporting of Social Assessment Results

A social assessment report will include at least following contents:

Table 16.18 Indicative Contents of Social Assessment Report

Chapter	Descriptions
Introduction	To define the basic purpose of the Social Assessment, its scope and a brief outline of how the report is organised.
Interventions Description	To provide brief details of the intervention – rationale, objectives, area, key activities, the proposed implementation schedule etc.
Approach and Methodology	To describe the methods used in conducting the assessment, both quantitative and qualitative.
Socio-economic Baselines	To provide brief profiles of the target area.
Description of Impacts due to Interventions	Based on consideration of the intervention's objectives and activities as well as the socio-economic/livelihoods assessment, to describe potential positive and negative impacts of the intervention.
Vulnerable Groups	To identify and describe particularly vulnerable groups within the community and how they may be affected by the Project. Forest Dependent community to be identified and documented.
Public Consultation and Information Disclosure	To document and present results of public consultation events with the communities.
Conclusion and Recommendations	To provide overall conclusions and recommendations.
Mitigation Measures	To identify specific measures to avoid, minimize and/or compensate for intervention activities with adverse impacts on communities and particularly vulnerable groups.
Monitoring	To provide the developed monitoring plan including monitoring mechanism and monitoring implementation arrangements

Source: JICA Survey Team (2019)

(1) Biodiversity Assessment

If the Subproject includes the construction of infrastructures such as check dams/ bunds around wetlands, roads, and buildings, biodiversity assessment will be carried out in and around the construction sites and affected areas (e.g. submerged area by a check dam) especially in critical, grassland and wetlands ecosystems. Biodiversity assessment includes but not limited to, following items:

- Identification of endangered species under IUCN Red List (especially Vulnerable, Endangered, Critically Endangered), India's Red List of threatened species of fauna and flora or scheduled under the Wildlife Act (1972)
- Identification of important habitat area for the endangered species

This component in the current project may be triggered when any biodiversity hotspot is located within the project area.

(2) Micro Planning and Other Planning

(i) Micro Planning

Community participation has been widely implemented in Gujarat State over a period of more than three decades. There may be POs existing in villages as JFMC, EDC or other PO. In such cases, there will also be micro plans prepared for these areas. However, since these micro plans may not be up-to-date or updated it is recommended that they should be subject to a participatory review. For new areas where POs are not formed the procedure of microplanning will be carried out as per the JFM Resolution or the relevant statute under which the PO is to be formed and operated.

Where POs do not have existing micro plans, participatory development of micro plans will be carried out. Micro plans will concentrate on proposals concerning Gram Panchayat and other forest lands within and surrounding the village. However, the micro plans will also stipulate community development and livelihood needs / priorities expressed by villagers. The micro planning process will involve specific procedures as mentioned above ensuring that the needs and priorities of vulnerable groups are reflected in the plans. Care should be taken that the vulnerable communities, in particular the Forest Dependent, who are not recognized by the conventional systems should be included in the planning process.

(ii) Other Intervention Planning

Other interventions, which are not included in a micro plan will be planned by the concern GFD organization depending on the scale, size and use. If the intervention is spread between Ranges, it will be dealt with at Division level, if it is trans-division/ district it can be planned at GFD Head Office level. All the procedures for micro planning and EMSMF should be followed for such plans.

(iii) Selection and Screening

Interventions will be selected based on the priority needs identified in the micro plans or other plans. Specific interventions will be selected on the basis of community preferences. However, certain exclusion criteria are required to ensure that the Project does not include Interventions with potentially significant adverse environmental impacts such as EIA required projects (i.e., No Category ‘A’ or ‘B’ projects as per Indian EPA (1986) and the EIA Notification (2006)).

Intervention selection and screening will be firstly carried out by PO for the micro plan. Each activity in the intervention will be screened and then the highest category among the activities will be the category of the intervention. For example, if the infrastructure development activity falls into category B while other activities fall into category C, the intervention will be categorized as B. Then, the screening results are submitted to Divisional Office with the screening result in the prescribed format.
The Project will exclude the following interventions:

- Interventions with significant adverse environmental impacts
- Interventions resulting into any loss of land or livelihoods
- Interventions requiring resettlement

The intervention categorisation as per the JICA Guideline (Refer Annexure) and finalisation of the exclusion criteria will be conducted by PMU prior to the commencement of the Project or at the early

stage (before the JFMC selection and consultation) of the preparatory work. In accordance with the JICA guidelines, various other exclusion criteria have also been developed and are shown in the table below.

Table 16.19 Subproject Exclusion Criteria

Component	Exclusion Criteria
Overall	➢ Interventions which involve diversion of forest land ➢ Interventions that involve acquisition of private land ➢ Interventions that cannot demonstrate the broad community support ➢ Interventions likely to have major adverse impacts on the environment
Statutory and JICA Category	➢ Interventions which will fall into "Category A" as per the JICA Guideline ➢ Interventions which will fall into "Category A or B" as per the EIA Notification, 2006 ➢ Interventions that attract provisions of the CRZ Notification ➢ Interventions involving the use of fertilizers and pesticides banned by WHO (Classes IA, IB and II)
Forest and Biodiversity	➢ Interventions to be conducted inside protected areas and will not contribute to environmental protection/ conservation of the selected protected areas. ➢ Interventions likely to cause damage to wildlife and their habitats ➢ Planting of non-native or invasive species of forest trees, shrubs or plants ➢ Interventions which involve felling of trees on Reserved Forest or PA unless ancillary to conservation and management of forests and wildlife defined in the working plan (e.g. fire breaks, thinning etc) ➢ Interventions involving the collection, processing and sale of NTFP species listed under CITES, India's Red List of threatened species of fauna and flora or scheduled under the Wildlife Act (1972)
Social Environment	➢ Interventions that involve child labour ➢ Interventions or activities which could lead to the exploitation of women ➢ Interventions which involve acquisition of private land and/or resettlement ➢ Activities that could cause damage to places of religious importance, historical monuments or cultural properties

Source: JICA Survey Team (2019)

Though interventions which fall into the "Category A" as per the JICA Guideline are not anticipated in the Project, following scale of interventions are basically regarded as the "Category A" and "Category B". However, screening criteria might be changed based on its location and social situation.

Category A

JICA Guidelines stipulates that "Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas". Example of the screening criteria is as shown below.

- Conversion or felling of more than 100 ha of forest
- Construction of embankments/dams with water reservoir area of more than 100 ha

- Development of more than 100 ha agricultural area
- Large-scale involuntary resettlement and land acquisition (more than 100 persons)

Category B

JICA Guidelines stipulates that "Proposed projects are classified as Category B if their 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." and no specific criteria is set out. Example of the screening criteria for the project is as shown below.

- Construction of embankments/dams with water reservoir area of more than 10 ha
- Development of more than 50 ha agricultural area
- Development of infrastructure or building where endangered species listed in Wildlife Act (1972) or their habitat are existed
- Building more than 20,000 square meters.
- Small-scale involuntary resettlement and land acquisition (more than 1 person)
- Other activities which fall into Category B in EIA Notification (2006)

Category C

JICA Guidelines stipulates that "Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society."

(3) Approval of Micro Plan and Interventions

POs will undertake the screening process for the proposed interventions and activities at village level. The outcome of the screening will be complied by the REO under the guidance of the SDEO. Once the final report is prepared it will be put forward for review of the DEO. DEO in turn will forward them for the approval of the Project Director at PMU.

If it is found during the above "Selection and Screening" process that the intervention falls into the "Category B" as per the JICA Guideline and adverse environmental/ social impacts are anticipated from such interventions, DEO will report to JICA through PMU in timely manner and preparation of the EMP and EMoP and their implementation.

If the intervention falls into category C, DEO will submit the screening result in the screening result format to JICA through PMU on quarterly basis. This report will be part of the overall Status Report to be submitted to JICA. (As on 15.11.2019)

(4) Environmental Management Plan and Monitoring Plan

Interventions that require the Environmental Management Plan (EMP) and the Environmental Monitoring Plan (EMoP) have not been identified at the time of preparation of this document. For the interventions that are categories as "Category B" as per the JICA Guideline, the EMP and EMoP will have to be prepared and the below process should be followed.

i. Screening of subprojects
ii. Scoping of subprojects
iii. Environmental and social survey/ assessments
iv. Preparation of EMP and EMoP
v. Implementation and monitoring of subprojects based on EMP and EMoP

The intervention owner (PMU) and contractors / implementers are the responsible persons for the implementation of environmental plans.

The EMP will consist and cover the environmental mitigation and consideration measures which will be taken in the course of the project implementation in construction and operation phases. The measures will be examined based on the subproject/intervention description and assessment results of environmental, social, health and safety impacts.

The EMoP will be formulated to supervise/ examine the implementation of proposed environmental mitigation and consideration measures and to measure the quality of surrounding environments under the influence of the project activities during construction and operation phases.

In case of community related intervention activities, contents of the EMP and EMoP will be included in the micro plan to be prepared by the concerned community.

(5) Monitoring and Reporting

The safeguards frameworks require certain outputs relevant to ensuring that environmental and social safeguards have been observed. Therefore, indicators are required to measure the utilization and quality of the safeguard processes. The table below presents monitoring items, their indicators, means of verification, frequency and responsible parties for demonstrating and measuring that safeguards measures have been implemented. Monitoring will be carried out for each intervention.

Such monitoring results will be compiled as monitoring report and submitted to JICA by PMU. Monitoring form will be developed also by PMU so that every intervention can use same format. Monitoring report will be submitted to JICA through PMU quarterly together with Project Status Report (PSR) to be prepared for the overall Project.

Table 16.20 Draft Monitoring Framework

	Item	Indicator	Means of Verification	Frequency	Responsible Institution
1.	Information disclosure and establishment of broad community support	Method, location, and timing of free, prior and informed consultation (FPIC) No. of men, women, SCs/ STs/ OBCs attended at the community meeting Percentage of interviewees satisfied with information disclosure process	Minutes of the Meetings Community resolution Voting records	For every sub-project. Additional measurement should be carried out whenever need arises during the Project implementation.	PMU/ Divisional Office
2.	Baseline Surveys	Social Assessment No. of men, women, SCs/ STs/ OBCs Biodiversity Assessment No. of endangered species and	Social Assessment Reports Biodiversity Assessment Reports	For every assessment	Divisional Office/ SDO/ Range Office

	Item	Indicator	Means of Verification	Frequency	Responsible Institution
		locations			
3.	Sub-project Planning	No. of men, women, SCs/STs/OBCs consulted in micro planning Percentage of interviewees satisfied with micro plans Linkage/ convergence with other schemes	Micro plans Beat action plans Other plans	For every sub-project planning	PMU/DO/ SDO/ RO
4.	Approval of Sub-project	No. of excluded sub-projects	Lists of sub-projects Reports on the selection and screening	At the time of sub-project selection	PMU/DO
5.	Sub-project implementation	No. of women, SC/ ST beneficiaries Percent of interviewees satisfied with beneficiaries selected	JFMC/EDC, SHGs, established Sub-project Plans	At the time of beneficiary selection At the time of sub-project planning	PMU/DO/ SDO/ RO
6.	Monitoring and Evaluation	No. of men, women, SCs/STs/ OBCs attended community meeting	Monthly, quarterly, annual monitoring forms Social audit reports	At least once a year. Additional measurement should be carried out whenever need arises during the project implementation.	PMU/DO/ SDO/ RO
		Check dam / bunds construction Ground water level River flow Water quality	Monitoring forms	Pre-construction: once After-construction: at least quarterly	PMU/DO/ SDO/ RO
7.	Grievance procedures	No of grievances submitted No of grievances resolved Percent of interviewees aware of and satisfied with grievance mechanism	Grievance forms	At least once a year. Additional measurement should be carried out whenever need arises during the Project implementation.	PMU/DO/ SDO/ RO

Source: JICA Survey Team (2019)

(6) Information Disclosure and Grievance Redressal Procedures

The Implementing Agency (GFD) will disclose all information related to environmental and social safeguard of the project. This will include all the ESMS related documents viz.

- Social assessment documents
- Monitoring report
- Various plans e.g. micro plans

All information will be made available in a timely manner, in an accessible place, and in a form and language understandable to all stakeholders, including the general public, and affected people, if any. This has been recommended so that they can provide meaningful inputs for further development of the ESMS. JICA will also make the monitoring result open for the public via their website.

Formal grievance redressal mechanism will be in line with existing policies, strategies, and regulations on grievances as defined by GoI (i.e., Guidelines for Redress of Public Grievances (2010)). However, it is expected that project related grievances can be dealt with through the proposed institutional structure of the Project. Thus, the grievance mechanism will be institutionalized in each level of project implementation, from the community to the executing agency.

The following are the basic principles for grievance redress under this Project:

1. Beneficiaries are the villagers and in particular the STFD communities and this project is aimed at respecting their rights and protecting their interests.
2. Project is aimed at free prior information and continuous consultations at all stages so as to give the beneficiaries concerns related to the execution of the interventions are adequately addressed and in a prompt and timely manner
3. Wages and other benefits to be provided to the beneficiaries either with their association directly with the interventions through POs or directly for other projects or for the livelihood component, will confirm with all the relevant statutory requirements of employment as stipulated by the Government from time to time.
4. All the stakeholders through proper consultation should be made aware of their rights to complain, if they have any grievances.
5. There will be no fees / cess or any type of charge to be paid for grievance redressal.
6. The grievance redressal will be institutionalized within the POs and the GFD.

16.7 Detail Procedures of STFDPF

The following paragraphs enumerate the process to be followed for various components under the framework.

16.7.1 STFDPF Details

It is important that the target population (ST and Forest Dependents) of the Project are consulted in the process of establishing broad community support for the Project at local level. In the preparatory stage, the locations where each of these communities live and derive a livelihood will be mapped.

(1) Free, Prior and Informed Consultation

It should be ensured that these ST and Forest Dependent communities are adequately represented in consultation meetings and during the preliminary information disclosure. In consultation meetings and disclosing information including written materials, language of communication should be

Gujarati.

Contents of written materials should be simple enough for everyone to follow.

In order to have a FPIC opportunities and facilities should be created to facilitate participation of women, elders and other vulnerable section in the consultations.

It should be the responsibility of the field officers and Social Safeguards Expert to make sure that visualization and visual presentations are used as much as possible.

A well designed program would benefit from well documented consultations with the indigenous communities.

(2) Social Assessment and Sub-Project/ Interventions Planning

Social assessment and sub-project planning process will involve specific procedures ensuring that the needs and priorities of vulnerable groups are reflected in subprojects under the Project.

In principle, the social assessment for STFDP should follow the procedure determined in the ESMSF. However, in case, there are target ST and Forest Dependent communities in the project areas, following issues will also be covered in the Social Assessment.

a. Detailed demography, cultural and political characteristics of affected ST & Forest Dependents.
b. Details of lands which affected ST & Forest Dependents have been traditionally possessing or having a customary using/occupying rights.
c. Natural resources which affected ST & Forest Dependents rely on for their social as well as economic bases.

The impact of the sub project / intervention will be assessed with special reference to the above and if there are any adverse impacts, mitigative measures for the same will be suggested.

(3) Selection and Screening of Subprojects/ Interventions

Selection of subprojects will be prioritized keeping in mind that the target beneficiaries (ST and Forest Dependents) will face no / minimum adverse impacts from the project activities. All subprojects to be supported by the project will have to be finalized through participatory consultation processes and vulnerable communities will be an integral part of this process. Target beneficiaries will have preferential treatment even during the project implementation stage.

(4) Monitoring and Reporting

Monitoring and reporting related to the STFDP will be monitored through the regular project monitoring and evaluation system together with ESMSF.

The project will include participatory monitoring, where identified ST and Forest Dependents are target communities, they should be consulted separately, ensuring that they have a fair opportunity to provide feedback on project implementation and benefits derived by them from the project interventions.

(5) Grievance Procedures

Grievance procedures for ST and Forest Dependents are the same as that of other vulnerable groups

provided in the ESMSF. However, if deemed necessary, a grievance redressal committee may be established to respond effectively in a timely and responsible manner.

16.7.2 Preparation of Scheduled Tribe and Forest Dependents Plan

(1) Process

The Scheduled Tribe and Forest Dependents Plan will be prepared at the village level, when adverse impacts of the Project to the ST and Forest Dependents are anticipated. The content of the Scheduled Tribe and Forest Dependents Plan will be a part of the micro plan or other sub-project plan to be prepared in lieu of the same. The Scheduled Tribe and Forest Dependents Plan will be prepared by the lead of field officers and with active participation of ST and Forest Dependents of the village/ habitation. A social safeguards specialist will be appointed for guiding the field staff for preparing these plans. The indicative steps for preparation of the Scheduled Tribe and Forest Dependents Plan have been described at the table below.

Table 16.21 Processes for Preparation of Scheduled Tribe and Forest Dependents Plan

Step	Safeguard Activity, Methods, Processes
Screening and Basic Information Collection	Consultation and confirmation of whether the plan is necessary to prepare or not. Collection of basic information on the village/habitation such as status of ST and forest dependents; possibility of forest dwellers; participation of ST and forest dependents in the project; potential impact of the project on ST and forest dependents.
Social Assessment	Assessments of needs and priorities of ST and forest dependents by participatory rural appraisal tools
Consultation with ST and Forest Dependents	Workshops and discussion for identification of mitigation measures and other support activities before commencing the micro planning.
Drafting and Approval of the Plan	Preparation based on workshop/discussion activities Meeting of POs

Source: JICA Survey Team (2019)

(2) Contents of Scheduled Tribe and Forest Dependents Plan

The Scheduled Tribe and Forest Dependents Plan shall include at least following contents.

Table 16.22 Indicative Contents of Scheduled Tribe and Forest Dependents Plan

Chapter	Descriptions
Introduction	Basic purpose of the plan, its scope and a brief outline of how the report is organized. Identification of the Scheduled Tribe and Forest Dependents
Sub-Project Description	Brief details of the sub-project – rationale, objectives, area, key activities, the proposed implementation schedule etc.
Socio-economic Baselines	Brief profiles of the target area. Baseline information on the demographic, social, economic and cultural characteristics of ST and Forest Dependents Baseline information on the natural resources (land, water and forest) managed and used by the ST and Forest Dependents.
Summary of the Social	Identify key project stakeholders

Chapter	Descriptions
Assessment and Free, Prior and Informed Consultation	Describe consultation with the ST and forest dependents Assess the potential adverse and positive effects of the project
Action Plan	Identify measures to be taken up for avoiding and/ or mitigating the potential adverse effects of the Project Identify activities to be carried out for supporting the ST and forest dependents to participate in the Project
Public Consultation and Information Disclosure	Document and present results of public consultation events with the communities.
Cost estimates and financing plan	Provide activities wise budget and possible sources of finance
Monitoring Plan	Provide details of monitoring mechanism upon implementation of Scheduled Tribe and Forest Dependents Plan

Source: JICA Survey Team (2019)

(3) Institutional Framework for STFDPF

In Principal the basic purpose and procedures for the ESMSF and STFDPF are the same. Therefore, the institutional framework for ESMSF will be applied for implementation of STFDPF.

16.7.3 Institutional Strengthening and Capacity Development Requirements for ESMSF and STFDP Implementation

The project will not include any sub-projects requiring environmental clearance nor any activities with major social impacts, however as described in the previous sections, there are certain potential impacts and risks. Management and monitoring of environmental and social risks require a certain level of awareness and technical capacity.

Particularly for ESMSF, certain specialized knowledge and skills will be required at different management levels for operationalising the procedures for assessing and screening environmental and social impacts as well as implementing and monitoring safeguards measures, especially when targeted ST and Forest Dependent communities are concerned.

It has been a normal practice in GFD that additional charge is given to Officers for E&S Considerations. This to a great extend weakens the implementation of the E&S frameworks. Hence, during the preparatory and implementation phases care should be taken that dedicated earmarked officers are allocated to the E&S implementation.

Since, the Environment and Social Considerations are being implemented for the first time in the JICA project. It is recommended that a manual be prepared for successful implementation of the issues at PMU and field levels.

The table below describes indicative key capacity development requirements for implementing the ESMSF and STFDP measures, steps and procedures. Detailed capacity development plan for environmental and social safeguard will be developed by the executing agency in line with the capacity development component of the Project during at the preparation stage.

Table 16.23 Indicative Details of Capacity Building Program

Level	Subject	Trainees	Schedule
PMU/ DO/ SDO Level	➢ JICA's safeguard policy ➢ Requirements for environmental and social safeguards framework ➢ ESMSF/STFDPF components and procedures in the Project ➢ Free and prior informed consent (FPIC) ➢ Monitoring and Evaluation	➢ IA Officers connected with the Projects ➢ DO and SDO Officials working on the project	➢ One time at the preparatory phase ➢ At regular interval for new officials / staff as and when required.
RO/ PO	➢ Requirements of the environmental and social safeguards ➢ ESMSF/STFDPF components and procedures in the Project ➢ Planning and doing participatory consultations with beneficiaries ➢ Free and prior informed consent (FPIC) ➢ Monitoring and evaluation	➢ Representatives from POs ➢ Other representative from Gram Sabha/ Panchayat viz. the Focal Person	➢ One time at the preparatory phase ➢ Whenever new intervention is planned to be executed

Source: JICA Survey Team (2019)

CHAPTER 17 PROJECT RISKS & ASSUMPTIONS

17.1 Key Assumptions

Overall design of the project focues on key goal – to conserve ecosystems in the state by sustainably managing the coastal systems, critical inland ecosystems that includes wetlands, grasslands and degraded forests, and strengthen measures for human-wildlife conflicts mitigation. Project area considers contiguous landscapes where ecosystem properties and the underlying ecological and socio-economic share common characteristics. Thus, the logical approach for evolving the institutional arrangements for the proposed project flows from the project goals, purpose/ objectives and planned activities to be implemented. The key results are expected under certain assumptions, and deliverables may get impacted if the project implementation is not efficient and effective. The key assumptions are:

1) Willingness of the state government, with the necessary budget and support for the human resources and other administrative & operational costs;
2) No political instability during the project implementation, and project is continued to be supported both by state as well as central governments;
3) Fund are timely allocated, and PMU proactively submits regular claims for disbursement during the implementation;
4) All envisaged procurements are approved without delays by the key decision-making authorities like the High-Power Steering Committee (HPSC) and the Governing Body (GB) of the project society;
5) There are no major changes in strategies, policies, plans, and organizational structures in the forest sector, that may adversely impact on the project results;
6) Project receive cooperation and support from relevant line departments at all level of operations;
7) There are no legal and critical social conflicts or disputes occurring in the target divisions, and selected project areas prior to initiating interventions; and
8) The project implementation is not severely impacted from any drastic economic recession in the national and regional economy.

17.2 Key Risks

No project can be isolated from external and unforeseen risks. Some of the key risks that are identified/ perceived at the project formulation stage are:

1) The envisaged human resources are not deployed by the GFD/ state government, and the project is managed mostly through outsourcing and/ or contracts;
2) Post project sustainability is not well addressed in absence of O&M processes and adequate allocation of funds;
3) The capacity of the GFD/ project staff and other key stakeholders is not effectively built to undertake the desired processes. Such situation may adversely impact on the project results;
4) Gujarat received a major earthquake in year 2001 with its epicenter in Bhuj, that results in huge loss of life and property. Thus, there may be risk of unforeseen large-scale natural disasters, such as forest fire, landslides, severe flooding, earthquakes or any climate change adverseries; and
5) Global political conditions are favourable and stable, and India's geo-political situation do not pose threats for smooth implementation of the project.

The project risks are further analyzed in Table 17.1 shows the results of the risk analysis.

Table 17.1 Risk Management Framework

Project Name:	Project for Ecosystem Restoration in Gujarat			
Country:	The Republic of India			
Sector:	Forestry			
Responsible Agency:	Gujarat Forest Department (GFD), Government of Gujarat			
Officers In-Charge:	Contact :	Nityanand Srivastava	Title:	APCCF Externally Aided Project/ Chief Project Director
	Mobile :	+91-792 325 7922 +91-898 075 5055	Email:	gj074@ifs.nic.in
Operational Staff				
Engineering Staff				
Country Office Staff				

KEY RISKS AND MITIGATION MEASURES

Potential project risks	Assessment
1. Stakeholder Risk	Probability: H/M/L
(Description of risk) The Gujarat Assembly elections were concluded in year 2017, and 14th Vidhan Sabha is working since then. The next state elections schedule will come sometime in year 2022 when the project will be in its second year of operations. With the new government in year 2022 it is likely that there will be change in political situations and governance models as well as priorities. However, commitments and priorities related to the forest sector is expected to maintain more or less the same and no significant changes are assumed. As much as possible, for the project implementation, existing structure and human resource of GFD will be utilised. However, with time the GFD officials responsible for project implementation may either get elevated and transferred to new positions or may get superannuated. Thus, continued capacity development initiatives need to be in place to support the project implementation. The Peoples Organizations (POs) like JFMCs, EDCs, ETDCs, SHGs receive continued guidance and handholding support, and are sufficiently capacitated to generate or arrange funds for post project sustainability of assets and institutions.	Impact: H/M/L Analysis of probability and impact: Moderate risk is estimated. The field staff may not proactively participate in the project works, and may view as additional tasks under regular departmental function. However, through regular follows-ups and capacity building support the desired support will be ensured. Initial challenge with the project will be generate interest amongst community for participation in the project. Continuous handholding support and engagement of NGOs/ Resource Organizations will minimize such risks. Mitigation measures: The mitigation measures to the risks are identified as follows: (a) strengthening the communications to stakeholders to help enhance the understanding of the benefits of the project, and (b) enhancing information disclosure and quick grievance redressal by the state as well as by the GFD, (c) continuous guidance and supervision, including capacity building initiatives; (d) Intersectoral coordination with the line departments and planning with the local/ district / block administration will ensure support sectoral convergence in project

Potential project risks	Assessment
	supported villages/ sites.
	Action during the implementation:
	Not required
	Contingency plan (if applicable):
	Not applicable
2. Executing Agency Risk	
2.1. Capacity Risk	Probability: H/M/L
(Description of risk) The GFD and other key stakeholders will get exposed to new approaches, processes and technical know-how particularly for the ecosystem management, landscape monitoring, use of GIS applications and Drone technology for planning and monitoring, engineering structures, CSR partnerships etc. Thus, acquiring required skills and expertise for the planned interventions will be critical given the vacancy positions in GFD and the limited institutional capacity for planning, management, monitoring and efficient delivery of services. The society for project implementation is getting created for the first time, and thus the GFD/ project staff has to quickly learn about the requirements of project operation and management under society-mode.	Impact: H/M/L
	Analysis of probability and impact:
	Moderate risk is estimated. There may some difficulties for the project stakeholders to fully understand the project processes, and accordingly operate and implement the project in the initial years. However, once they learn how to operate and manage the project in accordance with the project implementation guidelines, it is expected the project operation will become smooth and efficient.
	Mitigation measures:
	The proposed mitigation measures to the risks are identified as follows: (a) the project will focus on strengthening the institutional capacity by developing and implementing capacity development strategy and annual training calendar of the project staff and will acquire necessary skills and expertise from the market; (b) Operation Manual and Accounting Rules/ guidelines would be developed and adopted.
	Action during the implementation:
	PMU with technical assistance from the PMC will i) prepare the project implementation guidelines, ii) hold orientation and guidance workshops/ seminars for information dissemination, and iii) provide periodic handholding and training to the project staff to enable them to operate and manage the project as envisaged.
	Contingency plan (if applicable):
	Not applicable
2.2. Governance Risk	Probability: H/M/L
(Description of risk) High Power Steering Committee (HPSC), governing body and PMU and other institutions are established for overall decision makings, coordination, and implementation of the project. The role of PMU and the Member-Secretary to the Governing Body and HPSC will be critical to use	Impact: H/M/L
	Analysis of probability and impact:
	Moderate risk is estimated. The creation of society and establishing the institutions as envisaged will minimize the operational, coordination and management risks
	Mitigation measures:

Potential project risks	Assessment
such institutions for accelerating the project implementation as well as seeking guidance and support for efficient implementation including conflict resolutions and inter-sectoral convergence.	The HPSC led by Chief Secretary, and PMU led by full-time cadre officer on deputation to manage the project should be established at the respective levels. For the convergence, more linkages at district and blocks (under the district) by the range level offices (RMUs) is envisaged.
	Action during the implementation:
	Same as above.
	Contingency plan (if applicable):
	Not applicable
2.3. Fraud & Corruption Risk	Probability: H/M/L
(Description of risk) The international bidding has well laid out procedures and prior concurrence is required from JICA at each stage of selection, whereas for local bidding procedures need to be developed and adopted by the PMU at initial stage. The key staff also need to be trained on procurement processes. However, due to lack of understanding of procurement procedures and capacities to develop terms of reference (TOR), may sometime dilute or lease some gaps in the procurements of goods and services.	Impact: H/M/L
	Analysis of probability and impact:
	Low risk is estimate. There is less probability that any fraud, misappropriation, or issues on financial management will take place. There is a possibility that some inappropriate sub-projects, which may not necessarily benefit local people who participate in the project activities, might be selected and implemented.
	Mitigation measures:
	Under the managerial features of the institutional arrangements there are provisions for conducting independent CA audits, CAG audits as well as system of undertaking concurrent audits. Under the Monitoring & Evaluation, system of Grievance Redressal as well as RTI has been made to bring in transparency as well as accountability. For procurement of Goods & Services well defined procurement guidelines are in place at state level and the key staff will be sufficiently trained. Also, prior concurrence will be required from JICA on implementation of key sub-projects and services.
	Action during the implementation:
	At the start of the project implementation financial management and accounting rules and regulations for the project will be developed and will form part of the Operation Manual. PMU with technical assistance from the PMC will monitor the project financial management. PMC with also provide guidance and advice for proper and transparent management on a regular basis over the course of the project.
	Contingency plan (if applicable):
	Not applicable

Potential project risks	Assessment
3. Project Risk	
3.1. Design Risk	Probability: H/M/L
(Description of risk) Activities planned under the Project for Ecosystem Restoration – coastal, grasslands, wetlands, degraded forests and protected areas are diverse and big in scope. Thus, substantial time need to be devoted to collect and compile basis data required for robust planning. Further, to capture the features of various landscapes detailed survey and mapping requirements will get generated that will require huge time and resource. Furthermore, the identified project areas are scattered all over the state and many of the component activities are overlap, and thus may require sound capacities to be built particularly at the field level.	Impact: H/M/L Analysis of probability and impact: Moderate risk is estimated. It might be difficult for PMU to find out qualified contractors/facilitators capable to implement envisaged processes at the field level. In case no eligible individuals or organizations could be identified at the state level, PMU will try to procure at the national or regional level. The project divisions and ranges will need managerial and technical support from PMU for planning, data collection, monitoring and reporting. Mitigation measures: The proposed mitigation measures to the risks are identified as follows: (a) the provision of technical support in form of PMC to the PMU/ GFD during preparatory phase, and hiring other resource organizations; (b) the lessons learnt by the GFD from the past project will help in mitigating the risk; and (c) planning for phase out strategy prior to closure of the project will ensure systematic transfer of assets and responsibilities for proper O&M. Action during the implementation: Same as above. Contingency plan (if applicable): Not applicable
3.2. Program & Donor Risk	Probability: H/M/L
(Description of risk) The project design has been aligned with the state's sector strategies and policies, as well as considering priorities with GFD. It is assumed that the policies may remain unchanged during the implementation period, and project will help to achieve the aims and objectives spelt out in policies and acts and rules, for the forestry sector.	Impact: H/M/L Analysis of probability and impact: Low risk is estimated. Gujarat is recognized for its unique ecological profile characterized by four mountain ranges along its eastern boundary- Western Ghats, Vindhyas, Satpura and Aravlli, covered by diverse forest types, biodiversity rich plain forests, extensive savannahs, a complex and dynamic coastal system with two gulfs, multiple rivers and a huge network of inland wetland and a unique system of saline desert. Thus, there is good rationale for designing a project following landscape approach. Mitigation measures: Not required Action during the implementation:

Potential project risks	Assessment
	Not required
	Contingency plan (if applicable):
	Not applicable
3.3. Delivery Quality Risk	Probability: H/M/L
(Description of risk) It is necessary to develop and introduce a mechanism for collaborative management of the project areas for sustainable forest management in the post project period. System also needs to be developed for utilizing latest technologies for survey and mapping as well as planning & monitoring purposes. Thus, identification of project areas along with rationale may pose some challenge, and may have to cut across the local and political priorities. It is expected that the project beneficiaries or local communities who participate in the project will be engaged for consultations and planning & implementation/ maintenance for project interventions.	Impact: H/M/L
	Analysis of probability and impact:
	Moderate risk is estimated. There is probability that PMU will face some difficulties in gathering/collecting necessary data and information in timely manner for planning and monitoring of the operation and effect indicators, particularly for landscape level data. In case, collaborative management system is not well developed during initial phase, the project sustainability and project results may get impacted. Also, may be due to some ignorance or inadvertently, the equitable distribution of benefits may not happen properly.
	Mitigation measures:
	The initial orientations and capacity building will help to develop sound understanding on the project processes. The GIS tools and techniques will help to identify and priortize the project intervention areas. Guidelines and manual will help to uniformly disseminate the project information.
	Action during the implementation:
	Same as above.
	Contingency plan (if applicable):
	Not applicable.
4. Other Risk – Financial Capacity and Arrangements	Probability: H/M/L
(Description of risk) GFD has been managing budgets around 1200 Cr. annually, and the size of GFDP II has been around INR 830 Cr. Thus, the GFD has already demonstrated the financial capacities. It is assumed that the state government will consider forestry sector as priorty sector for making investments, and will proactively allocate annual budgets as per the annual fund requirements of the new project. We have seen enhanced capacities of the GFD through JICA assisted projects in the past, it is likely that the	Impact: H/M/L
	Analysis of probability and impact:
	Moderate risk is estimated.
	Mitigation measures:
	Annual budgetary flows for the project to be ensured by the state government under the Loan Agreement. In adverse case, if annual budget releases are not possible the government may think to provide upfront revolving fund to the project.
	Action during the implementation:
	The PMU/ GFD proactively approach the

Potential project risks	Assessment
GFD will be able to deliver a project that may cost around INR 1,100 Cr. in a span of 10 years.	state government for release of budgets on time every year, and must timely get approved the annual budgets from HPSC prior to release of budgets.
	Contingency plan (if applicable):
	Not applicable.
5. Overall Risk Rating	Probability: H/M/L
(Overall comments)	Impact: H/M/L
The overall risk is estimated as Moderate. The project faces significant risks in (a) institutional capacity for implementation and sustainability, (b) technical design of the project, (c) Delivery quality, (d) financial capacities and arrangements, and (e) stakeholders. The key risks, which may impair the effective implementation of the project, are related to the new processes and the participatory approach for implementing and managing activities being undertaken, to the institutional capacity and ongoing human resource constraints faced by the GFD.	

Source: JICA Survey Team (2019)

Annexure

Annexure 2.1: District wise Tribal Population (2011 Census)

No.	Dstrict Name**	Total Population	ST Population	% of ST Population
1	Ahmadabad*	7,214,225	89,138	1%
2	Amreli*	1,514,190	7,322	0%
3	Anand*	2,092,745	24,824	1%
4	Banas Kantha*	3,120,506	284,155	9%
5	Bharuch*	1,551,019	488,194	31%
6	Bhavnagar*	2,880,365	9,110	0%
7	Dohad*	2,127,086	1,580,850	74%
8	Gandhinagar	1,391,753	18,204	1%
9	Jamnagar	2,160,119	24,187	1%
10	Junagadh*	2,743,082	55,571	2%
11	Kachchh	2,092,371	24,228	1%
12	Kheda*	2,299,885	40,336	2%
13	Mahesana*	2,035,064	9,392	0%
14	Narmada	590,297	481,392	82%
15	Navsari	1,329,672	639,659	48%
16	Panch Mahals*	2,390,776	721,604	30%
17	Patan	1,343,734	13,303	1%
18	Porbandar	585,449	13,039	2%
19	Rajkot	3,804,558	24,017	1%
20	Sabar Kantha*	2,428,589	542,156	22%
21	Surat*	6,081,322	856,952	14%
22	Surendranagar	1,756,268	21,453	1%
23	Tapi	807,022	679,320	84%
24	The Dangs	228,291	216,073	95%
25	Vadodara*	4,165,626	1,149,901	28%
26	Valsad*	1,705,678	902,794	53%
	Gujarat	60,439,692	8,917,174	15%

* Proposed Project Districts; Seven more districts were created in 2013 – Aravalli; Morbi, Chota Udaipur, Gir Somnath, Devbhumi Dwarka, Botad and Mahisagar

Annexure 2.2: District Wise SC Population (Census 2011)

Sl no	District	Area	Total	Scheduled Caste	
			Population	Population	%age
1	Kachchh	Total	2,092,371	258,859	12.37
	Kachchh	Rural	1,363,836	170,304	12.49
	Kachchh	Urban	728,535	88,555	12.16
2	Banas Kantha	Total	3,120,506	327,460	10.49
	Banas Kantha	Rural	2,705,591	287,937	10.64
	Banas Kantha	Urban	414,915	39,523	9.53
3	Patan	Total	1,343,734	123,408	9.18
	Patan	Rural	1,062,653	96,923	9.12
	Patan	Urban	281,081	26,485	9.42
4	Mahesana	Total	2,035,064	162,288	7.97
	Mahesana	Rural	1,520,734	118,710	7.81
	Mahesana	Urban	514,330	43,578	8.47
5	Sabar Kantha	Total	2,428,589	187,685	7.73
	Sabar Kantha	Rural	2,064,869	159,214	7.71
	Sabar Kantha	Urban	363,720	28,471	7.83
6	Gandhinagar	Total	1,391,753	108,608	7.80
	Gandhinagar	Rural	791,126	40,454	5.11
	Gandhinagar	Urban	600,627	68,154	11.35
7	Ahmadabad	Total	7,214,225	759,483	10.53
	Ahmadabad	Rural	1,151,178	118,502	10.29
	Ahmadabad	Urban	6,063,047	640,981	10.57
8	Surendranagar	Total	1,756,268	179,461	10.22
	Surendranagar	Rural	1,259,352	128,019	10.17
	Surendranagar	Urban	496,916	51,442	10.35
9	Rajkot	Total	3,804,558	290,169	7.63
	Rajkot	Rural	1,590,508	147,979	9.30
	Rajkot	Urban	2,214,050	142,190	6.42
10	Jamnagar	Total	2,160,119	173,895	8.05
	Jamnagar	Rural	1,189,054	99,378	8.36
	Jamnagar	Urban	971,065	74,517	7.67
11	Porbandar	Total	585,449	51,830	8.85
	Porbandar	Rural	299,775	29,068	9.70
	Porbandar	Urban	285,674	22,762	7.97
12	Junagadh	Total	2,743,082	265,793	9.69
	Junagadh	Rural	1,836,670	204,153	11.12
	Junagadh	Urban	906,412	61,640	6.80
13	Amreli	Total	1,514,190	132,915	8.78
	Amreli	Rural	1,127,555	109,351	9.70
	Amreli	Urban	386,635	23,564	6.09
14	Bhavnagar	Total	2,880,365	157,034	5.45
	Bhavnagar	Rural	1,697,964	88,671	5.22
	Bhavnagar	Urban	1,182,401	68,363	5.78
15	Anand	Total	2,092,745	104,465	4.99

Sl no	District	Area	Total	Scheduled Caste	
			Population	Population	%age
	Anand	Rural	1,457,758	74,755	5.13
	Anand	Urban	634,987	29,710	4.68
16	Kheda	Total	2,299,885	115,631	5.03
	Kheda	Rural	1,776,276	86,794	4.89
	Kheda	Urban	523,609	28,837	5.51
17	Panch Mahals	Total	2,390,776	100,446	4.20
	Panch Mahals	Rural	2,055,949	83,082	4.04
	Panch Mahals	Urban	334,827	17,364	5.19
18	Dohad	Total	2,127,086	41,444	1.95
	Dohad	Rural	1,935,461	31,647	1.64
	Dohad	Urban	191,625	9,797	5.11
19	Vadodara	Total	4,165,626	221,629	5.32
	Vadodara	Rural	2,099,855	83,102	3.96
	Vadodara	Urban	2,065,771	138,527	6.71
20	Narmada	Total	590,297	8,733	1.48
	Narmada	Rural	528,425	5,954	1.13
	Narmada	Urban	61,872	2,779	4.49
21	Bharuch	Total	1,551,019	62,235	4.01
	Bharuch	Rural	1,026,060	35,364	3.45
	Bharuch	Urban	524,959	26,871	5.12
22	The Dangs	Total	228,291	992	0.43
	The Dangs	Rural	203,604	151	0.07
	The Dangs	Urban	24,687	841	3.41
23	Navsari	Total	1,329,672	35,464	2.67
	Navsari	Rural	920,535	17,348	1.88
	Navsari	Urban	409,137	18,116	4.43
24	Valsad	Total	1,705,678	38,237	2.24
	Valsad	Rural	1,070,177	20,777	1.94
	Valsad	Urban	635,501	17,460	2.75
25	Surat	Total	6,081,322	158,115	2.60
	Surat	Rural	1,232,109	38,640	3.14
	Surat	Urban	4,849,213	119,475	2.46
26	Tapi	Total	807,022	8,168	1.01
	Tapi	Rural	727,535	5,296	0.73
	Tapi	Urban	79,487	2,872	3.61
	All	Total	60,439,692	4,074,447	6.74
		Rural	34,694,609	2,281,573	6.58
		Urban	25,745,083	1,792,874	6.96

Annexe 2.3. Twenty Point Programme Achievements: Seedlings Planted by GFD and Through Public (Seedlings in '00000)

Sr. No	Year	Departmental Plantation			Seeding/Seed	Total
		Production Forestry	Social Forestry	Total (Col.3+4)	Farm Forestry (Through Public)	(Col.5+6)
1	2	3	4	5	6	7
1	1995-96	491.77	326.29	818.06	1,508.54	2,326.60
2	1996-97	690.96	156.15	847.11	1,947.72	2,794.83
3	1997-98	706.47	156.25	862.72	1,919.04	2,781.76
4	1998-99	759.91	156.61	916.52	1,920.00	2,836.52
5	1999-00	689.22	186.14	875.36	1,922.89	2,798.25
6	2000-01	645.51	186.33	831.84	1,939.76	2,771.60
7	2001-02	526.57	151.14	677.71	1,703.20	2,380.91
8	2002-03	463.83	129.99	593.82	1,597.46	2,191.28
9	2003-04	345.07	96.28	441.35	1,203.14	1,644.49
10	2004-05	364.62	142.30	506.92	1,805.14	2,312.06
11	2005-06	315.42	159.39	474.81	1,958.65	2,433.46
12	2006-07	469.47	161.57	631.04	2,251.00	2,882.04
13	2007-08	533.89	129.35	663.24	2,514.00	3,177.24
14	2008-09	701.16	197.91	899.07	2,451.80	3,350.87
15	2009-10	1,286.44	498.14	1,784.58	1,142.06	2,926.64
16	2010-11	1,852.58	391.75	2,244.33	755.63	2,999.96
17	2011-12	2,007.19	212.50	2,219.69	986.60	3,206.29
18	2012-13	1,768.08	243.45	2,011.53	957.19	2,968.72
19	2013-14	680.50	315.32	995.82	1,023.37	2,019.19
20	2014-15	370.32	429.99	800.31	1,020.00	1,820.31
21	2015-16	533.55	445.79	979.34	710.58	1,689.92
22	2016-17	392.39	310.02	702.41	1,139.05	1,841.46
23	2017-18	466.11	278.90	745.01	937.95	1,682.96

(Source: Gujarat Forest Statistics 2017-18, GFD)

Annexure 2.4 Details of Forest Right Act-2006 under Individual, Community, Infrastructure Approved Claims (Till 30.06.19)

S. No.	Name Of District	Individual Claims					Community Claims				
		Received Claims	Approved Claims	Approved Land Ha	Approved Land Acre	Given Ordinance	Received Claims	Approved Claims	Approved Land Ha	Approved Land Acre	Given Order
1	Banaskantha	9,488	6,611	3,624	8,952	6,611	784	784	78,612	194,172	595
2	Sabarkantha	11,928	2,628	1,248	3,081	2,619	527	28	10,917	26,965	28
3	Aravalli	7,697	4,089	2,538	6,268	4,089	426	153	28,532	70,474	153
4	Panchmahal	11,672	3,232	3,776	9,327	2,608	170	117	29,015	71,667	117
5	Mahisagar	11,994	3,950	1,295	3,200	3,950	469	110	21,744	53,708	110
6	Dahod	20,150	3,453	2,213	5,465	3,453	651	89	6,329	15,633	89
7	Chhotaudepur	17,557	6,667	4,157	10,268	6,667	377	103	25,253	62,375	103
8	Narmada	17,783	8,576	9,790	24,181	8,576	273	196	67,257	166,125	196
9	Bharuch	4,076	2,034	2,018	4,984	2,034	143	131	5,615	13,868	131
10	Surat	7,747	4,072	2,651	6,548	4,072	1,275	856	19,291	47,649	856
11	Tapi	11,947	8,104	8,790	21,711	8,104	506	506	50,268	124,162	506
12	Dang	7,341	3,207	3,756	9,277	3,187	629	629	20,626	50,946	258
13	Navsari	9,322	3,950	1,656	4,091	3,942	700	700	31,110	76,842	117
14	Valsad	34,167	28,286	9,054	22,363	28,286	257	257	75,414	186,273	257
TOTAL		182869	182,869	88,859	56,566	139,716	88,198	7,187	4,659	469,983	1,160,859

(Source: Office of APPCF, Land, GFD, Gandhinagar)

Annexure 2.5: Major Natura Disaster Events in Gujarat

Date	Disaster	Damage/ Loss
1945	Tsunami	Kandla coast was hit by a Tsunami of 12 mtrs height, due to an earthquake in the Makran fault line.
21/07/1956	Earthquake - 6.1	Anjar, Kutch - 115 people killed and hundreds injured. 1350 buildings destroyed at Anjar alone.
23/03/1970	Earthquake - 5.4	Bharuch - 26 people killed and 200 people injured in
1972-1973	Drought	
22/10/1975	Cyclone	Porbandar - 85 people died
03/06/1976	Cyclone	Saurashtra coast - 70 people died. 51 villages badly affected; 25,000 houses damaged: 4,500 cattle died
11/08/1979	Flood	Morbi – Heavy rainfall followed by breakdown of one dam- About 12000 people died in this flood
01/11/1981	Cyclone	Veraval & Porbandar - 14000 animals dead; heavey property losses. One ship sinks off Veraval
08/11/1982	Cyclone	Veraval - 544 dead; 2 lakh animals dead; heavy damage of property; 70 dams affected
June 1983	Cyclone	Heavy rain (70 cm in two days) in Saurashtra
1984-1987	Drought	
1994	Epidemic	Plague- 49 deaths in Surat
18/06/1996	Cyclone	Diu - 14 people died, 1611 houses damaged
09/06/1998	Cyclone	Kandla - 1,173 people died
20/05/1999	Cyclone	Pakistan border- 453 died; 5,153 buildings damaged
1999-2000	Drought	Banaskantha, Jamnagar, Kutch and Patan districts were severely affected.
26/01/2001	Earthquake-7.9	Kutch - Over 13000 people killed. A total of about 1.3 million houses, lifeline infrastructures were damaged
2001-2002	Drought	
July 2005	Flood	About 125 people died
July-Aug. 06	Flood	Surat city and south and central Gujarat - Nearly 150 people died
2012-2013	Drought	Affected Saurashtra & Kachchh
Aug & Sept 2013	Flood	Worst affected include Surat, Vadodara, Bharuch, Navsari, Narmada, Rajkot, Junagadh, Porbandar, Jamnagar, Kutch, Patan, Banaskantha, Sabarkantha and Mehsana.
June 2015	Flood	Affected districts include Amreli, Bharuch, Bhavnagar, Gir Somnath, Jamnagar, Junagadh, Porbandar, Rajkot
July 2015	Flood	Worst affected districts include Banaskantha, Patan, Kutch & Mehsana
2016	Drought	Affected districts Banaskantha, Dwarka, Kutch, Jamnagar, Porbandar & Rajkot

Source: GSDMA Plan 2016-17 –Vol. I.

Annexure 3.1. Non-Timber Forest Produce collected in Gujarat during 2017-18

Sr. No.	Nameof Produce	Quantity Collectedby Forest Department		Quantity Collectedby GSFDC		Total	
		Quantity (Quintal)	Value (INR 100,000)	Quantity (Quintal)	Value (INR 100,000)	Quantity (Quintal) Col.3+5	Value (INR 100,000) Col. 4+6
1	2	3	4	5	6	7	8
1	Grass	242,952.58	1,899.39	-	-	242,952.6	1,899.39
3	OtherGum	0	0	162.728	46.591	162.728	46.591
4	Aritha	0	0	-	1.18	0	1.18
5	Amla	0	0	-	1.09	0	1.09
6	KaranjSeeds	0	0	-	0.445	0	0.445
9	MahudaFruits (Doli)	431.85	8.64	1,007.53	21.23	1,439.38	29.87
10	Mahuda Flowers(Qtl)	1,154.66	85.96	16,043.96	52.75	17,198.62	138.71
11	Wax	0	0	5.395	1.323	5.395	1.323
12	Honey	0	0	863.315	110.24	863.315	110.24
13	LimbodiSeeds	0	0	3.00	-	3	0
14	Ratanjyot	0	0	-	0.03	0	0.03
15	Others(Misc.)	0	0	14.22	23.53	14.22	23.53
16	BahedaFruits	3765	0.26	117.324	0.46	3882.324	0.72
18	Charoliseeds	18	0.81	-	-	18	0.81
21	TimruLeaves	0	0	148,143.03	5,838.43	148,143.03	5,838.43
	Totals	246,736	1,900.46	166,360.50	6,097.30	414,682.63	8,092.359

Source: Gujarat Forest Statistics 2017-18

Annexure 3.2: Grassland Area in Gujarat

Although, grasslands are considered as one of the key ecologically important production system in the state, no systematic or authentic inventories of grasslands for the State is available. Shelat (1979) quoted the budget publication no. 18 of Government of Gujarat that potential source of grasses exists in about 3.6.66 million ha land. Out of these, about 120,000 ha area lies with Forest Department (as vidis), 852,000 ha as permanent pastures, and 2.691 million ha as barren and uncultivated government wasteland.

According to satellite imagery based grassland mapping exercise, eight districts of Kachchh and Saurashtra regions consist of about 13615 sq km of grasslands including 12,730 sq km of open grassland and 885 sq km of saline grasslands[1]. In addition, 8,317 sq km area was such where grasses were reported under the tree covers, including 5,506 sq km under *Prosopis juliflora* (See the table below)[2].

Extent of Different Categories of Grassland in Kachchh & Saurashtra (Area in Ha.)

District	Open Grassland		Grassland Under Tree		Saline Grassland		Prosopis + Grass		Total	
	Area	%	Area	%	Area	%	Area	%	Area	%
Amreli	79,428	12.7	24,770	4.0	0	0.0	28,389	4.6	132,587	21.0
Bhavnagar	230,150	20.6	30,676	2.8	7,095	0.6	0	0.0	267,921	24.0
Jamnagar	200,293	14.2	22,176	1.6	4,520	0.3	169,500	12.0	396,489	28.0
Junagadh	23,786	2.7	47,748	5.4	0	0.0	0	0.0	71,534	8.0
Porbandar	12,671	5.5	17,422	7.6	0	0.0	574	0.3	30,667	13.0
Rajkot	148,552	13.3	44,140	3.9	2,017	0.28	0	0.0	194,709	17.0
Surendranagar	68,179	6.5	1,993	0.2	0	0.0	188,278	18.0	258,450	25.0
Kachchh	509,933	11.2	92,217	2.0	74,869	1.6	163,891	3.6	840,910	18.0
Total	1,272,992	58.0	281,142	12.8	88,501	4.0	550,632	25.1	2,193,267	

Source: SAC (2001)

[1]SAC. 2001. Grassland mapping in Gujarat using remote sensing and GIS techniques. Space Application Centre. ISRO, Ahmedabad.

[2]First Gopalak Samiti report (1965) cautioned about the likely dangers of afforestation programs for pastoral livelihoods. But plantation of *P. juliflora* continued in many of the natural grasslands (Barwada & Mahajan, 2006).

Annexure 3.3: Grass Collection and Distribution

As discussed above, the grass from the reserved vidis is collected by the Forest Department and stored in godowns or on open platforms. The grass stored in closed godowns is kept up to three years as a buffer stock for meeting scarcity conditions in the State. As the palatability of stored grasses for three years are considered deteriorate, the grass is disposed off mainly through a process of open auctioning. In case of storage on open platforms, the grass stock is maintained for only one year. Presently, Forest Department possess 292 grass godowns and 52 open platforms.During fodder scarcity period or drought like situation, the collected grass is distributed through the Revenue Department as prescribed by the Relief Commissioner of the State.In year 2017-18, total grass collection from these vidis was about 25.3 million kg. At state level, the total grass collection from Reserved Vidis are showing upward trend in last many years (Fig. 1). However, it is also recorded that in last many years, the grasses are not distributed in same proportion as they are stocked. Fig. 2 indicates the above gap to certain extent but unless the volume of grass auction, after prescribed storage period is given, it may not describe the true picture.

The grass collection, storage and distribution system has some inherent issues, that are surfacing at many points. It is observed that while grasses are harvested every year, the process of distribution is not an yearly event. Thus, in case the godowns are full by previous year collection, the new collected grass are either stored in open or transported to nearby godowns,if there is some storage space available in those godowns. In both the cases the overall cost of collection gets increased. Importantly, the grasses stored in open need to be compulsorily distributed after one year of storage. Although, recently Govt. had invested on construction of godowns, because of regional variations in the grass production potential, they are still in shortfall. In addition to above, most importantly, the local community see the entire exercise of grass collection as an anticipated future scarcity insurance scheme of Govt., by curtailing present needs of local community.

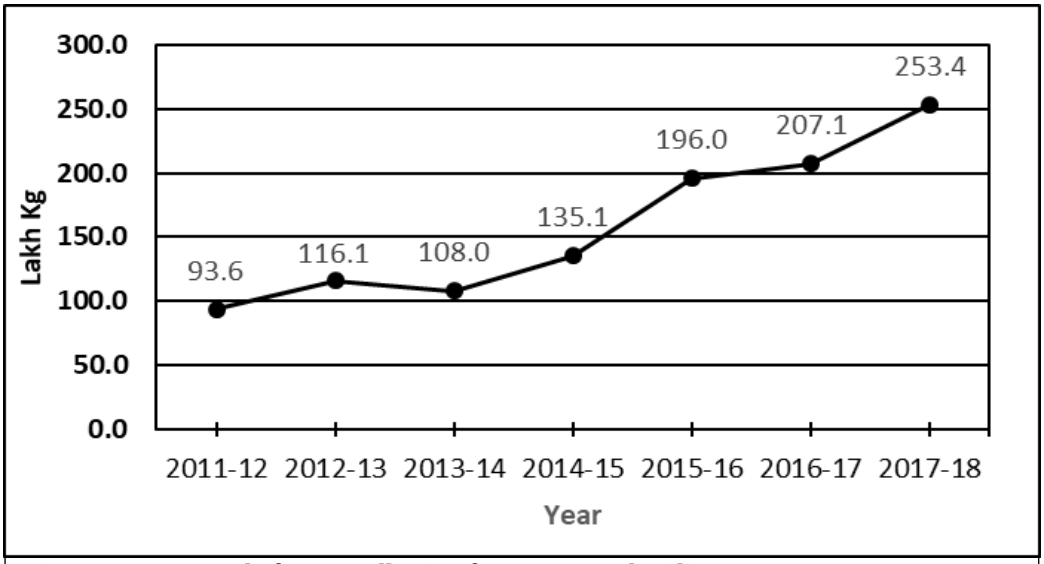


Fig. 1: Recent trend of grass collection from Reserved Vidis.
Source: Gujarat Forest Statistics (2011-12 to 2017-18)

*Lakh kg=100,000 kg

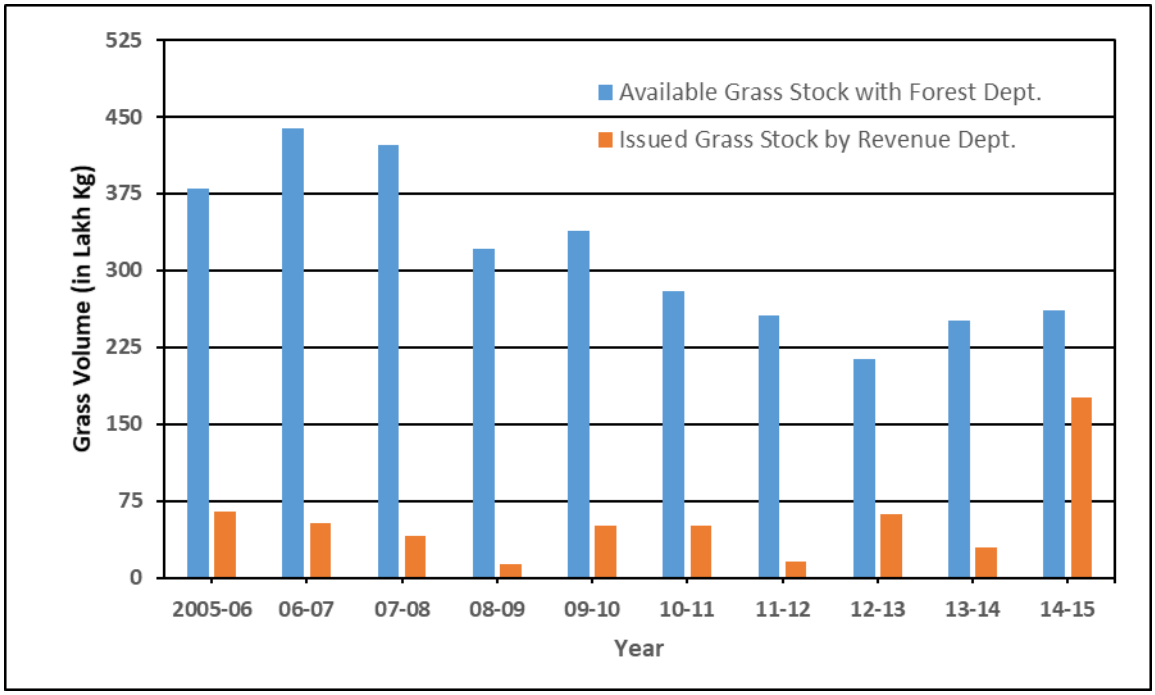


Fig. 2: Buffer and Distribution of Grass in different years
Source: https://forests.gujarat.gov.in/forest-area-information.htm

*Lakh kg=100,000kg

Annexutre 3.4: Important Grassland Dependent Fauna of Gujarat and Their Habitat Need

Species	IUCN Status	Grassland habitat need
Asiatic Lion *Panthea leo leo*	Endangered	Savanna grassland in hilly tracts
Blackbuck Antilope cervicapra	Least Concern	Pure grasslands in plains with low height. Blackbucks avoid bushy or and tall grasses
Chinkara Gazella bennettii	Least Concern	Undulating terrain or low hills with short grasses and sparse trees & bushes
Blue bull *Boselaphus tragocamelus*	Least Concern	Undulating terrain; low hills with forests with medium tree / bush density and low grasses
Wild Ass *Equus hemionus khur*	Near Threatened	Saline grasslands in the Little Rann of Kachchh, grasslands with sparse trees in the bets in the Little and Great Rann of Kachchh
Wolf *Canis lupus pallipes*	Unknown	Grassland with sparse trees and bushes with hiding areas in *Prosopis juliflora* thickets
Golden Jackal *Canis aureus*	Least Concern	Grassland with sparse trees and bushes with hiding areas in *Prosopis juliflora* thickets
Indian Fox *Vulpes bengalensis*	Least Concern	Grassland with sparse trees and bushes with hiding areas in *Prosopis juliflora* thickets
Desert fox *Vulpes vulpes*	Least Concern	Grasslands in very dry area, saline grasslands with bushes
Caracal *Caracal caracal*	Least Concern	Grasslands with sparse trees, bushes and hiding sites, wastelands in Kachchh.
Jungle cat *Felis chaus*	Least Concern	Thorn & dry deciduous forests, grassland with bushes, undulating terrains
Great Indian Bustard *Ardeotis nigriceps*	Critically Endangered	Open flat grasslands
Lesser Florican *Sypheotides indicus*	Endangered	Open flat grasslands with short grass height

Source: Adapted from Singh, H. S. (2005). Gujarat State Biodiversity Strategy and Action Plan. Gujarat State Forest Department, Gandhinagar.

Annexure 3.5: Pastoralism in Gujarat and the economic dependence on grasslands

In local parlance these pastoralists are commonly known as 'Maldharis'. As per old government records, there were 103 chariyans (pasture lands) in Gujarat and maldharis were settled in and around those *chariyan*. Importantly, pastoralists generally occupied an ecological niche between the deserts and the agricultural zones. However, with the expansion and intensification of agriculture, this niche has been shrunked for maldharis. Maldharis are also known as "Ter Tansalia" which means they comprise of 13 different castes including Rabari, Bharwad, Ahir, Charan, Jath (Muslim) and others and represent strong social hierarchical system[3]. In government system, they have the status of Other Backward Castes (OBC) and thus entitled for certain benefits. While, the pastoralists are located across the state, they occupied certain regions. For example, Banni region of Kachchh is known for its pastoral traditions, mostly of Muslims. Similarly, Jath muslims are closely associated with camel herding and located in isolated pockets near coastal areas of Kachchh, Jamngar, Bhavnagar and Bharuch districts.

Traditionally, the pastoral economy thrived on the vidis/grasslands and other grazing resources and largely based on milk and milk based products (like ghee, mawa etc), wool and also the meat. Till recently, bullock trading was main source of income. While there are limited understanding about the economic values of grasslands of Gujarat, it is certainly a mainstay of economy for certain communities and regions[4] (Box 1).

Box 1: Economic Values of Arid Grasslands in Kachchh

Grasslands are of particular ecological and economic significance to arid regions like Kachchh in Gujarat, due to their high biodiversity values and the dependence on them of a significantly large population of pastoral and agro-pastoral communities to sustain their livelihoods based on free-grazing livestock. Banni and Naliya are two large grassland tracts in Kachchh, Banni being considered as one of the largest remaining grassland tracts in the sub-continent. Nearly 80% of the grassland area of Banni has been lost through invasion by *Prosopis juliflora.* An ecological-economic analysis of these grasslands highlights the contributions of grasslands to the overall rural economy of the two regions.

The dominant occupation in Banni is livestock rearing (65% of total families), followed by wage labor, most of which is linked to charcoal making from *Prosopis juliflora*. Livestock and non-livestock based incomes are the two major income sources in Banni. The wood-charcoal from *P. juliflora* forms the major share of non-livestock based income and is permitted as per given guidelines. Mean annual gross income per household is about INR 57,000 from livestock, while that from other income sources is nearly INR 23,500. Total extrapolated gross income per year for the 2500 families in Banni works out to be about INR 170 million, of which 70% is from livestock with milk sales alone accounting for 64%.

In Naliya villages around the grassland, most of the households are agro-pastoral. Of the total average annual income, 37% comes from livestock. In the poorest group, the largest share of income is derived from the grassland dependent livestock sector (43%). Mean gross annual farm-based income per household is about INR 39,500, while that from livestock is about INR 29,000. Total extrapolated gross income per year for 750 families in the 9 villages studied is about INR 48 million. There are definite patterns of dependency on the grasslands, across seasons and income groups. There is marked variation in such dependency across different income groups, which points to differentials in the benefits derived from open pastures by different income groups. The mean imputed costs of the resources used per year by the poorest and richest quintiles are about INR 38,800 and INR 360,700 respectively. The total annual unpaid cost of grass resources for the nine villages studied works out to be approximately INR 4.75 million, based on a nominal cost of 50 Paise per kg of grass consumed. While the unpaid costs of grassland resources help the poor in subsistence, the huge benefits enjoyed by the richer agro-pastoralists could be a major input for the profitability of the relatively larger agro-pastoral enterprise.

Source: Geevan et al. (2003)

[3]Bharwada, C. and Mahajan, V. 2006.Quiet transfer of commons.Econ.Polit. Week., January 28: 313-315.

[4]Geevan, C.P., Dixit, A.M. and Silori, C.S. 2003. Ecological-Economic Analysis of Grassland Systems: Resource Dynamics and Management Challenges- Kachchh District (Gujarat). Submitted to MoEF, Govt. of India, New Delhi.

Annexure 3.6. Wetlands of Gujarat (Area in ha.)

Sr. No.	Wetland code	Wetland Category	Number of wetland sites	Total wetland area	% of wetland area
	1100	Inland Wetlands - Natural			
1	1101	Lake/Pond	40	23,550	0.68
2	1102	Ox-bow lake/Cut- off meander	1	6	0
3	1105	Waterlogged	278	20,660	0.59
4	1106	River/ Stream	1,039	275,877	7.94
	1200	Inland Wetlands -Man-made			
5	1201	Reservoir/Barrage	1,214	248,979	7.16
6	1202	Tank/Pond	8,818	73,873	2.13
7	1203	Waterlogged	34	13,951	0.4
8	1204	Salt pan	9	1,295	0.04
		Total - Inland	11,433	658,191	18.94
	2100	Coastal Wetlands - Natural			
9	2101	Lagoon	32	22,289	0.64
10	2102	Creek	170	149,898	4.31
11	2103	Sand/Beach	66	6,508	0.19
12	2104	Intertidal mud flat	1,066	2,260,365	65.05
13	2105	Salt Marsh	318	144,268	4.15
14	2106	Mangrove	746	904,75	2.6
15	2107	Coral Reef	50	33,547	0.97
	2200	Coastal Wetlands - Man-made			
16	2201	Salt pan	209	90,878	2.62
17	2202	Aquaculture pond	93	8,823	0.25
		Total - Coastal	2,750	2,807,051	80.78
Sub-Total			14,183	3,465,242	99.72
Wetlands (<2.25 ha)			9,708	9,708	0.28
Total			23,891	3,474,950	100

Source: National Wetland Atlas Space Application Centre, ISRO,2011

Annexure 7.1-a: List of Prioritised Ranges

Sl. No	Circle	District	Division	Range
1	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Ahmedabad SF
2	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF
3	Ahmedabad SF	Anand	Anand SF	Khambhat
4	Ahmedabad SF	Anand	Anand SF	Tarapur
5	Ahmedabad SF	Kheda	Nadiyad SF	Matar
6	Gandhinagar	Aravalli	Aravalli	Bhiloda
7	Gandhinagar	Aravalli	Aravalli	Malpur
8	Gandhinagar	Aravalli	Aravalli	Megraj
9	Gandhinagar	Aravalli	Aravalli	Modasa
10	Gandhinagar	Aravalli	Aravalli	Shamlaji
11	Gandhinagar	Gandhinagar	Gandhinagar	Dharoi
12	Gandhinagar	Sabarkantha	Sabarkantha	Dholwani
13	Gandhinagar	Sabarkantha	Sabarkantha	Khedbrahma
14	Gandhinagar	Sabarkantha	Sabarkantha	Poshina
15	Gandhinagar	Sabarkantha	Sabarkantha	Raigadh
16	Gandhinagar	Sabarkantha	Sabarkantha	RDF Khedbrahma
17	Gandhinagar	Sabarkantha	Sabarkantha	RDF Poshina
18	Gandhinagar	Sabarkantha	Sabarkantha	Vadali
19	Gandhinagar	Sabarkantha	Sabarkantha	Vijaynagar
20	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji North
21	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji South
22	Gandhinagar WL	Banaskantha	Banaskantha WL	Amirgadh
23	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta East
24	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta West
25	Gandhinagar WL	Banaskantha	Banaskantha WL	Dantivada
26	Gandhinagar WL	Banaskantha	Banaskantha WL	Iqbalgadh
27	Gandhinagar WL	Banaskantha	Banaskantha WL	Palanpur
28	Gandhinagar WL	Banaskantha	Banaskantha WL	Tharad
29	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar
30	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar West
31	Godhra SF	Godhra	Godhra SF	Godhra East
32	Godhra SF	Godhra	Godhra SF	Godhra West
33	Godhra SF	Godhra	Godhra SF	Halol SF
34	Godhra SF	Godhra	Godhra SF	Morva (Hadaf)
35	Godhra SF	Godhra	Godhra SF	Shahera
36	Godhra SF	Godhra	Godhra SF	Vejalpur
37	Godhra SF	Vadodara	Vadodara SF	Karjan

Annexure 7.1-a: List of Prioritised Ranges

Sl. No	Circle	District	Division	Range
38	Godhra SF	Vadodara	Vadodara SF	Padra
39	Godhra SF	Vadodara	Vadodara SF	Vaghodia
40	Junagadh	Bhavnagar	Bhavnagar	Bhavnagar
41	Junagadh	Bhavnagar	Bhavnagar	Jesar
42	Junagadh	Bhavnagar	Bhavnagar	Mahuva
43	Junagadh	Bhavnagar	Bhavnagar	Palitana
44	Junagadh	Bhavnagar	Bhavnagar	Sihor
45	Junagadh	Bhavnagar	Bhavnagar	Vallabhipur
46	Junagadh	Junagadh	Junagadh	Dungar North
47	Junagadh	Junagadh	Junagadh	Dungar South
48	Junagadh	Junagadh	Junagadh	Kutiyana
49	Junagadh	Junagadh	Junagadh	Mangrol
50	Junagadh	Junagadh	Junagadh	Verval
51	Junagadh	Morbi	Morbi	Gondal
52	Junagadh	Morbi	Morbi	Jasdan
53	Junagadh	Morbi	Morbi	Morbi
54	Junagadh	Morbi	Morbi	Rajkot
55	Junagadh	Morbi	Morbi	Wankaner
56	Junagadh WL	Junagadh	Gir East WL	Dalkhaniya
57	Junagadh WL	Junagadh	Gir East WL	Sarasiya
58	Junagadh WL	Junagadh	Gir East WL	Savarkundla
59	Junagadh WL	Junagadh	Gir East WL	Tulsi Shyam
60	Junagadh WL	Junagadh	Gir West WL	Babariya
61	Junagadh WL	Junagadh	Gir West WL	Dedakadi
62	Junagadh WL	Junagadh	Gir West WL	Talala
63	Junagadh WL	Junagadh	Gir West WL	Visavadar
64	Junagadh WL	Porbandar	Porbandar	Porbandar Bird Sanctuary
65	Junagadh WL	Porbandar	Porbandar	Ranavav
66	Junagadh WL	Bhavnagar	Shetrunji WL	Jafrabad WL Range
67	Junagadh WL	Bhavnagar	Shetrunji WL	Jesar WL Range
68	Junagadh WL	Bhavnagar	Shetrunji WL	Liliya WL Range
69	Junagadh WL	Bhavnagar	Shetrunji WL	Mahuva WL Range
70	Junagadh WL	Bhavnagar	Shetrunji WL	Palitana WL Range
71	Junagadh WL	Bhavnagar	Shetrunji WL	Rajula WL Range
72	Junagadh WL	Bhavnagar	Shetrunji WL	Talaja WL Range
73	Kutch	Kutchh	Kutch East	Bhuj-North
74	Rajkot SF	Amreli	Amreli SF	Kunkavav

Annexure 7.1-a: List of Prioritised Ranges

Sl. No	Circle	District	Division	Range
75	Rajkot SF	Amreli	Amreli SF	Lathi
76	Rajkot SF	Botad	Botad SF	Gariyadhar
77	Rajkot SF	Bhavnagar	Botad SF	Talaja
78	Surat	Bharuch	Bharuch Sub- division	Bharuch
79	Surat	Surat	Surat	Dumas
80	Surat	Surat	Surat	Hajira
81	Surat	Surat	Surat	Mandvi South for Khodamba
82	Vadodra	Dahod	Baria	Baria
83	Vadodra	Dahod	Baria	Dahod
84	Vadodra	Dahod	Baria	Dhanpur
85	Vadodra	Dahod	Baria	Fatepur
86	Vadodra	Dahod	Baria	Garbada
87	Vadodra	Dahod	Baria	Jhalod
88	Vadodra	Dahod	Baria	Limkheda
89	Vadodra	Dahod	Baria	Rampura
90	Vadodra	Dahod	Baria	Randhikpur
91	Vadodra	Dahod	Baria	Sagtala
92	Vadodra	Dahod	Baria	Sarjumi
93	Vadodra	Dahod	Baria	Vansiya Dungri
94	Vadodra	Chhota Udeipur	Chhota Udeipur	Bodeli
95	Vadodra	Chhota Udeipur	Chhota Udeipur	Boriad
96	Vadodra	Chhota Udeipur	Chhota Udeipur	Chhota Udeipur
97	Vadodra	Chhota Udeipur	Chhota Udeipur	Dolaria
98	Vadodra	Chhota Udeipur	Chhota Udeipur	Jetpurpavi
99	Vadodra	Chhota Udeipur	Chhota Udeipur	Kawat
100	Vadodra	Chhota Udeipur	Chhota Udeipur	Nasvadi
101	Vadodra	Chhota Udeipur	Chhota Udeipur	Panvad
102	Vadodra	Chhota Udeipur	Chhota Udeipur	Rangpur
103	Vadodra	Chhota Udeipur	Chhota Udeipur	Vadodara
104	Vadodra	Mahisagar	Mahisagar	Ditwas
105	Vadodra	Mahisagar	Mahisagar	Khanpur
106	Vadodra	Mahisagar	Mahisagar	Lunavada
107	Vadodra	Mahisagar	Mahisagar	Munpur
108	Vadodra	Mahisagar	Mahisagar	Santrampur East
109	Vadodra	Mahisagar	Mahisagar	Santranpur West
110	Vadodra	Panchmahal	Godhra	Halol
111	Vadodra	Godhra	Godhra	Rajgadh

Annexure 7.1-a: List of Prioritised Ranges

Sl. No	Circle	District	Division	Range
112	Vadodra WL	Vadodara	Vadodra WL	Jambughoda
113	Vadodra WL	Vadodara	Vadodra WL	Kanjeta
114	Vadodra WL	Vadodara	Vadodra WL	Shivrajpur

Source: JICA Survey Team (2019)

Annexure 7.1-b: Component Wise List of Ranges

ID	Component	Circle	District	Division	Range
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Ahmedabad SF
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Anand	Anand SF	Khambhat
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Anand	Anand SF	Khambhat
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Anand	Anand SF	Khambhat
C-1.	Ecological Infrastructure (Coastal Area)	Ahmedabad SF	Anand	Anand SF	Khambhat
C-1.	Ecological Infrastructure (Coastal Area)	Junagadh	Bhavnagar	Bhavnagar	Bhavnagar
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Bharuch	Bharuch Sub- divisi	Bharuch
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Bharuch	Bharuch Sub- divisi	Bharuch
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Bharuch	Bharuch Sub- divisi	Bharuch
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Bharuch	Bharuch Sub- divisi	Bharuch
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Bharuch	Bharuch Sub- divisi	Bharuch
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Surat	Surat	Dumas
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Surat	Surat	Dumas
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Surat	Surat	Dumas
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Surat	Surat	Dumas
C-1.	Ecological Infrastructure (Coastal Area)	Surat	Surat	Surat	Hajira
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Bhavnagar
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Jesar
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Mahuva
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Palitana
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Sihor
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Bhavnagar	Bhavnagar	Vallabhipur
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Junagadh	Junagadh	Kutiyana
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Junagadh	Junagadh	Mangrol
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Junagadh	Junagadh	Verval
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Morbi	Morbi	Gondal
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Morbi	Morbi	Jasdan
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Morbi	Morbi	Morbi
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Morbi	Morbi	Rajkot
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh	Morbi	Morbi	Wankaner
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir East WL	Dalkhaniya
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir East WL	Sarasiya
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir East WL	Savarkundla
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir East WL	Tulsi Shyam
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir West WL	Babariya
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir West WL	Dedakadi
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir West WL	Talala
C-2.1.	Ecological Infrastructure (Inland - Grassland)	Junagadh WL	Junagadh	Gir West WL	Visavadar
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Ahmedabad SF	Anand	Anand SF	Tarapur
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Ahmedabad SF	Kheda	Nadiyad SF	Matar
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar West
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Gandhinagar WL	Banaskantha	Banaskantha WL	Tharad
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Junagadh WL	Porbandar	Porbandar	Porbandar Bird Sanctuary
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Junagadh WL	Porbandar	Porbandar	Ranavav
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Kutch	Kutchh	Kutch East	Bhuj-North

Annexure 7.1-b: Component Wise List of Ranges

ID	Component	Circle	District	Division	Range
C-2.2.	Ecological Infrastructure (Inland - Wetland)	Vadodra WL	Vadodara	Vadodra WL	Shivrajpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Aravalli	Aravalli	Bhiloda
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Aravalli	Aravalli	Malpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Aravalli	Aravalli	Megraj
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Aravalli	Aravalli	Modasa
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Aravalli	Aravalli	Shamlaji
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Dholwani
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Khedbrahma
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Poshina
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Raigadh
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	RDF Poshina
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Vadali
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar	Sabarkantha	Sabarkantha	Vijaynagar
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji North
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji South
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Amirgadh
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta East
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta West
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Dantivada
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Gandhinagar WL	Banaskantha	Banaskantha WL	Iqbalgadh
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Godhra East
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Godhra West
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Halol SF
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Morva (Hadaf)
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Shahera
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Godhra SF	Godhra	Godhra SF	Vejalpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Bodeli
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Boriad
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Chhota Udeipur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Dolaria
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Jetpurpavi
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Kawat
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Nasvadi
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Panvad
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Rangpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Chhota Udeipur	Chhota Udeipur	Vadodara
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Baria
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Dahod
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Dhanpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Fatepur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Garbada
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Jhalod
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Limkheda
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Rampura
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Randhikpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Sagtala
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Sarjumi
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Dahod	Baria	Vansiya Dungri
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Ditwas

Annexure 7.1-b: Component Wise List of Ranges

ID	Component	Circle	District	Division	Range
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Khanpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Lunavada
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Munpur
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Santrampur East
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Mahisagar	Mahisagar	Santranpur West
C-2.3.	Ecological Infrastructure (Inland - Degraded Forest)	Vadodra	Godhra	Godhra	Rajgadh
C-3.1	HWC Management - Lion	Junagadh	Bhavnagar	Bhavnagar	Jesar
C-3.1	HWC Management - Lion	Junagadh	Bhavnagar	Bhavnagar	Mahuva
C-3.1	HWC Management - Lion	Junagadh	Bhavnagar	Bhavnagar	Palitana
C-3.1	HWC Management - Lion	Junagadh	Junagadh	Junagadh	Dungar North
C-3.1	HWC Management - Lion	Junagadh	Junagadh	Junagadh	Dungar South
C-3.1	HWC Management - Lion	Junagadh	Junagadh	Junagadh	Mangrol
C-3.1	HWC Management - Lion	Junagadh	Junagadh	Junagadh	Verval
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Jafrabad WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Jesar WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Liliya WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Mahuva WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Palitana WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Rajula WL Range
C-3.1	HWC Management - Lion	Junagadh WL	Bhavnagar	Shetrunji WL	Talaja WL Range
C-3.1	HWC Management - Lion	Rajkot SF	Amreli	Amreli SF	Kunkavav
C-3.1	HWC Management - Lion	Rajkot SF	Amreli	Amreli SF	Lathi
C-3.1	HWC Management - Lion	Rajkot SF	Bhavnagar	Botad SF	Talaja
C-3.1	HWC Management - Lion	Rajkot SF	Botad	Botad SF	Gariyadhar
C-3.2	HWC Management - S. Bear	Gandhinagar	Gandhinagar	Gandhinagar	Dharoi
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	Dholwani
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	Poshina
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	RDF Khedbrahma
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	RDF Poshina
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	Vadali
C-3.2	HWC Management - S. Bear	Gandhinagar	Sabarkantha	Sabarkantha	Vijaynagar
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji North
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji South
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Amirgadh
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta East
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta West
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Dantivada
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Iqbalgadh
C-3.2	HWC Management - S. Bear	Gandhinagar WL	Banaskantha	Banaskantha WL	Palanpur
C-3.2	HWC Management - S. Bear	Vadodra	Chhota Udeipur	Chhota Udeipur	Chhota Udeipur
C-3.2	HWC Management - S. Bear	Vadodra	Chhota Udeipur	Chhota Udeipur	Jetpurpavi
C-3.2	HWC Management - S. Bear	Vadodra	Dahod	Baria	Dhanpur
C-3.2	HWC Management - S. Bear	Vadodra	Dahod	Baria	Sagtala
C-3.2	HWC Management - S. Bear	Vadodra	Dahod	Baria	Vansiya Dungri
C-3.2	HWC Management - S. Bear	vadodra	Godhra	Godhra	Rajgadh
C-3.2	HWC Management - S. Bear	Vadodra WL	Vadodara	Vadodra WL	Jambughoda
C-3.2	HWC Management - S. Bear	Vadodra WL	Vadodara	Vadodra WL	Kanjeta
C-3.2	HWC Management - S. Bear	Vadodra WL	Vadodara	Vadodra WL	Shivrajpur
C-3.3	HWC - Crocodile	Godhra SF	Vadodara	Vadodara SF	Karjan

Annexure 7.1-b: Component Wise List of Ranges

ID	Component	Circle	District	Division	Range
C-3.3	HWC - Crocodile	Godhra SF	Vadodara	Vadodara SF	Padra
C-3.3	HWC - Crocodile	Godhra SF	Vadodara	Vadodara SF	Vadodara
C-3.3	HWC - Crocodile	Godhra SF	Vadodara	Vadodara SF	Vaghodia
C-3.4	HWC - Rescue C.	Surat	Surat	Surat	Mandvi South for Khodamba
C-3.4	HWC - Rescue C.	Vadodra	Panchmahal	Godhra	Halol

Source: JICA Survey Team (2019)

Annexure 7.1-c: Range Wise Component Mapping

Sl. No	Circle	District	Division	Range	Components							
					1. Development of Ecological Infrastructure (Coastal Area)	2.1 Development of Ecological Infrastructure (Inland - Grass)	2.2 Development of Ecological Infrastructure (Inland - Wetland)	2.3 Development of Ecological Infrastructure (Inland - Degraded Forest)	3.1 HWC-Lion	3.2 HWC- S. Bear	3.3 HWC – Crocodile	3.4 HWC - Rescue Centre
1	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Ahmedabad SF	○							
2	Ahmedabad SF	Ahmedabad	Ahmedabad SF	Dhanduhka SF	○							
3	Ahmedabad SF	Anand	Anand SF	Khambhat	○							
4	Ahmedabad SF	Anand	Anand SF	Tarapur			○					
5	Ahmedabad SF	Kheda	Nadiyad SF	Matar			○					
6	Gandhinagar	Aravalli	Aravalli	Bhiloda				○				
7	Gandhinagar	Aravalli	Aravalli	Malpur				○				
8	Gandhinagar	Aravalli	Aravalli	Megraj				○				
9	Gandhinagar	Aravalli	Aravalli	Modasa				○				
10	Gandhinagar	Aravalli	Aravalli	Shamlaji				○				
11	Gandhinagar	Gandhinagar	Gandhinagar	Dharoi						○		
12	Gandhinagar	Sabarkantha	Sabarkantha	Dholwani				○		○		
13	Gandhinagar	Sabarkantha	Sabarkantha	Khedbrahma				○				
14	Gandhinagar	Sabarkantha	Sabarkantha	Poshina				○		○		
15	Gandhinagar	Sabarkantha	Sabarkantha	Raigadh				○				
16	Gandhinagar	Sabarkantha	Sabarkantha	RDF Khedbrahma						○		
17	Gandhinagar	Sabarkantha	Sabarkantha	RDF Poshina				○		○		
18	Gandhinagar	Sabarkantha	Sabarkantha	Vadali				○		○		
19	Gandhinagar	Sabarkantha	Sabarkantha	Vijaynagar				○		○		
20	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji North				○		○		
21	Gandhinagar WL	Banaskantha	Banaskantha WL	Ambaji South				○		○		
22	Gandhinagar WL	Banaskantha	Banaskantha WL	Amirgadh				○		○		
23	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta East				○		○		
24	Gandhinagar WL	Banaskantha	Banaskantha WL	Danta West				○		○		
25	Gandhinagar WL	Banaskantha	Banaskantha WL	Dantivada				○		○		
26	Gandhinagar WL	Banaskantha	Banaskantha WL	Iqbalgadh				○		○		
27	Gandhinagar WL	Banaskantha	Banaskantha WL	Palanpur						○		

Annexure 7.1-c: Range Wise Component Mapping

Sl. No	Circle	District	Division	Range	Components							
					1. Development of Ecological Infrastructure (Coastal Area)	2.1 Development of Ecological Infrastructure (Inland - Grass)	2.2 Development of Ecological Infrastructure (Inland - Wetland)	2.3 Development of Ecological Infrastructure (Inland - Degraded Forest)	3.1 HWC-Lion	3.2 HWC- S. Bear	3.3 HWC – Crocodile	3.4 HWC - Rescue Centre
28	Gandhinagar WL	Banaskantha	Banaskantha WL	Tharad			○					
29	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar			○					
30	Gandhinagar WL	Ahmedabad	Nalsarovar WL	Nalsarovar West			○					
31	Godhra SF	Godhra	Godhra SF	Godhra East				○				
32	Godhra SF	Godhra	Godhra SF	Godhra West				○				
33	Godhra SF	Godhra	Godhra SF	Halol SF				○				
34	Godhra SF	Godhra	Godhra SF	Morva (Hadaf)				○				
35	Godhra SF	Godhra	Godhra SF	Shahera				○				
36	Godhra SF	Godhra	Godhra SF	Vejalpur				○				
37	Godhra SF	Vadodara	Vadodara SF	Karjan							○	
38	Godhra SF	Vadodara	Vadodara SF	Padra							○	
39	Godhra SF	Vadodara	Vadodara SF	Vaghodia							○	
40	Junagadh	Bhavnagar	Bhavnagar	Bhavnagar	○	○						
41	Junagadh	Bhavnagar	Bhavnagar	Jesar		○			○			
42	Junagadh	Bhavnagar	Bhavnagar	Mahuva		○			○			
43	Junagadh	Bhavnagar	Bhavnagar	Palitana		○			○			
44	Junagadh	Bhavnagar	Bhavnagar	Sihor		○						
45	Junagadh	Bhavnagar	Bhavnagar	Vallabhipur		○						
46	Junagadh	Junagadh	Junagadh	Dungar North					○			
47	Junagadh	Junagadh	Junagadh	Dungar South					○			
48	Junagadh	Junagadh	Junagadh	Kutiyana		○						
49	Junagadh	Junagadh	Junagadh	Mangrol		○			○			
50	Junagadh	Junagadh	Junagadh	Verval		○			○			
51	Junagadh	Morbi	Morbi	Gondal		○						
52	Junagadh	Morbi	Morbi	Jasdan		○						
53	Junagadh	Morbi	Morbi	Morbi		○						
54	Junagadh	Morbi	Morbi	Rajkot		○						

Annexure 7.1-c: Range Wise Component Mapping

Sl. No	Circle	District	Division	Range	Components							
					1. Development of Ecological Infrastructure (Coastal Area)	2.1 Development of Ecological Infrastructure (Inland - Grass)	2.2 Development of Ecological Infrastructure (Inland - Wetland)	2.3 Development of Ecological Infrastructure (Inland - Degraded Forest)	3.1 HWC-Lion	3.2 HWC- S. Bear	3.3 HWC – Crocodile	3.4 HWC - Rescue Centre
55	Junagadh	Morbi	Morbi	Wankaner		○						
56	Junagadh WL	Junagadh	Gir East WL	Dalkhaniya		○						
57	Junagadh WL	Junagadh	Gir East WL	Sarasiya		○						
58	Junagadh WL	Junagadh	Gir East WL	Savarkundla		○						
59	Junagadh WL	Junagadh	Gir East WL	Tulsi Shyam		○						
60	Junagadh WL	Junagadh	Gir West WL	Babariya		○						
61	Junagadh WL	Junagadh	Gir West WL	Dedakadi		○						
62	Junagadh WL	Junagadh	Gir West WL	Talala		○						
63	Junagadh WL	Junagadh	Gir West WL	Visavadar		○						
64	Junagadh WL	Porbandar	Porbandar	Porbandar Bird Sanctuary			○					
65	Junagadh WL	Porbandar	Porbandar	Ranavav			○					
66	Junagadh WL	Bhavnagar	Shetrunji WL	Jafrabad WL Range					○			
67	Junagadh WL	Bhavnagar	Shetrunji WL	Jesar WL Range					○			
68	Junagadh WL	Bhavnagar	Shetrunji WL	Liliya WL Range					○			
69	Junagadh WL	Bhavnagar	Shetrunji WL	Mahuva WL Range					○			
70	Junagadh WL	Bhavnagar	Shetrunji WL	Palitana WL Range					○			
71	Junagadh WL	Bhavnagar	Shetrunji WL	Rajula WL Range					○			
72	Junagadh WL	Bhavnagar	Shetrunji WL	Talaja WL Range					○			
73	Kutch	Kutchh	Kutch East	Bhuj-North			○					
74	Rajkot SF	Amreli	Amreli SF	Kunkavav					○			
75	Rajkot SF	Amreli	Amreli SF	Lathi					○			
76	Rajkot SF	Botad	Botad SF	Gariyadhar					○			
77	Rajkot SF	Bhavnagar	Botad SF	Talaja					○			
78	Surat	Bharuch	Bharuch Sub- division	Bharuch	○							
79	Surat	Surat	Surat	Dumas	○							
80	Surat	Surat	Surat	Hajira	○							
81	Surat	Surat	Surat	Mandvi South for Khodamba								○

Annexure 7.1-c: Range Wise Component Mapping

Sl. No	Circle	District	Division	Range	Components							
					1. Development of Ecological Infrastructure (Coastal Area)	2.1 Development of Ecological Infrastructure (Inland - Grass)	2.2 Development of Ecological Infrastructure (Inland - Wetland)	2.3 Development of Ecological Infrastructure (Inland - Degraded Forest)	3.1 HWC-Lion	3.2 HWC- S. Bear	3.3 HWC – Crocodile	3.4 HWC - Rescue Centre
82	Vadodra	Dahod	Baria	Baria				○				
83	Vadodra	Dahod	Baria	Dahod				○				
84	Vadodra	Dahod	Baria	Dhanpur				○		○		
85	Vadodra	Dahod	Baria	Fatepur				○				
86	Vadodra	Dahod	Baria	Garbada				○				
87	Vadodra	Dahod	Baria	Jhalod				○				
88	Vadodra	Dahod	Baria	Limkheda				○				
89	Vadodra	Dahod	Baria	Rampura				○				
90	Vadodra	Dahod	Baria	Randhikpur				○				
91	Vadodra	Dahod	Baria	Sagtala				○		○		
92	Vadodra	Dahod	Baria	Sarjumi				○				
93	Vadodra	Dahod	Baria	Vansiya Dungri				○		○		
94	Vadodra	Chhota Udeipur	Chhota Udeipur	Bodeli				○				
95	Vadodra	Chhota Udeipur	Chhota Udeipur	Boriad				○				
96	Vadodra	Chhota Udeipur	Chhota Udeipur	Chhota Udeipur				○		○		
97	Vadodra	Chhota Udeipur	Chhota Udeipur	Dolaria				○				
98	Vadodra	Chhota Udeipur	Chhota Udeipur	Jetpurpavi				○		○		
99	Vadodra	Chhota Udeipur	Chhota Udeipur	Kawat				○				
100	Vadodra	Chhota Udeipur	Chhota Udeipur	Nasvadi				○				
101	Vadodra	Chhota Udeipur	Chhota Udeipur	Panvad				○				
102	Vadodra	Chhota Udeipur	Chhota Udeipur	Rangpur				○				
103	Vadodra	Chhota Udeipur	Chhota Udeipur	Vadodara				○			○	
104	Vadodra	Mahisagar	Mahisagar	Ditwas				○				
105	Vadodra	Mahisagar	Mahisagar	Khanpur				○				
106	Vadodra	Mahisagar	Mahisagar	Lunavada				○				
107	Vadodra	Mahisagar	Mahisagar	Munpur				○				
108	Vadodra	Mahisagar	Mahisagar	Santrampur East				○				

Annexure 7.1-c: Range Wise Component Mapping

Sl. No	Circle	District	Division	Range	Components							
					1. Development of Ecological Infrastructure (Coastal Area)	2.1 Development of Ecological Infrastructure (Inland - Grass)	2.2 Development of Ecological Infrastructure (Inland - Wetland)	2.3 Development of Ecological Infrastructure (Inland - Degraded Forest)	3.1 HWC- Lion	3.2 HWC- S. Bear	3.3 HWC – Crocodile	3.4 HWC - Rescue Centre
109	Vadodra	Mahisagar	Mahisagar	Santranpur West				○				
110	Vadodra	Panchmahal	Godhra	Halol								○
111	Vadodra	Godhra	Godhra	Rajgadh				○		○		
112	Vadodra WL	Vadodara	Vadodra WL	Jambughoda						○		
113	Vadodra WL	Vadodara	Vadodra WL	Kanjeta						○		
114	Vadodra WL	Vadodara	Vadodra WL	Shivrajpur			○			○		

Source: JICA Survey Team (2019)

Annexure 7.2: Candidate List of Reserve and Non-reserve vidis (> 100 ha for RV and >50 ha for NRV)

Type	Name of District	Name of Taluka	Name of Vidi (Reserved)	Area (ha)	Forest Division	Forest Range
RV	Bhavnagar	Bhavnagar	Rojmal (Bhandariya)	195.22	Bhavnagar	Bhavnagar
RV	Bhavnagar	Ghogha	Kaltho Chapro	141.00	Bhavnagar	Bhavnagar
RV	Bhavnagar	Ghogha	Paval	263.55	Bhavnagar	Bhavnagar
RV	Bhavnagar	Jesar	Beda	649.29	Bhavnagar	Jesar
RV	Bhavnagar	Jesar	Ranigala (Jesar)	409.5	Bhavnagar	Jesar
RV	Bhavnagar	Mahuva	Gebar	727.67	Bhavnagar	Mahuva
RV	Bhavnagar	Palitana	Rajasthali	562.55	Bhavnagar	Palitana
RV	Bhavnagar	Palitana	Sajnasar	343.26	Bhavnagar	Palitana
RV	Bhavnagar	Palitana	Sarod	224.78	Bhavnagar	Palitana
RV	Bhavnagar	Sihor	Chorvadla	886.17	Bhavnagar	Sihor
RV	Bhavnagar	Sihor	Malvan	246.87	Bhavnagar	Sihor
RV	Bhavnagar	Sihor	Piparala	687.98	Bhavnagar	Sihor
RV	Bhavnagar	Sihor	Thala	390.52	Bhavnagar	Sihor
RV	Bhavnagar	Talaja	Hamirpara-Sankhadasar	107.35	Bhavnagar	Mahuva
RV	Bhavnagar	Talaja	Kundhada	455.83	Bhavnagar	Mahuva
RV	Bhavnagar	Talaja	Sagala Bhandara	152.33	Bhavnagar	Mahuva
RV	Botad	Botad	Dhankaniya	372.63	Bhavnagar	Vallabhipur
RV	Botad	Gadhada	Vavdi Nanosariya	105.98	Bhavnagar	Vallabhipur
RV	Amreli	Babra	Salemar Vikram	223.47	Gir East	Sarasiya
RV	Amreli	Babra	Sariyo Sandhiyo	240.8	Gir East	Sarasiya
RV	Amreli	Dhari	Kangrasa	126.07	Gir East	Dalkhaniya
RV	Amreli	Khambha	Ambaliya-Makhaniya	415.46	Gir East	Tulshishyam
RV	Amreli	Savarkundla	Mota Sasariya	355.43	Gir East	Savarkundla
RV	Amreli	Savarkundla	Nani Vadal	555.64	Gir East	Savarkundla
RV	Gir-Somnath	Talala	Haripur- Sajiya	274.90	Gir West	Talala
RV	Junagadh	Mendarda	Jinjuda	155.27	Gir West	Dedakadi
RV	Junagadh	Mendarda	Malanaka	337.51	Gir West	Dedakadi
RV	Junagadh	Mendarda	Moti Chavdi	518.04	Gir West	Dedakadi
RV	Junagadh	Visavadar	Chameli Santokadi	197.97	Gir West	Visavadar
RV	Junagadh	Visavadar	Ghado	163.17	Gir West	Visavadar
RV	Junagadh	Visavadar	Roniya	940.69	Gir West	Visavadar
RV	Junagadh	Maliya-Hatina	Amrapur (Charakhada)	218.45	Junagadh	Mangrol
RV	Junagadh	Maliya-Hatina	Chuldi (Jalondr)	177.33	Junagadh	Mangrol
RV	Junagadh	Maliya-Hatina	Dharampur (Kubaddhar)	101.11	Junagadh	Mangrol
RV	Junagadh	Maliya-Hatina	Kalibhda (Lakkaddhar)	101.61	Junagadh	Mangrol
RV	Junagadh	Maliya-Hatina	Mota Babra	405.18	Junagadh	Mangrol
RV	Junagadh	Maliya-Hatina	Nana Babra	117.06	Junagadh	Mangrol
RV	Porbandar	Kutiyana	Dudhiya	1499.54	Junagadh	Kutiyana
RV	Porbandar	Kutiyana	Madhva	648.3	Junagadh	Kutiyana
RV	Morbi	Wankaner	Dabhi Bhensla	786.92	Morbi	Wankaner
RV	Morbi	Wankaner	Jambudiya Moti	1608.92	Morbi	Wankaner
RV	Morbi	Wankaner	Mesariya	631.32	Morbi	Wankaner
RV	Morbi	Wankaner	Paneli	1295.73	Morbi	Morbi
RV	Morbi	Wankaner	Tithava Lokbhag	127.48	Morbi	Wankaner
RV	Rajkot	Gondal	Bhandariya	167.04	Morbi	Gondal
RV	Rajkot	Gondal	Vadadhari	117.08	Morbi	Gondal
RV	Rajkot	Gondal	Vanthali	215.89	Morbi	Gondal
RV	Rajkot	Jam Kandorda	Rampar, Meghvad, Boriya	160.46	Morbi	Gondal
RV	Rajkot	Jasdan	Bhadla	668.95	Morbi	Jasdan
RV	Rajkot	Jasdan	Kanesara	409.45	Morbi	Jasdan
RV	Rajkot	Jasdan	Umath Godaladhar	1547.4	Morbi	Jasdan
RV	Rajkot	Kotda Sanghani	Khokhri	144.51	Morbi	Rajkot
RV	Rajkot	Lodhika	Chimda	194.8	Morbi	Rajkot
RV	Rajkot	Lodhika	Khirsara	451.29	Morbi	Rajkot
RV	Rajkot	Paddhari	Khambhada	212.06	Morbi	Rajkot

Type	Name of District	Name of Taluka	Name of Vidi (Reserved)	Area (ha)	Forest Division	Forest Range
RV	Rajkot	Rajkot	Anandpar (Anandpar Baghi)	460.44	Morbi	Rajkot
RV	Rajkot	Rajkot	Bhayasar	380.41	Morbi	Rajkot
RV	Rajkot	Rajkot	Halenda	413.28	Morbi	Rajkot
RV	Rajkot	Rajkot	Lothda	448.93	Morbi	Rajkot
RV	Rajkot	Rajkot	Meswada, Jajamiya, Vadgamo	129.99	Morbi	Rajkot
RV	Rajkot	Rajkot	Moti Hirasar	288.06	Morbi	Rajkot
RV	Rajkot	Rajkot	Nani Hirasar	257.34	Morbi	Rajkot
RV	Rajkot	Upleta	Padvala	162.25	Morbi	Gondal
NRV	Bhavnagar	Ghogha	Khatdi	155.61	Bhavnagar	Bhavnagar
NRV	Bhavnagar	Ghogha	Vadalo Dungar (Bhandar)	72.65	Bhavnagar	Bhavnagar
NRV	Bhavnagar	Mahuva	Baladiya (Tataniya)	83.67	Bhavnagar	Jesar
NRV	Bhavnagar	Mahuva	Bhayagado (Jesar)	81.25	Bhavnagar	Jesar
NRV	Bhavnagar	Mahuva	Karjala	182.65	Bhavnagar	Jesar
NRV	Bhavnagar	Mahuva	Navkukri (Mandava)	137.92	Bhavnagar	Mahuva
NRV	Bhavnagar	Palitana	Anida-Vakneriya	155.8	Bhavnagar	Palitana
NRV	Bhavnagar	Shior	Amargadh	88.39	Bhavnagar	Shihor
NRV	Bhavnagar	Shior	Bhankhal	87.97	Bhavnagar	Shihor
NRV	Bhavnagar	Shior	Sikotraghodighada	715.57	Bhavnagar	Shihor
NRV	Bhavnagar	Gadhadu	Holiya darbar	52.61	Bhavnagar	Vallabhipur
NRV	Bhavnagar	Botad	Khakhoi / Saekoliya	53.85	Bhavnagar	Vallabhipur
NRV	Bhavnagar	Gadhadu	Nana Umarda	57.47	Bhavnagar	Vallabhipur
NRV	Amreli	Dhari	Hirava	126.07	Gir East	Dalkhaniya
NRV	Amreli	Babra	Khambhala	64.59	Gir East	Sarasiya
NRV	Amreli	Savarkundla	Bhekra	256.62	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Hipavadli	208.94	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Jadkala	206.76	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Kantrodi	316.47	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Kedariya	247.2	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Mathda	61.44	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Nano Sosariyo	93.66	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Palaniya	199.85	Gir East	Savarkundla
NRV	Amreli	Savarkundla	Vasiyali	217.53	Gir East	Savarkundla
NRV	Amreli	Khamba	Dadali	361	Gir East	Tulshishyam
NRV	Amreli	Khamba	Janjarda	103.02	Gir East	Tulshishyam
NRV	Amreli	Khamba	Kodiya	103.2	Gir East	Tulshishyam
NRV	Amreli	Khamba	Raydi	56.96	Gir East	Tulshishyam
NRV	Amreli	Khamba	Sarakadiya	59.63	Gir East	Tulshishyam
NRV	Junagadh	Bhesan	Tadka-pipaliya	76.76	Junagadh	Dungar North
NRV	Porbandar	Kutiyana	Chariyan Bhag	450.94	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Dadbha Harji	121.55	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Gandhelu	156.53	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Ghoghardo Ramnagar	168.07	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Margho Dungar	670.73	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Ranidhar	147.63	Junagadh	Kutiyana
NRV	Porbandar	Kutiyana	Tran Tobara	59.28	Junagadh	Kutiyana
NRV	Junagadh	Maliya-Hatina	Devgam	108.5	Junagadh	Mangrol
NRV	Junagadh	Maliya-Hatina	Kadakdhar Akalagir	50.29	Junagadh	Mangrol
NRV	Junagadh	Maliya-Hatina	Lanchadi	63.41	Junagadh	Mangrol
NRV	Junagadh	Maliya-Hatina	Maltimbi Ambalgadh	141.64	Junagadh	Mangrol
NRV	Junagadh	Manavadar	Sardargadh	51.08	Junagadh	Mangrol
NRV	Junagadh	Manavadar	Sherdi	113.31	Junagadh	Mangrol
NRV	Gir somnath	veraval	Inaj-moraj	50.16	Junagadh	Veraval
NRV	Rajkot	Gondal	Aambardi	113.39	Morbi	Gondal
NRV	Rajkot	Gondal	Gomata-Bandra	61.87	Morbi	Gondal
NRV	Rajkot	Gondal	Gomta Seemado	51.62	Morbi	Gondal
NRV	Rajkot	Upleta	Jaal	195.38	Morbi	Gondal
NRV	Rajkot	Jetpur	Kagvad	55.32	Morbi	Gondal
NRV	Rajkot	Dhoraji	Patanvav	131.52	Morbi	Gondal
NRV	Rajkot	Jetpur	Seluka moti	59.74	Morbi	Gondal

Type	Name of District	Name of Taluka	Name of Vidi (Reserved)	Area (ha)	Forest Division	Forest Range
NRV	Rajkot	Gondal	Trakuda Moti	66.07	Morbi	Gondal
NRV	Rajkot	Gondal	Vanthali Jungle	141.55	Morbi	Gondal
NRV	Rajkot	Jasdan	Ambardi	152.28	Morbi	Jasdan
NRV	Rajkot	Jasdan	Chhapro Kachhaliyo	72.69	Morbi	Jasdan
NRV	Rajkot	Vinchhiya	Chhasiya	69.39	Morbi	Jasdan
NRV	Rajkot	Vinchhiya	Devdhari	190.24	Morbi	Jasdan
NRV	Rajkot	Jasdan	Gokhlana	166.7	Morbi	Jasdan
NRV	Rajkot	Jasdan	Jivapar Nadikantha	55.39	Morbi	Jasdan
NRV	Rajkot	Vinchhiya	Modhuka Chadika	116.88	Morbi	Jasdan
NRV	Rajkot	Jasdan	Salaiya	57.54	Morbi	Jasdan
NRV	Rajkot	Vinchhiya	Somnath Pipaliya	89.41	Morbi	Jasdan
NRV	Rajkot	Jasdan	Virnagar Kadayo	71.6	Morbi	Jasdan
NRV	Morbi	Halvad	Samli	54.02	Morbi	Morbi
NRV	Rajkot	Rajkot	Anandpar/Dharmada/Chhipardi	113.31	Morbi	Rajkot
NRV	Rajkot	Rajkot	Dedhwari	65.82	Morbi	Rajkot
NRV	Rajkot	Rajkot	Haripar	110.55	Morbi	Rajkot
NRV	Rajkot	Paddhari	Khandheri	88	Morbi	Rajkot
NRV	Rajkot	Kotda Sanghani	Naranka Peerwadi	119.04	Morbi	Rajkot
NRV	Rajkot	Rajkot	Parewada	97.9	Morbi	Rajkot
NRV	Rajkot	Rajkot	Rampara Kund	146.55	Morbi	Rajkot
NRV	Rajkot	Rajkot	Sar	56.69	Morbi	Rajkot
NRV	Rajkot	Paddhari	Suwang	81.1	Morbi	Rajkot
NRV	Rajkot	Rajkot	Thorada	190.21	Morbi	Rajkot
NRV	Morbi	Vankaner	Gadhiyo Vankaner	153.38	Morbi	Wankaner
NRV	Morbi	Vankaner	Garida Kalera	180.31	Morbi	Wankaner
NRV	Morbi	Vankaner	Garida Plan	116.35	Morbi	Wankaner
NRV	Morbi	Vankaner	Ghiyavad (Karideri)	161.81	Morbi	Wankaner
NRV	Morbi	Vankaner	Ghiyavad Sarkadiya	80.94	Morbi	Wankaner
NRV	Morbi	Vankaner	Jalida	121.41	Morbi	Wankaner
NRV	Morbi	Vankaner	Jalida Pankhariya	80.97	Morbi	Wankaner
NRV	Morbi	Vankaner	Jambudiya Nani	342.84	Morbi	Wankaner
NRV	Morbi	Vankaner	Jepur Mal	86.30	Morbi	Wankaner
NRV	Morbi	Vankaner	Kachiya Galo Bandh	50.58	Morbi	Wankaner
NRV	Morbi	Vankaner	Kalyani	161.19	Morbi	Wankaner
NRV	Morbi	Vankaner	Rangpar Dipdagalo	135.05	Morbi	Wankaner
NRV	Morbi	Vankaner	Thikariyali	66.66	Morbi	Wankaner
NRV	Morbi	Vankaner	Tithva Vadsar	90.10	Morbi	Wankaner
NRV	Morbi	Vankaner	Tithva Venar Chhetariyo	60.69	Morbi	Wankaner
NRV	Morbi	Vankaner	Vasundhra Plan	141.38	Morbi	Wankaner
NRV	Gir-Somnath	Gadhada	Phareda	225.08	Gir West	Babariya
NRV	Gir-Somnath	Talala	Bamansa	189.79	Gir West	Bhamansar
NRV	Gir-Somnath	Talala	Mandorana	153.78	Gir West	Bhamansar
NRV	Gir-Somnath	Talala	Vadla	404.62	Gir West	Bhamansar
NRV	Junagadh	Mendarda	Haripur Tower	56.66	Gir West	Dedakadi
NRV	Junagadh	Mendarda	Nani Chavandi	149.14	Gir West	Dedakadi
NRV	Junagadh	Mendarda	Sai	59.86	Gir West	Dedakadi
NRV	Junagadh	Mendarda	Shiyardi	80.94	Gir West	Dedakadi
NRV	Gir-Somnath	Gadhada	Javantri	437.75	Gir West	Jamwada
NRV	Gir-Somnath	Talala	Bhojde	753.89	Gir West	Talala
NRV	Gir-Somnath	Talala	Borvav	263.15	Gir West	Talala
NRV	Gir-Somnath	Talala	Hadmatiya	228.15	Gir West	Talala
NRV	Gir-Somnath	Talala	Jasapur	175.25	Gir West	Talala
NRV	Gir-Somnath	Talala	Lakkadvera	171.64	Gir West	Talala
NRV	Gir-Somnath	Talala	Lushala	262.15	Gir West	Talala
NRV	Gir-Somnath	Talala	Madhupura	76.23	Gir West	Talala
NRV	Gir-Somnath	Talala	Rampara	121.41	Gir West	Talala
NRV	Gir-Somnath	Talala	Sangodra	243.62	Gir West	Talala
NRV	Junagadh	Visavadar	Hothaliya	72.09	Gir West	Visavadar
NRV	Junagadh	Visavadar	Javaldi	330.03	Gir West	Visavadar

Type	Name of District	Name of Taluka	Name of Vidi (Reserved)	Area (ha)	Forest Division	Forest Range
NRV	Junagadh	Visavadar	Lamdhar	683.01	Gir West	Visavadar
NRV	Junagadh	Visavadar	Manandiya	165.12	Gir West	Visavadar
NRV	Junagadh	Visavadar	Rajpara Towers	380.81	Gir West	Visavadar
NRV	Junagadh	Visavadar	Shobhavadla	522.01	Gir West	Visavadar

Source: JICA Study Team (2019)

Annexure 7.3: Prioritisation Process of Wetlands

1. Strategy for project area selection & implementation

The strategy for taking up wetland restoration is based on following facts that wetlands are subjected to autogenic terrestrialization process, they are subjected to anthropogenic pressures, some of them have high dependency of local community, due to these factors wetlands continue to degrade in the state. Moreover, there are number of the wetlands that are of high conservation significance and are not mainstreamed into legal framework of the country and they are vulnerable to further degradation. Supporting interventions to restore and enrich habitats, reducing anthropogenic pressures through providing alternate livelihood, improvement of management infrastructure along with mainstreaming of 5 wetlands by preparing model integrated plans and improving scientific knowledge base would help restore and manage wetland efficiently in the state.

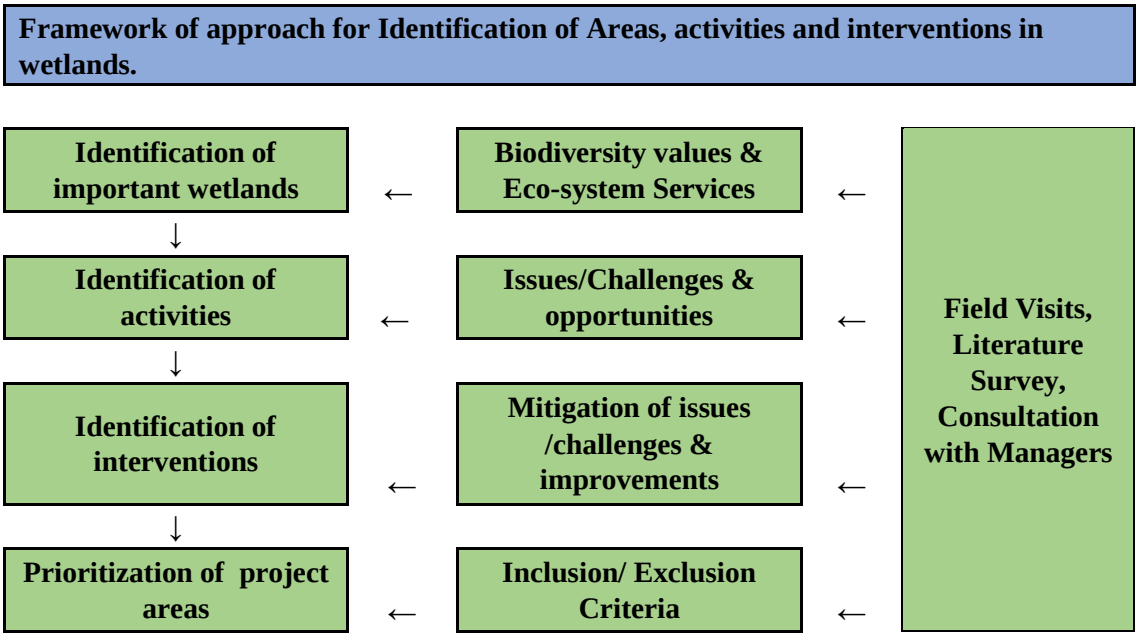
Gujarat holds 7.0% of the total numbers of wetlands (14,183) of India that are larger than 2.25 ha. and 22.7% of the total wetland areas (3,465,242 ha.) of the country. Since most of the wetlands are facing different types of issues and challenges is difficult to prioritize wetlands for restoration and mainstreaming. Therefore, as a strategy, first level of prioritization/selection in the project is carried based on wetlands selected for following two schemes of the central governments.

a) National Plan for Conservation of Aquatic Ecosystems (NPCA) -8 wetlands
b) Prime Minister's 100 wetlands rejuvenation programme (PM-WRP) – 11 wetlands

The total 13 wetlands are prioritized in abovementioned schemes with overlaps of areas (Table-2). These wetlands are prioritized through comprehensive consultation process with Gujarat Forest Department for their restoration and sustainable management. It is important to synchronize and augment ongoing wetland conservation efforts by the state and central governments. Therefore, for the present project, the wetlands are further prioritized from the above mentioned 13 areas for taking up restoration & habitat improvement activities and mainstreaming into legal framework.

2. Method and approach for project area selections:

Due to paucity of time for scale of information required, we carried out qualitative analysis of 13 pre-prioritized wetlands in order to select wetland areas, activities and interventions for the project. The importance of 13 pre-prioritized wetlands was assessed based on their biodiversity values and eco-system services provided by them. Further qualitative analysis was carried out to list and scale the issues & challenges faced by these wetlands through consultative processes, survey of secondary literature and field visits. The types of activities and interventions required to mitigate the issues & challenges faced by the wetlands were derived through qualitative analysis and consultative processes (Figure-1). A consultative workshop was organized at the forest office on 7th November 2019. Field managers and higher officials dealing with wetland conservation in the Forest Department provided qualitative inputs to rank the issues and challenges faced by wetlands as well as eco-system services provided by 13 wetlands. Qualitative ranking was carried out using 1-5 ranks where 1 is lowest and 5 being highest value. Based on the experience and understanding of the issues and challenges and the eco-system services provided by wetlands the final ranking was carried out.



Source: JICA Survey Team (2019)

Figure-1: Framework of approach for prioritization of project areas, identification of activities and the interventions.

Table-1 Wetlands prioritized under National Wetland Conservation Programme (NWCP) and Prime Minister's 100 Wetland Rejuvenation programme (PM-WRP)

No	Name – Location- Jurisdiction								Prioritized	
	Wetland Name	Lat	Long	District	Taluka	Division/s	Range/s	Area ha.	NWCP	PM-WRP
1	Great Rann of Kutch -Chhari Dhandh	23.588848°	69.315015°	Kutch	Nakhatrana	Kutch-West	Nakhatrana-west	22,700	1	1
2	Great Rann of Kutch (Flamingo City & Khadir island)	24.061423°	70.045167°	Kutch	Rapar	Kutch-East	Bhuj-North	300,000		1
3	Great Rann of Kutch -Nadabet	24.345253°	71.171066°	Banaskantha	Tharad	Banaskantha-WL	Tharad	100,000		
4	Khijadiya	22.533015°	70.178909°	Jamnagar	Jamnagar	Marine National Park	Khijadiya	605	1	1
5	Little Rann of Kutch	23.354386°	71.292120°	SuMultrendranagar, Patan, Kutch	Multiple	Dhrangadhra-WL	Bajana	495,370	1	1
6	Nalsarovar	22.798823°	72.022237°	Ahmedabad	Sanand	Sanand-WL	Nalsarovar West, Nalsarovar	12,082	1	1
7	Nani-Kakarad	20.851793°	72.849604°	Navsari	Navsari	Valsad-North		1,500	1	
8	Pariej lake	22.550975°	72.617330°	Kheda	Limbasi	Nadiyad-SF	Matar	378.79	1	1
9	Thol lake	23.137967°	72.410470°	Mehsana	Kadi	Sanand-WL	Thol	699	1	1
10	Wadhawana lake	22.388432°	73.397641°	Vadodara	Dabhoi	Vadadora-WL	Shivrajpur	579	1	1
11	Gosabara-Mokar wetland	21.602298°	69.727056°	Porbandar	Porbandar Ranavav	Porbandar	Porbandar Bird Sanctuary, Ranavav	12,913.58		1
12	Kanewal	22.467920°	72.526692°	Anand	Khambhat	Anand-SF	Tarapur	7,000		1
13	Chandrabhaga	22.215888°	68.993146°	Devbhumi Dwarika	Dwarika	Jamnagar Normal	Dwarika-Normal	448		1

Source: JICA Survey Team (2019)

a) Biodiversity values of wetlands: Qualitative biodiversity ranking of each of the wetlands was done based on their status in term of protected areas, Bio-sphere Reserve, Ramsar Site, Important Bird Areas, meeting Ramsar Criteria (1% bird population & 20,000 birds). Qualitative scoring was carried out using 1-3 numbers where 1 is lowest and 3 being highest. For IBA & Ramsar Criteria (1% bird population & 20,000 birds) value 1 was accorded where as for protected area value 2 was given, higher value i.e. 3 was given to Ramsar site and Biosphere Reserve. Sum of all the criteria was made to produce final biodiversity rank (Table-2).

Table-2: Qualitative Biodiversity Ranking of Wetland Sites

No	Name & Location	Biodiversity Values						
	Wetland Name	Protected Area	Biosp-here Reserve	Ramsar Site	IBA Area	Ramsar Criteria		Overall Bio-diversity Rank
						1% popn.	20,000 Birds	
1	Great Rann of Kutch - Flamingo City & Khadir	2	3		1	1	1	8
2	Little Rann of Kutch	2	3		1	1	1	8
3	Great Rann of Kutch - Chhari Dhandh	2			1	1	1	5
4	Great Rann of Kutch - Nadabet	2	3			1	1	7
5	Nalsarovar	2		3	1	1	1	8
6	Thol lake	2			1	1	1	5
7	Khijadiya	2			1	1		4
8	Pariej lake				1	1	1	3
9	Gosabara-Mokar wetland				1	1	1	3
10	Nani-Kakarad					1	1	2
11	Wadhawana lake					1	1	2
12	Kanewal				1			1
13	Chandrabhaga					1		1

Source: JICA Survey Team (2019)

b) Eco-system services provided by wetlands: Qualitative ranking of eco-system services was carried out during the workshop held on 7th November 2019 using 1-5 scores, where 1 is lowest and 5 being highest value. Based on the experience and understanding of the wetlands the managers and wetland expert qualitative analysis was carried out (Table-3). Based on the common understanding, the services provided by wetlands were listed and a qualitative value was given for each of them, finally total was made to understand the overall eco-system services provided by 13 wetlands (Table-3).

Table-3: Qualitative analysis of Eco-system services provided by the wetlands

No	Wetland Name	Eco-system Services							
		Fishing	Water for irrigation	Grass/ fodder	Flood control	Cultural Heritage value	Existing Eco-Tourism	Comm-unity Depen-dence	Overall Rank
1	Nalsarovar	3	2	3	4	3	5	5	25
2	Little Rann of Kutch	4		2	5		5	3	19

Table-3: Qualitative analysis of Eco-system services provided by the wetlands									
No	**Wetland Name**	**Eco-system Services**							
		Fishing	**Water for irrigation**	**Grass/ fodder**	**Flood control**	**Cultural Heritage value**	**Existing Eco-Tourism**	**Comm-unity Depen-dence**	**Overall Rank**
3	Great Rann of Kutch -Chhari Dhandh	1		4	4		3	3	15
4	Gosabara-Mokar wetland	4	3	3	3		1	1	15
5	Chandrabhaga	2	3	2	2	1		3	13
6	Great Rann of Kutch -Flamingo City & Khadir island				5	5	1	1	12
7	Wadhawana lake	3	5		2		2		12
8	Kanewal	2	5		3		1	1	12
9	Nani-Kakarad	3	2		1		1	3	10
10	Thol lake		5		1		4		10
11	Pariej lake	1	5		1		2		9
12	Great Rann of Kutch -Nadabet				5		2	1	8
13	Khijadiya				1		3	2	6

Source: JICA Survey Team (2019)

c) Issues/challenges and Opportunities in wetlands: Qualitative analysis of various issues and challenges faced by wetlands and mitigation was carried out during the workshop held on 7th November 2019 using 1-5 score, where 1 is lowest and 5 being highest value. Based on the experience and understanding of the wetlands the managers and wetland expert qualitative analysis was carried out (Table-5). Based on the common understanding on the issues and challenges faced by wetlands were identified and qualitative scoring of each of them was carried out. Input on variety and intensities of issues and challenges were provided by the managers were listed and a qualitative scores was assigned for each of them, finally total was made to understand the overall levels of threats, issues and challenges faced by 13 wetlands (Table-4).

Table-4: Issues and Challenges faced by the 13 wetlands											
No	**Name & Location**	**Challenges/Issues/problem**									
	Wetland Name	**Pollution**	**Encroachment**	**Poaching**	**Invasive species infestation**	**Siltation**	**Erosion**	**Over Fishing**	**Water level management**	**Eutro-phication**	**Total**
1	Nalsarovar	5		5	4	2		2	1	1	20
2	Nani-Kakarad	2	2	1	2	1		3			11
3	Gosabara-Mokar wetland	2	1	3	2	2		1			11
4	Great Rann of Kutch -Chhari Dhandh			2	4	2		1			9
5	Little Rann of Kutch			1	3	2		1			7

Table-4: Issues and Challenges faced by the 13 wetlands											
No	Name & Location	Challenges/Issues/problem									
	Wetland Name	Pollution	Encroachment	Poaching	Invasive species infestation	Siltation	Erosion	Over Fishing	Water level management	Eutro-phication	Total
6	Great Rann of Kutch -Nadabet				2		4				6
7	Chandrabhaga	2		1	1	1					5
8	Thol lake	2				1			1		4
9	Khijadiya				2	1					3
10	Pariej lake					1			1	1	3
11	Wadhawana lake					1			1		2
12	Kanewal								1	1	2
13	Great Rann of Kutch - Flamingo City & Khadir						1				1

Source: JICA Survey Team (2019)

d) Mitigation of issues and challenges: Based on common understanding and consultation with the managers, following activities are identified for mitigating various issues and challenges at various wetland sites (Table-5). During consultation with the Apart from these activities various other habitat improvement activities are also proposed that could enhance the overall ecological value of theses wetlands sites. These activities include making raised platform for improving habitats for birds, amphibians and reptiles and other aquatic fauna. Such platforms provide roosting and nesting places for birds.

e) Opportunities for habitat improvements and mainstreaming of wetlands: Apart from issues and challenges faced by the wetlands, there are several opportunities for improvement of their habitat, initiating community based eco-tourism activities, strengthening of protection, strengthening of infrastructure etc. in the prioritized wetland areas. Several wetlands that are not part of protected areas but has immense ecological and socio-economical significance could be potentially mainstreamed by bringing them within the legal framework of the state and central governments.

Table-5: Issues challenges& opportunities and potential mitigation			
No	**Issues/ Challenges & Opportunities**	**Issues at Wetland sites**	**Suggestive Mitigation measures/ activities/ interventions**
1	Solid waste Pollution	Nalsarovar, Gosabara, Chandrabhaga, Nani-Kakrad	Setting up of solid waste management system, Sewage treatment plants, awareness and education activities
2	Encroachment	Gosabara , Nani kakrad,	Mapping, Boundary demarcation, Mainstreaming of wetlands
3	Poaching of birds	Nalsarovar, Nani kakrad, Gosabara, Chhari Dhandh, LRK, Chandrabhaga	Removal of reed & weed for better surveillance Resource management through community development, Providing alternate livelihood,
4	Invasive species infestation	Nalsarovar, Nani kakrad, Gosabara, Chhari Dhandh, LRK, GRK-Nadabet, Chandrabhaga, Khijadiya	Habitat management activities, Removal of reed and invasive species i.e. *Prosipis* etc.

Table-5: Issues challenges& opportunities and potential mitigation			
No	**Issues/ Challenges & Opportunities**	**Issues at Wetland sites**	**Suggestive Mitigation measures/ activities/ interventions**
5	Siltation	Nalsarovar, Nani kakrad, Gosabara, Chhari Dhandh, LRK, Chandrabhaga, Thol, Khijadiya, Pariyej, Wadhwana, GRK-Nadabet	Desilting, Catchment treatment, plantation of trees in catchment area
6	Erosion	GRK-Nadabet	Bank restoration, Catchment treatment, plantation of trees in supra littoral areas
7	Over Fishing	Nalsarovar, LRK, Gosabara, Chhari Dhandh	Resource management through Community involvement, Providing alternate livelihood
8	Water level management	Nalsarovar, Thol, Pariyej, Wadhwana, Kanewal	Consultation with stakeholders
9	Eutrophication	Nalsarovar, Pariyej, Kanewal	Resource management through community involvement, Weed removal, Promotion of Organic farming, Awareness activities
10	Habitat improvement	Nalsarovar, Nadabet, Chhari Dhandh	Plantation of groves, creating and restoring raised platforms for birds and other fauna
11	Improvement of Eco-tourism	Nadabet, Chhari Dhandh, Mokarsagar,	Improvement of livelihood of local community through community based eco-tourism activities
12	Mainstreaming of wetlands	Nadabet, Kanewal, Pariej, Vadhwana, Gosabara-Mokar wetland	Preparation of wetland brief documents, preparation of model integrated management plans and implementation of plans

Source: JICA Survey Team (2019)

3. Criteria for selection of Wetlands for activities and interventions:

Restoration & habitat improvements of wetlands, mainstreaming of wetlands, and achieving global recognitions are main activities identified in the project. For restoration and habitat improvement activities the large wetlands that are under the jurisdiction of the Gujarat Forest Department having higher biodiversity values, providing higher eco-system services and facing higher challenges & issues are prioritized. Taking up of such activities in other wetlands that are not under the jurisdiction of state forest department, attract permissions from other departments therefore restoration and habiat improvement activities are not proposed in wetlands that are not under the jurisdiction of Forest department. The other component involves mainstreaming of wetlands under Wetland (Conservation and Management) Rules 2017. Those wetlands that are not part of protected areas, and have higher biodiversity values, providing higher eco-system services are selected for mainstreaming. Mainstreaming of other wetlands that are not under the jurisdiction of Forest department would require consent from concerned departments such as Revenue Department, Water Resource department etc. Apart from those, there are few wetlands which are under the jurisdiction of Forest Department and have higher biodiversity and socio cultural values are prioritized for global recognition i.e. recognize as Natural World Heritage Site and Ramsar Sites. Criteria for inclusion and exclusion of wetlands in the project for restoration, mainstreaming and seeking their global recognition (Ramsar site and world heritage site) are summarized as follow (Table-6, 7, 8, 9).

Table-6: Criteria for inclusion and exclusion for final selection of wetlands in project				
No	**Activities**	**Criteria**	**Inclusion**	**Exclusion**
1	**Restoration**	Wetland Area	Large Area	Small Area
		Jurisdiction	Forest department	Water Resource & Revenue departments
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services and higher issues & challenges	Low biodiversity values and ecosystem services
		Ecosystem services		Land dispute
		Issues & challenges		sites where investments have been made recently through other projects
2	**Mainstreaming into legal framework**	Wetland Area	Large Area	Small Area
		Jurisdiction	Revenue, Irrigation department*	Protected Areas
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services and higher issues & challenges	Low biodiversity values and ecosystem services
		Ecosystem services		Wetland where investments have been made recently through other projects
		Issues & challenges		Land dispute
3	**Global recognition, World Heritage Site and Ramsar Site**	Wetland Area	Large Area	Small Area
		Jurisdiction/Status	Forest department, notified wetlands	non notified wetlands or in jurisdictions of other govt. departments
		Biodiversity values	Wetlands with high biodiversity values, higher eco-system services meets Criteria (Ramsar & World Heritage Sites	Low biodiversity values and ecosystem services
		Ecosystem services		Does not meet criteria
		Issues & challenges		Disputed land

Source: JICA Survey Team (2019)

Table-7 Prioritized wetlands under project based on inclusion exclusion criteria.

		Inclusion Criteria						Exclusion					
		A	B	C	D	E	F	H	I	J	K	L	M
No	Wetland Name	Area	Jurisdiction	Bio-Diversity Rank	Eco-system services	challenges/ Issues/ problem	Total C+D+E	Land dispute	Recent investments through other projects	Small area	Low biodiversity	Inclusion Prioritized	Exclusion
1	Nalsarovar	12,082.0	FD	8	25	20	53					1	
2	Great Rann of Kutch -Chhari Dhandh	22,700.0	FD	5	15	9	29					1	
3	Great Rann of Kutch -Flamingo City & Khadir	300,000.0	FD	8	12	1	21					1	
4	Great Rann of Kutch -Nadabet	100,000.0	FD	7	8	6	21					1	
5	Kanewal	7,000.0	Irrigation	1	12	2	15					1	
6	Pariej lake	378.8	Irrigation	3	9	3	15					1	
7	Wadhawana lake	579.0	Irrigation	2	12	2	16					1	
8	Gosabara-Mokar wetland	12,913.6	Revenue	3	15	11	29					1	
9	Thol lake	699.0	FD/Irrigation	5	10	4	19			1			1
10	Little Rann of Kutch	495,370.0	FD	8	19	7	34		1				1
11	Khijadiya	605.0	FD	4	6	3	13			1			1
12	Chandrabhaga	448.0	Revenue	1	13	5	19				1		1
13	Nani-Kakarad	1,500.0	Revenue	2	10	11	23	1					1

Source: JICA Survey Team (2019)

Table-8 Activities and interventions identified for prioritized wetlands in the present project.													
No	**Wetland Name**	**Prioritization**		**Project Activities**									
		Inclusion	**Exclusion of wetland and their Justification**	**Wetland Restoration activities**	**Solid waste Pollution control**	**Strengthning of protection**	**Mainstreaming of wetlands**		**Eco-tourism**	**Global Recognition**		**Community Development**	
							Mainstreaming of wetlands	**Implementation of wetland plan**		**World Heritage Site**	**Ramsar Site**	**Wetland site**	**No. of Villages**
1	Nalsarovar	1		1	1							1	6
2	Great Rann of Kutch -Chhari Dhandh	1		1		1			1		1	1	5
3	Great Rann of Kutch -Flamingo City	1								1			
4	Great Rann of Kutch -Nadabet	1		1		1	1		1		1	1	10
5	Gosabara-Mokar wetland	1					1	1	1		1		
6	Kanewal	1					1*	1					
7	Pariej lake	1					1*	1					
8	Wadhawana lake	1					1*	1					
9	Thol lake		Small area/ Irrigation										
10	Little Rann of Kutch		Recent intervention by other projects										
11	Khijadiya		Small area										
12	Chandrabhaga		Low biodiversity value										
13	Nani-Kakarad		Land dispute										
			Total	**3**			**5**	**5**	**3**	**1**	**3**	**3**	**21**
* -Provided concerned departments consents are obtained for mainstreaming these wetlands as per Wetland (Conservation & Management) Rules 2017													

Source: JICA Survey Team (2019)

Table-9: Quantities of activities and interventions proposed under the project											
ACTIVITIES	**INTERVENTIONS**	**Flamingo City/ GRK**	**Nalsarovar**	**Chhari Dhandh**	**Nadabet/ KDWLS**	**Gosabara-Mokarsagar**	**Pariej lake**	**Kanewal lake**	**Wadhawana lake**	**Unit**	**Target**
Habitat improvements	Removal of weeds (Reed)		500							**ha.**	500
	Combating wetland terrestrialization by removal of Prosopis and unwanted weed species (ha.)		50	250	100					ha.	400
	Bank restoration/earthen bund of 15.0 km length (2.0x2.5 mtr)				75,000					m^3	75,000
	Creating/maintenance raised platforms for birds resting/roosting/breeding (earth work) (25x25x2.5)		15,625	3,9062.5						m^3	54,687.5
	Creating/maintenance raised platforms for birds resting/roosting/breeding (earth work) (50x50x2.5)				156,250					m^3	156,250
	Stone pitching around mounds 1.5 MTR		2,250	3,750	7,500					m^3	13,500
	Plantation of native trees in supralittoral zone & development of isolated groves			150	50					ha.	200
	Develop Solid waste collection and disposal system in 6 villages		1							1 system	1
Strengthning Protection	Boundary demarcation (Hadban) specific to wetland & waterlogged areas			200	200					Length	400
Preparation of Integrated Wetland management Plan	Preparation of wetland brief document & Integrated Wetland Management Plan as per Wetland Rules 2017				1	1	1	1	1	Plan	5
Implementation of Wetland management Plan	Implementation of wetland management plan					1	1	1	1	Sites	4
Preparation of Dossiers for World Heritage Site	Consultancy services for Preparation of Dossiers for World Heritage Site	1								Dossier	1

Table-9: Quantities of activities and interventions proposed under the project											
ACTIVITIES	**INTERVENTIONS**	**Flamingo City/ GRK**	**Nalsarovar**	**Chhari Dhandh**	**Nadabet/ KDWLS**	**Gosabara-Mokarsagar**	**Pariej lake**	**Kanewal lake**	**Wadhawana lake**	**Unit**	**Target**
Preparation of Dossiers for Ramsar Sites	Consultancy services for Preparation of Dossiers for Ramsar Sites			1	1	1				Dossier	3
Community development activities	Livelihood activities		1	1	1					LS	
	Eco-tourism activities			1	1	1				LS	3
Research projects	Research & awareness activities									LS	LS

Source: JICA Survey Team (2019)

4. Project Area Description

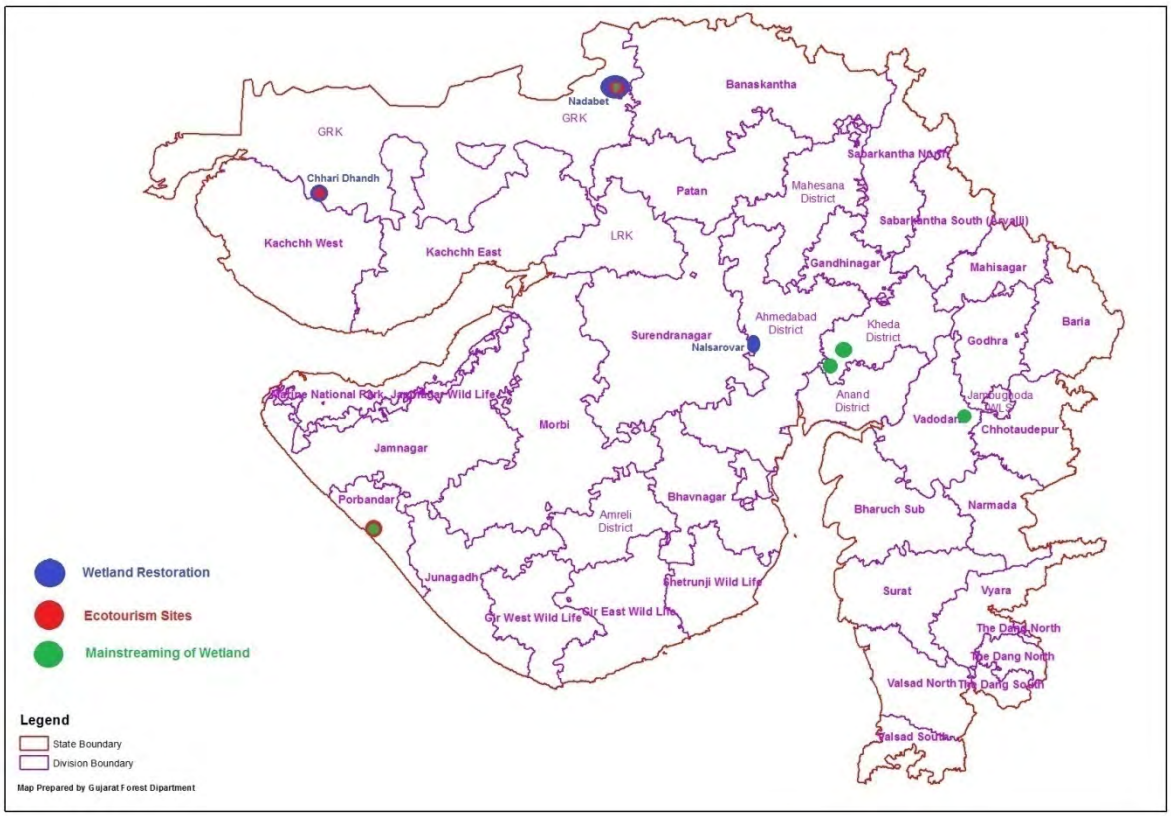
Total 8 wetlands are prioritized under this project for taking up various activities (Table-10 Table-11). All 8 wetlands are priority area for wetland restoration under National Wetland Conservation Plan as well as Prime Minister's 100 Wetland Rejuvenation Programme. Except Nadabet (Great Rann of Kutch) and Wadhwana wetlands all other 6 wetlands are Important Bird Areas recognized by Birdlife International and one of them is a Ramsar site. Of these 8 selected wetlands Nalsarovar, Flamingo City, Chhari Dhandh and part of Nadabet wetlands are under the jurisdictions of Gujarat Forest Department, others are managed by Water resource department and Revenue Departments.

Table-11: Project Area and identified activities

No	Wetland site	Activities
1	Nalsarovar	1. Habitat improvements 2. Solid Waste Pollution Control 3. Community Development
2	Chhari Dhandh (Great Rann of Kutchh)	1. Habitat Improvements, 2. Eco-Tourism, 3. Community Development, 4. Preparation of Dossier for Ramsar site
3	Nadabet (Great Rann of Kutchh)	1. Habitat Improvements, 2. Eco-Tourism, 3. Community Development 4. Preparation of Integrated Wetland Management Plan 5. Preparation of Dossier for Ramsar site
4	Gosabara-Mokarsagar wetland	1. Eco-tourism 2. Preparation of Integrated Wetland Management Plan 3. Implementation of Wetland management Plan 4. Preparation of Dossier for Ramsar site
5	Pariej lake	1. Preparation of Integrated Wetland Management Plan 2. Implementation of Wetland management Plan
6	Kanewal Lake	1. Preparation of Integrated Wetland Management Plan 2. Implementation of Wetland management Plan
7	Wadhawana lake	1. Preparation of Integrated Wetland Management Plan 2. Implementation of Wetland management Plan
8	Flamingo City–Khadir (Great Rann of Kutchh)	1. Preparation of Dossier for Natural World Heritage Site

Source: JICA Survey Team (2019)

Map-2: Wetland areas selected for management interventions under the project



Source: JICA Survey Team (2019)

1) Nalsarovar: Located in the Central Gujarat (Ahmedabad and Surendranagar districts), it is one of the largest natural lake (120.82 km^2). It is notified as a Wildlife Sanctuary Area in April-1969 and 1981 due to its higher ecological and biodiversity values. Gradually, wetland conservation works are strengthened at Nalsarovar and it is recognized as one of the Important Bird Areas of Gujarat and as 26th Ramsar Site of the Country in the Year-2012. Nalsarovar is also considered as one of the wetlands of National Importance under the National Wetland Conservation Programme by Government of India. Nalsarovar is one of the highly visited wetland sites of Gujarat. Major management issues include terrestrialization, higher anthropogenic pressures (pollution, poaching, fishing etc.) and higher dependency of local community on its natural resources. One of the 5 most Particularly Vulnerable Tribal Group of Gujarat i.e. 'Padhar' lives in the peripheral villages of Nalsarovar and they depend heavily on the resources of Nalsarovar for their day to day livelihood. Major issues and challenges for management include solid waste pollution, uncontrolled growth of reed and weed, growth of *Prosopis juliflora* on fringes, poaching of birds, paucity of funds and staff for effective management etc.

2) Great Rann of Kutch-Chhari Dhandh: Located in Great Rann of Kutch in North- Western Kutch district of Gujarat, it is one of the largest natural wetlands (227.0 km^2) representatives of 'Banni' region. It is notified as first Conservation Reserve in the year 2008 due to its higher ecological and biodiversity values. It is also recognized as one of the Important Bird Areas of Gujarat by Birdlife International. It meets most of the Ramsar criteria for recognizing it as wetlands of international importance. This wetland provides habitat for large congregations of waterbirds, particularly Pelicans, Cranes, Waders, etc. It also attracts large number of raptors such as eagles, buzzards, falcons, owls etc. Some of the rare birds are also found at this place i.e. Grey hypocoleus etc. attract birdwatchers. Chhari Dhandh is an important birdwatching destination of Kutch however; it lacks

basic facilities and amenities at the site. Major management issues include terrestrialization, higher anthropogenic pressures (poaching, fishing, siltation, growth of *Prosopis juliflora* on fringes, harvesting of grasses and over grazing etc.) and higher dependency of local community on its natural resources. Paucity of funds and staff for effective management etc. Large

3) Great Rann of Kutch-Nadabet wetland: Located in Luni River basin in North- Eastern part of Rann of Kutch in Banaskantha district, it is the largest natural wetlands (1,045.0 km^2) of Gujarat state and probably second largest in the country. Some part of this wetland falls in Wild Ass Sanctuary and Kutch Desert Wildlife Sanctuary whereas most of the part falls in the un-surveyed land of Rann of Kutch landscape. Though it has not been recognized as important wetland, recent surveys in February 2016 suggests that it support largest waterbird population (657,891 birds) in the state and probably in the country making it a candidate for recognizing it as a Ramsar site and also an IBA sites. Being a site supporting higher congregation of variety of birds, this site has very high potential for developing it as one of the eco-tourism sites of Gujarat. Major management issues include soil erosion where some of the natural bets (naturally elevated lands) which are rendezvous for local wildlife (Indian Wild Ass, Indian Wolf, Indian Fox, and variety of birds and reptiles) are being eroded. These bets are crucial sites for local wildlife during flooding. Management intervention would involve creating and strengthening a 15.0 km long earthen bund which would stop flood water affecting such bets and it would also help in holding water for waterbirds congregation.

4) Gosabara-Mokarsagar Wetland: Located in Porbandar District in different villages Gosa Tukda, Mokar, Odadar. This wetland is part of manmade and natural wetland also. It's a cluster of different wetlands. It is among the largest wetlands (116 km^2) of Gujarat. Creek Gosabara is open inland into Mokarsagar, It serves as a catchment area of Bhadar and Ozat River. In 1970's Salinity Ingress Prevention Cell (SIPC) built bund at different locations to prevent upstream freshwater runoff, before this area was an intertidal mudflat zone. In 2015, Asian Waterbirds Census conducted there near to 100 different species recorded with number of 94,204 birds. This wetland is on the path of Central Asian migratory flyway, so it attracts migratory birds because of strategic position. In March 2017, The Bombay Natural History Society (BNHS) declared 96 sq km coastal wetland area of Gosabara-Mokarsagar in Porbandar, as Important Bird Area (IBA) site. It is one of the most important places for migratory birds and other water birds. This wetland has a potential for Ramsar Site.

5) Pariyej: Located in Limbasi taluka of Kheda district. It is a large (378.8 ha.) manmade freshwater wetland. It is located 20 km from Kanewal wetland, in Kheda district. "Wetland of Kheda/Anand" are identified as IBA by the Birdlife International. It is prioritized as number one ranking wetland of Gujarat in biodiversity by SACON. It is selected as one of the 8 Nationally Important wetlands from Gujarat under National Wetland Conservation Programme. Recently, Narmada river water is supplied to the wetland which was earlier from Mahi canal. People use water of this wetland for agriculture and fishing purpose. This Wetland is also infested with submerged hydrophytic vegetation. One of the major issues of management is eutrophication due to higher nutrient loads from agriculture fields. This Wetland flourishes with numerous migratory and resident birds during winter. More than 60 species of birds can be seen at same time.

6) Kanewal: Located in Tarapur taluka of Anand district. This lake is freshwater, manmade Wetland of 7000 ha. area. It is largest among all Khambhat/ Anand wetlands which are recognized under IBA sites. It is recognized as Rank 1wetland for Biodiversity values by SACON. Kanewal is located near Gulf of Cambay. This lake was formed in 1890 especially for irrigation purposes. This wetland is under the jurisdiction of Irrigation/ Water Resource Department of Gujarat. This wetland area is favorable for Sarus cranes population. Narmada and Mahi Rivers provides the supply of water and

people use it for Irrigation and drinking purpose. This wetland consists of different aquatic floral species with planktons and it act as very good food for the Migratory and local birds species.

7) Wadhwana: It is located near Dabhoi, 43 km away from Vadodara city. This wetland (area of 5.8 km2) is an Irrigation Reservoir (man made Wetland) having freshwater in 2 km radius.This wetland was constructed over 100 years before by Shrimant Maharaja Sir Sayajirao Garkwad III. It receives fresh water from rains and Orsang River and Narmada canal network. Wetland has several small islands. Wadhwana wetland is known for large congregation and richness of waterbird species. The wetland flourishes in winter with numerous migratory and resident birds. Near about 50 species of water birds could see at a same time. It is also recognize as high biodiversity value site by SACON. Forest department has developed an attractive eco tourism facility at this site with watch towers and information boards for interpretations.

8) Great Rann of Kutch-Flamingo City & Khadir Island: Flamingo city is a small island located within the Kutch Desert Wildlife Sanctuary in the Great Rann of Kutchh wetland. It is one of the major wetlands of the Gujarat. This wetland area and its surrounding landscape make a complex of rich natural, cultural and ancient archeological heritage. It encompasses an ancient Harappan Civilization site, a traditional flamingo breeding site at Flamingo city, fossil deposits of Jurassic and cretaceous periods and unique saline desert. Owing to its high biodiversity values and significance this area also falls in Kutch Desert Wildlife Sanctuary and Kutch Biosphere reserve. This complex is a best candidate site for recognizing it as a “UNESCO Natural World Heritage Site”. Area between Bela Island, Khadir Islad and Pacchham Island in GRK is considered as one of the most biologically, culturally and archeologically important landscape in the country. Oldest human civilization traces are discovered from Dholavira on Khadir Island on the bank of Great Rann of Kutchh wetland. There are no major issues and challenges for management for this wetland sites, however, its global ecological and archeological significance remained unnoticed.

Annexure 8.1-a: Mangrove Plantation (Raised bed)

No. of raised bed 400/ha.	Daily Wage Rate @304.20
Size of bed : 1mt x 1mt x30cm	
No. of seeds : 40/bed	
Space : mt x5mt	
Current Year	
Item of work	Amount/ha (INR)
Preparation of bed of 1mt x 1mt x 30cm INR 30.00/bed	12,400
Collection of seeds @ INR 4/ bed	6,400
Alignment @ INR 6/bed	2,480
Seed Sowing @ INR 2.50/bed	1,040
Miscellaneous Expenditure including transportation of labour etc.@ INR 7.50/bed	3,100
Protection/Maintenance	
Removal of algae, Repairing of Raised bed, Protection	3,000
Total	28,420

Source: *GFD*

Annexure 8.1-b: Mangrove Plantation (Nursery Raised)

Spacement =2.5 m x 2 m	
No. of Plants = 2,000 Per ha.	
1st Year replacement 20 % =400seedling/ha	
2nd Year replacement 20 % 400 seedling/ha	
3rd Year replacement 20 % 400seedling/ha	
Total Seedlings = 3,200 seedling/ha	
Polyot size : 15cm x 25cm x 200g	Daily wages INR 307.90

Items of Works	Unit	Qty	Rate	Labour	Material	Total
1	2	3	4	5	6	7
1st Year						
1. Nursery						
a) Material : Cost of container, soil, manure seeds, water,fertilizer,insecticides, implements, shade etc	Nos	2,400	1.4	2,016	1,344	3,360
b)Labour :						
Preperation of beds filling and arranging, of bags sowing of seeds watering, shifting weeding etc (6 month)	Nos	2,400	2.5	3,543	2,362	5,905
Sub Total of Nursery				5,559	3,706	9,265
1st Year Plantation	Unit	Qty	Rate	Labour	Material	Total
C) Alignment & Stacking 3- Mandays	MD	3	307.9	924	500	1,424
D) Digging of pits & planting	NO	2、000	2.8	5,624	0	5,624
E) Protection				3768	0	3,768
1. Removal of algae by engaging	MD	9	307.9	2771	0	2,771
labour during peak season						
2. One labour for min 10 Ha. (3 Month)	MD	9	307.9	2,771	0	2,771
for protection & removal of algae.						
D) Transport of seedlings including	No	2、400	1.4	3,264	1,500	4,764
causality replacement.						
E) Entry point Activity	LS	LS	LS			
F) Economic support activities	LS	LS	LS			
Sub Total 1st Year Plantation				19121	2,000	21,121
Total for 1st Year Operations including Nursery				24,680	5,706	30,386
2nd Year cultural operation:	Unit	Qty	Rate	Labour	Material	Total
A) Nursery cost 2nd year planting	Nos	400	3.5	840	560	1,400
B) Causality replacement 20% Transport & Planting	Nos	400	4	960	640	1,600
C) Protection						

1. Removal of algae by engaging	MD	9	307.9	2,771	0	2,771
Labours during peak season, 3- Months						
2.one labour for min 10 ha. (12 Month)	MD	36	307.9	11,084	0	11,084
for protection & removal of algae						
D) Entry point Activity	LS	LS	LS			
E) Economic support activities	LS	LS	LS			
Total for 2nd Year cultural operation :				15,656	1,200	16,856
3rd Year cultural Operation	Unit	Qty	Rate	Labour	Material	Total
A) Nursery cost 3rd year planting	Nos	400	3.5	840	560	1,400
B) Causality replacement 20% Transport & Planting	Nos	400	4	960	640	1,600
C) Protection						
1. Removal of algae by engaging	MD	9	307.9	2,771	0	2,771
Labours during peak season, 3- Months						
2.one labour for min 20 ha. (12 Months)	MD	18	307.9	5,542	0	5,542
for protection & removal of algae						
Total for 3rd Year cultural Operation				10,113	1,200	11,313
4th Year cultural Operation	Unit	Qty	Rate	Labour	Material	Total
C) Protection						
1. Removal of algae by engaging	MD	9	307.9	2,771	0	2,771
Labours during peak season, 3- Months						
2.one labour for min 20 ha. (12 Month)	MD	18	307.9	5,542	0	5,542
for protection & removal of algae						
Total for 4th Year cultural Operation				8,313	0	8,313
Grand Total for - 4 Years				58,762	8,106	66,868
Rounded off						66,900

Source: GFD

Annexure 8.1-c. Mangrove Associated Species (Cost per Ha)

Spacement= 2.5 m x 2.5 m ; 1,600 / ha; 20% causality both in 1st and 2nd year
Polypot Size- 15cm X 25 cm
Daily Wage Rate @ INR 307.9
50% Tree Species, 50% Shrub Species

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
1	0' Year Operations (Advance Action Works)	Planning & Benchmark Data Collection	Lump sum			0	0	0
		Nursery: Preparation of Seedlings including maintenance upto March	No.	1,920	10	11,520	7,680	19,200
		Total for Preparatory work				11,520	7,680	19,200
2	1st Year	Site preparation: Site clearing & Pit digging (30 cmx x 30 cm)	No.	1,600	5	8,000	1,000	9,000
		Procument of Vermicompost, DAP, Insecticide etc and mixing with dug up soil	No	1,600	20	8,000	24,000	32,000
		Protection Fence : barbed wire	Lump sum			36,000	54,000	90,000
		Nursery Maintenance	No.	1,920	4	4,800	2,880	7,680
		Transport & Planting with 20% casualty	No.	1,920	8	9,600	5,760	15,360
		Support watering , fertilizer application, weeding & soil working period	No.	1,600	30	24,000	24,000	48,000
		Protection of fence , fire etc for 8 months	One person per 20 ha.		307.9	3694.8	0	3,695
		Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
		Total for 1st Year				94,695	112,040	206,735
3	2nd Year	Procurement of seedling for casualty replacement, planting with transport	No.	320	20	1,600	4,800	6,400
		Support watering , fertilizer application, weeding & soil working period	No.	1600	30	24,000	24,000	48,000
		Protection of fence , fire etc for 12 months	One person per 40 ha		307.9	2,771	0	2,771
		Field data collection on survival and tangible	Lumpsum			600	400	1,000

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
		benefits						
		Total for Second Year				28,971	29,200	58,171
4	3rd Year	Support waterin, fertilizer application, weeding & soil working period	No.	1,600	20	16,000	16,000	32,000
		Protection of fence, fire etc for 12 months	one person per 40 ha.		307.9	2,771	0	2,771
		Filed data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for Third Year				19,371	16,400	35,771
5	4th Year	Protection of fence, fire etc for 12 months	one person per 40 ha.		307.9	2,771		2,771
		Filed data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for 4th Year				3,371	400	3,771
		Grand Total				157,928	165,720	323,648
		Rounded off						323,700

Source: GFD

Annexure 8.1-d: Coastal Shelterbelts (Cost per ha.)

Spacement= 3.00 m x 2.00 m ; 1666/ ha;	
Polypot Size- 15cm X 25 cm	**Daily Wage Rate @ INR 307.90**

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
1	**0' Year Operations (Advance Action Works)**	Planning & Benchmark Data Collection	Lump sum			0	0	0
		Nursery: Preparation of Seedlings including maintenance upto March	No.	2,000	10	13,200	6,800	20,000
		Total for Preparatory work				**13,200**	**6,800**	**20,000**
2	**1st Year**	Nursery Maintenance	No.	2,000	4	9,000	3,000	12,000
		Raising of grass tussocks						0
		Site preparation: Making Ridges and Furrows / Pit digging (30cm X30 cm)	Lump sum			1,000	4,000	5,000
		Water harvesting Structures: Percolation tanks	Lump sum			2,500	7,500	10,000
		Protection Fence: Stone wall/ barbed wire/ trench cum live fence	rmt.	160	152.3	6,250	18,750	25,000
		Transport of seedlings from nursery to pits	No.	2,000	2.44	2,440	2,440	4,880
		Planting with 20%casuality along with basal dose of fertilizer 20gm DAP plus a little insecticide	No.	2,000	6	10,200	1,800	12,000
		Tussocks planting						
		Soil working with preparation of uphill tench of 1' deep and 45 cm wide	No.	2,000	15	30,000		30,000
		Support watering, if locally available, weeding & soil working period	Lump sum			15,000	5,000	20,000
		Protection of fence, fire, etc for 8 months	One person per 20 ha.		307.9	3,694.8		3,694.8
		Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
		Total for 1st Year				**80,685**	**42,890**	**123,575**
3	**2nd Year**	Raising of Nursery	No.	333.2	10	1,999	1,333	3,332
		Transport of seedlings from nursery to pits	No.	333.2	2.44	407	407	813
		Planting and provision for DAP & insecticide	No.	333.2	5.56	926	926	1,853

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour INR	Material	Total
		Support watering, if locally available, weeding & soil working period	Lump sum			12,000	3,000	15,000
		Protection of fence, fire, etc for 8 months Field data collection on survival and tangible benefits	One person per 40 ha.		307.9	1,847	0	1,847
		Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
		Total for Second Year				**17,779.4**	**6,065.6**	**23,845**
4	**3rd Year**	Support watering , if locally available, weeding & soil working period	Lump sum			7,200	1,800	9,000
		Protection of fence, fire etc for 12 months	one person per 40 ha.		307.9	2,771	0	2,771
		Filed data collection on survival and tangible benefits	Lump sum			600	400	1,000
		Total for Third Year				**10,571**	**2,200**	**12,771**
5	4th Year	Protection of fence, fire etc for 12 months	one person per 40 ha.		307.9	2,771		2,771
		Filed data collection on survival and tangible benefits	Lump sum			600	400	1,000
		Total for 4th Year				**3,371**	**400**	**3,771**
6	5th Year	Protection of fence, fire etc for 12 months						
		Filed data collection on survival and tangible benefits						
		Total for 5th Year				**0**	**0**	**0**
		Grand Total				**125,606**	**58,356**	**183,962**
		Rounded						**184,000**

Source: JICA Survey Team based on GFD rates

Annexure 8.2-a: List of Resource Organisations for Grassland Interventions

#	Organization Name	Year of Formation	Major Focus Area	HQ
1	Aga Khan Rural Support Program (AKRSP)	1983	Grassland development Livestock based livelihood Training and capacity building	Ahmedabad, Gujarat
2	BAIF Development Research Foundation	1967	Livestock development Grassland development Fodder improvement Livestock based livelihood Training and capacity building	Pune, Maharashtra
3	Centre for Environment and Social Concerns (CESC)	2004	Social and ecological research on grasslands	Ahmedabad, Gujarat
4	Centre for Pastoralism (CfP)	2017	Pastoral landscape development Grassland restoration Pastoral livelihood development	Delhi
5	Cohesion Foundation Trust	1996	Community development Training and capacity building Livelihood development	Ahmedabad, Gujarat
6	Foundation for Ecological Security (FES)	2001	Regeneration of common grazing lands Livestock grazing management Community Development Training and Capacity Building	Anand, Gujarat
7	Gujarat Ecological Education and Research (GEER) Foundation	1982	Ecological research and studies	Gandhinagar, Gujarat
8	Gujarat Institute of Desert Ecology (GUIDE)	1995	Grassland restoration Grassland research	Bhuj, Gujarat
9	Sahjeevan	1997	Grassland management & development Capacity building of livestock breeders Livestock based livelihood	Bhuj, Gujarat
10	VIKSAT-Nehru Foundation for Development	1975	Training and capacity building	Ahmedabad, Gujarat

Source: JICA Survey Team (2019)

Annexure 8.2-b: Restoration of Degraded Grassland (Rainfed) (Cost per ha.)

Potential area	Legally notified non reserved grass vidis of Saurashtra. Shallow soil depth and without water facility (Undulting forest areas with poor potential)
Species	Tussocks
Spacement	1 m x 0.25 mt
Tssocks per ha	16000
Daily wage	307.9

Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
					INR		
1st Year	Planning & Benchmark Data Collection	Lump sum			0	0	0
	Site preparation: Site clearing & removal of non - palable vegetation	No. of Man day	3	307.9	923.7	0	924
	SMC Works : Gully plugs/ Nalabunding, etc.	Lump sum			3,000	1,000	4,000
	Land preparation - Ploughing/ creation of furrows/bunding etc.	Lump sum			3,300	6,600	9,900
	Good Quality Seed procurement	kg	14	200	0	2,800	2,800
	Tussocks raising in Nursery. Preparation of seed pallets.	no.	16,000	0.8	6,400	6,400	12,800
	Application along with the cost of FYM 100qtl, chemical Fertilizers 150kg, etc	Lump sum			3,200	12,800	16,000
	Transport of Seed / seed pallets/ tussocks upto planting site	no.	16,000	0.3	2,400	2,400	4,800
	Planting of Tussocks/ seeds/ Seed pallets.	No. of Man day	20	307.9	6,158		6,158
	Weeding & soil workings	No.	3	2,500	7,500		7,500
	Up keep of the area, fencing protection, etc. (12*30/20= 18 man days / ha.)	No. of Man day	18	307.9	5542		5,542
	Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
	Total for 1st Year				**39,024**	**32,400**	**71,424**
2nd Year	Seed procurement and sowing	Lumpsum			560	2,040	2,600
	Weeding & Soil workings	No.	2	2500	5,000	0	5,000
	Up keep of the area, fencing protection, etc. (12*30/20= 18 mandays / ha.)	No. of Man day	18	307.9	5,760		5,760
	Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
	Total for Second Year				**11,920**	**2,440**	**14,360**

Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
					INR		
3rd Year	Weeding & Soil workings	No.	2	2,500	5,000	0	5,000
	Up keep of the area, fencing protection, etc. (12*30/20= 18 man days / ha.)	No. of Man day	18	307.9	5,760		5,760
	Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
	Total for Third Year				**11,360**	**400**	**11,760**
	Grand Total				**62,304**	**35,240**	**97,544**
	Rounded off						**97,600**

Source: GFD

Annexure 8.2-c: Restoration of Degraded Grassland (Irrigated) (Cost per ha.)

Potential area	Legally notified non reserved grass vidis of Saurashtra. Undulating forest areas with good potential, adequate soil depth and having water facility of creation of water facility
Species	Saniyar, Jinjivo, Bhangaru, Ratad etc.
Spacement	1 m x 0.25 mt
Tussocks per ha	16,000
Seed sowing	0.2 m x 0.2 m
Daily wage	INR 307.9

Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
					INR		
1st Year	Planning & Benchmark Data Collection	Lump sum			0	0	0
	Creation of Water facility	Lump sum			20,000	30,000	50,000
	SMC Works : Gully plugs/ Nala bunding, etc.	Lump sum			0	0	0
	Site preparation: removal of non -palable vegetation	No. of Man day	3	307.9	923.7	0	924
	Land preparation - Ploughing/ creation of furrows/ bunding etc.	Lump sum			3,300	6,600	9,900
	Good Quality Seed procurement	kg	14	200	0	2,800	2800
	Tussocks raising in Nursery. Preparation of seed pallets.	no.	16,000	0.8	6400	6,400	12,800
	Application along with the cost of FYM 100qtl, chemical Fertilizers 150kg, etc	Lumpsum			3,200	12,800	16,000
	Transport of Seed / seed pallets/ tussocks upto planting site	no.	16,000	0.3	2,400	2,400	4,800
	Planting of Tussocks/ seeds/ Seed pallets.	No. of Man day	20	307.9	6,158		6,158
	Support watering, weeding & soil workin period June- Sept.	Lumpsum			7,500	7,500	15,000
	Up keep of the area, fencing protection, etc. (12*30/20= 18 mandays / ha.)	No. of Man day	18	307.9	5,542		5,542
	Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
	Total for 1st Year				**56,024**	**68,900**	**124,924**
2nd Year	Seed procurement and sowing	Lumpsum			560	2,040	2,600

Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
					INR		
	Support watering, weeding & soil working period June- Sept.	Lumpsum			7,500	7,500	15,000
	Up keep of the area, fencing protection, etc. (12*30/20= 18 mndays / ha.)	No. of Man day	18	307.9	5,760		5,760
	Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
	Total for Second Year				14,420	9,940	24,360
3rd Year	Support watering, weeding & soil working period June- Sept.	Lump sum			7,500	7,500	15,000
	Up keep of the area, fencing protection, etc. (12*30/20= 18 mndays / ha.)	No. of Man day	18	307.9	5,760	0	5,760
	Field data collection on survival and tangible benefits	Lump sum			600	400	1,000
	Total for Third Year				**13,860**	**7,900**	**21,760**
	Grand Total				**84,304**	**86,740**	**171,044**
	Rounded off						**171,000**

Source: GFD

Annexure 8.3-a: Process of Preperation of Dossiers

(1) World Heritage Dossier

Process of preparation of dossier: The detailed process for preparation of Nomination Dossier for the natural world heritage site shall be in accordance with the Operational Guidelines 2019. It shall include a detailed study of the site and its buffer zone areas by highlighting its Outstanding Universal Value (OUV). Further it shall include co-ordination with stakeholders, Archeological Survey of India (ASI), State Government, Central Government, State Forest Department and number of agencies during the process of nomination, field evaluation and a final submission in accordance with the prescribed format. A prescribed "Format for the Nomination of Properties for Inscription on the World Heritage List" shall be filled up along with submission of required documents. The overall process of preparation includes provision of following information in prescribed format.

1) **Identification of property**: Location, geographic coordination, area, maps, buffer zone.
2) **Detailed description of property**: significant features, history of development, etc.
3) **Brief synthesis**: Including (i) a summary of factual information and (ii) a summary of qualities, justification of Criteria under which it is proposed, statement of integrity, statement of authenticity, protection & management requirements, comparative analysis, statement of Outstanding Universal Values,.
4) **State of Conservation and factors affecting**: present state of conservation, various factors affecting the property (development, environmental, natural disasters, visitation and inhabitants.
5) **Protection and Management of Property**: legislative, regulatory, contractual, etc. These include, Ownership, Protective designation, Means of implementing protective measures, Existing plans related to municipality and region in which the proposed property is located, Property management plan or other management system, Sources and levels of finance, Sources of expertise and training in conservation and management techniques, Visitor facilities and infrastructure, Policies and programmes related to the presentation and promotion of the property, Staffing levels and expertise (professional, technical, maintenance).
6) **Monitoring**: Key indicators for monitoring status of conservation, Administrative arrangements for monitoring property, Results of previous reporting exercises
7) **Documentation**: detailed documentation of photographs and audiovisual image inventory and authorization form, Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property, Form and date of most recent records or inventory of property, Address where inventory, records and archives are held, and Bibliography
8) **Details of proponent**.
9) **Signature of authorized persona**.

(2) World Heritage Approval Process

Following is the brief process of approval of nay nominations submitted to the World Heritage Committee.

Step-1: Approval of State and Central Government for listing the proposed site for nomination as world heritage site.

Step-2: Preparation of nomination file as per prescribed format.

Step-3: Submission of nomination to the UNESCO World Heritage Centre.

Step-4: Evaluation of nomination by independent advisory bodies.

Step-5: Decision of the 'Intergovernmental World Heritage Committee' based on criteria.

(2) Ramsar

1) **Process of preparation of dossier and approval**:

The detailed process for preparation of Nomination Dossier for listing of wetland as Ramsar site under the Ramsar Convention shall be in accordance with the Guidelines of Ramsar Convention. It shall include preparation of statement of importance of the site highlighting its unique biological and biodiversity values. Further it shall include co-ordination with stakeholders, local communities, State Government, Central Government, State Forest Department and number of agencies during the process of nomination, field evaluation and a final submission in accordance with the prescribed (RIS) format. The overall process of preparation includes provision of following information in prescribed format. Name, location, area, boundary details, ecological characters & biodiversity, Geo-referenced GIS maps, statement of importance of wetland site, justification of each Ramsar criteria met, geo-physical condition, classification of wetland, noteworthy flora & fauna, land tenure, threats and factors affecting site characters, conservation measures taken and proposed, scientific research, status of tourism etc.

2) Process of approval of Ramsar Site:

India is signatory to Ramsar Convention, it is solely the role and responsibility of a Contracting Party to designate a wetland within its territory as being internationally important under the Ramsar Convention, and to prepare and submit the RIS (including maps) in the correct format to the Ramsar Secretariat. The RIS for a newly designated Site must be officially submitted to the Ramsar Secretariat by the Ramsar Administrative Authority (AA) of the Contracting Party concerned, with a letter clearly stating that the wetland is being designated for inclusion in the Ramsar List and specifying the formal date of designation if wished. The filled up RIS are submitted to Ramsar Secretariat for their review. Following review, if the Secretariat identifies any problems with the format and content of the RIS (including maps), it discusses these with the Administrative Authority in order to agree and make any adjustments to the RIS for its finalization. Once the Secretariat confirms that the RIS meets the above requirements, the Secretary General approves the Site to be formally placed on the List of Wetlands of International Importance. A formal acknowledgement is issued to contracting party with a number assigned to Ramsar site and it’s information is uploaded on the website.

Annexure 8.3-b: List of Potential Livelihood Activities for Wetland Landscape

Supporting Souvenir shop: During our surveys, we observed that Nalsarovar, Chhari Dhandh and Nadabet have higher potential for developing them as important eco-tourism sites. However, we found that despite good business potential, there was no shop for purchasing souvenir from any of these sites. It is therefore, proposed to support opening souvenir shops at each of three sites through community organization i.e. EDC or ETDC. A budget of total INR 1.2 million is proposed for this activity.Forest department shall provide place to the community organization at Nalsarovar and Chhari Dhand areas where as at Nadabet site, EDC/ETDC would approach local gram panchayat and obtain a place. One time fund of INR 0.4 million would be given for each of the sites through EDC/ETDC.

Promoting community fishery: Nalsarovar wetland is subjected to over fishing by local community. Though fishing is not allowed inside the Nalsarovar Sanctuary, most primitive tribe "Padhar" and other communities depend heavily on fish resource of Nalsarovar. There are numerous incidences of illegal fishing activities inside the Nalsarovar. At the same time, there are number of satellite wetlands present in the periphery of Nalsarovar which provides solution to this issue. It is therefore, proposed to promote community fishery activities in 6 surrounding village wetlands. These wetlands would be restored or prepared for taking up fishery crop. A consultant in PMC would hire a consultant to assist in this work; they would help identify fish species and methodology to take up community fishery activities in the surrounding villages. This may also require convergence from fishery department. A budget of total of INR 0.3 million for each village is proposed and a total budget of INR 1.8 million is proposed for this activity. This work would be carried out through

Promotion of embroidery: Nalsarovar, Nadabet and Kutchh villages are known for their diversity of handmade embroidery works. Each community and region of Gujarat has different types of embroidery works. Women in the villages are involved in this work. Chhari Dhandh and its surrounding villages are well known for their traditional handicrafts. It is therefore, proposed to promote local traditional handmade embroidery work at 6 villages of Nalsarovar, 2 villages of Nadabet and 5 villages of Chhari Dhandh. A total budget of INR 0.2 million per village is proposed lumpsum. However, detailed needs to be worked out by the project implementing agency on methods selecting household, individuals or through SHGs etc. Total budget of INR 2.6 million is proposed for total 13 villages.

Duckery farming: Nalsarovar is one of the 26 Ramsar sites of India it is a protected area and also an important bird area. However, during our survey and consultation with officials it was revealed that poaching of bird is one of the major management issues of Nalsarovar. As per the official about 70% of their time and resources are devoted to curb bird poaching activities in Nalsarovar. It is also observed that the poaching is being carried out by local communities living in the peripheries of the Nalsarovar. Most of them are known to carryout subsistence hunting and their daily protein requirements. Poaching of birds is not allowed in India and moreover, Nalsarovar is a protected area. Therefore, there is an urgent need to provide alternate source to meet their protein requirements. Therefore, it is proposed to take up duckery farming on a pilot bases at two surrounding villages. The site selected shall not be within the eco-sensitive zone or shall not be very close to the wetland eco-system. Though, duckery farming is proposed on a pilot base, it requires to be scrutinized in terms of its impacts on the wild migratory bird populations of Nalsarovar and vice- a-versa. A total of INR 0.9 million per unit is proposed and total budget for 2 units is proposed as INR 1.8 million.

Annexure 8.4-a: Technical Details– Restorationof DegradedForests (without root stock)

Sr. No.	Particulars	Details	Operation Time
1	Potential Area:	Forest are as with forest cover less than 40%. No root stock or root stock with poor vigour.	-
2	Planning & Benchmark data collection	1.Survey & Demarcation, 2.Benchmark Data Collection: (i)Surviving Species & estimated number by Girth class, and (ii)Tangible benefits-availability of timber, firewood, grass, other NTFP, etc, 3.Preparation of Treatment Plan, 4. Preparation of plans and estimates for (i) stone masonry & barbed wire fencing and (ii) Check dams/Vantalawadies, etc.	Apr-Jun
3	Planting Design:	Spacing 3 mx 3 mi.e 1110 plants/ha. staggered manner from top to bottom	- -
4	Choice of Species:	50% Timber and fuelwood sp and 50% NTFP, fruit-bearing trees and bamboo	
5	Land Preparation (a) Pitts Digging (b) SMC Works	45cm X 45Cm X 45cm (a) Ring bunds in planting area. Discontinuous trench with continuous ridge in undulating area. Stabilisation with Ketki, AloeVera, Grass, Aawad etc. (b) Gully plugs & Nala bunding with loose stones. (c) Creation of mini-catchment uphill of each planted/naturally retained plants. Heap soil down hill of plant, dam and stabilise with stone pitching, if locally available.	Sep-Feb July-Aug Sep-Feb Premonsoon after planting
	(c) Water harvesting	Percolation Tank on slopes/Vantalawadi with pakka outlet Innatural depression and/or Pakka Check dam in water stream passing through plot, if any.	Nov-Feb
6	Protection Fence: (a) Outer periphery (b) Innerside	Peripheral Stone masonry of size 100cm at bottom, 60cm at top and 100cm height. Or 120cm at top, 60cm at bottom and 100cm sdeep discountinuous trench with continuous mound towards plot or Barbed Wire fence or combination of these type of fences depending upon the grazing pressure and availability of fence material locally. 60cm wide and 60cm deep trench discountinuous trench with continuous ridge of dug soil inside the plot. On the flattnd top and on the outer slope of the mound bamboo, Kachka, Chani-bor, Baval, Khair seeds to be shown. Between earthen ridge and Trench Thorny plants to be planted. A part of physical fencing, social fencing should be ensured i.e.village community should be motivated to check free grazingin the plantation plot.	July-Aug for Earth Work and seed sowing Rest type of fence- Sept- Feb
7	Tending Operation:	Cut back of mal formed trees, stunted coppice growth and Dressing of illicitly cut stools to encourage good coppice. Singling and pruning of promising coppice. Up rooting of poor root stock, especially of non-coppice species. Up rooting of unwanted growth	March March July-Aug
8	Planting technique:	Healthy plant of minimum 60cms height, raised in ploy pots Of size 15cm x 25cm to be planted in pits of 45cms x 45cms x 45 cms already dug Soil mixture should be prepared with dug soil and 4kg vermicompost	July June
9	Fertilizer:	20gm DAP and 2.5 gm insecticide powder be applied as Basaldose just before planting 2kg vermicompost in 2nd and 3rd year just before monsoon. Use organic in secticide if appropriate avoiding chemical insecticide.	July June

Sr. No.	Particulars	Details	Operation Time
10	Cultural Operation:	1st Year: Three weedings and soil workings will be done during the first year. 1st soil working to create mini catchment around plant.	July, Aug& After last support watering
		2nd Year: Two weedings and soil workings will be done during the second year 3rd Year : two weeding and soil working will be done during the third year Soil working with in ward sloping so that up hill water accumulation capacity increases after every soil working.	Aug &after Last support watering Aug & afer last support watering -
11	Watering:	Rain water accumulated in water harvesting structures should be used for support watering during dry spell of monsoon and postmonsoon period for three years.	-
12	Up keep of plantation:	Fence repair, cleaning, pruning and up keep of planted and naturally regenerated saplings will be entrusted to JFMC. Promotion of grass production and stall feeding through JFMC.	Whole year
13	Harvesting:	(a) Prosopis, lantana or any other unwanted shrubby growth may be allowed for meeting the requirement of fuel wood under technical guidance of GFD every year before monsoon season. After 5th year of planting (b) Firewood, bamboor small timber available due to tending operations should be given to villagers engaged on such operations free of cost. (c) Bamboo cleaning and harvesting of mature bamboos will be carried out every 5th year by JFMC as per the technical guidance of GFD. (d) Grass collection by villagers may be permitted every year. (e) Fruits/MFP should be allowed to be harvested in non-destructive manner by JFMC. (f) Trees will be cut as per the approved Working Plan. Provisions and proceeds shared as per JFM policy	May-June March May-June Nov-Dec Appropriate season Sep-March

Source: GFD Compiled by JICA Survey Team (2019)

Annexure 8.4-b: Restoration of Degraded Forest Area (Devoid of root stock) (Cost per ha.)

Spacement= 3 m x 3 m ; 1111 / ha; 20% causality both in 1st and 2nd year	50% Timber and fuelwood sp and 50% NTFP, fruit-bearing trees and bamboo
Polypot Size- 15cm X 25 cm	Daily Wage Rate @ INR 307.90

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
1	**0' Year Operations (Advance Action Works)**	Planning & Benchmark Data Collection	Lump sum			0	0	0
		Nursery : Preparation of seedling including maintenance upto March	No.	1,330	10	7,980	5,320	13,300
		Site Preparation : Site cleaning & Ploughing/Pit digging (45 cm x 45 cm)	Lumpsum			6,650	6,650	13,300
		Soil Moisture Conservation: gully plug, loose stone bunds, small check walls	Lumpsum			5,000		5,000
		Water harvesting structures: Percolation tanks, Van talawadi & Checkdams	Lumpsum			8,000	12,000	20,000
		Protection fence: Rubble masonry/barbered wire/trench cum live fence	Lumpsum			17,500	7,500	25,000
		Total for 0th Year				**45,130**	**31,470**	**76,600**
2	**1st Year**	Nursery Maintenance	No.	1,330	4	3,990	1,330	5,320
		Raising of Grass Tussocks						
		Nursery Raising for 20% casualty (20% of 1111)	No.	222	10	1,333	889	2,222
		Cut back and Uprooting of poor root stock	No. of man days	6	307.9	1,847.4	0	1,847.4
		Transport of seedling from nursery to Pits	Lumpsum			2,000	2,000	4,000
		Application of Vermicompost (2 kg) , DAP (20 gm), insecticides and preparation of soil	No.	555	15	7,215	1,110	8,325

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
		mixture						
		Planting including 20% casualty	No.	1,330	4	5,320	0	5,320
		Soil working with preparation of uphill trench of 1' deep and 45 cm wide (3 times)	No.	1,111	15.35	17,053.85	0	17,053.85
		Support watering, weeding & soil working period	No.	1,111	20	13,320	8,880	22,200
		Transport of Seeds /Seed pallets	No.	16,000	0.2	1,600	1,600	3,200
		Protection of fence, fire etc for 9 months	one person per 20 ha.			4,156.65	0	4,156.65
		Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for First Year				**58,436.1**	**16,208.8**	**74,644.9**
2	**2nd Year**	Procurement of Seedling for casualty replacement with transport	No.					
		Nursery Maintenance for casualty	No.	222	4	666.6	222.2	888.8
		Transport of seedling for casualty seedling	No.	222.2	3.3	362.6304	362.6304	725.3
		Planting for casualty seedling	No.	222.2	4	888.8		888.8
		Support watering , weeding & Soild working period (2 times)	No.	1,111	15.0000	9,999	6,666	16,665
		Protection of fence, fire for 12 months	One person per 40 ha.			2,771.1	0	2,771.1
		Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for Second Year				**15,288**	**7,651**	**22,939.0**
3	**3rd year**	Support watering , weeding & Soild working period (One time)	No.	1,111	10	6,666	4,444	11,110
		Protection of fence, fire for 12 months	One person per 40 ha.			2,771.1	0	2,771.1
		Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for 3rd Year				**10,037.1**	**4,844**	14,881.1
4	**4th Year**	Protection of fence, fire for 12 months	One person per 40 ha.			2,771.1	0	2,771.1

Sr. No.	Year of Operation	Item	Unit	Qty pet ha.	Cost per unit (INR)	Labour	Material	Total
						INR		
		Field data collection on survival and tangible benefits	Lumpsum			600	400	1,000
		Total for 4th Year				**3,371.1**	**400**	**3,771.1**
		Grand Total				**13,2262**	**60,574**	**192,836**
		Rounded off						**192,900**

Source: GFD

Annexure 8.4-c: Indicative Procedure of Management of Old JFM Plantation

1) Need for the Intervention

Over the years a large area allocated under JFM has been treated with Afforestation and Aided Natural Regeneration, in both degraded as well as dense forests (post year 2005). Significant areas under GFDP 1, GFDP 2 and FDA programmes were planted and protected under JFM framework between 1998 and 2016. The Government Resolution on JFM specifies that the communities become eligible for share in final net benefits to the extent of 50% in case of degraded forest and 20% in case of dense forests provided they have protected the forest area for 5 and 10 years respectively.

One of the findings of the survey is that few JFM villages have benefitted from interim or final harvest of the plantations created earlier. There are different reasons for this:

- Mortality and illicit harvesting of planted trees automatically negated the need for thinning operations
- Working Plans do not provide for such operations in old JFM plantations as the area is put under a Working Circle which does not specifically identifies such areas or necessarily provides for interim or final felling operations
- Few short rotation tree species which are managed on a rotation of 10-15 years are planted, and the plantations have a high proportion of long rotation tree species, especially Teak
- Administrative mechanism or guidelines for organizing felling and sharing of benefits with JFMCs is not clear

Under the present scheme of things, there is no clear focus on specifically managing the forests under JFM. The JFM (overlapping) Working Circle is included in the Working Plan but focuses more on creating new plantations. There are few details, if any, related to earlier plantations. Such plantations get placed under one of the main Working Circles such as Development and Conservation Working Circle, Production Working Circle, Afforestation Working Circle, Biodiversity Conservation Working Circle etc and gets managed accordingly. Each Working Circle prescribes various operations as well as lists village-wise allotment of areas, distribution of area into coupes and annual area under different coupes. The prescribed operations are carried out based on budget grant from the State Government. However, like afforestation, harvesting also suffers from inadequate allocation of funds. Also, at the time of plan preparation, the existence of plantations created under JFM may be ignored for various reasons, thereby providing no specific operations for these plantations, and often managing the area for other purposes as outlined for the main Working Circle.

Regular flow of benefits from forest creates incentives for the community to actively protect the forest. Absence of such a mechanism creates distrust in the JFM policy and weakens the JFM. It also serves as an advertisement for other communities which may not be under JFM regime or may not be actively protecting the forest.

This activity is proposed under the Project on a pilot basis to help develop system and arrangements for silvicultural working and harvesting of plantations and forest under JFM and thereby facilitate increased flow of goods and benefits to the associated community. It is expected that such an arrangement would also lead to improvements in the manner in which JFM Working Circle is designed under the Working Plan, which would be the main instrument to mainstream the management of JFM plantations, and thereby strengthening the JFM system.

During the course of GFDP-3, all the JFM areas taken up for intervention under Phase 1 and Phase 2 of Japanese Aided Projects (IFDP & GFDP) as well as under FDA would become eligible for sharing of benefits in case of degraded as well as dense forest, having completed five years (in case

of degraded forest) and 10 years (in case of dense forest).

2) Identification of JFMCs

The participation of the people will be essential for the success of the conservation program. And the livelihood concerns of the local communities should also be addressed. It is therefore important to involve the JFMCs in the process. 200 JFMCs shall be involved and they would support in the maintenance of the plantations after the first year of planting and community development and livelihood support activities shall be undertaken as described in the section below on livelihood support and community development.

Table 8.3.21 Indicative No JFMCs to be selected in different Divisions

Name of Division	No of JFMCs
Banaskantha	17
Sabarkantha	30
Aravalli	35
Mahisagar	35
Baria (Dahod)	28
Godhara (Panchmahal)	28
Chhotaudepur	27
Total	200

Source: JICA Study Team (2019)

JFMCs for focussed work on the human-wildlife conflict component of the project will also be selected in the 5 Divisions above covered by that component; their work will be not plantation dependent under the project unlike these 200 JFMCs though they can undertake plantation works with support from other sources.

3) Identification of JFM Areas

In the seven divisions selected for restoration of degraded forest interventions – Godhra, Chota Udaipur, Baria, Sabarkantha, Aravalli, Mahisagar & Banaskantha – around 1500 covering an area of around 1,10,000 ha, with an average area of around 75 hectare per JFMC. Out of this, 70 JFMCs (10 per Division) and 1400 hectare (20 ha per JFMC on an average) are proposed for piloting silvicultural operations, particularly interim harvesting (thinning) and final harvesting (where silviculturally feasible).

For the purpose of design of this activity, it is assumed that:

- The main operation would be thinning, as few short rotation trees were planted in earlier programmes and maximum 50% of the of the trees per unit area would be harvested, and most of the output would be in form of poles and small timber.
- With an annual increment of 3 cubic metre per hectare per year, the total volume of wood growth would be minimum 30 cubic metre per hectare in a 10-year-old plantation under rain-fed condition, 50% of which will yield 15 cu metre of wood per hectare.
- Assuming that most of the trees to be harvested as part of thinning would be in the girth class of 45 to 60 cm, the cost of harvesting (and transporting) one cubic metre would be around INR 5,000 (calculated on the basis of payment made to Forest Labour Cooperatives)

Criteria for selection of such JFMCs include:

- JFMC is more than 5 years old in case of plantation in degraded forest and more than 10 years old in case of dense forest
- The plantation is at least 10 years old. Older plantations would be given priority.
- It is either the Project village or located in the vicinity of the Project village
- Either the Working Plan prescribes interim / final harvest, or the condition of vegetation warrants it
- Minimum 20 ha of area is available for working

From the records available with the GFD at the Division level, 30 candidate sites with the oldest surviving JFM plantation would be selected in the vicinity of the other Project villages. Secondary data available from the Working Plan would be compiled and a rapid field assessment would be made by the field officers involving assessment of suitability of the site condition and discussion with the JFMC to assess their views. Based on the rapid assessment, a list of final sites for management would be made. Detailed procedure for site selection would be provided in the guideline.

4) **Preparation of a Working Scheme**

Depending upon the Working Circle in which the coupe(s) containing the JFM Plantation is located, and the type of operations prescribed, a Working Scheme may need to be prepared. Detailed guideline for site/vegetation survey and developing the scheme would be provided. The Working Scheme would be prepared and submitted for approval with appropriate authorities, along with approval from the concerned JFMC.

5) **Approval of the Working Schemes**

Approval of the Working Schemes: The Working Schemes would be sent for approval from Regional Office of the MoEF&CC, through the office of PCCF. from concerned agency (year 2 & 3)

Organizing implementation of the harvesting operations: The harvesting and transport (to depot) operations would be allocated either to the concerned JFMC or the Forest Labour Cooperative. The trees would be marked by the GFD field staff for felling, and the operation would be carried out under supervision of GFD field staff.

In case Forest Labour Cooperatives are involved, the implications for the share in benefits would be explained. There may be a need for a government order to clarify the situation and giving primacy to JFMCs, in case both – JFMCs and FLCs – claim the harvesting work. This would be addressed in the preparatory phase.

- Auction and Sharing of benefits: The auction and sale would be carried out according to existing procedures. In case the JFMCs want part of the harvest for own use, the terms and conditions for the same would be prepared (also specified in the guideline) and discussed and agreed with the JFMC, as per the JFM agreement. Procedure for transfer of funds (net benefits) to the JFMC account would be designed.

6) **Preparation of Guidelines and Standard Operating Procedures**

This would be done by the PMU with help from the PMC in the preparatory phase. Among other things, the guidelines would suggest the method of JFM area selection for working, procedure for making a management plan, role and responsibilities of the JFMC and the GFD in developing and executing the plan, procedure for disposal of the harvested produce, transfer of JFMCs share to JFMC account etc.

Training and orientation of the GFD staff may be required for JFMC/coupe selection, preparation of Working Scheme. JFMC would be informed and consulted at every stage and would be made aware of the dos and don'ts as well encouraged to utilize the funds as per the JFM guidelines and develop arrangements for sharing of benefits within the community.

At present no budget is provided for this activity. Options related to funding of this activity would be discussed with GFD during last field survey.

Annexure 8.5-a: Overview of the Eixising Eco Tourims Sites

1) **Polo eco-tourism center**

Polo located about 150 km from Ahmedabad in Sabarkantha district in midst Vijaynagar forests on the banks of Harnav River. The forests have rich bio-diversity consisting of over 300 plant species. The wildlife in the region includes sloth bear, leopard, four horned antelope, flying squirrel, grey hornbill breeding site for vultures. There are historical ruins adjacent to site. Eco-tourism facilities include six air-conditioned huts, Nature education site, Interpretation centre and hospitality and guide facilities. The ETDC manages the hospitality facility that include canteen, catering to tourists and also provides bicycles on rent. It is reported that since 2005 over 42,000 tourists have used the stay facility available at site. Large numbers of daytime tourists visit the site. It is reported that during holidays the number of visitors may be as high as 3,000. Profit from operation apart from employment is estimated at INR 640,000.

2) **Kilad eco-tourism center**

Situated at bank of Ambika River near Vansda National Park at entrance of Dangs district. It is reported that it is attracting about 4000 tourists annually. The infrastructure at the centre includes four rooms and six tenting sites for stay, interpretation centre and cafeteria and children activity area. It is providing employment to 30-35 local people. The eco-tourism centre receipts are reported to be INR 531,000, INR 532,000 and INR 708,800 for the years 2015-16, 2016-17 and 2017-18 respectively.

3) **Padamdungri Eco-tourism center**

Padamdungri is located on the banks of Ambika River in Vyara forest division 35 km from Vyara and 90 km from Surat. The eco-tourism centre was developed during 2008-09. There are four of air-conditioned and six non-air-conditioned cottages, tenting facilities for stay. Other infrastructure includes nature trails, adventure activity area, interpretation centre, Amphitheatre, Machan, canopy walk, cactus garden. The centre has average annual footfall of 125,000 persons and annual revenue generation is estimates at Rs. 4 million.

4) **Dhanpuri eco-tourism cenetre**

Dhanpuri is eco-tourism site developed in Jambughoda sanctuary. Infrastructure at Dhanpuri includes eight air-conditioned rooms; eight non air-conditioned rooms, eight tents, community hall, cafeteria, interpretation centre. There is opportunity for adventure activity area, canopy walk, nature walk, cycling, etc. Over 100,000 tourists enjoy the facilities at the centre. Local ETDC earns revenue of over INR 4.7 million per annum.

Annexure 8.5-b: Outline of the Priority Research Projects under Component 3: Human and Wildlife Conflict Component

1) **HWC studies:**

Location specific HWC related studies may be prioritized under the project. Focus should be on the five major HWC causing species, i.e., Lion, leopard, sloth bear, crocodile, blue bull. Studies may focus on causes of conflict that reside in habitat or changes in land use in its habitat, population dynamics of conflict causing animals, etc. The research studies may also focus on alternatives to redress the HWC. It is expected that three study for each of the five HWC causing species will be pursued during the project period.

2) **Monitoring and disease surveillance:**

Disease surveillance has been one of the less attended disciplines in wildlife management. Recent outbreak of canine distemper virus among lion brought this discipline of research and monitoring to focus. Disease could spread in variety of ways.

- Amongst wild animals
- From domestic/feral animals to wild animals and vice versa.
- From wild animals to human being and vice versa.

It is important that surveillance is strengthened for all of these alternative paths. Regular screening of population of domestic animals in vicinity of wildlife habitats is utmost important. Same way the human population in these regions must be regularly screened. Sample selected randomly or in a predetermined high-risk group may be subjected to periodic screening. At the same time, it is necessary that the human being coming in close contact with wild animals be regularly monitored for infections that they may attract from wild animals or may pass on to wild animals inadvertently.

3) **Identification and promotion of corridors of movement:**

Migration corridors happen to be less studied. Many HWC are caused in such corridors. This is because such areas are not part of usual habitat of wild animals. Often there are seasons of migration. Sometimes migration is in search of new habitats or territory by the territorial animals. This project plans to promote safe corridors for migration of animals more specifically species that are cause of HWC. Planning for intervention to restore ecological health of corridors of migration requires identification and delineation of corridors, animal needs and preferences during migration, detailing of specific habitat manipulation/improvement needs. This will ensure scientific targeted approach and efficiency of interventions.

4) **Crop damage by herbivore :**

Study to develop models for compensation of damage by herbivore animal. Damage to agriculture crops due to crop depredation by wild herbivores especially blue bull and wild boar is cause of wide spread resentment in Gujarat. There have been farmer agitations resulting in a scheme for subsidizing farmland fencing by government. Variety of models of fencing that include barbed wire fencing with varying configuration, electric fencing, live hedge, use of colourful sari strips and use of sprays of aloe vera and neem etc. have been tried. There is varying success with no single model being of universal use. It is desired that efficacy of these models is evaluated with reference to local variations as part of action research by research institution in partnership with GFD. Alternatives/models evolved may be practiced on pilot scale in an organised scientific study. This will provide scientific input to effort to address the crop damage due to blue bull and/or wild boar. At the same time crop damage due to various causes need be segregated. This will require detailed study and research over crop cycle in different locales and for different crops. These studies may also help suggest change in cropping pattern that will alleviate distress due to crop depredation by

wild herbivores. The studies would include behaviour study of Blue bull. This will help develop protection methods and means.

5) **Wild boar (Sus scrofa) related Studies:**

Wild boar is known to damage agriculture crops specially below ground crops (potato, ground nut) and roots of many other agriculture crops leading to crop failure. The wild boar population is wide spread in Gujarat. There are observations suggesting cross breeding of wild boar with domestic pigs and also domestic pigs going feral. However, there are no scientific studies to deny or support the observations. Large carnivore lion and leopard prey on wild boar. There is need to build population of wild boar in forests and reduce its occurrence near habitation. Research and studies could help address this concern and need.

6) **Vulture related studies:**

Vultures play important ecological role in the food chain. Gujarat is home to four species of vultures. White-rumped vulture, Long-billed vulture, Red-headed vulture and Egyptian vulture are regularly sighted in Gujarat. GFD through GEER Foundation has been undertaking vulture population surveys. GFD is also making efforts to conserve vulture population. However, success of these efforts is limited with vulture population declining over period. May 2016 survey by GEER Foundation recorded total of 999 vultures of four species. Of these, 843 individuals were Gyps vulture (458 White-rumped Vultures and 385 Long-billed Vultures), 24 Red-headed Vultures and 132 Egyptian Vultures. While during the previous state wide estimation in May 2012, a total of 1,037 vulture were recorded which included 938 Gyps vultures (577 White-rumped Vultures & 361 Long-billed Vultures), 8 Red-headed Vultures and 97 Egyptian Vultures (Source GEER Foundation reports). There are few known breeding sites of vultures at Girnar, Rajula, Vijaynagar forests, Don hills of Dangs. In view of serious threat to existence of vultures it will be important that species of vulture especially long-billed and white-rumped vulture are studied for their movement and breeding behaviour.

7) **Population Habitat Viability Assessment (PHVA)/ Conservation Assessment and Management Plan (CAMP):**

Asiatic lion and Wild Ass (Equus hemionus khur) are endemic to Gujarat. Both are included in the Red list of IUCN as Endangered and Near Threatened. Asiatic Lion is included in the IUCN Red List as Endangered because of its small population size and area of occupancy. The Indian wild ass is currently listed as Near Threatened by IUCN. Additionally, Gujarat is home to large number of threatened and rare species. Some of them are on brink of local extinction. These include Great Indian Bustard, Lesser florican, Caracal, Indian Wolf, Vulture species, sloth bear, etc. This heritage of faunal diversity that is at risk needs scientific assessment of risks that are best addressed by tools like PHVA/CAMP. The core element of PHVA workshop being based on method of Conservation Planning Specialist Group (CBSG) of the IUCN is a quantitative assessment of the risk of species extinction. It uses the Vortex software that is a computer tool for modelling to simulate the complex dynamics of wildlife population growth and assessment of the change pattern over time in presence of various influencing factors including biotic factors. One such exercise was undertaken for Asiatic lion in nineties. It is proposed to revisit the subject and do appropriate scientific exercise using PHVA/CAMP or any other suitable scientific tool for Indian Grey Wolf, Great Indian Bustard, Caracal.

8) **Study on Status of Crocodile and Human conflict**

Crocodile Conflicts in Lentic and Lotic Wetland Systems of Gujarat - Crocodile/Marsh Crocodile (*Crocodylus palustris*) is a Schedule I reptilian species as per the Wildlife (Protection) Act, 1972. The reptile does not shy away from human presence and can easily inhabit and proliferate in lentic and lotic wetland ecosystems in/near urban, suburban or rural settlements. Crocodiles in Vishvamitri river flowing across Vadodara city and a large number of irrigation reservoirs in rural landscape of Kheda and Anand districts is good example of it living in vicinity of human-

dominated landscapes. The population of Crocodile has been on rise in Gujarat (especially in Central Gujarat and Saurashtra). This leads to increasing human-crocodile conflicts (HCC) in the State, especially in Central Gujarat. Therefore, there is a critical need to understand the population status of Crocodile in different regions (Central Gujarat, Saurashrtra, Kutch, North Gujarat and South Gujarat) of the State. Moreover, there is also a critical need of understanding region-wise micro-level causes for the HCC. Role of breeding phase of the Mugger in HCC especially requires in depth study. The proposed study will attempt to bring forth both, the population status and causes of HCC in different regions of Gujarat so that GFD and various NGOs can create awareness for reducing HCC in the State.

9) **Human-Wild Ass (Equus hemionus khur) Conflicts in the Fringe Areas and ESZ area of Wild Ass Sanctuary:**

The Wild Ass Sanctuary (WAS) in the Little Rann of Kachchh (LRK) is the only stronghold of these ungulates. Recent studies in WAS by GEER Foundation had found that Wild Ass utilizes the fringe area of the Sanctuary intensively. Crop-raiding by Wild Ass in the agricultural areas in/adjacent to Sanctuary fringe is a common phenomenon. Therefore, to minimize Wild Ass-Farmer friction, a study is being proposed to understand causes, pattern and magnitude of crop-raiding by Wild Ass in the fringes of WAS and in its eco-sensitive zones. The study will be aimed at determining and recommend specific ways in which Wild Ass-Farmer confrontations are minimized.

10) **Status of Barking Deer and Four-horned Antelope - an important prey base species for large carnivores in some PAs :**

In any Protected Area, the status of natural prey base affects the status of large predator and Leopard (Panthera pardus) is not an exception to this ecological rule. The big cat often moves outside the PAs and enters the human dominated areas in search of food that includes man's livestock and poultry, pariah dogs etc. Barking Deer and Four-horned Antelope constitute an important prey-base for Leopard in the forests (including those protected as PAs) of eastern hilly belt of Gujarat. For the long-term conservation of leopard in this region and to minimize man-leopard conflicts, there is a need to maintain adequate population of these two ungulate species in their forested habitat. Therefore, it is required to assess the status of Barking Deer and Four-horned Antelope as an important prey-base of Leopard in the Protected Areas of Eastern Forest belt of Gujarat. The proposed study aims at determining the status of these two herbivores in Ratanmahal and Jambughoda Wildlife Sanctuaries and the forest areas of Sabarkantha, Dahod, Panchmahal and Chotaudepur districts in Central Gujarat. It proposes to determine population, density, and relative abundance.

11) **Documentation for Heritage site:**

It is envisaged that one or two of the wetlands with unique features shall be documented as candidate heritage site for recognition under the UNESCO's program of World Heritage Site program. One of the sites proposed is the Kala Dungar to Khadir region of the Great Rann of Kutch. It has rich archaeological history with Hadapan site Dholaveera in its midst and unique natural feature of Rann and the Flamingo breeding site known as Flamingo city. It needs documentation of details that require collection of current and historical data on various ecological, natural and socio-economic features of site.

12) **Impact of Grazing:**

It is often said that over grazing is bane of forests of Gujarat and cause of degradation of many habitats. Degradation of habitats leads to loss of prey base and wider movement of animals in search of food and water. However, scientific study to quantify impact of grazing is lacking. Study for estimating impact of grazing and experimenting with alternative regimes of grazing may be taken up with the objective of developing grazing regime alternatives to reduce adverse impact of

grazing.

13) **Improvement of animal rescue equipment:**

There is need and scope for improvement of animal rescue equipment, cages and loading-unloading methods and aids. Concerns are efficiency, weight, and ease of handling. The cages are required to be moved to areas in forests without proper roads, unloaded, moved to strategic place, and retrieved after capture of animal along with animal, loaded on truck and moved to rescue centre. These activities are cumbersome and often risky too. Safety of animal and persons handling is concern. There is need to innovate to improve efficiency of operation.

Annexure 8.6: Draft Manual for Green CSR

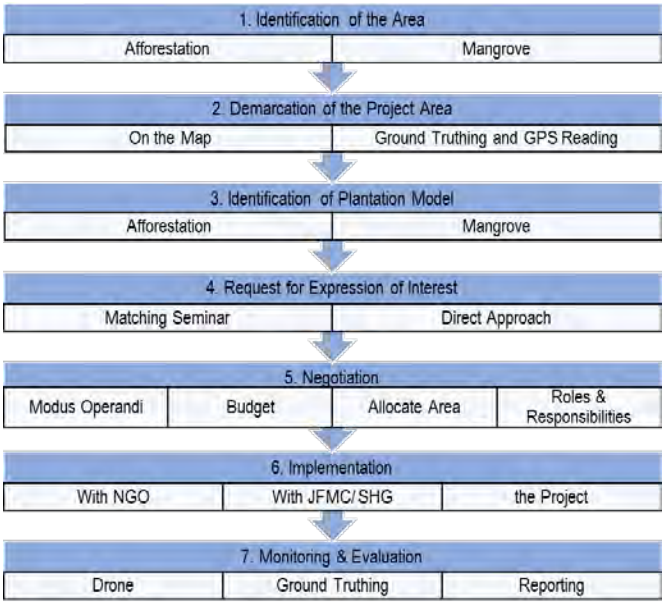
(1) Introduction

The effort to tackle the impacts of climate change continues; progress has been staggering. Further, India has submitted the Intended National Determined Contribution (INDC) to the UNFCCC, committing to eight points, including the creation of a carbon sink equivalent to 2.5 to 3 billion tonnes by 2030 through the enhancement of forest and tree cover. Part of the contribution is made under the Green India Mission, which was launched in 2014 in order to improve forest management in India and thus to mitigate impacts resulting from climate change. It has targeted the enhancement of forest and tree cover up to 5 million hectares and the improvement of the quality of forest and non-forest land of another 5 million ha, to be achieved in 10 years. In cases where the forest land is converted to other land use for development, the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) guides the compensatory afforestation. As a result, India's forest cover is slowly improving, and the same is true for the state of Gujarat. However, there is still a lot more to be done to achieve the goal, and resources seem insufficient[1].

On the other hand, as the society as a whole becomes more aware and conscious of sustainability, the corporate houses are expected to make their business conduct more sustainable and ethical. How the corporates deal with sustainability is now rated as known as Environment Social and Governance perspective (ESG rating) and affect their corporate value in the global market. Thus, corporates cannot only pursue profit without taking care of the sustainability issues. Environment, of which forest is a part, is an area that the corporates can contribute.

Since Gujarat is home to many corporate houses, opportunity for corporate funded afforestation exists.Under the Companies Act 2013, corporate houses of a certain level of value need to spend a set amount of their profits to contribute to the betterment of society. So far, most of the CSR funding in Gujarat goes to education, sanitation, and livelihoods. The forest and environment sector has yet to gain attention. This is partly due to the lack of promotion and facilitation efforts made by the concerned organizations. However, as has been seen in the Maharashtra Forest Department, CSR fund of the corporate houses can be utilized to further advance forest cover.

To the Gujarat Ecosystem Management Project with a mandate to improve and conserve the diverse ecosystem of the state intends to promote corporate engagement in the afforestation by extending its expertise in sustainable forest management.



Source: JICA Study Team (2019)

Figure 1: Implementation Process of Green CSR/ Private Partnership Projects

(2) Objectives of the Manual

This manual provides a step wise description of planning, implementation and M&E of afforestation projects through CSR/Private Partnership to be used by the concerned project officer. The overall framework will follow the guidelines on afforestation through private sector engagement as issued by the Ministry of Environment, Forest and Climate Change (Forest Conservation Division) vide F. No. 5-2/2017-FC dated 26 August 2019.

[1] https://www.downtoearth.org.in/news/forests/green-india-mission-grossly-underfunded-parliament-panel-63291

(3) Overall Implementation Framework of Green CSR/ Private Partnership Sub-Component

The overall implementation framework of Green CSR/Private Partnership sub-component is given in the figure to the right. Planning process is comprised of seven steps. In this scheme, the implementation agency will be JFMCs/EDCs/SHGs under the technical supervision of the Project. In case there are no JFMCs/EDCs/SHGs found in the area, local CBOs can be engaged for the work. In both cases, a tripartite agreement will be exchanged between the corporate houses, JFMCs/EDCs/SHGs/CBOs, and the Project. While identifying the area, demarcation of the project area, and identification of plantation model, the PMU officer in charge will work closely with the respective circle, division and range-level project implementation units established under the PMU. In the implementation stage, technical guidance and monitoring will be undertaken jointly by the range-level project implementation and PMU officer in charge. Procurement of the materials would also be done from the GFD nurseries. The reporting will be mainly done by the PMU officer in charge of the Green CSR/Private Partnership.

(4) Planning

1) Identification of the Area

The implementation begins with the identification of the area for afforestation. The process will be initiated by the PMU officer in charge of Green CSR/Private Partnership in consultation with the respective circle, division and range-level project implementation units. Field-level consultations with the potential field-level implementation unit (JFMC/EDC/SHG/CBOs) will be carried out with guidance provided by PMU officer in charge and the concerned divisions and ranges. The suggested criteria for identification of the site are as below.

- Crown density below 40% and natural regeneration is not possible
- Minimum of 50 ha of geographically contiguous forest land
- Within the Project districts
- Rights over forest resources in the potential sites, communities affected and mitigation measures
- Easily accessible to the public and JFMC/EDC/SHG/CBO
- Consensus by the JFMC/EDC/SHG/CBO members and other local stakeholders (i.e. Gram Panchayat Sarpanch, sub-committee of Gram Panchayats, Biodiversity Management Committee, ward members etc.)

In case geographically contiguous forest land cannot be identified for the intervention, revenue forest can also be considered. District wise open forest area is given in the table below and the potential Project districts are indicated in bold. Districts having more than 70% of the recorded forest are marked with “x” in the table below and can be considered as priority districts for the Green CSR project interventions. Since the corporates are likely to invest in areas to which they are closely associated (i.e. operational area, facilities established, where employees come from, etc.), a few districts may be shortlisted.

Table 1: District Wise Recorded Forest Areas by Density Class

Sl. No.	District	Geographical Area in km²	Very Dense Forest in km²	Moderate Dense Forest in km²	Open Forest in km²	Total of Forest Land	% of Open Forest to the Total of Forest Land	Districts with More than 70% of the Open Forest*
1	Ahmedabad	8,107	0	12	117	129	**90.7**	**X**
2	Amreli	7,397	0	63	188	251	**74.9**	**X**
3	Anand	3,204	0	18	45	63	**71.4**	**X**
4	Banaskantha	10,743	0	372	476	848	**56.1**	
5	Bharuch	6,509	0	71	243	314	**77.4**	**X**
6	Bhavnagar	10,034	0	47	230	277	**83.0**	**X**
7	Dahod	3,642	1	118	419	538	**77.9**	**X**
8	Gandhinagar	2,140	0	11	81	92	88.0	
9	Jamnagar	14,184	0	55	380	435	87.4	
10	Junagadh	8,831	15	956	663	1,634	**40.6**	
11	Kachchh	45,674	0	301	2,011	2,312	87.0	
12	Kheda	3,953	0	20	74	94	**78.7**	**X**
13	Mehsana	4,401	0	13	146	159	**91.8**	**X**
14	Narmada	2,817	20	464	479	963	49.7	
15	Navsari	2,246	18	125	159	302	**52.6**	
16	Panchmahals	5,231	0	219	518	737	**70.3**	**X**
17	Patan	5,792	0	1	101	102	99.0	
18	Porbandar	2,316	0	16	108	124	87.1	
19	Rajkot	11,198	0	3	138	141	97.9	
20	Sabarkantha	7,394	29	304	474	807	**58.7**	
21	Surat	4,549	5	294	216	515	**41.9**	
22	Surendranagar	10,423	0	6	169	175	96.6	
23	Tapi	3,139	80	479	251	810	31.0	
24	Dangs	1,766	210	743	415	1,368	30.3	
25	Vadodara	7,546	0	145	484	629	**76.9**	**X**
26	Valsad	3,008	0	344	594	938	**63.3**	
	Total	196,244	378	5,200	9,179	14,757	62.2	

* X: indicates district with high potential for Green CSR project.

Source: India State of Forest 2017, Forest Survey of India.

The mangrove cover of the state has increased more than 200% over the period between 1987 and 2017. However, what we know from the statistics is that the 84.9% of the mangrove area is still open area. Although plantation efforts lead to valuable increments in the mangrove area, it still requires substantial efforts to achieve a healthy mangrove ecosystem. The districts may be selected from the areas where many corporates are located along the coastal belt. Regeneration on revenue land may also be considered for this activity. As for mangrove Restoration, projects may also be implemented in collaboration with the GEC.

Table 2: District Wise Mangrove Area by Density Class

Sl. No	District	Very Dense Mangrove in km²	Moderate Mangrove in km²	Open Mangrove in km²	Total in km²	% of Open Mangrove to the Total
1	Ahmedabad	0	1	31	32	96.9
2	Amreli	0	0	2	2	100.0
3	Anand	0	0	8	8	100.0
4	Bharuch	0	14	31	45	68.9

Sl. No	District	Very Dense Mangrove in km²	Moderate Mangrove in km²	Open Mangrove in km²	Total in km²	% of Open Mangrove to the Total
5	Bhavnagar	0	6	16	22	72.7
6	Jamnagar	0	28	156	184	84.8
7	Junagadh	0	0	3	3	100.0
8	Kachchh	0	118	680	798	85.2
9	Navsari	0	0	14	14	100.0
10	Porbandar	0	0	1	1	100.0
11	Rajkot	0	1	3	4	75.0
12	Surat	0	4	17	21	81.0
13	Vadodara	0	0	3	3	100.0
14	Valsad	0	0	3	3	100.0
	Total	0	172	968	1,140	84.9

Source: India State of Forest 2017, Forest Survey of India.

2) Formulation of Five-Year Action Plan and Annual Work Plan for Green CSR/Private Partnership for Afforestation

The Project will identify the area suitable for CSR/Private Partnership-based afforestation activities. The area should be geographically contiguous and large enough to be worked upon in five years. The total land area shall be demarcated on the map and ground truthing should also be conducted by the PMU officer in charge and concerned forest guard to record the GPS coordinate. This exercise will be carried out jointly by the PMU officer in charge and the division and range-level project implementation units. During the planning exercise, following points shall be deliberated upon. While discussing on the following points, "Greening of Maharashtra (pp 9 – 11)" by Maharashtra Forest Department may be referred to.

- Tripartite agreement template
- Rights of implementation units (JFMC/EDC/SHG/CBO) over the forest resources (i.e. grass, fuelwood, medicinal plants, etc.) in the Green CSR plantation sites
- Benchmark survival rate[2]
- Consensus on the roles and responsibilities of GFD (circle, division, and range)
- Non performing JFMC/EDC/SHG/CBO
- In case the plantation is affected by Natural Calamity
- Cancellation of the contract when survival rate does not reach the benchmark survival rate set by the Project

The Five-Year Plan can be prepared separately for afforestation and mangrove plantation by the PMU officer in charge in close consultation with the respective circle, division and range-level project implementation units. Depending on the identified landscape, a plantation model can be identified by the Project. The annual target for plantation can also be prepared along with the cost of plantation as per the schedule of rates. The initial two years shall be taken as a pilot phase and thus the Project should attempt to complete 15% of the total area during the first and second years of implementation, while 20% of the total area should be allotted for the third and fourth years, and 30% of the area for the fifth year. The prepared strategy and plans shall be submitted to the PMU executive committee and thereafter submitted to the Governing Body for approval.

An Annual Work Plan will be prepared by the PMU officer in charge in close consultation with the respective circle, division and range-level project implementation units at the end of the previous financial year to be approved by the Governing Body of the Project.

The budget for the Five-Year Plan should be prepared as per the schedule of rates of the GFD and

[2] In the case of Maharashtra Forest Department, 50% survival rate after three years was set as a benchmark. When the survival rate is not met, the tripartite agreement is to be cancelled. (Greening of Maharashtra. P 11)

other costs shall be based on prevailing market rates.

3) Preparation of Green CSR/Private Partnership Project Proposals for Corporates

When mobilising private resources, the Project shall initiate the process of interaction. A project proposal document will provide a basis for effective communication between the stakeholders. The project proposals for corporates shall be prepared by the PMU officer in charge of the Green CSR projects based on the Annual Work Plan. The proposal should contain a description of the project area, what plantation model should be adopted, mode of execution, M&E, reporting, and the budget. The area can be divided into patches of manageable size so that, depending on the budget available with the corporates, the number of patches can be allocated to the interested corporates.

The budget should be calculated according to the schedule of rates of the GFD and prevailing market rates. It should also include two years of maintenance costs, and 15% of the institutional charge. Of which, 70% of the institutional charge will be given to the JFMC/EDC/SHG/CBO as to cover administrative expenses as well as to be utilised for community development. The institutional charges will be disbursed to the JFMC/EDC/SHG/CBO as per the survival rate of the trees.

The duration of each project will be three years, comprised of plantation work (first year), and maintenance/gap filling in the second and third years. The booking for CSR investment is to be done by the end of each financial year so that advanced booking can be done. Bookings and donations can also be made throughout the year, and the seminar held by the Green CSR/Private Partnership Unit can be held at various locations twice a year.

Table 3: Indicative Roles and Responsibilities of Each Party

Concerned Actor	Roles and Responsibilities
Private Partner	• Providing Funds • Publicizing Green CSR Interventions by the Project and promoting plantation activities by the corporates
PMU	• Signer of the tripartite agreement • Overall technical and managerial supervision and monitoring • Supervision of the management of the financial transactions concerning Green CSR projects and CSR fund
Circle	• Overall technical and managerial supervision and monitoring • Supervision of the financial transactions concerning Green CSR projects and CSR fund
Forest Divisions	• Overall execution of the tripartite agreement • Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/ CBO) • Technical supervision of the implementing organization (JFMC/EDC/SHG/ CBO) • Providing quality saplings • Site verification • Monitoring (physical and financial)
Range/ Concerned Forest Guard	• Taking coordinates of the plantation sites • Guiding JFMC/ EDC/ SHG/ CBO members for procurement of the materials, undertaking the plantation works, and watch and ward • Site verification • Regular monitoring (physical and financial)
PMU Officer in Charge	• Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/ CBO) • Monitoring (physical and financial) • Reporting • Management of Green CSR fund including developing operational manual

Concerned Actor	Roles and Responsibilities
	for the fund
JFMC/EDC/SHG/CBO	• Taking part in the site identification • Consensus building among the villagers to take part in the Green CSR project • Taking part in the selection of the trees to be planted • Mobilization of the laborers • Procurement of planting materials • Undertaking of afforestation work as per the technical guidance of the project • Watch and Ward • Record keeping (i.e. financial record, plantation register)

Source: JICA Study Team (2019)

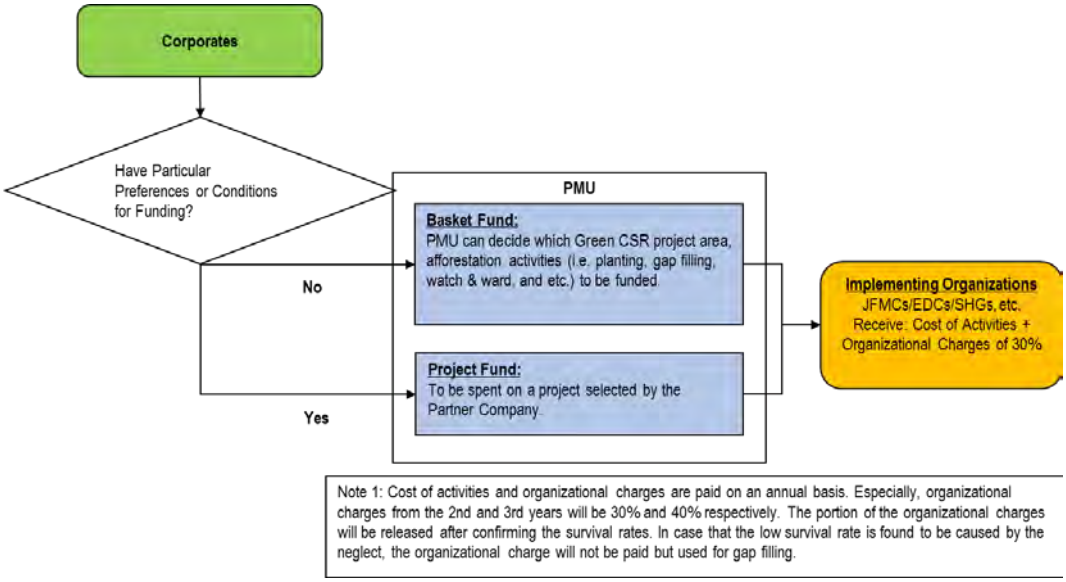
Table 4: Indicative Main Cost Component for Green CSR/PP Project

(a) Cost of Saplings and other planting materials
(b) Wages
(c) Cost of transporting the saplings
(d) Maintenance cost for 2 years
(e) Watch and ward
(f) Organizational Charge of 15% of the total of (a) – (e)

Source: JICA Study Team (2019)

The organizational charge of 15% will be shared between the Green CSR/Private Partnership unit and the implementing agency of JFMC/EDC/SHG/CBO at the rate of 30:70. The community organizations will receive 70% of the organizational charge, and this can be used for community development as per the collective decision taken at the General Body of the JFMC/EDC/SHG/CBO. The 30% of the charge will be retained by the PMU in a separate account to be used when the maintenance/gap filling budget is not sufficient and for the maintenance after the completion of the financing period.

Fund flow is given in the figure below. The Green CSR funds are received from the corporate partners for a particular plantation site, and the funds will be directly transferred from the PMU to the implementing JFMC/EDC/SHG/CBO's bank account. Disbursement will be done in instalment. The first disbursement will be for the cost of the saplings and wages, and 30% of the organizational charge of their share. In the second and third years, the maintenance costs and organizational charge will be transferred to the accounts of JFMC/EDC/SHG/CBO's bank account after confirming the survival rate set by the project each year. However, to prevent malfunctioning of JFMC/EDC/SHG/CBO or low survival rate, regular monitoring and guidance by the concerned forest guard, the concerned project division and the officer in charge in PMU will be carried out.



Source: JICA Study Team (2019)

Figure 2: Fund Flow of Green CSR/Private Partnership Project

4) Identification of Corporate Partners and Mobilisation of Resources

a. Holding Green CSR/Partnership Seminars

The Project will organize seminars in Ahmedabad and Surat to identify corporate partners. The indicative seminar program is given in the table below.

Table 5: Indicative Outline of the Green CSR/Partnership Seminar

Particulars	Description
Venue	Ahmedabad, Surat, Vadodara
Frequency	Once in every six months
No of participants	100 persons (CSR persons in the corporate houses, NGOs, local government officers, etc.)
Programme	Sharing of the details of the Project (objectives, Project area, implementation, funding options, etc.) Response from the corporates Sharing of experience by the JFMC/EDC/SHG/CBO (the second year onwards)

Source: JICA Study Team (2019)

b. Establishing Web-Based Gateway for Raising Fund for Green CSR/Private Partnership

With the intention of effectively interacting with the corporates, a gateway will be established as part of the Project web-site. This gateway should have the investable project proposals prepared by the officer in charge in PMU and should also receive proposals from the corporates. In addition, it should provide free guidance to those corporates that are interested in investing or require technical guidance for forest ecosystem management. It should also provide an option to receive donations as seen in websites such as Swachh Bharat Kosh and Nature Club (in Surat). The maintenance of the gateway shall be done by the M&E/MIS section of the Project.

5) Signing of Tripartite Agreement

A tripartite agreement needs to be exchanged between the private partners, the Project and JFMC/EDC/SHG/CBO engaged for the afforestation activities. Both the existing and newly organized JFMC/EDC/SHG/CBO can be considered as implementing body of the Green CSR project. The agreement should specify the roles and responsibilities of each party, allotted areas of

afforestation, work specification, and financial details, among other matters. There should also be a clear statement that the private sector partners will not have rights over the trees planted and the fruits on the trees, as well as the land where the afforestation work is done. The draft will be prepared by the officer in charge of Green CSR in PMU and reviewed and approved by the Executive Committee of the PMU and Governing Body of the Project.

6) Implementation of Afforestation Activities

Once the tripartite agreement is signed by all concerned parties, the afforestation work will be undertaken by JFMC/EDC/SHG/CBO under the technical guidance of the concerned forest division, range and the forest guard of the respective areas. The required saplings shall be procured from the GFD nursery.

(5) M&E

1) Establishment of CSR Monitoring - Web-Based Platform

PMU officer in charge of Green CSR will undertake monitoring and evaluation of the projects in coordination with the PMU M&E/MIS section and concerned division and range. As each of the Green CSR/Private Partnership projects will have its own unique monitoring indicators, having a web-based platform would enable timely monitoring by the PMU and facilitate the reporting process. All of the CSR project sites shall be geo-coded.

Drones will be used to take the images of the project sites on a quarterly basis. These images will be made available on the website for each sponsoring company along with the description of the areas and synopses of site observations.

2) M&E Data Collection

Monitoring of the Green CSR project will be undertaken at each site while the fund is received by a corporate. Once the financing period is completed, the plantation site will be monitored under the project monitoring system and looked after by the JFMC/EDC/SHG/CBO that implemented the works and the concerned forest guard. Photo records of the site can be taken twice a year and uploaded on the project website.

Monitoring Indicators will be comprised of two indicator groups. One type of indicator concerns with the plantation and the other concerns with the finances and performance of JFMC/EDC/SHG/CBO. Indicative monitoring indicators are given in the table below.

Table 6: Indicative Monitoring Indicators for CSR Afforestation Projects

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
CSR Project Indicators	• Number of companies invested • Areas covered by each company • Number of JFMC/EDC/SHG /CBO engaged	Tripartite Agreement Signed	PMU	Quarterly
	• Number of workers engaged (gender segregated) • Amount spent on wages	Muster roll kept at the JFMC/EDC/SHG/CBO	Division/Range (Forest Guard)	Monthly
	• Amount spent on materials	Account book maintained by JFMC/EDC/SHG/CBO		Monthly

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
	• Number of saplings procured • Number of saplings planted • Number of saplings survived	Plantation Register kept by the forest guard/JFMC/EDC/SHGs	Division/Range (Forest Guard)	Monthly
Plantation Monitoring Indicators	• As per the M&E indicator of the GFD	As per the record kept under the M&E system of the GFD	Division/Range (Forest Guard)	As per the GFD M&E guidelines

Source: JICA Study Team (2019)

The site-based technical guidance and the field record will be kept on paper by the concerned forest guard. The recorded data will be forwarded from the concerned range to the division. The division will upload the data onto the web-based Green CSR monitoring system. At least in every quarter, the concerned officer from the division and circle will visit the site and provide managerial and technical follow up. Annual site visits shall also be organized by the Project for the contributing corporate houses. During these site visits, concerned divisional and range-level project officer or staff shall accompany.

The Project also welcomes site visits by corporates that are interested in hosting one.

3) Reporting to the Funding Corporates

The monitoring report generated from the MIS system will be made available on the web, where the corporates can also access it as required. The monthly progress report will also be sent to the private partners via e-mail. In case a printed version is required, the Project will provide one upon request. The reporting to the corporates will continue for the duration of the particular project financed by them.

4) Networking

Networking would be undertaken primarily by the officer in charge in PMU. The association of industries and cooperates within and outside of the state (i.e. FICCI, CII, JETRO, etc.) can be contacted to build a network, through which the Project may identify potential collaborators, and also to generate project ideas. Participation in a national and state CSR summit shall also be an annual activity. In addition, local (mostly district level) stakeholders may be invited twice a year to have the Green CSR/Private Partnership project proposals shared with them. The PMU officer in charge will also attend the district level meetings held by the projects for the purpose of networking with the local stakeholders.

5) Publicity/Documentation

The corporates require proper reporting by the Project. The reporting should be concise and easy to read, yet capture the key aspects of the interventions. Success stories can also be documented for the benefit of the Project, as well as for the corporates. Competent private agencies may also be engaged if there is a need to produce such things as videos or publications. The reports will be prepared by the PMU officer in charge of Green CSR.

6) Evaluation of the Five-Year Plan

In the fifth year of the Project, the PMU will assess the Project achievements and take a decision on whether to continue or not. If the activities are to be continued, the second Five-Year Plan should be developed following the process adopted in creating the first Five-Year Plan.

7) Green CSR Project Evaluation and Impact Assessment

The overall project will have the midterm project evaluation, end of project evaluation at the end of

the project and impact assessment in the post project period. As part of this exercise, the achievements and impacts of Green CSR project shall be assessed. The cost shall be estimated as part of the overall project Evaluation and Impact Assessment component.

(6) Institutional Arrangement for Green CSR/Private Partnership

Within the PMU of the Project, an officer in charge of Green CSR projects will be placed. The officer will plan, monitor Green CSR projects and will coordinate with the concerned circle, divisions, ranges, community level implementation units and the funding corporates. The field level implementation will be undertaken by JFMC/EDC/SHG/CBO or any other community organization with technical guidance by the forest guard in the concerned range. Concerned forest guard also monitors the progress on a regular basis.

In case resource organizations are required to assist the community-level implementing organization, they can be engaged as required. The procurement of such organization shall be undertaken by the PMU following the standard procurement procedures. Collaboration with the GEC on mangrove regeneration activities may be sought.

(7) Financial Management for CSR/Private Partnership

The PMU, as a registered society under the Societies Registration Act 1860, shall have a clause in its by-laws on the management of the CSR fund. Registration with the Income Tax Department for applicable tax exemption for the PMU (Income Tax Act Section 12AA) and for the entities making donations towards Green CSR (Income Tax Act Section 10 (23c)) should also be done during the formation stage of the PMU. A separate account will be kept for the CSR/Private Partnership by the Finance Officer in the PMU. When establishing the PMU, the financial management for CSR/Private Partnership shall be further examined by receiving expert advice from a Chartered Accountant. This shall be documented in the Operation Manual of the PMU.

Fund flow of the Green CSR Projects will follow the overall financial management system of the PMU.

END

Annexure 8.7: Indicative List of Drone Schools with Relevant Training Courses including Data Post-Processing in Japan

No.	School Name	Organizer	Course Contents			URL
			Drone Operation	Safety Management	Data Post-Processing	
1	Amana Drone School	Amanabi Inc.	○	○	○	https://adstokyo.com/
2	Drone Business College	QualitySoft Corporation	○	○	○	https://drone-bc.jp/
3	Drone School	Kokusai Kogyo Co., Ltd.	○	○	○	https://biz.kkc.co.jp/solution/uav-school/

This is not an exhaustive table. It may be possible to find different schools that can provide similar training courses to these in this table.

Annexure 8.8-a: List of Farmer Producer Organizations in Gujarat under Small Farmers' Agri-Business Consortium

Sl. No	Name of the FPO	Address	Commodity	Resource Organisations
1	Adivasi Khet Vikas Sangathan Producer Company Ltd.	Sr. No. 127/128, Reva Ginning & Pressing Factory, Behind Naswadi Railway Station, Kawant Road, Naswadi, Tal : Naswadi, Dist :	Cotton, Tur, Maize	Cohesion Foundation Trust
2	Kankrej Kisan Producer Company Ltd.	H2880, Bhakti Nagar, Near Ganesh Steel Corporation, Thara, Tal : Kankrej, Dist : Banaskantha, Gujarat	Castor, Cotton, Wheat, Bajara, Pulses	Cohesion Foundation Trust
3	Vadhiyar Kisan Producer Company Ltd.	Varahi, 21 Makan Chali, Railway Station Road, Thara Raod, Po : Santalpur Tal : Patan, Dist : Patan, Gujarat	Castor Seed, Cotton, Guar Seed	Cohesion Foundation Trust
4	Vagad Kisan Producer Company Ltd.	1st Floor, Sindhyachal Building, Near NJ Hospital, Rapar Block, Opp. Vikasvadi, Ayodhyapuri, Rapar, Tal : Rapar, Dist : Kachchh, Gujarat	Castor Seed, Guar Seed, Cumin Seed	Cohesion Foundation Trust
5	Shri Munikripa Vegetable Producer Company Ltd.	32 Fakir Andeg, Andeg, Tal : Sanand, District : Ahmedabad, Gujarat	Tomato, Bitter Gourd, Brinjal	Development Support Centre
6	Bhal Pradesh Vividh Khet Utpadak Ane Vechan Sahakari Mandali Ltd.	Post-Frdra Near Shankar Temple, Tal : Dhandhuka, District : Ahemdabad, Gujarat.	Gram, Cumin Seed, Wheat	Development Support Centre
7	Dahod Gramin Adivasi Vikas Producer Company Ltd.	Kanchan Kunj Society, Anand Bhavan, Chakalya Road, Dahod, Tal & Dist : Dahod, Gujarat.	green Gram, Black Gram	Gramin Vikas Trust
8	Netrang Pulse Crop Producer Company Ltd.	C/o Anujibhai Bhikhji Bhai Vasava 3, Vadkhunta. Post : Vadkhunta, Tal : Jhagadia, Dist : Bharuch, Gujarat.	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
9	Quality Vegetables Farmers Producer Company Ltd.	P.O. Gitapur, Chandanmukhi line, Bhagpura, Rampura, Ahemdabad382140, Gujarat.	NA	International Traceability System Ltd.
10	Kheda Farmers Vegetables Producer Company Ltd.	Village amsaran, mehmedabar387335,Gujarat	NA	International Traceability System Ltd.
11	Ekta Farmer Producer Cooperative	Post Kuha Block- Dascroi, Dist. Ahmedabad, Gujrat	Paddy, Wheat, caster, Brinjal, Laides Finger	Development Support Centre
12	Surydeep Adivasi Pulse Producer Company Ltd.	35, Mukhya Faliyu, Galiba, Jagadiya- 393130, Bharuch Gujarat	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
13	Bhumiputra Pulse Crop Producer Company Ltd.	Patdi, Ta. Dediapada, Narmada- 393041	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
14	Lilotri Pulse Producer Company Ltd.	Avlikund, Tal. Sagbara, Narmada, Narmada, Gujarat, India, 39302	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
15	Umarpada Pulse Crop Producer Company Ltd.	Chimipatal, Umarpada, Surat, Surat- 394445, Gujarat	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
16	Dangi Adivasi Mahila Khedut Utpadak Producer Company Ltd.	Aga Khan Rural Development Program (Movi Road, Netrang, Bharuch, Gujarat, 393130)	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
17	Limkheda Adivasi Khedut Vikas Producer Company Ltd.	Village Bar, Taluka Limkheda, Dahod- 389140, Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
18	Jhalod Ekta Producer Company Ltd.	Kalimahudi, Karath, Ta. Zalod, Jhalod, Dohad- 389180, Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
19	Morva Hadaf Kheti Vikas Producer Company Ltd.	Village- Kadadra, Morva Hadaf, Panch Mahals- 389115, Gujarat,	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
20	Godhra Khedut Vikas Producer Company Ltd.	Chhariya, Taluk- Godhra, Village: Chhariya, District: Panchmahal, Godhra, Panchmahals- 389001 , Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
21	Fasal Vikas Producer company Ltd.	Kantu Ambakhakar Fly, Ghoghamba, Panchmahals- 389380, Gujarat	Maize, Paddy, Tur, Ground Nut, Gram, What	Gramin Vikas Trust

Source: http://sfacindia.com/Aboutus.aspx

1) Clusters Promoted by MART under GFDP II

Cluster/District	No of villages	SHGs engaged	Products
Visdalia (Surat)	28	56	Vegetables, Spices
Motiya (Bharuch)	25	50	Vegetables, Roasted Ground nut
Sagbara (Narmada)	25	50	Incense stick
Waghai (Dang)	25	50	Vegetable, Turmeric, Safed Musli, Marigold, Nagli, Bamboo craft, Mango trading and processing
Dharampur (Valsad)	24 and more	48 and more	Mango trading and processing, Fire crackers

Source: MART (2013). Final Report, Gujarat Forestry Development Project II.

Annexure 8.8-b: List of Organic Manufacturers and Merchants and Potential Partner Companies

1) Herbs and Medicinal Plants

Sl. No	Name of Manufacturer cum Merchant	Address	City	Contact Person	Pincode	Mobile No	E-mail	Phone	Fax
1	Agricultural Produce Market Committee, Surat	Sardar Market, Puna-Kumbharia, Dumbhal	Surat	Neelesh L. Thorat	396010	9824119366	apmcsurat1@gmail.com	2336453	2369175
2	Ahmed Overseas	Survey No. 270 P 3, Plot No. 2, At Makhiyada	Junagadh	Sorathia Faisal Azizbhai	362011	-	ahmed.overseas@gmail.com	2661975	2661975
3	Desai Fruits And Vegetables Pvt. Ltd.	House No.426, Desai Falia,At & Po.Amadpore , N.H. No.8	Navsari	Mr. Sanjay Gupta	396445	9099070002	bharat.patel@desaifv.com	281547	281546
4	Dhara Foods Pvt. Ltd.	Gokul Near Ramji Mandir Station Road	Anand	Dharmendra Patel	388001	9825077579	dharafoods99@gmail.com	240743	243777
5	Divya Corporation	Junagadh Highway, Plot No. 39, Tal Keshod	Agatrai	Jayesh Prabhudas Badani	362222	8140403888	divya_corp@rediffmail.com	253531	253591
6	Earth Expo Company	Industrial Plot Number 305, Vartej Gidc	Bhavnagar	Pravin Valanki	364060	9898419831	buy4earth@gmail.com	2471400	
7	Elite Green Pvt. Ltd.	A-806 , 8Th Floor Privilion, B/H Iscon Temple, Ambli Bopal Road,	Ahmedabad	Raghulal	380054	9978984995	s.maya@eliteindia.com	40324245	40324246
8	Fuletra Agro Food	Survey No 148 & 149,,B/H Sardar Patel Industrial Estate Village	Rajkot	Atman R Bhesdadiya	363621	9913700059	fuletrafood@gmail.com	2463060	24603060
9	Gajanand Foods Pvt.Ltd.	1St Floor Gajanand House Opp. Jitendra Shopping	Ahmedabad	Jayeshbhai	380061	9879111544	export@gajanand.com	9879111544	987911544
10	Gayatri Psyllium Industries	70, Khadia Gunj Bazaar	Unjha	Amit M Patel	384170	9825033422	info@gayatripsyllium.com	254141	254141
11	Ghanshyam Traders	Victor By Pass, Near Railway Crossing	Mahuva	Bhadresh Surani	364290	9726998383	info@ghanshyamtraders.com	294219	294219
12	Jalaram Agriexports Pvt. Ltd.	C-407, 4Th Floor, The Imperial Heights, 150 Ft., Ring Road, Opp.	Rajkot	Mr.Hiren Kotecha	360005	9825057255	jalaram13@jalaramagri.com	221413	221513
13	Kitchen Xpress Overseas Ltd.,	Ramdev Estate, Nr. Sola Overbridge, Sarkhej-Gandhinagar	Ahmedabad	Gargi Desai	380060	9662538828	documents@kxol.in	268371	268380
14	Ldh Agro Food Private Limited	201 & 202, Lakulesh Complex, Near Dilux Cross Road, Nizampura	Vadodara	Sunil Shah	390002	9484468212	shahsunil38@yahoo.in	9428588888	9428588888
15	Mz Food Products Pvt. Ltd.	C-31, Ratilal Park Society, St. Xaviers High School Road,	Ahmedabad	Nirav Patel	380009	9712325000	nirav@mzfoodprodusts.com	271656	271156
16	Patson Foods India Private Limited	Block No.888, Vada Road N.H.No. 8, Ganesh Sisodara	Navsari	Arvindbhai	396445	9825083811	info@patsonfoods.com	237701	237701
17	Shree Bhagwati Enterprise	Plot No.219, G.I.D.C.-2, Dolatpara	Junagadh	Chimanlal Rugnathbhai Kanabar	362037	9925032602	bejunagadh@gmail.com	2660486	2660386
18	Shreeji Protein	Behind Kisan Society, Victor Road, Dist. Bhavangar	Mahuva	Aravind Senta	364290	9898878568	sales1@shreejiprotein.com	223940	223944
19	Varsha Industries Pvt.Ltd.	Survey No.35, Rajkot Highway, Opp.Mahasagar Petrol Pump,	Junagadh	Praful B Desai	362310	9426834031	docs@varshaindustries.co.in	2661800	2660059

Source: APEDA Directory (https://itrack.apeda.gov.in/onlineregistration/Directory_ExpList.aspx) accessed October 2019

2) Natural Honey

Sl. No	Name of Manufacturer cum Merchant	Address	City	Pin Code	Contact Person	Mobile No	E-mail	Phone	Fax
1	Adf Foods Limited	83/86, G.I.D.C. Industrial Estate	Nadiad	387001	Mr. Bimal Ramesh Thakkar	9323352244	brabahar@adf-foods.com	61415555	61415577
2	Badani Corporation	Rajkot Road, Survey No.10/3, Plot 1 & 2, Opp:Dipak Petrol Pump, Dolatpura	Junagadh	362003	Kamlesh Badani	9825075941	badani.kamlesh@gmail.com	2680091	2680092
3	Bombaywalla Puranpoli Private Limited	602, 6Th Floor, Atlanta Tower,Nr S Ears Tower Gulbai Tekra	Ahmedabad	380006	Chitra Gupta	9537000200	bombaywallapp@me.com	48900886	65418777
4	Earth Expo Company	Industrial Plot Number 305, Vartej Gidc	Bhavnagar	364060	Pravin Valanki	9898419831	buy4earth@gmail.com	2471400	
5	Fuletra Agro Food	Survey No 148 & 149,,B/H Sardar Patel Industrial Estate Village Kherva Kuvadva	Rajkot	363621	Atman R Bhesdadiya	9913700059	fuletrafood@gmail.com	2463060	24603060
6	Green Fibres Foods (India) Pvt. Ltd.	Block No.955, Railway Crossing National Highway No.8, Degam, Tal: Chikhli,	Navsari	396530	Haresh Savaliya	9825043095	greenfibrefoods@yahoo.com	237701	237701
7	Gujarat Co-Op Milk Marketing Federation Ltd	Post Box No. 10, Amul Dairy Road	Anand Ahmedabad	388001	Jayen Mehta	9375032287	mukeshdave@amul.coop	258506	240208
8	Jalaram Agriexports Pvt. Ltd.	C-407, 4Th Floor, The Imperial Heights, 150 Ft., Ring Road, Opp. Big Bazar	Rajkot	360005	Mr.Hiren Kotecha	9825057255	jalaram13@jalaramagri.com	221413	221513
9	Ldh Agro Food Private Limited	201 & 202, Lakulesh Complex, Near Dilux Cross Road, Nizampura	Vadodara	390002	Sunil Shah	9484468212	shahsunil38@yahoo.in	9428588888	9428588888
10	Patson Foods India Private Limited	Block No.888, Vada Road N.H.No. 8, Ganesh Sisodara	Navsari	396445	Arvindbhai	9825083811	info@patsonfoods.com	237701	237701
11	Shree Bhagwati Enterprise	Plot No.219, G.I.D.C.-2, Dolatpara	Junagadh	362037	Chimanlal Rugnathbhai Kanabar	9925032602	bejunagadh@gmail.com	2660486	2660386
12	Vadilal Industries Ltd.	Vadilal House, 53, Shrimali Society, Navrangpura	Ahmedabad	380009	Mr Rajesh Gandhi	9426173896	smvyas@vadilalgroup.com	26564018	26564027
13	Varsha Industries Pvt.Ltd.	Survey No.35, Rajkot Highway, Opp.Mahasagar Petrol Pump, Sukhpur	Junagadh	362310	Praful B Desai	9426834031	docs@varshaindustries.co.in	2661800	2660059
14	Yours Ethnic Foods Private Limited	3/D Nidhishri Corporation Nr Vimal ,House Vitthalbhai Patel So.Stadium	Road Navrangpura Ahmedabad	380013	Nilambhai Narendrabhai Patel	8511226919	account@yoursfoods.com	7096670300	26404050

Source: APEDA Directory (https://itrack.apeda.gov.in/onlineregistration/Directory_ExpList.aspx) accessed October 2019.

Annexure 8.8-c.: TOR for NGOs to be Engaged for Pilot Project for Building Responsible Supply Chain

1. Scope of Work for NGOs

NGOs will

1) Provide necessary assistance and guidance for the producers' organizations to carry out production, processing and transportation of the produce as per the requirements of the partner company;
2) Assist the producer organizations in record keeping, holding meetings and other organizational management activities;
3) Liaise with the PMUand partner company;
4) Report to the PMU and PMC supply chain specialists on the progress made and any issues detected in the field; and
5) Undertake any other activities directed by the PMU.

2. Procurement

Procurement of the NGOs will be done through local competitive bidding. QCBS (80:20) shall be adopted. The PMC supply chain specialists will prepare the tender document and selection procedures and criteria in consultation with the PMU.

3. Team Composition

Position	Desired Qualification	TOR
Site Manager	(a) M.A. in Rural Marketing, Agricultural Marketing, or MBA or a post graduate degree in any other relevant field (b) Work experience in similar projects for eight years or more (c) Entrepreneurship training background would be an asset (d) Experience in developing a responsible supply chain, sustainable farming and MFP harvesting, and ethical marketing would be an asset	1) Oversee the activities of producer organizations 2) Ensure that the production and processing processes are carried out as per required specifications 3) Organize training as required 4) Provide guidance in organizational management skills including financial transactions and record keeping 5) Undertake regular monitoring as per the instructions of the PMU 6) Facilitate communication between the producer organizations, partner company and the PMU/PMC 7) Prepare monitoring report and submit to the PMU/PMC 8) Provide assistance and guidance to producer organizations as need arises in certification, marketing, technical guidance, etc. 9) Assist the PMC/PMU and partner company during the site visits and discussions 10) Undertake any other activities directed by the PMU/PMC
Site Coordinator	(a) M.A. in Rural Marketing, Agricultural Marketing, MBA or a post graduate degree in any other relevant field (b) Working experience in marketing and developing organizational capacity	1) Provide day to day assistance to the producer organization in organizational management and in production/processing activities 2) Identify any issues in organizational management and production/processing activities and report to the site manager 3) Assist the site manager 4) Assist the PMC/PMU and partner company during the site visits and discussions

Position	Desired Qualification	TOR
	of the farmer producer organization for five years or more (c) Familiarity with the responsible supply chain, sustainable farming and MFP harvesting, and ethical marketing would be an asset	5) Undertake any other activities directed by the PMU/PMC

Source: JICA Study Team (2019)

Annexure 8.8-d: List of Government Schemes/Programmes Relevant to Strengthening Value Chain

Component	Subsidy Details	Remarks
Spice Crops to Increase Productivity		
Seed spices and rhizomatic spices	Unit cost: INR 30,000 per ha In general areas maximum of INR 12,000 per ha. (40% of cost) In Tribal Sub Plan areas maximum of INR 15,000 per ha. (50% of cost) Area limited to 4 ha	The expenditure on planting material and cost of INM*/IPM** etc. Additional subsidy given by state government to general category 15% and 25% for reserved category.
For Planting Materials		
d infrastructure (for handling, processing, packing, storage etc. of seeds meant for use as seed material for cultivation of horticulture crops)	Unit cost: INR 20 million per ha Public sector: 100% of the unit cost. Private sector: 50% of the unit cost. One-time subsidy.	Project based credit linked back ended subsidy. Additional subsidy given by state government to general category 15% and 25% for reserved category.
Organic Farming		
Adoption of Organic Farming	Unit cost: INR 20,000 per ha 50% of cost limited to INR 10,000/ha. Maximum area of 4 ha per beneficiary The subsidy is given in 3 splits, first year INR 4,000, second and third year INR 3,000 is allotted.	The program to be linked with certification Certification should be done through the agency accredited by APEDA
Organic certification	For cluster of 50 ha INR 5 lakh for a cluster. The subsidy is allotted in 3 splits, which include first year INR 150,000, second year INR 150,000 and in third year INR 200,000.	Project based program linked with certification. Certification should be done through the agency accredited by APEDA
Certification for Good Agricultural Practices (GAP), including infrastructure	Unit cost: INR 10,000 per ha 50% of cost for maximum area of 4 ha per beneficiary	Certification should be done through the agency accredited by APEDA Additional subsidy given by state government to general category 15% and 25% for reserved category.
Post-Harvest Facilities		
Pack house (size 9m X 6 m)	Unit cost: INR 400,000 per unit 50% of the unit cost limited maximum to INR 200,000 per unit	Project based
Integrated pack house with facilities for conveyer belt, sorting, grading units, washing, drying and weighing. (size 9 m X 18 m)	Unit cost: INR 5 million per unit For general category 35% of the unit cost limited to maximum INR 1.75 million per unit. For scheduled and hilly region, 50% of the unit cost limited to maximum INR 2.5 million per unit	Project based Credit linked back ended subsidy.
Pre-cooling unit (capacity 6T)	Unit cost: INR 2.5 million per unit For general category 35% of the unit cost limited to maximum INR 875,000 per unit For scheduled and hilly region, 50% of the unit cost limited to INR 1.25 million per unit.	Project based Credit linked back ended subsidy. Additional subsidy given by state government to general category 15% and 25% for reserved category.
Farm Mechanization		
Tractor (up to 20 PTO***)	Unit cost: INR 300,000 per unit Subsidy for general farmers 25% of cost, subject to maximum of INR 75,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by agriculture department.

Component	Subsidy Details	Remarks
	Subsidy for small/marginal farmers, SC/ST farmers/women farmers 5% of cost, subject to maximum of INR 100,000 per unit.	
Tractor/power tiller (below 8 BHP) driven equipment		
Planting, Reaping and Digging Equipment	Unit cost: INR 30,000 per unit Subsidy for general farmers 40% of cost, subject to maximum of INR 12,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers 50% of cost, subject to maximum of INR 15,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by agriculture department
Plastic mulch laying machine	Unit cost: INR 70,000 per unit Subsidy for general farmers 40% of cost, subject to maximum of INR 28,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers 50% of cost, subject to maximum of INR 35,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by agriculture department.
Self-Propelled horticulture machinery	Unit cost: INR 250,000 per unit Subsidy for general farmers 40% of cost, subject to maximum of INR 100,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers 50% of cost, subject to maximum of INR 125,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by agriculture department
Stablishing Market Infrastructure		
Rural markets/apni mandies/direct markets (environment	Unit cost: INR 2.5 million per project 40% of capital cost of project in general areas and 55% in case of hilly & scheduled areas, per beneficiary.	Project based Credit linked back ended subsidy
Collection, Sorting, Grading, Packing Unit		
Collection, sorting/grading, packing unit etc.	Unit cost: INR 1.5 per project 40% or maximum INR 600,000 per unit of capital cost of project in general areas and 55% or maximum INR 825,000 per unit in case of hilly & scheduled areas, per beneficiary.	Project based Credit linked back ended subsidy

*INM: Integrated Nutrient Management
** IPM: Integrated Pest Management
***PTO: Power Take Off
Many more subsidies including financial assistance for training and study tours are available from the site.
Source: Compiled by the JICA Study Team based on the website of the Agriculture, Farmers Welfare & Co-operation Department, Government of Gujarat. (https://agri.gujarat.gov.in/horticultural-aid-schemes.htm)

Annexure 8.9:List of Modules Available in eGujForest and Their Purposes

No.	Module	Sub-Module	Purpose
1	Land Management	• Administrative Boundaries • Forest Boundaries • Form-I Details • Demarcation & Revenue Record Updation	• This module of MIS application deals with detailed information of forestland, extent and location, area and notification numbers. Every detail of the forestland collected is maintained for reference and management.
2	Establishment (FHRMS)	• Staff Management • Legislative Assembly Questions • Right To Information Application List • Court Case Monitoring	• This module deals with administrative issues and keeps record of all the employees of forest department. In addition to this transfer, promotion, ACR, leave, pension, gradation, loan and biodata are also managed in this application. • Other than the employee details the queries raised in the state legislative assembly, Lok Sabha (the lower house of Parliament) and Rajya Sabha (the upper house of Parliament) are managed through MIS for quick reply and tracking. • The information asked for by citizens under the RTI Act is maintained in this application for timely reply. • Several cases filed by the GFD and outside persons are under trial in different courts. The information and status of court cases are maintained in this application for better management, response and tracking of court cases
3	Vigilance	• Primary Investigation, • Departmental Enquiry • Suspension Cases	• This module deals with internal illegal practices or misconduct by government officers or employees during the delivery of the government duties. The cases reported against the employees have gone through different processes. The information and status of the cases are maintained and managed in this application.
4	Working Plan	• Working Plan • Working Circle • Coup Sequence	• This module deals with the information of the working plan wing of the GFD. Working plans are prepared forest division wise for every 10 years, for systematic forest management. The WP contains working circles, factors for treatable areas, number of felling series and number of coups. The WP prescription details per coup area are being entered, accordingly the annual plan of operations (APO) prescribed as per working plan can be drawn from the application and treatments undertaken by the field staff can be monitored.
5	Finance	• Subhead wise	• This application deals with financial

No.	Module	Sub-Module	Purpose
		expenditure • Subhead wise revenue	matters. The funds allocated for different activities under head and subhead wise to the field office goes through different levels like the GFD, circle, division and range at different times in a financial year, and monthly subhead wise expenditure done at different levels are entered in the application for better financial management. The achievements according to the targets and maintenance of various registers for financial propriety also can checked from the application. • The field official also collects revenue for various things. The subhead wise revenue collected and deposited in the treasury are updated monthly in this application.
6	Plantation & Nurseries	• Treatment Plan • Plantation • Nurseries	• This module deals with core activities like plantations and nurseries. Before taking up the plantation, the treatment plans are prepared consisting of site selection, details of land, prescriptions of working plans, treatable areas, treatments required, species to be planted, number of plants required, requirement of SMC structure, proposed silviculture operations, fund requirement etc. The treatment plans are submitted to division office for approval. After approval of a treatment plan, the frontline staff in the field takes up proposed plantation activities. The seedlings are raised in the nurseries in view of requirements in plantation and maintenance. The details of plantations and nurseries are maintained in various registers in field offices. These details are entered in this module of MIS application.
7	Monitoring & Evaluation	• Nursery Monitoring • Plantation Monitoring	• A standard guideline issued by the GFD called ‘Standing Order-08’ for the systematic monitoring of nurseries and plantations. The plantations are monitored for 5 years since creation. The monitoring registers are maintained for plantations and nurseries at the field offices. Every plantation is monitored physically by the division office. Some plantations are also monitored by random sampling by higher officials and some plantations are monitored by engaging outside agencies, called third party assessment. Monitoring records are maintained in this application.
8	Participatory Management	• People’s Organization (PO)	• The Forest Department, with the participation of local communities,

No.	Module	Sub-Module	Purpose
		• Self Help Group (SHG) • Executive Committee Registration • Village Survey Details • Micro plans	manage some forest areas (similar to JFM). A local community comes together and forms one organization. The organization nominates the members of executive committee to deal with day-to-day management. The target area is surveyed and micro-plans are prepared for systematic management of the target area for five years. The community also forms small groups for micro-financial institutes or enterprises in rural areas for socio-economic development. The details of these organizations and activities are maintained in the application under 'participatory management'.
9	CM Dashboard	• -	• The Chief Minister's Office in the Gujarat State has a digital dashboard containing important information for display and monitoring directly by the CM. The required information for what is displayed on the CM dashboard is automatically filtered from MIS application on a daily basis as a web service.
10	Forest Produce	• List Marking Registers • Add and approve Tree Data • Felling Register • List Marking Registers completion • Ravangi Patrak (transit permits) register • Maintain Depot Register • Measurement of Materials at Depot • Lotwari Register	• The forest produce is maintained in different registers for transparency. This produce is sold later to the bidders. The harvest details are maintained in different registers at different locations. This information regarding the produce is entered in the application for monitoring and future reference.
11	Offences	• Manage First Offence Report • First Offence Report details • Enquiry details • Final order details • Final Heval details • Human Assault details	• This module deals with protection and offences related to forest and wildlife. All details of different types of offences like illicit cutting, encroachment, mining, intentional fire, hunting, boundary alteration, grazing, transit offence, and human assault are maintained in this application. Enquiries about the offences reported are made for better management. The details of the enquiries, progress of enquiries, orders issued, final reports, etc. are entered in this application.
12	Sawmill	• View and Manage Applications	• This module deals with information for applications received for the renewal or

No.	Module	Sub-Module	Purpose
		• Generate License. • License fee details	issue of new licenses for sawmills. The applications are received at the division office and the details of application, machinery, sawmill, partner information, location or change of location, transfer of ownership, and renewal of old licenses, along with the process of approval of licenses, is entered in the application for future reference.
13	Wildlife & Eco Tourism	• Wildlife management • Eco-Tourism	• The details of wildlife rescue, release, wildlife injury & deaths, human injury & deaths, compensation paid, wildlife population estimations, permission for research and videography, list of ecotourism sites, facilities at ecotourism sites, number of tourists visited, and revenue income are entered and maintained.
14	Malki (special permission for cutting)	• Malki application list • Geen kisan credit card details, • Applicant name transfer	• The cutting of five special trees are banned in Gujarat State: Sag, Sisam, Chandan, Limdo, and Kher. Cutting of these trees needs special permission from the Forest Department. Applications for cutting of these trees are received at division offices. The details of the applications, including land specifications and list of documents submitted are entered in this module for monitoring.
15	Research & Training	• Research • Training	• Information related to departmental research and training is maintained in this application. The candidate plus trees (CPT) are identified as sources or mother trees for collection of quality planting material. The list of CPT, flowering and fruiting records, collection of material (seed, etc.), seed testing and production details, stock allotment, research project agencies, research projects, plot types, research plots, research centres, facilities, fertilizer types, and fertilizer production details are collected and entered in this module for research activities. • Training action plans are prepared and approved, accordingly the training is conducted. Details on training schedule, list of trainees, training attendance and resource details of resource persons are maintained in this module.
16	e-services	• -	• The GFD provides some services to the public within the state; out of these, 8 services can be applied for online through the GFD website. Details on different applications are entered in MIS so that the status of applications received and process

No.	Module	Sub-Module	Purpose
			undergone can be tracked.
17	Green Gujarat	• -	• During Van Mahotsav (mass planation festival) the seedlings are distributed to the public for plantations at their places under the Green Gujarat scheme. The targets and achievements of seedling distribution are entered in this module.
18	Grass Module	•	• Grass raised in forests are to meet fodder targets. These grasses are raised in vidis and after harvest are stored in go downs and distributed in the desert area as fodder for livestock and wildlife. Details on grass production, harvest, storage in godowns, distribution, and stock are maintained in this module.
19	IT Cell	•	• The required IT hardware and software are managed by the IT cell at the GFD. The inventory of HW and SW, and GSWAN connectivity entered in this module
20	MGNREGA	•	• The forest department also pools funds from an MGNREGA scheme for activities under convergence. The details on planned work, total expenditure, and funds received from MGNREGA are entered in this module.
21	Forest Statistics	•	• This module contains yearly reports showing the performance of all wings of the Forest Department.

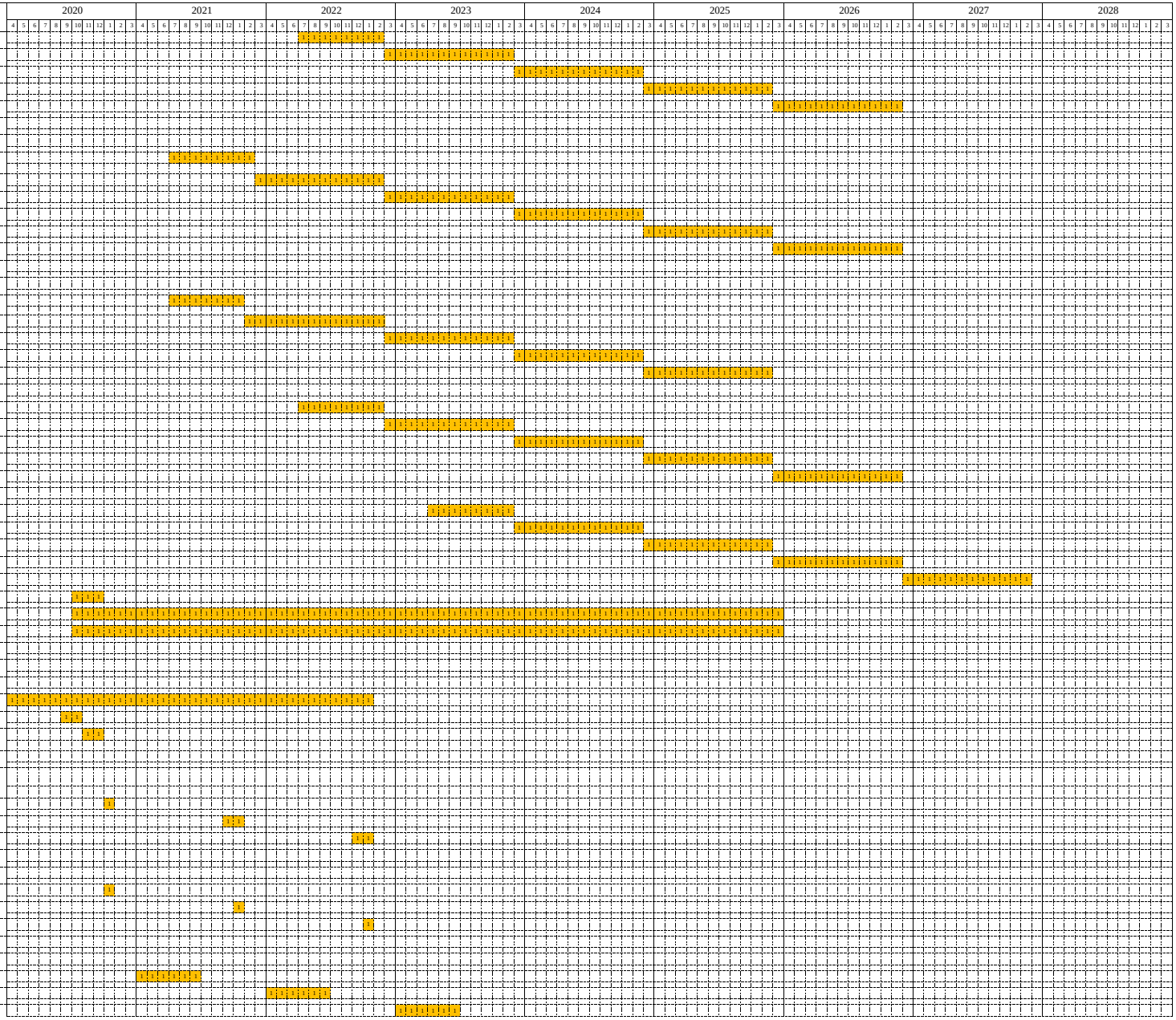
Source: JICA Study Team (2019) based on interviews with GFD IT Cell

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
Appraisal	1									
Pledge	1									
Signing of Loan Agreement	1									
	0									
Procurement of Consultant	0									
- Preparation of RFP	3									
- No Objection by JICA	1									
- Advertising	2									
- Technical Bid Evaluation	1									
- No Objection by JICA	1									
- Price Bid Evaluation	1									
- No Objection by JICA	1									
- Contract Negotiation	1									
- No Objection by JICA	1									
	0									
Consulting Services	59									
Detailed Design	0									
Tender Assistance	0									
- Preparation of PQ Documents	0									
- No Obiection bv JICA	0									
- PQ Advertising	0									
- PQ Evaluation	0									
- No Obiection bv JICA	0									
- Preparation of Bid Documents	0									
- No Obiection bv JICA	0									
- Advertising	0									
- Technical Bid Evaluation	0									
- No Obiection bv JICA	0									
- Price Bid Evaluation	0									
- No Obiection bv JICA	0									
- Contract Negotiation. Preparation for Contract/Commencement of works	0									
- No Obiection bv JICA	0									
Construction Supervision	0									
Defect Notification Period (DNP)	0									
Component 1. Development of Ecological Infrastructure in Coastal Area	0									
1.1 Preparatory work	0									
1.1.1 Preparation of Landscape Map	11									
1.1.2. Site Identification	6									
1.1.3 Consultation with Gram Panchayat and Preparation of Micro Plan including Treatment Plan	6									
1.1.4 Selection of Site for Mangrove Nursery	6									
1.1.5 Collection of Seed Material	6									
1.2 Plantation of Mangroves	0									
1.2.1 Nursery Works	25									
1.2.2 Raised Bed Plantation (Direct Seeding Method)	0									
1) Batch 1	29									
2) Batch 2	30									
3) Batch 3	30									
4) Batch 4	30									
1.2.3 Nursery Raised Plantation	0									
1) Batch 1	0									
a) 1st year nursery	8									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
2) Batch 2	0									

Annexure 10: Detailed Implementation Schedule

	Month
a) 1st year nursery	8
b) 1st year plantation work	12
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
1.3 Plantation of Mangrove Associated Species	0
1) Batch 1	0
a) 0' Year Operations (Advance Action Works)	8
b) 1st year plantation work	12
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
f) 5th year maintenance work	12
1.4 Coastal shelter-belts (with SMC)	0
1) Batch 1	0
a) 0' Year Operations (Advance Action Works)	7
b) 1st year plantation work	13
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
2) Batch 2	0
a) 0' Year Operations (Advance Action Works)	8
b) 1st year plantation work	12
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
3) Batch 3	0
a) 0' Year Operations (Advance Action Works)	8
b) 1st year plantation work	12
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
1.5 Community Development Activities	3
1.6 Awareness Programme	66
1.7 Research studies	66
Component 2 Development of Ecological Infrastructure in Inland	0
2.1 Restoration of Grassland	0
2.1.1 Preparatory Works	0
2.1.1 (1) Preparation of Landscape Map	34
2.1.1 (2) Preparation of Guideline /Framework for Vidi Management	2
2.1.1 (3) Training of Trainers for FD Staffs on Project Interventions: New JFMC regulation/ Grassland project design, community mobilisation etc	2
2.1.2 Community Mobilization and Vidi Selection	0
2.1.2 (1) Consultative Meetings with Potential Project Villages	0
1) Batch 1	1
2) Batch 2	2
3) Batch 3	2
4) Batch 4	0
2.1.2 (2) Preparation of Final list of Vidis/villages	0
1) Batch 1	1
2) Batch 2	1
3) Batch 3	1
4) Batch 4	0
2.1.2 (3) Preparation of Micro Plan including Treatment Plan and Approval	0
1) Batch 1	6
2) Batch 2	6
3) Batch 3	6



Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
4) Batch 4	0									
2.1.2 (4) Community Development Fund: Implementation of Micro Plan based Community Development	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
4) Batch 4	0									
2.1.2 (5) Engagement of Community Facilitator	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
4) Batch 4	0									
2.1.3 Removal of Weeds	0									
1) Batch 1	2									
2) Batch 2	2									
3) Batch 3	2									
4) Batch 4	2									
2.1.4 Fencing in Grasslands (Before Grass Development Works)	0									
2.1.4 (1) Stone Wall/ Rubble Wall	0									
1) Batch 1	2									
2) Batch 2	2									
3) Batch 3	2									
4) Batch 4	2									
2.1.4 (2) Protection Trench	0									
1) Batch 1	2									
2) Batch 2	2									
3) Batch 3	2									
4) Batch 4	2									
2.1.4 (3) Barbed Wire Fence	0									
1) Batch 1	2									
2) Batch 2	2									
3) Batch 3	2									
4) Batch 4	2									
2.1.5 Grassland Plantation - Rainfed with SMC	0									
1) Batch 1	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
2) Batch 2	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
3) Batch 3	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
2.1.6 Grassland Plantation - Rainfed without SMC	0									
1) Batch 1	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
2) Batch 2	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
3) Batch 3	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
d) 3rd year maintenance work	4									
2.1.7 Grassland Plantation -Irrigated	0									
1) Batch 1	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
2) Batch 2	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
3) Batch 3	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
4) Batch 4	0									
a) 1st Year Nursery, land preparation and plantation work	5									
c) 2nd year maintenance work	4									
d) 3rd year maintenance work	4									
2.1.8 Fireline/ Pathways Creation	0									
1) Batch 1	2									
2) Batch 2	2									
3) Batch 3	2									
4) Batch 4	2									
2.1.9 Livelihood Enhancement for Grassland Landscape	0									
2.1.9 (1) Promotion of Micro Enterprise for Grassland Landscape	0									
a. Support for SHG based Micro Enterprise	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
4) Batch 4	0									
2.1.9 (2) Community Based Revolving Fund (For Micro Enterprise)	3									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
4) Batch 4	0									
2.1.9 (3) Cluster Based Enterprise and Value Chain Development	0									
a. Scoping studies for selection of products and clusters	6									
b. Engagement of Resource institutions and hand holding of CLO	54									
c. Cluster Development Fund	6									
2.1.10 Piloting of Controlled and Rotational Grazing	0									
2.1.10 (1) Development of Operational Protocols and Manuals	4									
2.1.10 (2) Working with Herders Communities and Development of Controlled and Rotational Grazing System	48									
2.1.11 Awareness Programme	91									
2.1.12 Research in Grassland Conservation	79									
a) Testing effectiveness and environmental and health impacts of different methods of controlling weeds	24									
b) Piloting the use of low-cost technologies for improving livestock grazing system, grass cutting, transporting etc	36									
c)Assessment and valuation of ecosystem goods and services of grasslands in the State	36									
d) Assessing the impact of livestock grazing on grassland productivity and biodiversity	36									
e) Prepare socio-economic and ecological atlas of vidis of Saurashtra region	24									
f) Preparing State Livestock Grazing Policy	24									
g) Economic analysis of grass collection and distribution policy	24									
h) Documentation of good grassland and gaucher management practices in State	24									
	0									
2.2 Restoration of Wetlands	0									

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
2.2.1 Preparatory Works	0									
2.2.1 (1) Preparation of Landscape Map	19									
2.2.1 (2) Site Selection and Verification including Mapping	6									
2.2.1 (3) Stakeholder Consultation	6									
2.2.1 (4) Identification / Formation of EDCs	6									
2.2.1 (5) Preparation of Micro Plan including Treatment Plan and Approval	6									
2.2.1 (6) Community Development Fund: Implementation of Micro Plan based Community Development Activ	3									
2.2.1 (6) Selection and Engagement of Community Facilitator	48									
2.2.2 Removal of weeds (Reed)	0									
2) Batch 1	3									
3) Batch 2	3									
4) Batch 3	3									
5) Batch 4	3									
2.2.3 Weed Removal (Prosopies and others)	0									
2) Batch 1	5									
3) Batch 2	5									
4) Batch 3	5									
5) Batch 4	5									
2.2.4 Bank Restoration for Controlling Soil Erosion (Nadabet Wetland)	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
2.2.5 Creating/Maintenance of Raised Platforms in Wetlands (earth work)	0									
(1) Creation of Mound (25m x 25m x 2.5m)										
1) Batch 1 (10 platforms)	3									
2) Batch 2 (10 platforms)	3									
3) Batch 3 (15 platforms)	3									
(2) Creation of Mound (50m x 50m x 2.5m)	0									
1) Batch 1 (5 platforms)	3									
2) Batch 2 (5 platforms)	3									
3) Batch 3 (5 platforms)	3									
4) Batch 4 (5 platforms)	0									
5) Batch 5 (5 platforms)	0									
(3) Stone Pitching Around Mound (25x 25x2.5)	0									
1) Batch 1 of size (25x 25x3) (10 platforms)	3									
2) Batch 2 of size (25x 25x3) (10 platforms)	3									
3) Batch 3 of size (25x50x2.5) (15 platforms)	3									
(4) Stone Pitching Around Mound (50x50x2.5)	0									
1) Batch 1 of size (50x50x2.5) (5 platforms)	3									
2) Batch 2 of size (50x50x2.5) (5 platforms)	3									
3) Batch 3 of size (50x50x2.5) (5 platforms)	3									
4) Batch 4 of size (50x50x2.5) (5 platforms)	0									
5) Batch 5 of size (50x50x2.5) (5 platforms)	0									
2.2.6 Plantation of Nnative Trees	0									
1) Batch 1	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	0									
2) Batch 2	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									

Annexure 10: Detailed Implementation Schedule

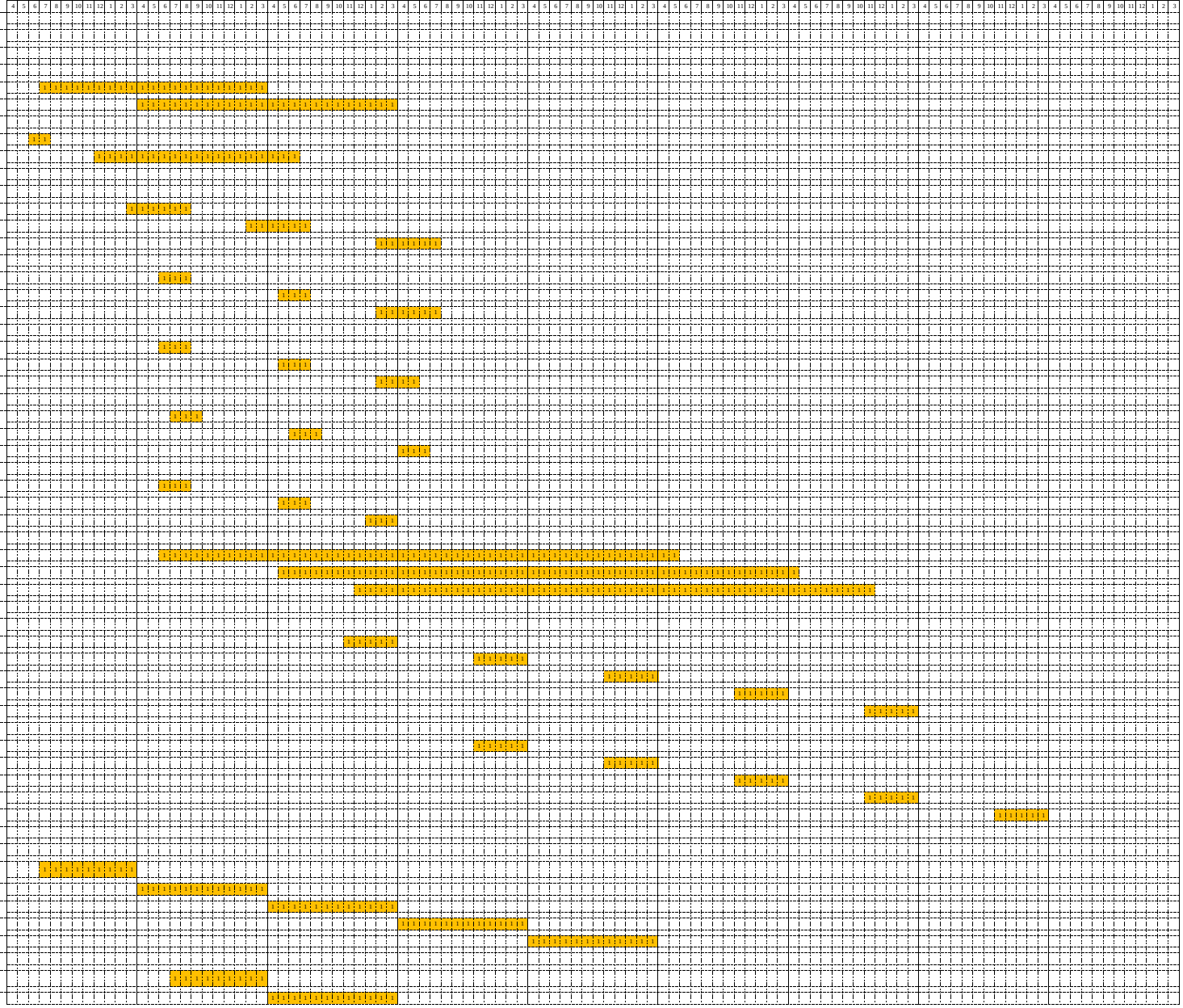
	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
e) 4th year maintenance work	12									
3) Batch 3	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
4) Batch 4	0									
a) 0' Year Operations (Advance Action Works)	0									
b) 1st year plantation work	0									
c) 2nd year maintenance work	0									
d) 3rd year maintenance work	0									
e) 4th year maintenance work	0									
2.2.7 Develop Solid Waste Collection and Disposal System	36									
2.2.8 Boundary Demarcation at Nadabet and Chharidand Wetlands	0									
1) Batch 1	6									
2) Batch 2	6									
2.2.9 Mainstreaming of Wetlands										
(1) Preparation of Wetland Brief Document & Integrated Wetland Management Plan as per Wetland Rules 2017	12									
(2) Implementation of Wetland Management Plan	48									
2.2.10 Preparation of World Heritage Site Dossiers	24									
2.2.11 Preparation Ramsar Sites Dossiers	24									
2.2.12 Livelihood Enhancement for Wetland Ecosystem	0									
2.2.12 (1) Promotion of Micro Enterprise in Wetland Ecosystem	48									
2.2.12 (2) Community Based Revolving Fund (for Micro Enterprise Development)	3									
2.2.12 (3) Cluster level micro enterprise and value chain development	0									
a. Scoping studies for selection of products and clusters	6									
b. Engagement of Resource institutions and hand holding of CLO	54									
c. Cluster Development Fund	6									
2.2.13 Eco-Tourism	0									
2.2.13 (1) Identification of the Site and Feasibility assessment of potential sites	3									
2.2.13 (2) Formation/re organisation of eco tourism development committees	2									
2.2.13 (3) Preparation of eco tourism development plan	3									
2.2.13 (4) Implementation of planned activities	48									
2.2.13 (5) Technical training (hospitality, guide, catering etc.)	9									
2.2.13 (6) Support for Eco Tourism Related Micro Enterprise	40									
2.2.13 (7) Support for promotion and marketing (design of website/promotion material/participation in travel/tr	40									
2.2.13 (8) Capacity Building for ETDCs	0									
2.2.13 (8) 1) Staff Support for three years	36									
2.2.13 (8) 2) ETDC Fund	36									
2.2.13 (8) 3) Partnership Facilitation Fund	36									
2.2.14 Awareness Programme	36									
2.2.15 Research & Monitoring	36									
	0									
2.3 Restoration of Degraded Forests	0									
2.3.1 Preparatory work	0									
2.3.1 (1) Landscape Mapping	12									
2.3.1 (2) Finalisation of the Site Selection Criteria	1									
2.3.1 (3) Scoping of the Project Sites and Site Verification	6									
2.3.2 Village/site Selection	0									
2.3.2 (1) Consultative meetings with villages of candidate forest sites to take community agreement /willingness for forest management and JFMC formation	0									
1) Batch 1	3									
2) Batch 2	3									

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
3) Batch 3	3									
2.3.2 (2) Formation and re-formation of the JFMC	2									
1) Batch 1	3									
2) Batch 2	6									
3) Batch 3	0									
2.3.2 (3) Finalisation of the Project sites /villages	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
2.3.2 (4) Preparation of Micro Plan including Treatment Plan and Approval	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
2.3.2 (5) Community Development Fund: Implementation of Community Development Activities includi	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
2.3.2 (6) Engagement of Community Facilitator	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
2.3.3 Degraded Forest Plantation & Maintenance Work	0									
1) Batch 1	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	0									
2) Batch 2	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
3) Batch 3	0									
a) 0' Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
2.3.4 Livelihood Strengthening	0									
2.3.4 (1) Promotion of Micro Enterprise for Degraded Forest Landscape	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
2.3.4 (2) Community Based Revolving Fund (for Micro Enterprise Promotion)	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
2.3.4 (3) Cluster Level Micro Enterprise and Value Chain Development	0									
a. Scoping Studies for Selection of Products and Clusters	6									
b. Engagement of Resource institutions and hand holding of CLO	54									
c. Cluster Development Fund	6									
2.3.5 Awareness Programme	87									
2.3.6 Solar Energy Pilot Initiative	8									
2.3.7 Plantation Related Research	48									

Annexure 10: Detailed Implementation Schedule

	Month
	0
Component 3. Managing Human Wildlife Conflicts	0
3.1 Preparatory Activities	0
3.1.1 Habitat Mapping	0
1) Batch 1	21
2) Batch 2	24
3.1.2 Identification of the Potential Sites for Project Interventions and Site Verification	0
3.1.2 (1) Finalisation of the Site Selection Criteria	2
3.1.2 (2) Scoping of the Project Sites and Site Verification	19
3.1.2 (3) Village Selection	0
3.1.2 (3) 1) Consultative Meetings with Candidate Villages	0
1) Batch 1	6
2) Batch 2	6
3) Batch 3	6
3.1.2 (3) 2): Formation and Re-formation of JFMC/ EDC	0
1) Batch 1	3
2) Batch 2	3
3) Batch 3	6
3.1.2 (3) 3): Finalisation of the Project Sites/ Villages	0
1) Batch 1	3
2) Batch 2	3
3) Batch 3	4
3.1.3 (3) 4) Micro Plan Preparation Including Treatment Plan and Approval	0
1) Batch 1	3
2) Batch 2	3
3) Batch 3	3
3.1.3 (3) 5) Community Development Fund: Implementation of Community Development Activities including I	0
1) Batch 1	3
2) Batch 2	3
3) Batch 3	3
3.1.3 (3) 6) Selection and Engagement of Community Facilitators	0
1) Batch 1	48
2) Batch 2	48
3) Batch 3	48
3.2 Habitat improvement	0
3.2.1 Removal of Invasive Weeds	0
1) Batch 1	5
2) Batch 2	5
3) Batch 3	5
4) Batch 4	5
5) Batch 5	5
3.2.2 Follow Up of Weed Removal for Subsequent Year	0
1) Batch 1	5
2) Batch 2	5
3) Batch 3	5
4) Batch 4	5
5) Batch 5	5
3.2.3 Grove of Preferred Species as Habitat	0
1) Batch 1	0
a) 0' Year Operations (Advance Action Works)	9
b) 1st year plantation work	12
c) 2nd year maintenance work	12
d) 3rd year maintenance work	12
e) 4th year maintenance work	12
2) Batch 2	0
a) 0' Year Operations (Advance Action Works)	9
b) 1st year plantation work	12



Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
3) Batch 3	0									
a) 0 Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
4) Batch 4	0									
a) 0 Year Operations (Advance Action Works)	9									
b) 1st year plantation work	12									
c) 2nd year maintenance work	12									
d) 3rd year maintenance work	12									
e) 4th year maintenance work	12									
3.2.4 Soil Moisture Conservation Works	0									
1) Batch 1	7									
2) Batch 2	7									
3) Batch 3	7									
4) Batch 4	7									
5) Batch 5	7									
3.2.5 Promotion of Orchard for Corridor Enrichment	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
4) Batch 4	3									
5) Batch 5	3									
3.2.6 Development of Water Point Facilities for Wild Animal	0									
3.2.6 (1) Windmill/Solar Pump Driven Guzzler	0									
1) Batch 1	7									
2) Batch 2	7									
3) Batch 3	7									
3.2.6 (2) Manually Filled Water Points	0									
1) Batch 1	7									
2) Batch 2	7									
3) Batch 3	7									
3.2.6 (3) Additional Hand Pump for Manually Filled Water Points	0									
1) Batch 1	7									
2) Batch 2	7									
3) Batch 3	7									
3.3 Protection	0									
3.3.1 Fireline	0									
3.3.1.1 firelines (15 mt wide)	25									
3.3.1.2 firelines (8 mt wide)	25									
3.3.1.3 firelines watchers	0									
3.3.1.4 fire protection equipment	13									
3.3.1.5 exigency fund	0									
3.3.2 Establishment of Breeding Centre	0									
3.3.2 (1) Ungulate centre	0									
1) Batch 1	32									
2) Batch 2	32									
3.3.2 (2) Hare centre	0									
1) Batch 1	32									
2) Batch 2	32									
3) Batch 3	32									
3.3.2 (3) Red Jungle Fowl centre	0									
1) Batch 1	32									

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
2) Batch 2	32									
3) Batch 3	32									
3.4 Awareness Programme	78									
3.4.1 Nature Education	0									
3.4.1 (1) Preparation of Modules	0									
1) Batch 1	12									
2) Batch 2	12									
3) Batch 3	12									
3.4.1 (2) Training of Trainers	0									
1) Batch 1	4									
2) Batch 2	4									
3) Batch 3	4									
4) Batch 4	4									
3.4.1 (3) Nature Education Camps	0									
1) Batch 1	5									
2) Batch 2	5									
3) Batch 3	5									
4) Batch 4	5									
5) Batch 5	5									
3.4.2 Distance Learning (Software)	36									
3.4.3 Van Chetna Kedras (Software)	24									
3.4.4 Promote Partnership of NGOs and Volunteers	0									
1) Small grants	60									
2) Awards and recognition	60									
3.4.5 Eco-clubs	0									
1) Batch 1	60									
2) Batch 2	48									
3.4.6 Botanical Gardens (Bio Park)	0									
1) Batch 1	36									
2) Batch 2	36									
3.5 Wildlife Rescue	0									
3.5.1 Development of Rescue Centre	0									
1) Development of Rescue centre at Khodamba (Civil Work)	36									
2) Development of Rescue centre at Pavagadh (Civil Work)	36									
3) Development of Rescue centre at Vadodara (Civil Work)	36									
3.5.2 Quick Response Centre	0									
3.5.2 (1) Capital Cost for Quick Response Centre	0									
a) Batch 1	12									
b) Batch 2	12									
3.5.2 (2) Trucks for Quick Response Centre	0									
a) Batch 1	0									
b) Batch 2	6									
3.5.3 Capacity Building for Rescue Centre	6									
3.5.3 (1) Training of Trakers	0									
a) Batch 1	5									
b) Batch 2	5									
3.5.3 (2) Training in Immobilisation of Animals	0									
a) Batch 1	5									
b) Batch 2	5									
c) Batch 3	5									
d) Batch 4	5									
3.5.3 (3) Training to staff in Animal rescue	0									
a) Batch 1	5									
b) Batch 2	5									
c) Batch 3	5									
d) Batch 4	5									
3.6 Eco Tourism Promotion	0									

Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
3.6.1 Identification of the Sites and Feasibility Assessment of Potential Sites	3									
3.6.2 Consensus Building and Formation/Re Organisation of Eco Tourism Development Committees (ETDC)	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
3.6.3 Preparation of eco tourism development plan	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
3.6.4 Implementation of planned activities	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
3.6.5 Technical Training (hospitality, guide, catering etc.)	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
3.6.6 Support for Eco Tourism Related Micro Enterprise	0									
1) Batch 1	36									
2) Batch 2	36									
3) Batch 3	36									
3.6.7 Support for Promotion and Marketing (design of website/promotion material/participation in travel/trade fares)	75									
3.6.8 Capacity building for ETDCs	0									
3.6.8 (1) Staff Support (ETDC Management)	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
3.6.8 (2) ETDC Fund	0									
1) Batch 1	36									
2) Batch 2	36									
3) Batch 3	36									
3.6.8 (3) Partnership Facilitation Fund	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
3.7 Livelihood Enhancement for Areas affected by Human Wildlife Conflicts	0									
3.7.1 Promotion of Micro Enterprise for the Areas affected by Human Wildlife Conflict	0									
3.7.1 (1) Support for SHGs including Identification of SHGs	0									
1) Batch 1	48									
2) Batch 2	48									
3) Batch 3	48									
3.7.1 (2) Community Based Revolving Fund	0									
1) Batch 1	3									
2) Batch 2	3									
3) Batch 3	3									
3.7.2 Cluster Based Enterprise and Value Chain Development	0									
a. Scoping studies for selection of products and clusters	6									
b. Engagement of Resource institutions and hand holding of CLO	54									
c. Cluster Development Fund	6									
3.8 Strengthening of GEER foundation	0									
a) Sr. Scientist	66									
b)Equipments	0									
c) Black flash camera Traps (colour model)	12									
d) Night vision binoculars	12									
e) Point & Shoot bridge camera	12									
f) Handheld navigator with GPS & GLONASS	12									

Annexure 10: Detailed Implementation Schedule

| | Month | 2020 | | | | | | | | | | | | 2021 | | | | | | | | | | | | 2022 | | | | | | | | | | | | 2023 | | | | | | | | | | | | 2024 | | | | | | | | | | | | 2025 | | | | | | | | | | | | 2026 | | | | | | | | | | | | 2027 | | | | | | | | | | | | 2028 | | | | | | | | | | | |
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Annexure 10: Detailed Implementation Schedule

| | Month | 2020 | | | | | | | | | | | | 2021 | | | | | | | | | | | | 2022 | | | | | | | | | | | | 2023 | | | | | | | | | | | | 2024 | | | | | | | | | | | | 2025 | | | | | | | | | | | | 2026 | | | | | | | | | | | | 2027 | | | | | | | | | | | | 2028 | | | | | | | | | | | |
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Annexure 10: Detailed Implementation Schedule

	Month
Batch 3	2
4) Human Wildlife Conflict	0
Batch 1	2
Batch 2	2
Batch 3	2
4.3 GIS Technical Upgradation Training Overseas study Tour	0
4.3.1 Preliminary need Analysis	32
4.3.2 Oversea Training /Exposure Visit	32
4.3.3 Domestic Training in Gujarat	32
4.4 CSR/ Partnership Development	0
4.4.1 Pilot Project for Responsible Supply Chain Development with Private Partnership	0
4.4.1 (1) Identification of Cluster Producer Organisation	6
4.4.1 (2) Market Survey	6
4.4.1 (3) Situational Analysis	4
4.4.1 (4) Identification of the Buyer/ manufacturer	4
4.4.1 (5) Development of Project Plan and Signing of Tripartite Agreement	4
4.4.1 (6) Procurement and Engagement of NGO for Supporting Cluster Organisations	30
4.4.1 (7) Implementation of the pilot Project	28
4.4.2 Development of Green CSR Monitoring Platform	4
4.4.3 Networking Seminars for Green CSR	60
4.4.4 Publicity Video Preparation CSR/ Partnership Development/ Business Development	6
4.4.5 Public Awareness Creation on CSR/ Private Partnership	10
4.4.6 CSR/ Supply Chain Evaluation	6
4.5 Monitoring and Evaluation	0
4.5.1 (1) Long Term Landscape Monitoring	16
4.5.1 (2) Concurrent Monitoring and Periodic Reviews	0
a) Project Circle	82
b) PMU Executive Committee	29
c) Governing Body	14
d) HPSC	8
4.5.1 (3) MIS and Reporting System	9
4.5.1 (4) Technology based Monitoring - GIS applications	0
4.5.1 (4) 1) Prioritization of Target Mangrove Plantation Areas	32
4.5.1 (4) 2) Habitat Mapping	32
4.5.1 (4) 3) Drone based Plantation Monitoring	32
4.5.1 (4) 4) Cloud based Data Management and Monitoring	32
4.5.1 (4) 5) GIS/MIS enhancement	32
a) Equipment Procurement	32
b) Expansion of eGujForest Operation	32
c) Development of New GIS Modules for eGujForest	32
4.5.1 (4) 6) Institutional arrangement for GIS	73
4.5.1 (5) Annual Strategy Planning & Review Workshop	0
a) Circle	14
b) State	7
4.5.2 Impact Assessment	0
4.5.2 (1) Socio-economic Survey	0
a) Baseline Survey	6
b) Terminal Impact Survey	6
4.5.2 (2) Thematic and Short Studies	12
4.5.3 Audit	0
a) Statutory Audit	9
b) Concurrent Audit	17
4.5.4 Grievance Redressal, RTI and Public Disclosure	96
4.6 Environment and Social Consideration	96
4.6.1 Preparation of E&S Manual and Monitoring Plan	3
a) Environmental and Social Consideration Field Expert (ESCFE)	12
4.6.2 Monitoring	32

Annexure 10: Detailed Implementation Schedule

| | Month | 2020 | | | | | | | | | | | | 2021 | | | | | | | | | | | | 2022 | | | | | | | | | | | | 2023 | | | | | | | | | | | | 2024 | | | | | | | | | | | | 2025 | | | | | | | | | | | | 2026 | | | | | | | | | | | | 2027 | | | | | | | | | | | | 2028 | | | | | | | | | | | |
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Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
(i) key staff at all Division offices (On contract) (Total Division offices : 27)	0									
a) Divisional Project Manager (NRM)	96									
b) Divisional Project Manager (Livelihoods & Convergence)	96									
c) Divisional Project Accountant	96									
(ii) Support staff at all Division offices (On outsourcing basis) (Total division offices : 27)	0									
a) Computer Operators	96									
b) Drivers	96									
4.7.3 (2).Office Equipment/ Office automation/ Gadgets and others	0									
a) Laptop	3									
b) Computer	3									
c) Multidisciplinary Printer with function such as photocopy and scanning	3									
d) Office furniture (set of Table and Chair)	3									
4.7.4 . Strengthening of Range Office	0									
4.7.4 (1) Human resource support to Range office (Fulltime positions) (On Contract) (for all Range Offices: 114)	0									
a) Range Project Assistant (Livelihoods & Convergence)	96									
b) Range Community Mobilizer	96									
4.7.4 (2) Office Equipment/ Office automation/ Gadgets and others (for all Range Offices: 114)	0									
a) Laptop	3									
b) Computer	3									
c) Multidisciplinary Printer with function such as photocopy and scanning	3									
d) Office furniture (set of Table and Chair)	3									
4.8 Publicity and Communication	0									
4.8.1 Communication and Publicity	96									
4.8.2 Support for GFD on Information, Education and Communication	12									
	0									
Component NE: Administration Cost	0									
5.1. Administration Cost of PMU	0									
5.1.1 PMU Staffing (Deputation from GFD)	0									
5.1.1 (1) Key staff (Fulltime position)	0									
a) Chief Project Director (Rank :APCCF & above)	96									
5.1.1 (2) Administration, Finance, Budget & Audits (Fulltime position)	0									
a) Project Director (Rank: CF/ CCF)	96									
b) Finance Officer (GFD/ Directorate of Accounts & Treasuries (DAT))	96									
c) Head Clerk	96									
d) Accountants	96									
5.1.1 (3) M&E and Institutional Strengthening	0									
a) Project Director (Rank: CF/ CCF) (Fulltime position)	96									
b) Assistant Director (GIS) (Rank: ACF) (Part-time position)	96									
5.1.1 (4) Coordination and Implementation (Fulltime position)	0									
a) Project Director (Rank: CCF)	96									
b) Deputy Director (Wildlife) (Rank: Sr. DCF)	96									
c) Assistant Director (HWCM) (Rank:ACF)	96									
d) Deputy Director (Ecosystem Management) (Rank: DCF)	96									
5.1.1 (5) CSR and Livelihoods (Fulltime Position)	0									
a) Deputy Director (CSR & Livelihoods) (Rank: Sr. DCF)	96									
5.1.2 PMU Office expense (tea/coffee/ stationary etc.)	96									

Annexure 10: Detailed Implementation Schedule

| | Month | 2020 | | | | | | | | | | | | 2021 | | | | | | | | | | | | 2022 | | | | | | | | | | | | 2023 | | | | | | | | | | | | 2024 | | | | | | | | | | | | 2025 | | | | | | | | | | | | 2026 | | | | | | | | | | | | 2027 | | | | | | | | | | | | 2028 | | | | | | | | | | | |
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Annexure 10: Detailed Implementation Schedule

	Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
5.7.9 Strengthening of Communication unit of GFD	0									
5.7.9.(1) staff - Communication expert	72									
5.7.10 Staff for Rescue Centre	0									
a) Range Forest Officer	84									
b) Forester	60									
c) Animal keeper	60									
d)veterinary officer full time	48									
e) veterinary assistant	48									
5.7.11 Staff for quick response Centre	0									
1) Batch 1	0									
a) Forester	72									
b) Driver	72									
c) Tracker	72									
2) Batch 2	0									
a) Forester	60									
b) Driver	60									
c) Tracker	60									
5.7.12 Rescue centre at Khodamba and Pavagadh -0&M expense for 4 years each for both	48									
5.7.13 Rescue centre at Vadodara - 0&M expense for 4 years	48									
5.7.14 Field Centres -0&M expense for 4 years for 6 no. field centres	48									
	0									
	0									

Annexure 11: Detailed Implementation and Procurement Methods

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
	Establishment of PMU	GFD	GFD	By Registration
	Establishment of Project management Units at Circle, Division, Range	GFD/ PMU	PMU	By Government Order/ Notification
Component 1: Development of Ecological Infrastructure in Coastal Area				
1.1	Preparatory work			
1.1.1	Preparation of Landscape Map	PMU	PMU/ PMC/ Contractor	Local competitive bidding
1.1.2	Site Identification	DMU	DMU/ FMU/ PMU/ Gram Panchayat	Direct Implementation
1.1.3	Preparation of Field Maps	DMU	DMU/ FMU	Direct Implementation
1.1.4	Consultation with Gram Panchayat and Preparation of Micro Plan including Treatment Plan	DMU	FMU/ DMU/ Gram Panchayat	Direct Implementation
1.1.5	Selection of site for Mangrove Nursery	DMU	FMU/DMU/ Gram Panchayat	Direct Implementation
1.1.6	Collection of Seed Material	DMU	FMU/ Gram Panchayat/ Contractor	Direct Implementation/ Direct Contract by Quotation/ MOU with Gram Panchayat
1.2	Plantation of Mangroves			
1.2.1	Nursery Works	DMU	FMU/ Gram Panchayat/ Contractor	Direct Implementation/ Direct Contract by Quotation/ MOU with Gram Panchayat
1.2.2	Raised bed plantation	DMU	FMU/ Gram Panchayat/ Contractor	Direct Implementation/ Direct Contract by Quotation/ MOU with Gram Panchayat
1.2.3	Nursery raised plantation			
1.3	Plantation of Mangrove Associated Species	DMU	FMU/ Gram Panchayat/ Contractor	Direct Implementation/ Direct Contract by Quotation/ MOU with Gram Panchayat
1.4	Coastal Shelter-Belts (with SMC)	DMU	FMU/ Gram Panchayat/ Contractor	Direct Implementation/ Direct Contract by Quotation/ MOU with Gram Panchayat
1.5	Community Development Activities	DMU	Gram Panchayat (Village Organisation)/ FMU/ DMU	MOU with Gram Panchayat

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
1.6	Awareness	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU or Contract/ Local competitive bidding/ Direct Procurement by Quotation
1.7	Research studies	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU or Contract/ Local competitive bidding/ Direct Procurement by Quotation
Component 2: Development of Ecological Infrastructure in Inland Area				
2.1	Restoration of Grassland	DMU		Local Competitive Bidding or Direct Procurement by Quotation
2.1.1	Preparatory work			
2.1.1.(1)	Preparation of Landscape Map	PMU	PMU/ PMC/ Contractor	Local competitive bidding
2.1.1(2)	Preparation of guideline /framework for vidi selection	PMU	PMU/ DMU/ PMC	Direct Implementation
2.1.1 (3)	Training of Trainers for FD staffs on Project Interventions (specific to vidi project interventions)	PMU	PMU/ DMU/ PMC	Direct Implementation
2.1.2	Community mobilization and vidi selection			
2.1.2 (1)	Consultative meetings with villages of candidate vidis	DMU	RMU/ DMU	Direct Implementation
2.1.2 (2)	Preparation of final list of vidis/villages	DMU	RMU/ DMU	Direct Implementation
2.1.2 (3)	Preparation of Micro Plan including Treatment Plan and Approval	DMU	JFMC/ EDC/ RMU/ DMU/ PMC	Direct Implementation
2.1.2 (4)	Community development Fund: Implementation of Micro Plan based community development activities and EPA	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.1.2 (5)	Engagement of Community Facilitator	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.1.3	Removal of weeds	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.4	Fencing in Grasslands before grass development	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
	works			Procurement by Quotation
2.1.4 (1)	Stone wall/ rubble wall	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.4 (2)	Protection trench	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.4 (3)	Barbed wire fence	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.5	Grassland plantation - rainfed with SMC	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.6	Grassland plantation - rainfed without SMC	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.7	Grassland plantation - Irrigated	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.8	Fireline/ pathways creation	DMU	Contractor/ JFMC/ EDC/ RMU	Local Competitive Bidding or Direct Procurement by Quotation
2.1.9	Promotion of Micro Enterprise for Grassland Landscape			
2.1.9 (1)	Support for SHG based Micro Enterprise	DMU/ CCSU/ PMU	GLPC/ PMC	MOU
2.1.9 (2)	Community based revolving fund	DMU/ CCSU/ PMU	PMU/ PMC/ JFMC/ EDC	Direct Implementation
2.1.9 (3)	Cluster Development for Grassland Landscape			
2.1.9 (3) a.	Scoping studies for selection of products and clusters	PMU	Resource Organisation/ PMC	Local Competitive Bidding or Direct Procurement by Quotation
2.1.9 (3) b.	Engagement of Resource institutions and hand holding of CLO	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.1.9 (3) c.	Cluster Development Fund	PMU	PMU/ PMC/ Cluster Organisations	Direct Implementation/ MOU with Cluster Organisations

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
2.1.10	Piloting of controlled and rotational grazing	DMU	JFMC/ EDC/ RMU/ PMC	Direct Implementation/ MOU with JFMC/ EDC
2.1.11	Development of operational protocols and manuals	PMU	PMU/ PMC	Direct Implementation
2.2	Restoration of Wetland			
2.2.1	Preparatory Works			
2.2.1 (1)	Preparation of Landscape Map	PMU	PMU/ PMC/ Contractor	Local competitive bidding
2.2.1 (2)	Site Selection and Verification including Mapping	PMU	DMU/ RMU/ PMU/ PMC	Direct Implementation
2.2.1 (3)	Stakeholder Consultation	DMU	RMU/ DMU	Direct Implementation
2.2.1 (4)	Identification / Formation of EDCs	DMU	RMU/ DMU	Direct Implementation
2.2.1 (5)	Preparation of Micro Plan and including Treatment Plan where applicable and Approval	PMU	EDC/ RMU/ DMU/ PMC	Direct Implementation
2.2.1 (6)	Community Development Fund: Implementation of Micro Plan based Community Development Activities and EPA	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.2.1 (7)	Engagement of Community Facilitator	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.2.2	Removal of weeds (Reed)	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.3	Weed Removal (Prosopies and others)	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.4	Bank restoration/ Earthen bund of 15 km length (2.0x2.5 mtr)	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.5	Creating/maintenance of raised platforms in wetlands (earth work)	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.6	Plantation of native trees in supralittoral zone and development of groves	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.7	Develop solid waste collection and disposal system in 6 villages of	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
	Nalsarovar			Quotation
2.2.8	Boundary demarcation at Nadabet and Charizard wetland	DMU/ CCSU/ PMU	DMU/ RMU	Direct Implementation
2.2.9	Mainstreaming of Wetlands			
(1)	Preparation of wetland brief document & Integrated Wetland Management Plan as per Wetland Rules 2017	PMU	Resource Organisation/ PMC	Local Competitive Bidding
(2)	Implementation of wetland management plan	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.2.10	Preparation of World Heritage Site Dossiers	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.2.11	Preparation of Ramsar Sites Dossiers	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.2.12	Livelihood Enhancement for Wetland Ecosystem			
2.2.12 (1)	Promotion of SHG based Micro Enterprise in Wetland Ecosystem	DMU/ CCSU/ PMU	GLPC/ PMC	Single Source Hiring with MOU
2.2.12 (2)	Community based revolving fund	DMU/ CCSU/ PMU	PMU/ PMC/ JFMC/ EDC	Direct Implementation
2.2.12 (3)	Cluster level micro enterprise and value chain development			
2.1.12 (3) a.	Scoping studies for selection of products and clusters	PMU	Resource Organisation/ PMC	Local Competitive Bidding or Direct Procurement by Quotation
2.1.12 (3) b.	Engagement of Resource institutions and hand holding of CLO	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.1.12 (3) c.	Cluster Development Fund	PMU	PMU/ PMC/ Cluster Organisations	Direct Implementation/ MOU with Cluster Organisations
2.2.13	Eco-Tourism			
2.2.13 (1)	Identification of the Site and Feasibility assessment of potential sites	PMU	Resource Organisation/ DMU/ RMU	Local Competitive Bidding
2.2.13 (2)	Formation/re organisation of eco tourism development committees	PMU	Resource Organisation/ DMU/ RMU	Direct Implementation
2.2.13 (3)	Preparation of eco tourism development plan	PMU	ETDC/ Resource Organisation/ DMU/ RMU	Direct Implementation

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
2.2.13 (4)	Implementation of planned activities	ETDC	ETDC/ DMU/ RMU	Direct Implementation/ Direct Procurement by Quotation
2.2.13 (5)	Technical training (hospitality, guide, catering etc.)	DMU/ CCSU/ PMU	Resource Organisation	Local Competitive Bidding/ Direct Procurement by Quotation
2.2.13 (6)	Support for Eco Tourism Related Micro Enterprise	PMU	GLPC/ PMC	Single Source Hiring with MOU
2.2.13 (7)	Support for promotion and marketing (design of website/promotion material/participation in travel/trade fares)	PMU	Resource Organisation/ PMC/ PMU	Direct Implementation/ Local Competitive Bidding/ Direct Procurement by Quotation
2.2.13 (8)	Capacity Building for ETDCs			
2.2.13 (8) 1)	Staff support (ETDC management functions)	DMU	DMU	Direct Implementation/ Local Recruitment
2.2.13 (8) 2)	ETDC Fund	PMU	PMU/ PMC	Direct Implementation
2.2.13 (8) 3)	Partnership Facilitation Fund	PMU	DMU/ PMU	Direct Implementation
2.2.14	Awareness Programme	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU/ Contract/ Local competitive bidding/ Direct Procurement by Quotation
2.2.15	Research	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU/ Contract/ Local competitive bidding/ Direct Procurement by Quotation
2.3	Restoration of Degraded Forests			
2.3.1	Preparatory work			
2.3.1 (1)	Landscape Mapping	PMU	PMU/ PMC/ Contractor	Local competitive bidding
2.3.1 (2)	Finalisation of the Site Selection Criteria	PMU	PMU/ DMU/ RMU/ PMC	Direct Implementation
2.3.1 (3)	Scoping of the Project Sites and Site Verification	PMU	PMU/ DMU/ RMU/ PMC	Direct Implementation
2.3.2	Village/site Selection			
2.3.2 (1)	Consultative meetings with villages of candidate forest sites to take community agreement /willingness for forest	DMU	RMU/ DMU	Direct Implementation

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
	management and JFMC formation			
2.3.2 (2)	Formation and re-formation of JFMC	DMU	RMU/ DMU	Direct Implementation
2.3.2 (3)	Finalisation of the Project sites /villages	DMU	RMU/ DMU	Direct Implementation
2.3.2 (4)	Preparation of Micro Plan including Treatment Plan and Approval	DMU	JFMC/ EDC/ RMU/ DMU/ PMC	Direct Implementation
2.3.2 (5)	Community Development Fund: Implementation of Community Development activities including EPA	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.3.2 (6)	Engagement of Community Facilitator	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
2.3.3	Degraded Forest Plantation & Maintenance Work	DMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
2.3.4	Livelihood Strengthening			
2.3.4 (1)	Promotion of Micro Enterprise for Degraded Forest Landscape	DMU/ CCSU/ PMU	GLPC/ PMC	Single Source Hiring with MOU
2.3.4 (2)	Community based revolving fund	DMU/ CCSU/ PMU	PMU/ PMC/ JFMC/ EDC	Direct Implementation
2.3.4 (3)	Cluster level micro enterprise and value chain development			
2.3.4 (3) a.	Scoping studies for selection of products and clusters	PMU	Resource Organisation/ PMC	Local Competitive Bidding or Direct Procurement by Quotation
2.3.4 (3) b.	Engagement of Resource institutions and hand holding of CLO	PMU	Resource Organisation/ PMC	Local Competitive Bidding
2.3.4 (3) c.	Cluster Development Fund	PMU	PMU/ PMC/ Cluster Organisations	Direct Implementation/ MOU with Cluster Organisations
2.3.5	Awareness Programme	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU/ Contract/ Local competitive bidding/ Direct Procurement by Quotation
2.3.6	Solar energy pilot initiative	DMU/ RMU	RMU/ DMU/ JFMC/ Beneficiary Households/ Gujarat Energy Development Agency	Direct Implementation/ MOU

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
2.3.7	Plantation related research	PMU	Resource Organisation/ PMC	Single Source Hiring with MOU/ Contract/ Local competitive bidding/ Direct Procurement by Quotation
Component 3 Human Wildlife Conflict Management				
3.1	Preparatory Activities			
3.1.1	Habitat Mapping	PMU	PMU/ PMC/ Contractor	Local competitive bidding
3.1.2	Identification of the Potential Sites for Project Interventions and Site Verification	PMU/ DMU	DMU/ RMU/ PMC	Direct Implementation
3.1.2 (1)	Finalisation of the Site Selection Criteria	PMU/ DMU	DMU/ RMU/ PMC	Direct Implementation
3.1.2 (2)	Scoping of the Project Sites and Site Verification	PMU/ DMU	DMU/ RMU/ PMC	Direct Implementation
3.1.2 (3)	Village/site Selection	DMU	RMU/ DMU/ PMC	Direct Implementation
3.1.2 (3) 1)	Consultative Meetings with Candidate Villages	DMU	RMU/ DMU	Direct Implementation
3.1.2 (3) 2)	Formation and Re-formation of JFMC/ EDC	DMU	RMU/ DMU	Direct Implementation
3.1.2 (3) 3)	Finalisation of the Project Sites/ Villages	DMU	RMU/ DMU	Direct Implementation / Direct Procurement by Quotation
3.1.2 (3) 4)	Micro plan preparation and approval	DMU	JFMC/ EDC/ RMU/ DMU/ PMC	Direct Implementation/ Direct Procurement by Quotation
3.1.2 (3) 5)	Community Development Fund: Implementation of Community Development activities including EPA	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
3.1.2 (3) 6)	Selection and Engagement of Community Facilitator	DMU	JFMC/ EDC/ RMU/ DMU	Direct Implementation
3.2	Habitat improvement			
3.2.1	Removal of invasive weeds	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.2	Follow up of weed removal for subsequent year	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.3	Grove of Preferred Species as Habitat	DMU	Contractor	Local Competitive Bidding or Direct Procurement by

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
				Quotation
3.2.4	Soil Moisture Conservation Works	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.5	Corridor Enrichment	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.6	Development of Water Point Facilities for Wild Animal	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.6 (1)	Windmill/Solar Pump Driven Guzzler	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.6 (2)	Manually Filled Water Points (Capital Cost)	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.2.6 (3)	Additional Hand Pump for Manual Points	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3	Protection			
3.3.1	Fire line	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.1 (1)	fire lines (15 mt wide)	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.1 (2)	fire lines (8 mt wide)	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.1 (3)	fire lines watchers	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.1 (4)	fire protection equipment	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.1 (5)	Exigency fund	PMU	PMU/ GFD	Direct Implementation
3.3.2	Establishment of Breeding Centre	DMU	Contractor	Local Competitive Bidding or Direct

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
				Procurement by Quotation
3.3.2 (1)	Ungulate centre	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.2 (2)	Hare centre	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.3.2 (3)	Red Jungle Fowl centre	DMU	Contractor	Local Competitive Bidding or Direct Procurement by Quotation
3.4	Awareness raising programs			
3.4.1	Nature Education			
3.4.1 (1)	Preparation of modules	PMU	GFD	Direct Implementation/ Local Competitive Bidding or Direct Procurement by Quotation
3.4.1 (2)	Training of Trainers	PMU	GFD	Direct Implementation/ Local Competitive Bidding or Direct Procurement by Quotation
3.4. 1 (3)	Nature education camps	PMU	GFD/ DMU	Direct Implementation/ Local Competitive Bidding or Direct Procurement by Quotation
3.4.2	Distance Learning (Software)	PMU	GEER Foundation	Single Source Hiring with MOU
3.4.3	Van Chetna Kedras (Software)	PMU	GFD/ DMU/ FMU	Direct Implementation/ Direct Procurement by Quotation
3.4.4	Promote Partnership of NGOs and Volunteers	PMU	GFD/ DMU	Direct Implementation
3.4.5	Eco-clubs	PMU	GEER Foundation	MOU
3.4.6	Botanical Gardens (Bio Park)	PMU	Contractor	Local Competitive Bidding
3.5	Wildlife Rescue			
3.5.1	Development of Rescue Centre	DMU/ GFD	Contractor	Local Competitive Bidding
3.5.1 1)	Development of Rescue centre at Khodamba (Civil Work)	DMU/ GFD	Contractor	Local Competitive Bidding

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
3.5.1 2)	Development of Rescue centre at Pavagadh (Civil Work)	DMU/ GFD	Contractor	Local Competitive Bidding
3.5.1 3)	Development of Rescue centre at Vadodara (Civil Work)	DMU/ GFD	Contractor	Local Competitive Bidding
3.5.2	Quick Response Centre			
3.5.2 (1)	Capital cost for quick response centre	DMU/ GFD	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
3.5.2 (2)	Trucks for quick response centre	DMU/ GFD	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
3.5.3	Capacity Building for Rescue Centre			
3.5.3 (1)	Training of trakers	DMU/ GFD	GFD/ Resource Persons/ PMC	Single Source Hiring with Contract
3.5.3 (2)	Training in immobilisation of Animals	DMU/ GFD	GFD/ Resource Persons/ PMC	Single Source Hiring with Contract
3.5.3 (3)	Training to staff in Animal Rescue Centre	DMU/ GFD	GFD/ Resource Persons/ PMC	Single Source Hiring with Contract
3.6	Eco Tourism Promotion			
3.6.1	Identification of the Sites and Feasibility assessment of potential sites	PMU	Resource Organisation/ DMU/ RMU	Local Competitive Bidding
3.6.2	Consensus Building and Formation/re organisation of eco tourism development committees	PMU	Resource Organisation/ DMU/ RMU	Direct Implementation
3.6.3	Preparation of eco tourism development plan	PMU	ETDC/ Resource Organisation/ DMU/ RMU	Direct Implementation
3.6.4	Implementation of planned activities	ETDC	ETDC/ DMU/ RMU	Direct Implementation/ Direct Procurement by Quotation
3.6.5	Technical training (hospitality, guide, catering etc.)	DMU/ CCSU/ PMU	Resource Organisation	Local Competitive Bidding/ Direct Procurement by Quotation
3.6.6	Support for Eco Tourism Related Micro Enterprise	PMU	GLPC/ PMC	Single Source Hiring with MOU
3.6.7	Support for promotion and marketing (design of website/promotion material/participation in travel/trade fares)	PMU	Resource Organisation/ PMC/ PMU	Direct Implementation/ Local Competitive Bidding/ Direct Procurement by Quotation

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
3.6.8	Capacity Building for ETDCs			
3.6.8 (1)	Staff support (ETDC management functions)	DMU	DMU	Direct Implementation/ Local Recruitment
3.6.8 (2)	ETDC Fund	PMU	PMU/ PMC	Direct Implementation
3.6.8 (3)	Partnership Facilitation Fund	PMU	DMU/ PMU	Direct Implementation
3.7	Livelihood Enhancement for Areas affected by Human Wildlife Conflicts			
3.7.1	Promotion of Micro Enterprise for the Areas affected by Human Wildlife Conflict			
3.7.1 (1)	Support for Micro Enterprise for the areas affected by Human Wildlife Conflict	DMU/ CCSU/ PMU	GLPC/ PMC	Single Source Hiring with MOU
3.7.1 (2)	Community based revolving fund	DMU/ CCSU/ PMU	PMU/ PMC/ JFMC/ EDC	Direct Implementation
3.7.2	Cluster Development			
3.7.2 a.	Scoping studies for selection of products and clusters	PMU	Resource Organisation/ PMC	Local Competitive Bidding or Direct Procurement by Quotation
3.7.2 b.	Engagement of Resource institutions and hand holding of CLO	PMU	Resource Organisation/ PMC	Local Competitive Bidding
3.7.2 c.	Cluster Development Fund	PMU	PMU/ PMC/ Cluster Organisations	Direct Implementation/ MOU with Cluster Organisations
3.8	Strengthening of GEER foundation			
a)	Sr. Scientist	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
b)	Equipment	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
c)	Back flash camera Traps (colour model)	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
d)	Night vision binoculars	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
e)	Point & Shoot bridge camera	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
f)	Handheld navigator with GPS & GLONASS	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
g)	Tablet for Field data collection	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
h)	Laptop	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
i)	Tenting equipment	PMU	GEER Foundation	Direct Procurement/ Direct Procurement by Quotation
3.9	Research Projects	PMU	PMU/ GFD/ Geer Foundation	Direct Implementation / Single Source Hiring with MOU or by Contract
Component 4 Institutional Strengthening				
4.1	Preparation of Manuals and Guidelines			
4.1.1	Operation Manual for the PMU	PMU	PMU/ PMC	Direct Implementation
4.1.2	Guidelines on Entry Point Activities	PMU	PMU/ PMC	Direct Implementation
4.1.3	Handbook for Community Facilitators	PMU	PMU/ PMC	Direct Implementation
4.1.4	Micro Planning and Implementation Manual including formats for Each Ecosystem	PMU	PMU/ PMC	Direct Implementation
4.1.5	Community Organisation Management Manual (for JFMC/ EDC/ ETDC)	PMU	PMU/ PMC	Direct Implementation
4.1.6	Community Revolving Fund (for JFMC/ EDC)	PMU	PMU/ PMC	Direct Implementation
4.1.7	Community Based Eco-Tourism Development Manual including Operation Manual for Corpus Fund	PMU	PMU/ PMC	Direct Implementation
4.1.8	Operation Manual for Cluster Development Fund	PMU	PMU/ PMC	Direct Implementation
4.1.9	Manual for Green CSR/ Partnership	PMU	PMU/ PMC	Direct Implementation
4.1.10	Micro Enterprise Development and Cluster Development	PMU	PMU/ PMC	Direct Implementation
4.2	Capacity Development			
4.2.1	Training Needs Assessment	PMU	PMU/ Resource Organisation	Direct Implementation/ Direct Procurement by

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
				Quotation/ Single Source Hiring by Contract
4.2.2	Development of Capacity Development Strategy	PMU	PMU/ Resource Organisation	Direct Implementation/ Direct Procurement by Quotation/ Single Source Hiring by Contract
4.2.3	Preparation of Annual Training Calendar	PMU	PMU	Direct Implementation
4.2.4	Training			
4.2.4 (1)	Orientation	PMU	PMU/ PMC	Direct Implementation
4.2.4 (2)	Training			
4.2.4 (2) 1)	PMU	PMU	PMU/ Resource Person/ PMC	Direct Implementation/ Single Source Hiring by Contract
4.2.4 (2) 2)	CCMU	PMU	PMU/ Resource Person/ PMC	Direct Implementation/ Single Source Hiring by Contract
4.2.4 (2) 3)	DMU	PMU	PMU/ Resource Person/ PMC	Direct Implementation/ Single Source Hiring by Contract
4.2.4 (2) 4)	FMU	PMU	CCSR/ DMU/ Resource Organisation/ PMC	Direct Implementation/ Direct Procurement by Quotation/ Local Competitive Bidding
4.2.4 (3)	Refresher Training for PMU/ CCMU/ DMU/ FMU			
4.2.5	Overseas Study Tour for PMU/DMU	PMU	PMU/ PMC	Direct Implementation
4.2.6	Exposure Vist - National/Outside State (RMU)	PMU	PMU/ PMC/ Resource Organisation	Direct Implementation/ Single Source Hiring with MOU or Contract
4.2.7	National Workshop	PMU	PMU/ PMC	Direct Implementation
4.2.8	Capacity Building for People's Organisations			
4.2.8 (1)	Training			
4.2.8 (1) 1)	Training for Community Facilitators	DMU/ PMU/ PMC	RMU/ DMU/ PMC/ Resource Persons	Direct Implementation/ Direct Procurement
4.2.8 (1) 2)	Micro Planning	DMU/ PMU/ PMC	RMU/ DMU/ PMC/ Resource Persons	Direct Implementation/ Direct Procurement
4.2.8 (1) 3)	Organisational Management	DMU/ PMU/	RMU/ DMU/ PMC/ Resource	Direct Implementation/ Direct Procurement

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
		PMC	Persons	
4.2.8 (2)	Exposure Visits for JFMC/ EDC/ ETDC	DMU/ CCSU/ PMU	DMU/ CCSU/ PMU	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation
4.3	GIS Technical Upgradation Training Overseas Study Tour			
4.3.1	Preliminary need Analysis	PMU/ PMC	PMU/ PMC	Direct Implementation
4.3.2	Oversea Training /Exposure Visit	PMU/ PMC	Resource Organisation/ PMU/ PMC	Direct Implementation/ Single Source Hiring by MOU or Contract/ Direct Procurement by Quotation
4.3.3	Domestic Training in Gujarat	PMU/ PMC	Resource Organisation/ PMU/ PMC	Direct Implementation/ Single Source Hiring by MOU or Contract/ Direct Procurement by Quotation
4.4	CSR/ Partnership Development			
4.4.1	Pilot Project for Responsible Supply Chain Development with Private Partnership			
4.4.1 (1)	Identification of Cluster Producer Organisation	PMU	PMU/ PMC	Direct Implementation
4.4.1 (2)	Market Survey	PMU	PMU/ PMC/ Resource Organisation/ Persons	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation/ Single source Hiring with Contract
4.4.1 (3)	Situational Analysis	PMU	PMU/ PMC/ Resource Organisation/ Persons	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation/ Single Source Hiring with Contract
4.4.1 (4)	Identification of the Buyer/ manufacturer	PMU	PMU/ PMC/ Resource Organisation/ Persons	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation/ Single source Hiring with Contract
4.4.1 (5)	Development of Project Plan and Signing of Tripartite Agreement	PMU	PMU/ PMC/ Resource Organisation/ Persons	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
4.4.1 (6)	Procurement and Engagement of NGO for Supporting Cluster Organisations	PMU	PMU/ PMC/ Resource Organisation	Local Competitive Bidding
4.4.1 (7)	Implementation of the pilot Project	PMU	PMU/ PMC/ Resource Organisation/ Persons	Direct Implementation/ Direct Procurement/ Direct Procurement by Quotation
4.4.2	Development of Green CSR Monitoring Platform	PMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
4.4.3	Networking Seminars for Green CSR	PMU	PMU/ PMC	Direct Implementation/ Direct Procurement by Quotation
4.4.4	Publicity Video Preparation CSR/ Partnership Development/ Business Development	PMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
4.4.5	Public Awareness Creation on CSR/ Private Partnership	PMU	PMU/ PMC	Direct Implementation/ Direct Procurement by Quotation
4.4.6	Publicity Video for Responsible Supply Chain through Private Partnership	PMU	Contractor	Local Competitive Bidding/ Direct Procurement by Quotation
4.4.7	CSR/ Supply Chain Evaluation	PMU	PMU/ PMC	Direct Implementation
4.5	Monitoring and Evaluation			
4.5.1 (1)	Long Term Landscape Monitoring	PMU	Resource Organisation	Direct Procurement by Quotation/ Local Competitive Bidding
4.5.1 (2)	Concurrent Monitoring and Periodic Reviews			
a)	Project Circle	PMU	PMU/ PMC	Direct Implementation
b)	PMU Executive Committee	PMU	PMU/ PMC	Direct Implementation
c)	Governing Body	PMU	PMU/ PMC	Direct Implementation
d)	HPSC	PMU	PMU/ PMC	Direct Implementation
4.5.1 (3)	MIS and Reporting System	PMU	PMU/ PMC/ Contractor	Direct Implementation/ Local Competitive Bidding
4.5.1 (4)	Technology based Monitoring -GIS applications	PMU	PMU/ PMC/ Contractor	Direct Implementation/ Local Competitive Bidding
4.5.1 (5)	Annual Strategy Planning & Review Workshop			

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
a)	Circle	CCSU	CCSU/ PMU/ PMC	Direct Implementation/ Direct Procurement by Quotation
b)	State	PMU	PMU/ PMC	Direct Implementation/ Direct Procurement by Quotation
4.5.2	Impact Assessment			
4.5.2 (1)	Socio-economic Survey			
a)	Baseline Survey	PMU	Resource Organisation/ PMC/ PMU	Local Competitive Bidding
b)	Terminal Impact Survey	PMU	Resource Organisation/ PMC/ PMU	Local Competitive Bidding
4.5.2 (2)	Thematic and Short Studies	PMU	Resource Organisation/ PMC/ PMU	Local Competitive Bidding
4.5.3	Audit			
a)	Statutory Audit	PMU	CAG	Direct Implementation
b)	Concurrent Audit	PMU	CA	Direct Procurement
4.5.4	Grievance Redressal, RTI and Public Disclosure			
4.6	Environment and Social Consideration			
4.6.1	Preparation of E&S Manual and Monitoring Plan	PMU	Environment and Social Consideration Expert	Single Source Hiring by Contract
4.6.2	Monitoring	PMU	RMU/ DMU/ CCSU/ PMU	Direct implementation
4.7	Strengthening of Project Implementation System			
4.7.1	Strengthening of PMU Office	PMU	PMU	Direct Implementation/ Direct Procurement by Quotation
4.7.2	Strengthening of Circle office	CCSU	CCSU	Direct Implementation/ Direct Procurement by Quotation
4.7.3	Strengthening of Division office	DMU	DMU	Direct Implementation/ Direct Procurement by Quotation
4.7.4	Strengthening of Range office	RMU	RMU	Direct Implementation/ Direct Procurement by Quotation
4.8	Publicity and Communication			

Component/ Sub-Component	Activities	Proponent/ Owner	Executor/ Contractor	Method
4.8.1	Information, education and communication for GFD	PMU	PMU	Direct Implementation/ Direct Procurement by Quotation

Source: JICA Survey Team (2019)

Annexure 12: Draft ToR for Project Management Consultant for PERG

Terms of Reference for Project Management Consultant for the Project for Ecosystem Restoration in Gujarat

DRAFT

Chapter 1. Background

- The Government of Gujarat has received a loan from the Japan International Cooperation Agency (hereinafter referred to as "JICA") to finance the Project for Ecosystem Restoration in Gujarat (hereinafter referred to as “the Project”) which is to enhance sustainable management of ecosystems in the diverse landscapes in the state.
- The outline of the Project is as follows:
  - Executing Agency: Project Management Unit (PMU) for the Project, Project for Ecosystem Restoration in Gujarat (PERG).
  - Location of the Project: 18 territorial divisions (Bharuch Sub-division, Surat, Valsad North, Valsad South, Bhavnagar, Chhota Udeipur, Baria, Junagadh, Sabarkantha, Godhra, Morbi, Kutchh East, Kutchh West, Porbandar, Aravalli, Mahisagar, and Gandhinagar), 6 wildlife divisions (Banaskantha, Gir West, Gir East, Nalsarovar, Vadodra, and Shetrunji), and 5 social forestry divisions16 territorial divisions (Ahmedabad, Anand, Nadiyad, Amreli, Botad and Vadodara)
  - The Project is expected to be completed by March 2028.
- At this moment, the Project is expected to comprise of the following components:

Components	Main Activities
Component 1: Development of Ecological Infrastructure in Coastal Area	1) Preparatory works for Mangrove Afforestation and Conservation Activities 2) Mangrove Plantation (raised bed plantation, nursery raised plantation, plantation of mangrove associated species) 3) Coastal shelter belts with SMC 4) Awareness creation 5) Research studies
Component 2: Development of Ecological Infrastructure in Inland Area	1) Restoration of Degraded Grassland a. Identification of vidis and community mobilisation b. Preparation of micro plan and implementation of community development c. Removal of weeds d. Fencing e. Grassland plantation (with/ without SMC/ irrigated) f. Canopy manipulation g. Fireline creation h. Livelihood enhancement and cluster development i. Pilot projects j. Research activities 2) Restoration of Wetland a. Identification of the intervention areas and community institutions b. Preparation of micro plan and implementation of community development c. Wetland restoration works d. Preparation of Integrated Wetland Management Plan and

	implementation e. Preparation of World Heritage site and Ramsar Dossier f. Livelihood engagement and cluster development g. Eco-tourism h. Research 3) Restoration of Degraded Forests a. Identification of intervention areas and community institutions b. Preparation of micro plans and implementation of community development activities c. Assisted natural regeneration d. Pilot activities on management of old JFM Plantation and solar energy e. Livelihood enhancement and cluster development f. Research
Component 3: Human Wildlife Conflict Management	1) Habitat mapping 2) Identification of community institutions and community engagement 3) Preparation of micro plan 4) Weed removal 5) Grove creation 6) Soil moisture conservation works 7) Corridor enrichment 8) Water management 9) Fireline 10) Prey base improvement 11) Awareness creation 12) Nature education 13) Rescue centre 14) Eco tourism promotion 15) Livelihood enhancement and cluster development 16) Research
Component 4: Institutional Capacity Strengthening	1) Preparation of manuals and guidelines 2) Capacity Development 3) CSR/ Private Partnership facilitation and development 4) Pilot Project on Responsible Supply Chain Development through Private Partnership 5) M&E 6) GIS/ MIS 7) PMC 8) Phase out

- The Government of Gujarat intends to use a part of the proceeds of the loan for eligible payments for consulting services for which this ToR is issued.
- Technical information: available relevant basic data and studies, technical standard or specifications to be used, etc.
- Related projects: None.

Chapter 2. Objectives of Consulting Services

The consulting services shall be provided by an international consulting firm (hereinafter referred to as "the Consultant") in compliance with Guidelines for the Employment of Consultants under Japanese ODA Loans, April 2012. The objective of the consulting services is to assist the Project Management Unit of the Project (hereinafter referred to as PMU) established at PERG in implementation of the project activities by providing the following services:

(1) Assistance in the management of the project
(2) Technical assistance in the implementation of the project components/activities in an efficient and effective manner
(3) Technology Transfer

Chapter 3. Scope of Consulting Services

(1) Assistance in the management of the project

The Consultant shall:

(a) Assist PMU in managing the project in an effective and efficient manner.
(b) Assist PMU in periodical monitoring of the project activities with the monitoring formats and improving the project design, framework, and systems based on the monitoring data stored in the GIS-based monitoring system.
(c) Assist PMU in preparing annual work and budget plans based on the appropriate estimation of work quantity as well as unit costs of the respective inputs.
(d) Assist PMU in enhancing the capacity of stakeholders in sustainable ecosystem restoration and management
(e) Assist PMU in procuring the necessary small equipment for the project implementation.
(f) Assist PMU in the proper fund management and smooth communication/coordination with JICA.
(g) Assist PMU in providing guidance and orientation to CCSUs, DMUs, RMUs and other specialized agencies for implementation of the projects.
(h) Assist PMU in preparing TORs for the project activities to be outsourced to the contractors.
(i) Assist PMU in monitoring and supervising the works undertaken specialized agencies to secure the expected outputs.
(j) Assist PMU in designing and developing information dissemination project materials.
(k) Assist PMU in monitoring the progress of the project, assessing the results and effects of the project activities, solving any issues and problems that might hinder the effective and efficient operations of the project, and draw lessons learned from the implementation of the project over the course of the project.
(l) Assist PMU in reporting any matters to JICA.

(2) Technical assistance in the implementation of the project components/ activities in an efficient and effective manner

The Consultant Shall

(a) Assist PMU in preparation of manuals required for project activities with community engagement
(b) Assist PMU in designing community based eco-tourism promotion sub-component
(c) Assist PMU in implementing business development for livelihood enhancement
(d) Assist PMU in establishing MIS/ GIS based M&E system
(e) Assist CCSUs/DMUs / RMUs to strengthen their technical, managerial, and administrative

capacities for implementation and management of the project.

(f) Assist PMU/ CCSUs/DMUs / RMUs in providing orientation, technical guidance, and advice to specialized agencies for the effective implementation of the project activities.

(g) Assist PMU in monitoring the planning process of JFMC/ EDC/ ETDCs

(h) Assist PMU in preparing the phase-out strategies

(i) Assist PMU in developing guidelines and manuals relevant to implementation of the project

(j) Assist PMU/ CCSUs/ DMUs/ RMUs and other relevant stakeholders in ensuring that local communities could obtain the maximum benefit from the rejuvenated ecosystem services in the post project period.

(k) Assist PMU in preparing and submitting the plans to JICA for approval.

(l) Provide technical assistance to PMU/ CCSUs/ DMUs / RMUs and other specialized agencies.

(3) Technology transfer

The Consultant shall carry out the technology transfer as an important aspect in design and supervision works. The Consultant shall provide the opportunity to PMU officers and staffs to be involved in the working team of the Consultant during the implementation of the project activities. If requested by PMU, the Consultant shall demonstrate the necessary technical procedures. The consultant shall assist PMU and its staff to build their capacity as a part of on the job training under the Project.

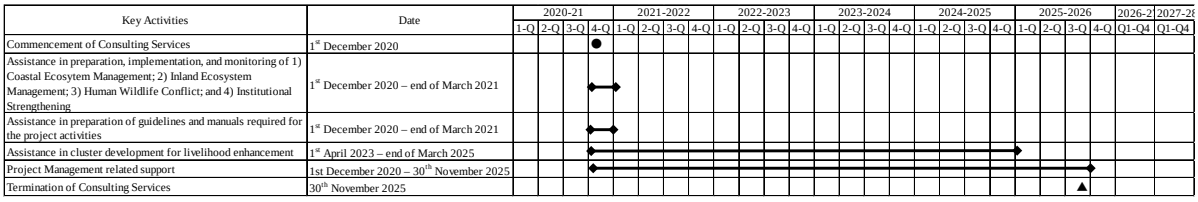
Chapter 4. Expected Time Schedule

The total duration of consulting services will be 60 months. The implementation schedule expected is as shown in Table: 4-1.

Table: 4-1 Implementation Schedule Expected

Key Activities	Date	Duration in Months
Commencement of Consulting Services	1st December 2020	-
Assistance in preparation, implementation, and monitoring of 1) Development of Ecological Infrastructure in Coastal Area; 2) Development of Ecological Infrastructure in Inland Area; 3) Human Wildlife Conflict; and 4) Institutional Strengthening	1st December 2020 – end of March 2021	60
Assistance in preparation of guidelines and manuals required for the project activities	1st December 2020 – end of March 2021	
Assistance in cluster development for livelihood enhancement	1st December 2020 – end of March 2025	
Project Management related support	1st December 2020 – 30th November 2025	
Termination of Consulting Services	30th November 2025	-

Figure 4-1: Indicative Schedule



Chapter 5. Staffing

Six positions of Professional (A) consultants and six positions of Professional (B) consultants will be engaged over 60 months' duration of consulting services for a total of 90 man-months for Professional (A) and 269 man-months for Professional (B) consultants.

(1) Qualification of key Team Members

The qualification of key Team Members is shown in Table: 5-1.

Table: 5-1 Qualification of key Team Members

Designation	Qualification
Team Leader/ Ecosystem Management / Project Management (Professional A)	Education: - Post Graduate in Forestry, Natural Resource Management, Biodiversity conservation or other related fields Experience: - 15 years or more experiences in the field of ecosystem restoration and management including mangrove, degraded forest and wildlife protection - Experiences of consulting services for more than four ecosystem restoration and management projects in India or other Asian countries - Experiences in working in at least one ecosystem restoration and management project in India - At least three experiences of leading a consultants' team as the Team Leader or the Co-Team Leader - More than one experience in leading the donor funded projects/studies Language (English): - Proficient in writing and speaking Regional Experience: - Familiarity and Experience in South Asia, particularly in India
Wetland Management (Professional A)	Education: - Post Graduate in biodiversity conservation, botany, zoology, forestry, Natural Resource Management, or any other related field. Experience: - Proven track records of preparation of the Ramsar dossier and documents related to World Heritage Site - Experiences in preparation of integrated wetland management plan and implementation - Experiences in planning and implementing community-based wetland conservation and management activities - Experiences in developing community based eco-tourism in wetland areas Language (English): - Proficient in writing and speaking Regional Experience: - Familiarity and Experience in South Asia, particularly in India

Designation	Qualification
Eco Tourism (Professional A)	Education: - Post Graduate in Hospitality Business Development and Management or any other related field Experience: - 10 years or more professional experiences in tourism development sector - Experiences in planning community-based tourism development - Experiences in developing community-based tourism sites - Experiences in promoting responsible tourism - Experiences in designing and conducting community level hospitality training Language (English): - Proficient in writing and speaking Regional Experience: - Familiarity and Experience in South Asia, particularly in India
Supply Chain Development (Professional A)	Education: - MBA or Post Graduate Degree in relevant field Experience: - Experience in working in responsible supply chain management, value chain development or with farmer producer organizations for five years or more - Worked in export of agriculture produce for more than ten years Language (English): - Proficient in writing and speaking Regional Experience: - Familiarity and Experience in South Asia, particularly in India Language
GIS/ RS (1) (Professional A)	Education: - Master's Degree or higher in RS or GIS technology Experience: - Minimum of 10 years of working experience in the fields of RS or GIS - Sufficient field experience in a capacity development program, including designing training programs and developing training materials - Experience with handling various RS and GIS software such as ESRI ArcGIS, ERDAS Imagine, eCognition, ENVI, and QGIS - Experience with drone-based surveys - Experience with field data collection (ground truthing) using GPS or other mobile devices - Work experience in the forestry sector in India - Work experience with technical assistance aid projects - Good understanding about international industrial trends in GIS and RS technology

Designation	Qualification
	Language: - Proficiency in English (writing and speaking)
GIS/ RS (2) (Professional A)	Education: - Master's Degree or higher in fields of RS or geospatial information technology Experience: - Minimum of 10 years of working experience in development work, using satellite imagery data and geospatial information technology - Experience with satellite Big Data cloud processing system such as Google Earth Engine and in-depth relevant knowledge and skills - Experience with database management and system architecture design. - Work experience with grassland management, wildlife management, and coastal forest management - Work experience with technical assistance aid projects - Good understanding about international industrial trends in GIS and RS technology Language: - Proficiency of communication skills in English (writing and speaking)
Co-Team Leader/ Ecosystem Management (Professional B)	Education: - Post Graduate in Botany, Zoology, Biodiversity, Natural Resource Management or any other related field Experience: - 15 years or more experiences in leading a team of experts in nature conservation, biodiversity conservation, ecosystem restoration and management projects or similar projects - Experiences in working in the similar landscape to Gujarat - Experiences in developing manuals and handbooks in community-based ecosystem restoration and management or any other related subjects - Having wholistic working experience and expertise in coastal and inland landscape and human wildlife conflict - Experiences in designing and implementing participatory nature conservation activities - Experience of consulting services for at least three ecosystem restoration and management related projects - At least three experiences of leading a consultants' team as the Team Leader or the Co-Team Leader Language: - Proficient in English in both writing and speaking - Proficient in Gujarati and Hindi Regional Experience:

Designation	Qualification
	- Familiarity and Experience in South Asia, particularly in India
Eco Tourism (Professional B)	Education: - Post graduate degree in hospitality, MBA, or any other related field - Knowledge in responsible tourism would be an asset. Experience - More than 10 years or more experiences in the community-based tourism development. - Experiences in designing and conducting nature education and awareness programmes - Experiences in organizing and conducting hospitality related training for the communities - Experiences in assisting community organisations to operate tourism activities and manage organization Language: - Proficient in English in both writing and speaking - Proficient in Gujarati and Hindi
Livelihood/ Supply Chain Development (Professional B)	Education: - MBA or post graduate degree in agri business, agriculture marketing, trade and commerce, social development or any other related field Experience: - 10 years or more experiences in export business development with emphasis to organic and natural products (e.g. agriculture produce/ MFPs for - Conducted market and value chain studies for more tha 5 commodities - Experiences in working with SHGs and SHG clusters - Experiences in promoting micro enterprises in the rural areas - Experiences in develoing the manuals for clsuter development, micro enterprise development and corpus fund management - Expertise in responsible supply chain management; certification system relevant to responsible supply chain management; or ethical marketing - Working experience in developing organizational capacity of producer organization for seven years and more - Experience in export in agricultural produce/MFPs, especially to the European market Language: - Proficient in English in both writing and speaking - Proficient in Gujarati and Hindi

Consultant may propose other experts and supporting staffs required to accomplish the tasks outlined in the ToR.

(2) Scope of works for the respective personnel

Detailed information on the major tasks and duties each member of PMC shall perform is provided as follows:

No	Position	**I or L**	**Major Tasks and Duties**
A-1	Team Leader/ Ecosystem Management/ Project Management	I (Pro-A)	The Team Leader will assist PMU in the following aspects of project management: a) Preparation of the overall work plan of PMC; b) Maintaining close coordination with PMU and offices concerned and assist PMU in coordinating with JICA; c) Guiding and supervising the activities of all PMC specialists, both International and National consultants; d) Supervising the activities of all office staff of Project Consultants; e) Undertaking the managerial responsibilities of PMC, including seeking approvals from PMU on mobilisations/ demobilisations and field visits by PMC specialists; f) Making suggestions to PMU on Community Based Forest Management and communicate inputs of the specialists on various project aspects; g) Participating in various meetings and events, and with specialists as per requirement and request from PMU; h) Preparing/ reviewing guidelines and manuals relating to project management, accounting procedures and procurement; i) Compiling all periodical reports of consulting services and responsible for outputs of reports (inception reports, monthly, quarterly, annual reports and completion report); j) Undertaking field visits to project sites and prepare Back-to-Office report for PMU; k) Preparing monthly accomplishment reports of PMC; l) Ensuring that all the scope of consultancy is accomplished; The Team Leader/ Ecosystem Management/ Project Management will assist PMU in the following aspects of ecosystem restoration and management: a) Preparation and review guidelines and manuals relating to project activities; b) Planning overall capacity development activities for project implementation units including community based organisations; c) Monitoring the physical and financial work progress of the project implementation; d) Reporting to JICA; Any other assistances requested by PMU within the scope of work of the consulting services.
A-2	Wetland Management	I (Pro-A)	The Wetland Management Specialist will assist PMU in: a) Preparation of the work plan for wetland restoration sub-component b) Preparation of the TOR for specialised agencies to prepare the Ramsar and World Heritage Dossier and Integrated Wetland Management Plan and supervise the work c) Designing and supervising the research activities d) Designing and conducting training and awareness

No	Position	I or L	Major Tasks and Duties
			programmes The Wetland Management Specialist will: a) Act as a resource person for relevant training programs b) Undertake any other tasks requested by the PMC Team Leader; c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
A-3	Eco Tourism	I (Pro-A)	The Eco Tourism specialist will assist PMU in: a) Identifying the eco-tourism sites b) Preparation of the site based eco-tourism development plan c) Preparation of manual for community based eco-tourism promotion d) Preparation of the TOR for the resource organization to prepare the community based eco-tourism development plan and supervise its work e) Preparation of the TOR for the resource organisations for training and technical guidance for the ETDCs and supervise f) Undertaking survey for destination marketing and draw strategies for destination marketing g) Undertaking destination marketing The Eco Tourism Specialist will: a) Act as a resource person for relevant training programs b) Undertake any other tasks requested by the PMC Team Leader; c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
A-4	Supply Chain Development	I (Pro-A)	The Supply Chain Development Specialist will assist PMU in: a) Overseeing market survey and situational analysis b) Reviewing and finalising the concept note for the pilot project for responsible supply chain development c) Establishing linkage with partner companies in India and overseas d) Developing pilot project plans jointly with the partner company, producer organizations and the PMU e) Providing guidance in responsible supply chain and value chain development for the partner company and farmer producer organizations f) Liaising with the partner company and PMU/producer organizations g) Organizing visits of the producers to the potential partner companies h) Undertaking regular monitoring and ensuring the compliance to the specification given by the partner company

No	Position	I or L	Major Tasks and Duties
			The Supply Chain Development Specialist will: a) Act as a resource person for relevant training programs b) Undertake any other tasks requested by the PMC Team Leader; c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
A-5	GIS/ Remote Sensing (1)	I (Pro-A)	The GIS/ Remote Sensing Specialist (1) will assist PMU in: a) Designing overall implementation plans for GIS Unit b) Supervising GIS/RS Expert and GIS Operators and monitor Project implementation progress c) Discussing with GIS/RS Expert on GIS analysis, database management, and satellite imagery analysis d) Procuring necessary equipment and accessories for establishing GIS Unit and development of MIS e) Evaluating outcomes of Project implementation periodically f) Designing plans regarding phase-out process for the sustainable phase g) Undertaking field visits to project sites and prepare such reports as brief travel reports and monthly accomplishment reports pertaining to his/her specialty and submit them to the Team Leader h) Developing the implementation structure and work flow of drone-based monitoring system i) Procurement of the contractors/outsourcing companies for satellite RS-based mapping and drone-based surveys j) Supervising the activities of these contractors and ensure the quality of outcomes k) Preparation of and editing guidelines and manuals for field surveys, RS and GIS analysis, and drone-based surveys The GIS/ Remote Sensing Specialist (1) will: a) Act as a resource person for relevant training programs b) Undertake any other tasks requested by the PMC Team Leader; c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
A-6	GIS/ Remote Sensing (2)	I (Pro-A)	The GIS/ Remote Sensing Specialist (2) will assist PMU in: a) Examining the existing system used at SDC and conducting the needs assessment for function enhancement of visualization function to ensure compatibility with output data from a new system b) Defining necessity of capacity building for system development and operation and maintenance c) Developing and introducing satellite Big Data cloud-based processing (e.g. Google Earth Engine), data sharing, and visualization systems to SDC d) Examining operational procedures of ICT infrastructure in cloud and SDC with local designated companies for future

No	Position	I or L	Major Tasks and Duties
			system operation e) Creating a list of target data and selecting necessary data and examine technical specifications such as required accuracy and frequency f) Examining sources of target data; in particular, examine accessibility of data hosted at SDC, output data from the Project, data prepared by consultants, open source data, data obtained from a website g) Estimating the maximum amount of integration in a storage space due to update of output data from the developed system; based on the results, estimate costs for renting cloud-based data storage h) Proposing data sharing format and rules between the new GIS visualization and the existing system at SDC i) Defining security levels for target data; in particular, define privileged users and public users (open access) and examine management methods for target data j) Preparing user manuals about GIS data sharing and visualization system (The manuals are intended for administrators, privileged users, and public users separately.) k) Organizing training for administrator and privileged users; conduct follow-ups to make SDC staff fully understand necessary operations l) Proposing system enhancement based on feedback from the trial phase m) Preparing reports GIS/ Remote Sensing Specialist (1) will: a) Act as a resource person for relevant training programs b) Undertake any other tasks requested by the PMC Team Leader; c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
A-7	M&E	I (Pro-A)	The M&E/ MIS Specialist will assist PMU in: a) Establishing effective and efficient monitoring system; b) Procurement of the contractors for baseline survey, periodical assessments, and other related activities etc.; c) Supervising the work of the above contractors and ensuring qualities of their outputs; d) Reviewing baseline and mid-term surveys reports, and other M&E reports/ documents e) Preparation of the guidelines and manuals required for M&E and MIS; f) Operationalising MIS and project accounting system, and g) Monitoring and evaluation of the progress and outputs of Project activities h) Conducting field validation, preparation of the physical and financial progress report; i) Providing progress data and information required to be used by the High-Power Committee (HPC), Governing Body (GB) and JICA for review and appropriate decision

No	Position	I or L	Major Tasks and Duties
			making; j) Designing, reviewing and revising project performance indicators, and developing methodologies for verification with respect to such indicators; k) Compiling periodical M & E reports; and l) Organising annual review meetings at State Level. The M&E/ MIS Specialist will: a) Work in collaboration with Remote Sensing/ GIS Specialist for effective monitoring; b) Assist FCCUs/DMUs in the field validation; c) Train PMU and other project related staffs in MIS and project accounting system; d) Accomplish the tasks related to the Project as directed by the Team Leader; e) Undertake field visits to project sites and prepare Back-to-Office report for PMU; and e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-1	Co-Team Leader/ Ecosystem Management	L (Pro-B)	The Co-Team Leader/Ecosystem Management will assist PMU in the following aspects: a) Assisting the team leader of PMC, and serve as the acting team leader during the off-assignment period of the team leader. b) Reviewing manuals/ guidelines and training programmes and finalise c) Implementation of the overall project activities and operation of PMU/ CCSU/ DMU/ RMU and community level institutions d) Facilitating the convergence with other stakeholders; e) Planning overall capacity development activities for community development and livelihood improvement. f) Organising international training programs; g) Reviewing and finalise micro plan/ annual plan/ annual convergence plan format as required along with other PMC specialists; h) Designing and organizing exposure visits for PMU and other project implementation units; and The Co-Team Leader/ Community Development/ Gender will: a) Undertake any other tasks requested by the PMC Team Leader; and b) Undertake field visits to project sites and prepare Back-to-Office report for PMU c) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-2	Participatory Ecosystem Restoration and Management	L (Pro-B)	The Participatory Ecosystem Restoration and Management Specialist will assist PMU in: a) Ensuring the community engagement in ecosystem restoration and management activities b) Identification of the sites for project activities with community engagement including afforestation activities using CSR c) Reviewing and finalising the entry point activities, micro

No	Position	I or L	Major Tasks and Duties
			planning manuals and Green CSR manuals d) Assisting RMUs to carry out the training programmes for the community facilitators e) Guiding RMUs and JFMC/EDCs to implement the entry point activities f) Facilitating convergence with other programmes and schemes g) Conducting exposure visits for the JFMCs/ EDCs. h) Developing necessary capacity building programs and training materials for the project staffs and community; i) Preparation of the process documentation; j) Supporting Eco-tourism activities k) Networking with the corporates and mobilise CSR funds for afforestation. The Participatory Ecosystem Restoration and Management Specialist will; a) Work closely with Co-Team Leader (Ecosystem Management) b) Act as a resource person for the training programs; c) Undertake any other tasks requested by the PMC Team Leader; and d) Undertake field visits to project sites and prepare Back-to-Office report for PMU e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-3	Wetland Management	L (Pro-B)	Wetland Management Specialist will assist PMU in: a) Preparation of work plan for wetland restoration sub-component b) Preparation of TOR for specialised agencies to prepare the Ramsar and World Heritage Dossier and Integrated Wetland Management Plan and supervise the work c) Designing and supervising the research activities d) Designing and conducting training and awareness programmes e) Conducing exposure visit for the JFMC/ EDC members The Wetland Management Specialist will: a) Work closely with the Wetland Management Specialist (International) b) Act as a resource person for relevant training programs c) Undertake any other tasks requested by the PMC Team Leader; d) Undertake field visits to project sites and prepare Back-to-Office report for PMU e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-4	Grassland Management	L (Pro-B)	The grassland Management Specialist will assist PMU in: a) Preparation of the work plan b) Identification of the project vidis c) Ensuring community engagement in the project activities d) Guiding the community in micro planning process e) Overseeing the research activities and prepare reports f) Conducting exposure visits for the JFMC/ EDC members

No	Position	I or L	Major Tasks and Duties
			The Grassland Management Specialist will; a) Act as a resource person for the training programs; b) Undertake any other tasks requested by the PMC Team Leader; and c) Undertake field visits to project sites and prepare Back-to-Office report for PMU d) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-5	Eco Tourism	L (Pro-B)	The Eco Tourism Specialist will assist PMU in; a) In identifying the eco-tourism sites b) Implementation of the site based eco-tourism development plan c) Preparation of manual for community based eco-tourism promotion d) Preparation of TOR for the resource organization to prepare the community based eco-tourism development plan and supervise its work e) Preparation of TOR for the resource organisations for training and technical guidance for the ETDCs and supervise f) Providing field level technical guidance g) Undertaking destination marketing h) Organising exposure visits for the ETDC members The Eco Tourism Specialist will ; a) Work closely with the Eco Tourism specialist (International) b) Act as a resource person for the training programs; c) Undertake any other tasks requested by the PMC Team Leader; and d) Undertake field visits to project sites and prepare Back-to-Office report for PMU e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-6	Livelihood/ Supply Chain Development	L (Pro-B)	The Livleihood/ Supply Chain Development Speiclist will assist PMU in: a) Preparation of the TOR for the market survey and situational analysis b) Procurement of the individuals/firms for the market survey and situational analysis c) Identification of the produce and prepare concept note for the pilot project for responsible supply chain development d) Developing pilot project plans jointly with the partner company, producer organsiations and the PMU e) Providing guidance in responsible supply chain and value chain development for the partner company and farmer producer organsiations on a regular basis f) Liaising with the partner company and PMU/producer organizations on a regular basis g) Undertaking regular monitoring and ensure compliance to the specificiation given by the partner company

No	Position	I or L	Major Tasks and Duties
			h) Developing video and other materials for publicity i) Organizing visits of the producers to the potential partner companies j) Networking with the stakeholders The Livelihood/ Supply Chain Development will; a) Work closely with the Supply Chain Specialist (International) b) Act as a resource person for the training programs; c) Undertake any other tasks requested by the PMC Team Leader; and d) Undertake field visits to project sites and prepare Back-to-Office report for PMU e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to the Team Leader.
B-7	M&E/ MIS	L (Pro-B)	The M&E/ MIS Specialist will assist PMU in: a) Developing quantitative and qualitative monitoring indicators that are in line with the Project objective, along with methods of collecting data and frequency of monitoring with the PMU and PMC specialists b) Designing new GIS and MIS modules which enable the GFD to track their project progress and assess the impact with the GFD IT Cell c) Preparing TOR for baseline, mid-term, and end-term impact assessment, and any other monitoring and evaluation-related work to be undertaken d) Preparing guidelines and manuals required for M&E e) Operationalising MIS and project accounting system f) Field validation preparing physical and financial progress reports g) Providing progress data and information required to be used by the High Power Steering Committee, Governing Body of the PMU, and JICA for review h) Reviewing and revising a list of the existing monitoring indicators and developing methods for verification to each indicator i) Assisting regional offices in the field validation and training j) Discussing with M&E/MIS/Documentation for data integration k) Communicating with the Assistant Director of IT for smooth implementation of the Project l) Preparation of the periodical monitoring report The M&E/ MIS Specialist will; a) Work closely with GIS/ Remote Sensing Specialist (International) (1), GIS/ Remote Sensing Specialist (International) (2) and M&E Specialist (International) b) Act as a resource person for the training programs; c) Undertake any other tasks requested by the PMC Team Leader; and d) Undertake field visits to project sites and prepare Back-to-Office report for PMU e) Prepare brief travel reports and monthly accomplishment reports pertaining to his/ her specialty and submit them to

No	Position	**I or L**	**Major Tasks and Duties**
			the Team Leader.

Chapter 6. Reporting

Within the scope of consulting services, the Consultant shall prepare and submit reports and documents to PMU as shown in Table: 6-1. The Consultant shall provide electronic copy of each of these reports. All reports shall be prepared in English.

Table: 6-1 Reports to be Submitted

Category	**Type of** Report	Timing	**No.** of **Copies**
Consultancy Services	Inception Report	Within 1 months after commencement of the services	5 copies each per time
	Monthly Progress Report	Every month except the month overlapping with the Quarterly Progress and Annual Progress Report.	5 copies each per time
	Quarterly Progress Report	Every quarter except the quarter overlapping with the Annual Progress Report	5 copies each per time
	Annual Progress Reports	10th day of the first month of the next financial year	5 copies each per time
	Completion Report of the Consulting Services	One month before the closure of the contract	10 copies each per time
Other Report	Back to Office Report	Within 7 days on return of the field visit	1 set of copy per submission
	Technical Report	As required or upon request	As required

Contents to be included in each report are as follows:

(Example of Monthly Progress report and Inception report)

a) Inception Report (5 copies each of English and Vietnamese versions): to be submitted within 1 month after the commencement of the services, presenting the methodologies, schedule, organization, etc.

b) Monthly Progress Report (5 copies): to describes briefly and concisely all activities and progress for the previous month by the 10th day of each month. Problems encountered or anticipated will be clearly stated, together with actions to be taken or recommendations on remedial measures for correction. Also indicates the work to be performed during the coming month.

c) Quarterly Progress Report (5 copies): to describe all activities and progress for the reporting period (quarter) by the 10th day of the month on a quarterly basis. Problems encountered or anticipated will be clearly stated, together with actions to be taken or recommendations on remedial measures for correction. Also indicates the work to be

performed during the following quarter.

d) Annual Progress Report (5 copies): to describe all activities and accomplishments made for the year by the 10th day of the 1st month of the year. Problems encountered together with actions taken should be described. Lessons learned from the project activities done in the year should also be described in the report. The works and activities planned for the following years should be indicated.

e) Completion Report of the Consulting Services (10 copies): to be submitted one month before the completion of the consulting services. The report should describe the approaches and methodologies taken, all the activities carried out and inputs made by the consultant, the results and accomplishments made by the consulting services, lessons learned for the project as well as consulting services, and recommendations for ensuring the sustainability of the project effect and future projects similar to the project.

f) Back to Office Report (1 copy): to be submitted to report the findings from the very site visits conducted by the PMC specialists. The report shall be submitted within 7 days from the date of return to the office from the field. One copy of the report shall be submitted to PMU.

g) Technical Report (as per required): to be submitted as required or upon request by PMU or by the initiation of PMC for technical topics relevant to project implementation.

Chapter 7. Obligations of the Executing Agency

A certain range of arrangements and services will be provided by the Executing Agency to the Consultant for smooth implementation of the Consulting Services. In this context, the Executing Agency will:

(1) Report and data

Make available to the Consultant existing reports and data related to the Project as requested by PMC;

(2) Office space

Provide an office space in the Headquarters of the Executing Agency with necessary equipment, furniture and utility. However, the Consultant's requirement for office space, including necessary equipment, furniture and utilities, should be clearly stated in the proposal with its rental cost for the case where PERG would be unable to provide such facilities;

(3) Cooperation and counterpart staff

Appoint counterpart officials, agent and representative as may be necessary for effective implementation of the Consulting Services;

(4) Assistance and exemption

Use its best efforts to ensure that the assistance and exemption, as described in the Standard Request for Proposal issued by JICA, will be provided to the Consultant, in relation to

- work permit and such other documents;
- entry and exit visas, residence permits, exchange permits and such other documents
- clearance through customs;
- instructions and information to officials, agent and representatives of the Borrower's Government;
- exemption from any requirement for registration to practice their profession;
- privilege pursuant to the applicable law in the Borrower's Country.

Annexure 13: Estimation of Project Benefits and EIRR

1 Benefits from CO_2 Sequestration and Emission Reduction

1.1 Methodology

The amount of carbon sequestration by plantation is estimated based on guidelines of "**JICA Climate - Fit version 2.0 (March 2014) 01. Forest and Natural Resources Conservation/Afforestation Tool (prepared by Japan Weather Association)"**

The calculation formula is shown below:

$$\Delta C = N * (\frac{44}{12})$$

Where:
ΔC = actual net CO_2 sequestration per year (t CO_2 –e/year)
N = (AGB + BGB) x CF
Where: AGB: above ground biomass at time t (t C/ha),
BGB: below ground biomass at time t (t C/ha),
BGB = AGB * RBA
RBA: ratio of below to above ground biomass

All major plantation activities are expected to be completed by 7th years and hence it is assumed that the benefits shall start accruing from 8th year.

1.2 CO_2 Sequestration benefits from Mangrove Plantation

Mangrove plantation will be undertaken in 8,000 ha. These plantations when reach the desired level will produce significant Co2 sequestration and thereby environmental gains.

1.2.1 Input/ Assumptions:

The basic inputs/ assumptions for the benefit calculation are summarized below:

- Total area for Mangrove plantation is considered to be 8000 ha.
- Carbon to dry matter ratio (i.e. carbon fraction): 0.45
- Ratio of BGB to AGB: 0.29
- Estimated CER Price: 7 USD/ t CO_2 i.e. 497.7 INR/ t CO_2

Source and Notes

1. *Forest Trends Ecosystem Marketplace. State of Forest Carbon Finance 2017. (Forestry projects sell between USD 4 to USD 10 /tCo2)*
2. *2006 IPCC guidelines for National Greenhouse Inventories*
3. *Aboveground biomass growth in mangrove forests (tonnes d.m. ha-1 yr-1) , Tropical Dry, Mean-3.3, min.-0.1, Max.-7.5*
4. *Carbon fraction of aboveground mangrove biomass (tonnes C (tonnes d.m.)-1)= 0.451*
5. *Ratio of belowground biomass to aboveground biomass (R) in mangroves forests-0.29 for tropical dry*

6. *AGB- Above Ground Biomass; BGB- Below Ground Biomass; dm- Dry Matter, Ton- tonnes*

The CO_2 sequestration has been calculated using the methodology described in the guidelines of JICA Climate-FIT Version 2.0, March 2014. Screenshot of First year Calculation is provided in table below.

Table 1 Calculation of CO_2 sequestration for Mangrove plantation

01. Forest and Natural Resources Conservation/Afforestation

Project Name

Mangrove Cultivation

Emission Reduction

		Value	Unit
$ER_{AR,y}$	Net absorption	18731	tCO_2/year
$\Delta C_{PJ,y}$	Project absorption	18731	tCO_2/year
$\Delta C_{BL,y}$	Baseline absorption	0	tCO2/year
PE_y	Project emission	0	tCO_2/year

Inputs

*Input only orange cell

Parameter	Description		Value	Unit
$A_{PJ,i}$	Acreage of the stratum i in the forested land	Afforestation in degraded forest	8000	ha
$T_{A,y,i}$	Per hectare aboveground biomass in the stratum i in year y	Afforestation in degraded forest	1.1	t dm/ha
$T_{A,y-1,i}$	Per hectare aboveground biomass in the stratum i in year y-1			
CF_i	Carbon fraction of trees in the stratum i	Afforestation in degraded forest	0.45	tC/tdm
R_i	Ratio of belowground biomass to aboveground biomass (ratio of belowground vs. aboveground) for the stratum i	Afforestation in degraded forest	0.29	
$A_{cf,i}$	Acreage of the stratum j			
$V_{A,cf,i}$	Per hectare aboveground biomass in the stratum j in the year of clearance			
R_j	Ratio of belowground biomass to aboveground biomass for the stratum j			

Source: JICA Survey Team (2019)

Based on the abovementioned assumption and methods, CO_2 sequestration benefits over 50 years have been calculated and placed in table below.

Table 2 Carbon sequestration benefits from Mangrove plantation

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biiomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/year)	Carbon Sequestration (INR Million)
1						
2						

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biiomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/year)	Carbon Sequestration (INR Million)
3						
4						
5						
6						
7						
8	1.1	0.29	1.4	5,108	**18,731**	9
9	1.1	0.29	1.4	5,108	18,731	9
10	1.1	0.29	1.4	5,108	18,731	9
11	2.1	0.29	2.7	9,752	35,759	18
12	2.1	0.29	2.7	9,752	35,759	18
13	2.1	0.29	2.7	9,752	35,759	18
14	3	0.29	3.9	13,932	51,084	25
15	3	0.29	3.9	13,932	51,084	25
16	3	0.29	3.9	13,932	51,084	25
17	3.8	0.29	4.9	17,647	64,706	32
18	3.8	0.29	4.9	17,647	64,706	32
19	3.8	0.29	4.9	17,647	64,706	32
20	4.6	0.29	5.9	21,362	78,329	39
21	4.6	0.29	5.9	21,362	78,329	39
22	4.6	0.29	5.9	21,362	78,329	39
23	6.2	0.29	8.0	28,793	105,574	53
24	6.2	0.29	8.0	28,793	105,574	53
25	6.2	0.29	8.0	28,793	105,574	53
26	7.5	0.29	9.7	34,830	127,710	64
27	7.5	0.29	9.7	34,830	127,710	64
28	7.5	0.29	9.7	34,830	127,710	64
29	6.2	0.29	8.0	28,793	105,574	53
30	6.2	0.29	8.0	28,793	105,574	53
31	6.2	0.29	8.0	28,793	105,574	53
32	5.6	0.29	7.2	26,006	95,357	47
33	5.6	0.29	7.2	26,006	95,357	47
34	5.6	0.29	7.2	26,006	95,357	47
35	4.4	0.29	5.7	20,434	74,923	37
36	4.4	0.29	5.7	20,434	74,923	37
37	4.4	0.29	5.7	20,434	74,923	37
38	3.6	0.29	4.6	16,718	61,301	31
39	3.6	0.29	4.6	16,718	61,301	31
40	3.6	0.29	4.6	16,718	61,301	31

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biiomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/year)	Carbon Sequestration (INR Million)
41	2.8	0.29	3.6	13,003	47,678	24
42	2.8	0.29	3.6	13,003	47,678	24
43	2.8	0.29	3.6	13,003	47,678	24
44	2	0.29	2.6	9,288	34,056	17
45	2	0.29	2.6	9,288	34,056	17
46	2	0.29	2.6	9,288	34,056	17
47	1.1	0.29	1.4	5,108	18,731	9
48	1.1	0.29	1.4	5,108	18,731	9
49	1.1	0.29	1.4	5,108	18,731	9
50	0.5	0.29	0.6	2,322	8,514	4
	Total				**2,767,050**	**1,377**

Source: JICA Survey Team (2019)

With the CO_2 reduction of 2,767,050-ton, total benefits of 1,377 million are estimated over a period of 50 years of the project dur to Mangrove plantation.

1.3 CO_2 Sequestration benefits from Plantation of Mangrove Associated species

The plantation of Mangrove Associated Species will be undertaken in 500 ha which will provide with carbon sequestration benefits.

1.3.1 Assumptions:

The basic assumptions for the benefit calculation are as follows:

- Total area for plantation of Mangrove Associated Species is considered to be 1000 ha.
- Carbon to dry matter ratio (i.e. carbon fraction): 0.47
- Ratio of BGB to AGB: 0.27
- Estimated CER Price: 7 USD/ t CO_2 i.e. 497.7 INR/ t CO_2

Source:

1. *Forest Trends Ecosystem Marketplace. State of Forest Carbon Finance 2017. (Forestry projects sell between USD 4 to USD 10 /tCO_2)*
2. *2006 IPCC guidelines for National Greenhouse Inventories*

The CO_2 sequestration was calculated using the methodology described in the guidelines of JICA Climate-FIT Version 2.0, March 2014. Screenshot of First year Calculation is provided in table below.

Table 3 Calculation of CO_2 sequestration for plantation of Mangrove associated species

01. Forest and Natural Resources Conservation/Afforestation

JICA Climate-FIT Version 2.0, March 2014
Japan International Cooperation Agency
(Prepared by Japan Weather Association)

Project Name

Mangrove Associated Species

Emission Reduction

		Value	Unit
$ER_{AR,y}$	Net absorption	2626	$tCO_2/year$
$\Delta C_{P,y}$	Project absorption	2626	$tCO_2/year$
$\Delta C_{BL,y}$	Baseline absorption	0	tCO2/year
PE_y	Project emission	0	$tCO_2/year$

Inputs

*Input only orange cell

Parameter	Description		Value	Unit
$A_{P,i}$	Acreage of the stratum i in the forested land		500	ha
$T_{A,y,i}$	Per hectare aboveground biomass in the stratum i in year y		2.4	t dm/ha
$T_{A,y-1,i}$	Per hectare aboveground biomass in the stratum i in year y-1			
CF_i	Carbon fraction of trees in the stratum i		0.47	tC/tdm
R_i	Ratio of belowground biomass to aboveground biomass (ratio of belowground vs. aboveground) for the stratum i		0.27	
$A_{y,j}$	Acreage of the stratum j			
$V_{A,y,j}$	Per hectare aboveground biomass in the stratum j in the year of clearance			
R_j	Ratio of belowground biomass to aboveground biomass for the stratum j			

Source: JICA Survey Team (2019)

Based on the above-mentioned assumption and methods, CO_2 sequestration benefits over 50 years period have been calculated and placed in Table below.

Table 4 Carbon sequestration benefit from plantation of Mangrove associated species

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
1						
2						
3						
4						
5						
6						
7						

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
8	2.4	0.27	3.0	716	**2,626**	1
9	2.4	0.27	3.0	716	2,626	1
10	2.4	0.27	3.0	716	2,626	1
11	3.3	0.27	4.2	985	3,611	2
12	3.3	0.27	4.2	985	3,611	2
13	3.3	0.27	4.2	985	3,611	2
14	4.1	0.27	5.2	1,224	4,487	2
15	4.1	0.27	5.2	1,224	4,487	2
16	4.1	0.27	5.2	1,224	4,487	2
17	4.9	0.27	6.2	1,462	5,362	3
18	4.9	0.27	6.2	1,462	5,362	3
19	4.9	0.27	6.2	1,462	5,362	3
20	5.7	0.27	7.2	1,701	6,238	3
21	5.7	0.27	7.2	1,701	6,238	3
22	5.7	0.27	7.2	1,701	6,238	3
23	6.5	0.27	8.3	1,940	7,113	4
24	7	0.27	8.9	2,089	7,660	4
25	7	0.27	8.9	2,089	7,660	4
26	7.3	0.27	9.3	2,179	7,989	4
27	7.3	0.27	9.3	2,179	7,989	4
28	7.3	0.27	9.3	2,179	7,989	4
29	7.3	0.27	9.3	2,179	7,989	4
30	7	0.27	8.9	2,089	7,660	4
31	7	0.27	8.9	2,089	7,660	4
32	7	0.27	8.9	2,089	7,660	4
33	6.5	0.27	8.3	1,940	7,113	4
34	6.5	0.27	8.3	1,940	7,113	4
35	5.7	0.27	7.2	1,701	6,238	3
36	5.7	0.27	7.2	1,701	6,238	3
37	5.7	0.27	7.2	1,701	6,238	3
38	4.9	0.27	6.2	1,462	5,362	3
39	4.9	0.27	6.2	1,462	5,362	3
40	4.1	0.27	5.2	1,224	4,487	2
41	4.1	0.27	5.2	1,224	4,487	2
42	3.3	0.27	4.2	985	3,611	2
43	3.3	0.27	4.2	985	3,611	2
44	2.4	0.27	3.0	716	2,626	1

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
45	2.4	0.27	3.0	716	2,626	1
46	1.6	0.27	2.0	478	1,751	1
47	1.6	0.27	2.0	478	1,751	1
48	1.2	0.27	1.5	358	1,313	1
49	1.2	0.27	1.5	358	1,313	1
50	1.2	0.27	1.5	358	1,313	1
					216,894	**108**

Source: JICA Survey Team (2019)

With the CO_2 reduction of **216,894-ton**, total benefits of total INR 108 million are estimated over a period of 50 years of the project.

1.4 CO_2 Sequestration benefits from Coastal Shelterbelt Plantation

The plantation of Coastal Shelterbelt will be undertaken in 5,000 ha . This will provide significant carbon sequestration benefits and it shall also provide goods in the form of timber, fuel wood and carbon sequestration benefits.

1.4.1 Assumptions:

The basic input/assumptions for the benefit calculation are as summarized below:

- Total area for plantation of Coastal Shelterbelt is considered to be 5,000 ha.
- Carbon to dry matter ratio (i.e. carbon fraction): 0.47
- Ratio of BGB to AGB: 0.27
- Estimated CER Price: 7 USD/ t CO_2 i.e. 497.7 INR/ t CO_2

Source:

1. *Forest Trends Ecosystem Marketplace. State of Forest Carbon Finance 2017. (Forestry projects sell between USD 4 to USD 10 /tCO_2)*
2. *Above-ground net volume growth for Casuarina equisetifolia is min 6 and max 20 m3 ha-1 y-1 in tropical/ subtropical region. Presuming density of wood 0.75, Dry Matter will be about 4 tonnes min and 15 tonnes max.*
3. *BGB to AGB Ratio for Natural Forests in Tropical/ sub-tropical Dry Forests: Mean=0.27, Std. Deviation=0.01, Min. =0.26, Max=0.28*
4. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*
5. *AGB- Above Ground Biomass; BGB- Below Ground Biomass; dm- Dry Matter, Ton- tonnes*

The CO_2 sequestration has been calculated using the methodology described in the guidelines of JICA Climate-FIT Version 2.0, March 2014. Screenshot of First year Calculation is provided in table below.

Table 5 Calculation of CO_2 sequestration for Coastal shelterbelt plantation

01. Forest and Natural Resources Conservation/Afforestation

ICA Climate-FIT Version 2.0, March 2014
Japan International Cooperation Agency
(Prepared by Japan Weather Association)

Project Name

Coastal shelterbelts

Emission Reduction

		Value	Unit
$ER_{AR,y}$	Net absorption	**38870**	tCO_2/year
$\Delta C_{P,J,y}$	Project absorption	**38870**	tCO_2/year
$\Delta C_{BL,y}$	Baseline absorption	0	tCO2/year
PE_y	Project emission	0	tCO_2/year

Inputs

*Input only orange cell

Parameter	Description		Value	Unit
$A_{P,J,i}$	Acreage of the stratum i in the forested land		3700	ha
$T_{A,y,i}$	Per hectare aboveground biomass in the stratum i in year y		4.8	t dm/ha
$T_{A,y-1,i}$	Per hectare aboveground biomass in the stratum i in year y-1			
CF_i	Carbon fraction of trees in the stratum i		0.47	tC/tdm
R_i	Ratio of belowground biomass to aboveground biomass (ratio of belowground vs. aboveground) for the stratum i		0.27	
$A_{er,i}$	Acreage of the stratum j			
$V_{A,P,y,i}$	Per hectare aboveground biomass in the stratum j in the year of clearance			
R_j	Ratio of belowground biomass to aboveground biomass for the stratum j			

Source: JICA Survey Team (2019)

Based on the abovementioned assumption and methods, CO_2 sequestration benefits over 50 years have been calculated and placed in table below.

Table 6 Total benefit from carbon sequestration through Coastal shelterbelt plantation

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
1						
2						
3						
4						
5						
6						
7						

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
8	4.8	0.27	6.1	10,601	**38,870.1**	19.3
9	4.8	0.27	6.1	10,601	38,870.1	19.3
10	4.8	0.27	6.1	10,601	38,870.1	19.3
11	6.5	0.27	8.3	14,355	52,636.6	26.2
12	6.5	0.27	8.3	14,355	52,636.6	26.2
13	6.5	0.27	8.3	14,355	52,636.6	26.2
14	8.2	0.27	10.4	18,110	66,403.1	33.0
15	8.2	0.27	10.4	18,110	66,403.1	33.0
16	8.2	0.27	10.4	18,110	66,403.1	33.0
17	9.8	0.27	12.4	21,644	79,359.8	39.5
18	9.8	0.27	12.4	21,644	79,359.8	39.5
19	9.8	0.27	12.4	21,644	79,359.8	39.5
20	11.4	0.27	14.5	25,177	92,316.6	45.9
21	11.4	0.27	14.5	25,177	92,316.6	45.9
22	11.4	0.27	14.5	25,177	92,316.6	45.9
23	13.1	0.27	16.6	28,932	106,083.1	52.8
24	13.9	0.27	17.7	30,699	11,2561.4	56.0
25	13.9	0.27	17.7	30,699	11,2561.4	56.0
26	14.7	0.27	18.7	32,465	119,039.8	59.2
27	14.7	0.27	18.7	32,465	119,039.8	59.2
28	14.7	0.27	18.7	32,465	119,039.8	59.2
29	14.7	0.27	18.7	32,465	119,039.8	59.2
30	13.9	0.27	17.7	30,699	112,561.4	56.0
31	13.9	0.27	17.7	30,699	112,561.4	56.0
32	13.9	0.27	17.7	30,699	112,561.4	56.0
33	13.1	0.27	16.6	28,932	106,083.1	52.8
34	13.1	0.27	16.6	28,932	106,083.1	52.8
35	11.4	0.27	14.5	25,177	92,316.6	45.9
36	11.4	0.27	14.5	25,177	92,316.6	45.9
37	11.4	0.27	14.5	25,177	92,316.6	45.9
38	9.8	0.27	12.4	21,644	79,359.8	39.5
39	9.8	0.27	12.4	21,644	79,359.8	39.5
40	8.2	0.27	10.4	18,110	66,403.1	33.0
41	8.2	0.27	10.4	18,110	66,403.1	33.0
42	6.5	0.27	8.3	14,355	52,636.6	26.2
43	6.5	0.27	8.3	14,355	52,636.6	26.2
44	4.9	0.27	6.2	10,822	39,679.9	19.7
45	4.9	0.27	6.2	10,822	39,679.9	19.7
46	3.3	0.27	4.2	7,288	26,723.2	13.3

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
47	3.3	0.27	4.2	7,288	26,723.2	13.3
48	2.4	0.27	3.0	5,300	19,435.1	9.7
49	2.4	0.27	3.0	5,300	19,435.1	9.7
50	2.4	0.27	3.0	5,300	19,435.1	9.7
Total					**3,210,835**	**1,598**

Source: JICA Survey Team (2019)

With the CO_2 reduction of 3,210,835-**ton**, total benefits of total INR 1,598 million are estimated over a period of 50 years of the project.

1.5 CO_2 Sequestration benefits from Afforestation in Degraded Forest

The afforestation will be undertaken in Degraded Forest area (9,000 ha), HWC area falls under degraded forest (1,600 ha) and wetland (150 ha). Total plantation will be undertaken in 10,750 ha area. This will provide carbon sequestration benefits as well as other benefits through forestry products.

1.5.1 Assumptions:

The basic inputs/assumptions for the benefit calculation are summarized below:

- Total area for Afforestation in Degraded Forest is considered to be 10,750 ha.
- Carbon to dry matter ratio (i.e. carbon fraction): 0.47
- Ratio of BGB to AGB: 0.27
- Estimated CER Price: 7 USD/ t CO_2 i.e. 497.7 INR/ t CO_2

Source:

1. *Forest Trends Ecosystem Marketplace. State of Forest Carbon Finance 2017. (Forestry projects sell between USD 4 to USD 10 /tCO_2)*
2. *(https://www.google.com/search?q=IPCC+reference+on+biomass+increment+of+various+types+of+forests&oq=IPCC+reference+on+biomass+increment+of+various+types+of+forests+&aqs=chrome..69i57.36350j0j7&sourceid=chrome&ie=UTF-8)/ IPCC-GPG- Defalt Values.xls.*
3. *ANNUAL AVERAGE ABOVEGROUND BIOMASS INCREMENT IN PLANTATIONS BY BROAD CATEGORY in Asia above 20 years for rainfall below 1000mm: Mean=6.45; Min.=1.2, Max.= 11.7 Tonnes Dry Matter / ha / yr*
4. *BGB to AGB Ratio for Natural Forests in Tropical/ sub-tropical Dry Forests: Mean=0.27, Std. Deviation=0.01, Min. =0.26, Max=0.28*
5. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*

The CO_2 sequestration has been calculated using the methodology described in the guidelines of JICA Climate-FIT Version 2.0, March 2014. Screenshot of First year Calculation is provided in table below.

Table 7 Calculation of CO_2 sequestration for afforestation in degraded forest

01. Forest and Natural Resources Conservation/Afforestation

ICA Climate-FIT Version 2.0, March 2014
Japan International Cooperation Agency
(Prepared by Japan Weather Association)

Project Name

Degraded Forest

Emission Reduction

		Value	Unit
$ER_{\Delta R,y}$	Net absorption	**89406**	tCO_2/year
$\Delta C_{P,J,y}$	Project absorption	**89406**	tCO_2/year
$\Delta C_{BL,y}$	Baseline absorption	0	tCO2/year
PE_y	Project emission	0	tCO_2/year

Inputs *Input only orange cell

Parameter	Description		Value	Unit
$A_{P,J,i}$	Acreage of the stratum i in the forested land		10750	ha
$T_{A,y,i}$	Per hectare aboveground biomass in the stratum i in year y		3.8	t dm/ha
$T_{A,y-1,i}$	Per hectare aboveground biomass in the stratum i in year y-1			
CF_i	Carbon fraction of trees in the stratum i		0.47	tC/tdm
R_i	Ratio of belowground biomass to aboveground biomass (ratio of belowground vs. aboveground) for the stratum i		0.27	
$A_{sr,i}$	Acreage of the stratum j			
$V_{A,sr,i}$	Per hectare aboveground biomass in the stratum j in the year of clearance			
R_j	Ratio of belowground biomass to aboveground biomass for the stratum j			

Source: JICA Survey Team (2019)

Based on the above mentioned assumption and methods, CO2 sequestration benefit over 50 years has been calculated and placed in table below.

Table 8 Total benefit from carbon sequestration through afforestation in degraded forest

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
1						
2						
3						
4						
5						
6						
7						
8	**3.8**	**0.27**	**4.8**	**24,383**	**89,406**	44
9	3.8	0.27	4.8	24,383	89,406	44

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
10	3.8	0.27	4.8	24,383	89,406	44
11	5.2	0.27	6.6	33,367	122,345	61
12	5.2	0.27	6.6	33,367	122,345	61
13	5.2	0.27	6.6	33,367	122,345	61
14	6.5	0.27	8.3	41,708	152,931	76
15	6.5	0.27	8.3	41,708	152,931	76
16	6.5	0.27	8.3	41,708	152,931	76
17	7.8	0.27	9.9	50,050	183,517	91
18	7.8	0.27	9.9	50,050	183,517	91
19	7.8	0.27	9.9	50,050	183,517	91
20	9.1	0.27	11.6	58,392	214,103	107
21	9.1	0.27	11.6	58,392	214,103	107
22	9.1	0.27	11.6	58,392	214,103	107
23	10.4	0.27	13.2	66,733	244,689	122
24	11.1	0.27	14.1	71,225	261,159	130
25	11.1	0.27	14.1	71,225	261,159	130
26	11.7	0.27	14.9	75,075	275,275	137
27	11.7	0.27	14.9	75,075	275,275	137
28	11.7	0.27	14.9	75,075	275,275	137
29	11.7	0.27	14.9	75,075	275,275	137
30	11.1	0.27	14.1	71,225	261,159	130
31	11.1	0.27	14.1	71,225	261,159	130
32	11.1	0.27	14.1	71,225	261,159	130
33	10.4	0.27	13.2	66,733	244,689	122
34	10.4	0.27	13.2	66,733	244,689	122
35	9.1	0.27	11.6	58,392	214,103	107
36	9.1	0.27	11.6	58,392	214,103	107
37	9.1	0.27	11.6	58,392	214,103	107
38	7.8	0.27	9.9	50,050	183,517	91
39	7.8	0.27	9.9	50,050	183,517	91
40	6.5	0.27	8.3	41,708	152,931	76
41	6.5	0.27	8.3	41,708	152,931	76
42	5.2	0.27	6.6	33,367	122,345	61
43	5.2	0.27	6.6	33,367	122,345	61
44	3.9	0.27	5.0	25,025	91,758	46
45	3.9	0.27	5.0	25,025	91,758	46
46	2.6	0.27	3.3	16,683	61,172	30
47	2.6	0.27	3.3	16,683	61,172	30
48	1.9	0.27	2.4	12,192	44,703	22

Year	Annual Average AGB Increment (t dm/ha)	Ratio of BGB to AGB	Annual Average Biomass increment (t dm/ha)	Annual increase in Biomass Carbon stock (t C/Yr)	Co2 reduction (t Co2/ year)	Carbon Sequestration (INR Million)
49	1.9	0.27	2.4	12,192	44,703	22
50	1.9	0.27	2.4	12,192	44,703	22
Total					**7,427,729**	**3,697**

Source: JICA Survey Team (2019)

With the CO_2 reduction of 7,427,729-ton, total benefits of total INR 4367 million are estimated over a period of 50 years of the project.

1.6 Summary of Carbon Sequestration Benefits

Summary of carbon sequestration benefits are summarized in table below.

Year	Co2 reduction (t Co2/year)	Annual Benefit (INR million)
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	149,633	74
9	149,633	74
10	149,633	74
11	214,351	107
12	214,351	107
13	214,351	107
14	274,905	137
15	274,905	137
16	274,905	137
17	332,945	166
18	332,945	166
19	332,945	166
20	390,986	195
21	390,986	195
22	390,986	195
23	463,459	231
24	486,954	242
25	486,954	242

Year	Co2 reduction (t Co2/year)	Annual Benefit (INR million)
26	530,014	264
27	530,014	264
28	530,014	264
29	507,877	253
30	486,954	242
31	486,954	242
32	476,737	237
33	453,242	226
34	453,242	226
35	387,580	193
36	387,580	193
37	387,580	193
38	329,540	164
39	329,540	164
40	285,121	142
41	271,499	135
42	226,271	113
43	226,271	113
44	168,121	84
45	168,121	84
46	123,702	62
47	108,377	54
48	84,182	42
49	84,182	42
50	73,965	37
Total	**13,622,507**	**6,780**

Source: JICA Survey Team (2019)

2 Benefits from Coastal Ecosystem Services

The coastal ecosystem (mangrove, mangrove associated species along with shelterbelts) plays an important role in enhancing the fishery resources and reducing the impacts of natural disasters like tsunami and cyclones. It is an important spawning site for several marine species and also provide breeding and nursery grounds and ideal habitats for a variety of plant and animal species. For example, India's mangroves are home to 4,011 species (the highest in the world), many of which are edible fish and shellfish – providing sufficient and nutritious food directly to local communities. Poor and vulnerable populations can especially benefit from these readily available sources. It also helps in preventing salinity and seawater ingress into the inland agricultural areas and thereby increasing the productivity of agriculture and forest produces. It provides (coastal shelterbelts) the local communities with fuel wood, fodder, timber. In order to take into account above benefits, coastal ecosystem service benefits has been attempted by assigning value to net growing stock/AGB.

All major plantation activities are expected to be completed by 7th years and hence it is assumed that the benefits shall start accruing from 8th year.

2.1 Mangrove Plantation

Apart from carbon sequestration, the value of mangrove ecosystem services in terms of its net growing stock value is also estimated.

The price of AGB is assumed INR 3000 per ton for calculation of net growing stock value[1] .The benefit from growing stock is calculated as shown in **Table 9**.

Table 9 Net growing stock benefit from Mangrove plantation

Year	Annual Average AGB Increment (t dm/ha)	Price of AGB	Net Growing Stock Value (Million INR)
1			
2			
3			
4			
5			
6			
7			
8	1.1	3,000	26.4
9	1.1	3,000	26.4
10	1.1	3,000	26.4
11	2.1	3,000	50.4
12	2.1	3,000	50.4
13	2.1	3,000	50.4
14	3	3,000	72
15	3	3,000	72
16	3	3,000	72
17	3.8	3,000	91.2
18	3.8	3,000	91.2
19	3.8	3,000	91.2
20	4.6	3,000	110.4
21	4.6	3,000	110.4
22	4.6	3,000	110.4
23	6.2	3,000	148.8
24	6.2	3,000	148.8

[1] *Source: GFD's proposal provided in DPR*

Year	Annual Average AGB Increment (t dm/ha)	Price of AGB	Net Growing Stock Value (Million INR)
25	6.2	3,000	148.8
26	7.5	3,000	180
27	7.5	3,000	180
28	7.5	3,000	180
29	6.2	3,000	148.8
30	6.2	3,000	148.8
31	6.2	3,000	148.8
32	5.6	3,000	134.4
33	5.6	3,000	134.4
34	5.6	3,000	134.4
35	4.4	3,000	105.6
36	4.4	3,000	105.6
37	4.4	3,000	105.6
38	3.6	3,000	86.4
39	3.6	3,000	86.4
40	3.6	3,000	86.4
41	2.8	3,000	67.2
42	2.8	3,000	67.2
43	2.8	3,000	67.2
44	2	3,000	48
45	2	3,000	48
46	2	3,000	48
47	1.1	3,000	26.4
48	1.1	3,000	26.4
49	1.1	3,000	26.4
50	0.5	3,000	12
Total			**3,900**

Source: JICA Survey Team (2019)

2.2 Plantation of Mangrove Associated Species

Apart from carbon sequestration, the value of mangrove ecosystem services in terms of its net growing stock value is also estimated for mangrove associated species.

The plantation of Mangrove Associated Species shall be undertaken in 500 ha of area. The price of AGB is assumed INR 3,000 per ton for calculation of net growing stock value[2] .The benefit from growing stock is calculated as shown in **Table 10**.

Table 10 Net growing stock benefit from plantation of Mangrove associated species

Year	Annual Average AGB Increment (t dm/ha)	Price of AGB	Net Growing Stock Value (Million INR)
1			
2			
3			
4			
5			
6			
7			
8	2.4	3,000	3.6
9	2.4	3,000	3.6
10	2.4	3,000	3.6
11	3.3	3,000	4.95
12	3.3	3,000	4.95
13	3.3	3,000	4.95
14	4.1	3,000	6.15
15	4.1	3,000	6.15
16	4.1	3,000	6.15
17	4.9	3,000	7.35
18	4.9	3,000	7.35
19	4.9	3,000	7.35
20	5.7	3,000	8.55
21	5.7	3,000	8.55
22	5.7	3,000	8.55
23	6.5	3,000	9.75
24	7	3,000	10.5
25	7	3,000	10.5
26	7.3	3,000	10.95
27	7.3	3,000	10.95
28	7.3	3,000	10.95

[2] *Source: GFD's proposal provided in DPR*

Year	Annual Average AGB Increment (t dm/ha)	Price of AGB	Net Growing Stock Value (Million INR)
29	7.3	3,000	10.95
30	7	3,000	10.5
31	7	3,000	10.5
32	7	3,000	10.5
33	6.5	3,000	9.75
34	6.5	3,000	9.75
35	5.7	3,000	8.55
36	5.7	3,000	8.55
37	5.7	3,000	8.55
38	4.9	3,000	7.35
39	4.9	3,000	7.35
40	4.1	3,000	6.15
41	4.1	3,000	6.15
42	3.3	3,000	4.95
43	3.3	3,000	4.95
44	2.4	3,000	3.6
45	2.4	3,000	3.6
46	1.6	3,000	2.4
47	1.6	3,000	2.4
48	1.2	3,000	1.8
49	1.2	3,000	1.8
50	1.2	3,000	1.8
Total			**297.3**

Source: JICA Survey Team (2019)

2.3 Coastal Shelterbelt Plantation

Apart from the carbon benefits through coastal shelterbelt plantation, it shall also provide other economic benefits such as other timber production and fuel wood production, which are calculated as follows:

Assumptions:

- The coastal shelterbelt plantation will be undertaken on total area of 3,700 ha
- Harvesting & Transportation cost is assumed to be 20% of gross value

The calculation of the value of timber production and fuel wood production is shown in **Table 13 and 14** respectively.

(i) Other Timber products

The unit price/ market price/ value of Other Timber products has been determined using past data of quantities sold by GFD in 2017-18 and value generated from its sale. This is specified in table below.

Table 11 Unit Price/ Market price / Value of other Timber Price

Item	Quantities sold in 2017-18 (CMT)	Sale Value Generated (INR million)	Value/ Market Price/ Unit Price (INR Per CMT)
Other Timber	12,875.15	87.1	6,762

Source: Gujarat Forest Statistic, 2017-18,
CMT stands for cubic meter.

Table 12 Calculation of net value of other timber production

Year	Density (Trees/ha)	Volume (m^3/tree)	Yield (m^3/ha)	Unit price (INR/m^3)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
20th year	800	0.40	320	**6,762**	2,163,846	20%	432,769	1,731,077
40th year	800	0.90	720	**6,762**	4,868,653	20%	973,731	3,894,923

Note : In 20th Year , there will be mechanical thinning of removing 50% trees .In 40th Year mature trees will be harvested
Source: JICA Survey Team (2019)

(ii) Fuel Wood

The unit price/ market price/ value of Fuel wood has been determined using past data of quantities sold by GFD in 2017-18 and value generated from its sale. This is specified in table below.

Table 13 Unit Price/ Market price / Value of Fuel Wood

Item	Quantities sold (MT)	Value generated by GFD (INR million)	Unit Price in MT (INR Per MT)	Unit Price in KG (INR Per KG)
Fuel Wood	66,763.42	51.7	774.6	**0.8**

Source: Gujarat Forest Statistic, 2017-18,
MT stands for Metric Tone

Table 14 Calculation of net value of fuel wood production

Year	Yield (kg/ha)	Market price (INR/kg)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
10	8,000	**0.8**	6,197	20%	1,239	4,958
20	15,000	**0.8**	11,619	20%	2,324	9,295
40	20,000	**0.8**	15,492	20%	3,098	12,394

Source: JICA Survey Team (2019)

Year wise calculation of benefit from coastal shelterbelt plantation is shown in **Table 15.**

Table 15 Total benefits from coastal shelterbelt plantations

Year	Benefits from Timber	Fuel wood Value	Total (INR in Million)
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	3.7	4
12	0	7.3	7
13	0	7.3	7
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	1,281	7	1,288
22	2,562	14	2,576
23	2,562	14	2,576
24	0	0	0
25	0	0	0

Year	Benefits from Timber	Fuel wood Value	Total (INR in Million)
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0
33	0	0	0
34	0	0	0
35	0	0	0
36	0	0	0
37	0	0	0
38	0	0	0
39	0	0	0
40	0	0	0
41	2,882	9	2,891
42	5,764	18	5,783
43	5,764	18	5,783
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	0	0	0
49	0	0	0
50	0	0	0

Source: JICA Survey Team (2019)

3 Benefits from Restoration of Grassland

The interventions in grassland is proposed in 8,500 ha area. The grassland plantation will be divided into two plots, where one will be grown through rainfed method and one from irrigated method.

Assumptions:

- The total area for grassland plantation: 8,500 ha.
  (1) Grassland (Rainfed): 8,200 ha
  (2) Grassland (Irrigated): 300 ha
- Harvesting & Transportation cost is assumed to be 40% of gross value

- Government of Gujarat is selling grass at subsidized rate of INR 2 per KG. As this does nor reflect market price, an approach involving cost + sale price is adopted to determine the value of grass. This is specified in table below.

Table 16 Determination of Value of Grass

Item	Amount (INR per KG)
Weeding, harvesting, collecting, prepare grass bale, insurance*	12
Transportation and loading & unloading (10- 15 km)**	1
Sale price (Sale at subsidised rates) ***	2
Total	**15**

*Source: *GFD's resolution no FST/1118/1006/M dated 26/03/2019, ** APCCF (development)'s resolution dated 20/11/2019, *** Prevailing approved subsidized rates as derived based on discussion with GFD*

- The project is expected to increase yield of grassland significantly.

Table 17 Expected yield from Grassland

Years after Plantation	Rainfed	Irrigated
	Yield (kg/ha)	
4th Year	250	250
8th Year	500	3,000
12th Year	1,000	6,000
23rd years onwards	2,000	10,000

Source: JICA Survey Team (2019)

The benefits from Grassland is estimated and provided in **Table below.**

Table 18 Total benefits from grassland production

Year	Grassland (Irrigated) (INR million)	Grassland (Rainfed) (INR million)	Total (INR Million)
1			
2			
3			
4			
5			
6			
7			
8	0.7	18.5	19.13
9	1	21.9	23.20

Year	Grassland (Irrigated) (INR million)	Grassland (Rainfed) (INR million)	Total (INR Million)
10	2	26.1	28.43
11	4	31.0	35.38
12	8	36.9	45.00
13	10	43.9	53.51
14	11	52.2	63.64
15	14	62.1	75.68
16	16	73.8	90.00
17	17	78.2	95.09
18	18	82.8	100.48
19	18	87.8	106.17
20	19	93.0	112.19
21	20	98.5	118.55
22	21	104.4	125.28
23	22	110.6	132.40
24	23	117.2	139.92
25	24	124.1	147.88
26	25	131.5	156.29
27	27	147.6	174.60
28	27	147.6	174.60
29	27	147.6	174.60
30	27	147.6	174.60
31	27	147.6	174.60
32	27	147.6	174.60
33	27	147.6	174.60
34	27	147.6	174.60
35	27	147.6	174.60
36	27	147.6	174.60
37	27	147.6	174.60
38	27	147.6	174.60
39	27	147.6	174.60
40	27	147.6	174.60
41	27	147.6	174.60
42	27	147.6	174.60
43	27	147.6	174.60
44	27	147.6	174.60
45	27	147.6	174.60
46	27	147.6	174.60
47	27	147.6	174.60
48	27	147.6	174.60

Year	Grassland (Irrigated) (INR million)	Grassland (Rainfed) (INR million)	Total (INR Million)
49	27	147.6	174.60
50	27	147.6	174.60
Total			**5,859**

Source: JICA Survey Team (2019)

4 Benefits from Forestry Production

The afforestation will be undertaken in Degraded Forest area (9,000 ha), HWC area falls under degraded forest (1,600 ha) and wetland (150 ha). Total plantation will be undertaken in 10,750 ha area. This will provide carbon sequestration benefits as well as other significant benefits from forestry production such as teak timber production, other timber production, fuel wood production and fruit and NTFP production.

Assumptions:

- Area: 10,750 ha
- It is assumed that for the given below plantations, the economic benefits mentioned herein will be attained from the 8th year.

The calculation of the net value through other benefits is shown in Table below.

(i) Teak Timber products

The unit price/ market price/ value of Teak Timber products has been determined using past data of quantities sold by GFD in 2017-18 and value generated from its sale. This is specified in table below.

Table 19 Unit Price/ Market price / Value of Teak Timber Price

Item	Quantities sold in 2017-18 (CMT)	Sale Value Generated (INR million)	Value/ Market Price/ Unit Price (INR Per CMT)
Teak Timber	6044.26	4,77.8	79,047

Source: Gujarat Forest Statistic, 2017-18,
CMT stands for cubic meter.

Table 20 Calculation of net value of teak timber production

Year	Density (Trees/ha)	Volume (m^3/tree)	Yield (m^3/ha)	Unit price (INR/m^3)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
20th year	200	0.25	50	79,047	3,952,328	20%	790,466	3,161,863
40th year	200	0.45	90	79,047	7,114,191	20%	1,422,838	5,691,353

Source: JICA Survey Team (2019)

Notes : In 20th Year , there will be mechanical thinning of removing 50% teak trees along with dead dried and diseased trees. In 40th Year mature trees will be harvested along with dead dried and diseased trees

(ii) Other Timber products

The unit price/ market price/ value of Other Timber products has been determined using past data of quantities sold by GFD in 2017-18 and value generated from its sale. This is specified in table below.

Table 21 Unit Price/ Market price / Value of other Timber Price

Item	Quantities sold in 2017-18 (CMT)	Sale Value Generated (INR million)	Value/ Market Price/ Unit Price (INR Per CMT)
Other Timber	12,875.15	87.1	6,762

Source: Gujarat Forest Statistic, 2017-18,
CMT stands for cubic meter.

Table 22 Calculation of net value of other timber production

Year	Density (Trees/ha)	Volume (m^3/tree)	Yield (m^3/ha)	Unit price (INR/m^3)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
20th year	100	0.25	25	6,762	169,050	20%	33,810	135,240
40th year	300	0.45	135	6,762	912,872	20%	1,82,574	730,298

Source: JICA Survey Team (2019)

Note : In 20th Year , there will be mechanical thinning of removing 50% trees .In 40th Year mature trees will be harvested.

(iii) Fuel Wood

The unit price/ market price/ value of Fuel wood has been determined using past data of quantities sold by GFD in 2017-18 and value generated from its sale. This is specified in table below.

Table 23 Unit Price/ Market price / Value of Fuel Wood

Item	Quantities sold (MT)	Value generated by GFD (INR million)	Unit Price in MT (INR Per MT)	Unit Price in KG (INR Per KG)
Fuel Wood	66,763.42	51.7	774.6	**0.8**

Source: Gujarat Forest Statistic, 2017-18,
MT stands for Metric Tonne

Table 24 Calculation of net value of fuel wood production

Year	Yield (kg/ha)	Market price (INR/kg)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
10	5,000	0.8	3,873	20%	775	3,098
20	10,000	0.8	7,746	20%	1,549	6,197
30	5,000	0.8	3,873	20%	775	3,098
40	20,000	0.8	15,492	20%	3,098	12,394
50	5,000	0.8	3,873	20%	775	3,098

Source: JICA Survey Team (2019)

(iv) Fruits and NTFP Production

Table 25 Calculation of net value of fruit and NTFP production

Year	Density (Trees/ha)	Income/ tree at constant prices (INR)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
10	200	50	10,000	20%	2,000	8,000
11	200	60	12,000	20%	2,400	9,600
12	200	70	14,000	20%	2,800	11,200
13	200	80	16,000	20%	3,200	12,800

Year	Density (Trees/ha)	Income/ tree at constant prices (INR)	Gross value (INR/ha)	Harvesting & Transportation cost (% of gross value)	Harvesting & Transportation cost (INR/ha)	Net value (INR/ha)
14	200	90	18,000	20%	3,600	14,400
15	200	100	20,000	20%	4,000	16,000
16	200	110	22,000	20%	4,400	17,600
17	200	120	24,000	20%	4,800	19,200
18	200	130	26,000	20%	5,200	20,800
19	200	140	28,000	20%	5,600	22,400
20	200	150	30,000	20%	6,000	24,000
21	200	160	32,000	20%	6,400	25,600
22	200	170	34,000	20%	6,800	27,200
23	200	180	36,000	20%	7,200	28,800
24	200	190	38,000	20%	7,600	30,400
25-45	200	200	40,000	20%	8,000	32,000

Source: JICA Survey Team (2019)

The year wise calculation of benefit from forestry production is shown in **Table below**.

Table 26 Year wise benefits from forestry production

Planting year	Teak Timber	Other Timber	Fuel wood	Fruits and NTFP	Total
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	86	86
11	0	0	8	103	112
12	0	0	12	120	133
13	0	0	12	138	150
14	0	0	0	155	155
15	0	0	0	172	172
16	0	0	0	189	189
17	0	0	0	206	206
18	0	0	0	224	224
19	0	0	0	241	241

Planting year	Teak Timber	Other Timber	Fuel wood	Fruits and NTFP	Total
20	0	0	0	258	258
21	0	0	17	275	292
22	8,498	363	25	292	9,178
23	12,746	545	25	310	13,626
24	12,746	545	0	327	13,618
25	0	0	0	344	344
26	0	0	0	344	344
27	0	0	0	344	344
28	0	0	0	344	344
29	0	0	0	344	344
30	0	0	0	344	344
31	0	0	8	344	352
32	0	0	12	344	356
33	0	0	12	344	356
34	0	0	0	344	344
35	0	0	0	344	344
36	0	0	0	344	344
37	0	0	0	344	344
38	0	0	0	344	344
39	0	0	0	344	344
40	0	0	0	344	344
41	0	0	33	344	377
42	15,296	1,963	50	344	17,652
43	22,943	2,944	50	344	26,281
44	22,943	2,944	0	344	26,231
45	0	0	0	344	344
46	0	0	0	0	0
47	0	0	0	0	0
48	0	0	0	0	0
49	0	0	0	0	0
50	0	0	0	0	0

Source: JICA Survey Team (2019)

5 Benefits from reduction in incidents of Human Wildlife Conflicts

The incidents of HWC causes (i) human injuries (ii) human deaths and (iii) injuries /death of the cattle. Such incidents also reduce productivity and as a consequences GFD pays compensation amount to victims to compensate for loss of productivity. The Project interventions are expected to reduce Human

Injuries, Human Death and cattle injuries and Death of Cattle and thereby saving the amount of costs/ compensation to be paid cattle owners.

Analysis of the past data points to significant compensation paid by GFD amounting to INR 48.4 million and INR 42.2 million in 2017-18 and 2016-17 respectively for incidents pertaining to HWC. While number of HWC incidents have been reduced but compensation amount has increased. This is shown in table below.

Table 27 Past data of HWC incidents and Compensation

Particular	2017-18			2016-17			% of reduction in HWC cases owing to interventions by GFD
	No. of cases	Ex gratia/ Compensation (INR)	Ex gratia/ Compensation (INR Per case/ incident)	No. of cases	Ex gratia	Ex gratia (INR Per case/ incident)	
Human Injuries	158	709,000	4,487	182	1,487,793	8,175	15%
Human Death	17	6,800,000	400,000	20	6,350,000	317,500	18%
Injuries/ Death of Cattle	4,233	40,742,482	9,625	5,091	34,393,419	6,756	20%
TOTAL (INR)		48,251,482			42,231,212		
TOTAL (INR Million)		**48.3**			**42.2**		

Source: Gujarat Forest Statistic, 2017-18, 2016-17

It is assumed that the incidents pertaining to HWC would continue to decline for next five years in Business as usual scenario at the same rate. It is also assumed that such incidents further may not decline during rest of the project period in the absence of specific interventions. The project interventions are reasonably expected to reduce HWC incidents by 15% from Business as usual scenario during next five years and by 30% during rest of the project period. The value of compensation paid in 2017-18 is adopted for analysis.

Based on above inputs/assumptions, benefits from reduction of HWC incidents have been estimated and provided in table below.

Table 28 Benefits from reduction of HWC incidents

Year	HWC conflict cases in Business as Usual Scenario			HWC conflict cases after Project Interventions			Reduction in HWC conflict cases after Project Interventions			Benefits in Amount (INR million)
	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	
1	134	14	3,375							
2	114	12	2,691							
3	96	9	2,145							
4	82	8	1,711							
5	69	6	1,364							

Year	HWC conflict cases in Business as Usual Scenario			HWC conflict cases after Project Interventions			Reduction in HWC conflict cases after Project Interventions			Benefits in Amount (INR million)
	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	
6	69	6	1,364							
7	69	6	1,364	59	5	1,159	10	1	205	2.40
8	69	6	1,364	59	5	1,159	10	1	205	2.40
9	69	6	1,364	59	5	1,159	10	1	205	2.40
10	69	6	1,364	59	5	1,159	10	1	205	2.40
11	69	6	1,364	59	5	1,159	10	1	205	2.40
12	69	6	1,364	49	5	955	21	2	409	4.80
13	69	6	1,364	49	5	955	21	2	409	4.80
14	69	6	1,364	49	5	955	21	2	409	4.80
15	69	6	1,364	49	5	955	21	2	409	4.80
16	69	6	1,364	49	5	955	21	2	409	4.80
17	69	6	1,364	49	5	955	21	2	409	4.80
18	69	6	1,364	49	5	955	21	2	409	4.80
19	69	6	1,364	49	5	955	21	2	409	4.80
20	69	6	1,364	49	5	955	21	2	409	4.80
21	69	6	1,364	49	5	955	21	2	409	4.80
22	69	6	1,364	49	5	955	21	2	409	4.80
23	69	6	1,364	49	5	955	21	2	409	4.80
24	69	6	1,364	49	5	955	21	2	409	4.80
25	69	6	1,364	49	5	955	21	2	409	4.80
26	69	6	1,364	49	5	955	21	2	409	4.80
27	69	6	1,364	49	5	955	21	2	409	4.80
28	69	6	1,364	49	5	955	21	2	409	4.80
29	69	6	1,364	49	5	955	21	2	409	4.80
30	69	6	1,364	49	5	955	21	2	409	4.80
31	69	6	1,364	49	5	955	21	2	409	4.80
32	69	6	1,364	49	5	955	21	2	409	4.80
33	69	6	1,364	49	5	955	21	2	409	4.80
34	69	6	1,364	49	5	955	21	2	409	4.80
35	69	6	1,364	49	5	955	21	2	409	4.80
36	69	6	1,364	49	5	955	21	2	409	4.80
37	69	6	1,364	49	5	955	21	2	409	4.80
38	69	6	1,364	49	5	955	21	2	409	4.80
39	69	6	1,364	49	5	955	21	2	409	4.80
40	69	6	1,364	49	5	955	21	2	409	4.80
41	69	6	1,364	49	5	955	21	2	409	4.80
42	69	6	1,364	49	5	955	21	2	409	4.80
43	69	6	1,364	49	5	955	21	2	409	4.80

Year	HWC conflict cases in Business as Usual Scenario			HWC conflict cases after Project Interventions			Reduction in HWC conflict cases after Project Interventions			Benefits in Amount (INR million)
	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	Human Injuries	Human Death	Injuries/ Death of Cattle	
44	69	6	1,364	49	5	955	21	2	409	4.80
45	69	6	1,364	49	5	955	21	2	409	4.80
46	69	6	1,364	49	5	955	21	2	409	4.80
47	69	6	1,364	49	5	955	21	2	409	4.80
48	69	6	1,364	49	5	955	21	2	409	4.80
49	69	6	1,364	49	5	955	21	2	409	4.80
50	69	6	1,364	49	5	955	21	2	409	4.80

Source: JICA Survey Team (2019)

6 Benefits from Livelihood Activities

(1) Eco Tourism

Development of 4 existing and 8 new eco-tourism sites have been proposed for eco-tourism. Owing to project interventions, tourists visiting all 12 sites shall be expected to increase. Tourist would also likely to spend on different activities which will contribute to local economy.

The tourists flow to existing eco-tourism sites are specified in table below.

Table 29 Existing Eco-Tourism sites where project interventions are proposed

Site Name	Location	Annual Tourists	Income/Profit
Polo	150 km from Ahmedabad.	288,000	**Profit :** INR 640,000
Kilad	Near Vansda National Park at entrance of Dangs district.	4,000	Employment: 35 people **Gross Receipt** 2015-16: INR 531,000 2016-17: INR 532,000 2017-18: INR 708,800
Padamdungri	Situated on the banks of Ambika River in Vyara forest division 35 km from Vyara and 90 km from Surat.	125,000	Revenue : INR 4 million
Dhanpuri	site developed at Jambughoda sanctuary	100,000	Revenue : INR 4.7 million

Source: JICA Survey Team (2019)

In the absence of past data, it is assumed that the number of tourists will increase at 3% per annum during first five years in the absence of project interventions. This rate shall stabilize at 2% during 6 to 20 years. Beyond 20 years there shall not be any increase owing to stabilization. In case of project intervention, it is conservatively estimated that the number of tourists would increase at 5% per annum during first five years which shall stabilize at 7% during 6 to 20 years. However thereafter there shall not be any increase in tourism flow. The net benefits of project interventions are specified in table below.

Table 30 Net increase of Tourists (%) in existing site

Sites	Annual Increase in Tourist in without project			Annual increase in Tourist in With Project scenario			Net Increase in Tourist (%)		
	0-5 years	6-20 years	21-50 years	0-5 years	6-20 years	21-50 years	0-5 years	6-20 years	21-50 years
Polo	3%	2%	0%	5%	7%	0.00%	2%	5%	0.0%
Kilad	3%	2%	0%	5%	7%	0.00%	2%	5%	0.0%
Padamdungri	3%	2%	0%	5%	7%	0.00%	2%	5%	0.0%
Dhanpuri	3%	2%	0%	5%	7%	0.00%	2%	5%	0.0%
Total							**2%**	**5%**	**0.0%**

Source: JICA Survey Team (2019)

It is assumed that 100 tourists shall visit new eco-tourism site during weekend when such sites shall be developed. it is conservatively estimated that the number of tourists shall increase at 7% per annum during first five years which shall reach to 15 % during 6 to 20 years. This shall stabilize at 1% during rest of the project period.

The analysis of spending pattern of tourist visiting existing eco-tourism sites points to spending of INR 70 per Tourist. It is assumed that the project interventions shall help in double the spending by Tourist to INR 150 during 6 – 20 years period and INR 300 during rest of project tenure. In order to estimate operating profit, it is estimated that expenditure shall be 95% of the revenue during first 5 years. This shall improve to 90% during 6 to 20 years and stabilize at 80% during rest of the project period.

Based on above inputs/ assumptions, net benefits in terms of operating profit is estimated and shown in table below.

Table 31 Net benefits from Eco- Tourism activities

Year	Revenue (INR Million)	Expenditure (INR Million)	Net Benefits : Operating Profit (INR Million)
1			
2			
3			
4			
5			

Year	Revenue (INR Million)	Expenditure (INR Million)	Net Benefits : Operating Profit (INR Million)
6			
7	38	35.7	2
8	38	36.5	2
9	39	37.2	2
10	40	38.0	2
11	41	38.8	2
12	92	82.9	9
13	97	87.2	10
14	102	91.8	10
15	107	96.6	11
16	113	101.8	11
17	119	107.2	12
18	125	112.9	13
19	132	119.0	13
20	139	125.5	14
21	147	132.4	15
22	155	139.7	16
23	164	147.5	16
24	173	155.8	17
25	183	164.6	18
26	193	174.0	19
27	387	309.6	77
28	387	309.9	77
29	388	310.1	78
30	388	310.4	78
31	388	310.6	78
32	389	310.9	78
33	389	311.1	78
34	389	311.4	78
35	390	311.7	78
36	390	311.9	78
37	390	312.2	78
38	391	312.5	78
39	391	312.8	78
40	391	313.0	78
41	392	313.3	78
42	392	313.6	78
43	392	313.9	78
44	393	314.2	79
45	393	314.5	79

Year	Revenue (INR Million)	Expenditure (INR Million)	Net Benefits : Operating Profit (INR Million)
46	393	314.8	79
47	394	315.1	79
48	394	315.4	79
49	395	315.7	79
50	395	316.0	79

Source: JICA Survey Team (2019)

(2) Cluster Development

The net profit from different income generating activities of existing clusters was derived in discussion with respective clusters/ GFD officials. It is shown in table below.

Table 32 Net profit from income generating activities of existing clusters

Cluster	Net Profit (INR)
Visdalia Cluster	1,635,000
Wild Honey Cluster	252,000
Charoli cluster - Chhota Udaipur	70,000
Rajawat Cluster for Custard Apple	7,045,487
Average	**9,002,487**

Source: JICA Survey Team (2019)

Following inputs/ assumption was drawn into analysis for estimating benefits from income generating activities of clusters which shall be taken up for development through project interventions.

Table 33 Inputs/assumptions for estimating benefits from income generating activities to be undertaken by different clusters

Particular	Details
Total number of clusters proposed	8
Existing clusters to be developed as Pilot project during Project tenure	2
New Clusters	6
Average Net profit of existing clusters (INR) (a)	**9,002,487**

Particular	Details
Base year from which new cluster shall start making profit	5th Year
Base year Profit for new cluster (10% of (a))	9,00,249
Life of the cluster	20 years

Source: JICA Survey Team (2019)

It is assumed that the project interventions shall contribute in terms of increasing the profit . It is assumed that the profit of existing cluster shall increase by 3% during fist five years. Same shall be increase by 6% during 6- 10 years and stabilize at 8% during next five years. New cluster shall register no profit during first five years as expenditure owing to fixed cost shall be higher as compared revenue. It shall making profit from 6th years. It is assumed that its profit shall be increased by 5% during 6 to 10 years and reach to 8% during 11th to 15 years. This shall stabilize at 10% during next five years.

Based on above inputs/assumptions, benefits from cluster development is estimated and specified in table below.

Table 34 Net benefits from income generating activities to be undertaken by different clusters

Year	Existing cluster (INR)		New Cluster (INR)		Total Benefits (INR Million)
	Net profit of Existing Cluster (INR Per cluster)	Total Net profit of two clusters to be taken up on	New Cluster (INR Per cluster)	Total Net profit of six clusters to be taken up on	
1					
2					
3	9,002,487	18,004,974	0	0	18.0
4	9,272,562	18,545,123	0	0	18.5
5	9,550,738	19,101,477	0	0	19.1
6	9,837,261	19,674,521	0	0	19.7
7	**10,132,378**	20,264,757	**900,249**	5,401,492.2	25.7
8	10,740,321	21,480,642	945,261	5,671,567	27.2
9	11,384,740	22,769,481	992,524	5,955,145	28.7
10	12,067,825	24,135,650	1,042,150	6,252,902	30.4
11	12,791,894	25,583,789	**1,094,258**	6,565,548	32.1
12	**13,559,408**	27,118,816	1,181,799	7,090,791	34.2
13	14,644,161	29,288,321	1,276,342	7,658,055	36.9
14	15,815,693	31,631,387	1,378,450	8,270,699	39.9
15	17,080,949	34,161,898	1,488,726	8,932,355	43.1
16	18,447,425	36,894,850	**1,607,824**	9,646,943	46.5
17	**19,923,219**	39,846,438	1,768,606	10,611,638	50.5

Year	Existing cluster (INR)		New Cluster (INR)		Total Benefits (INR Million)
	Net profit of Existing Cluster (INR Per cluster)	Total Net profit of two clusters to be taken up on	New Cluster (INR Per cluster)	Total Net profit of six clusters to be taken up on	
18			1,945,467	11,672,801	11.7
19			2,140,014	12,840,082	12.8
20			2,354,015	14,124,090	14.1
21			2,589,416	15,536,499	15.5
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Source: JICA Survey Team (2019)

7 Project Economic Cashflow

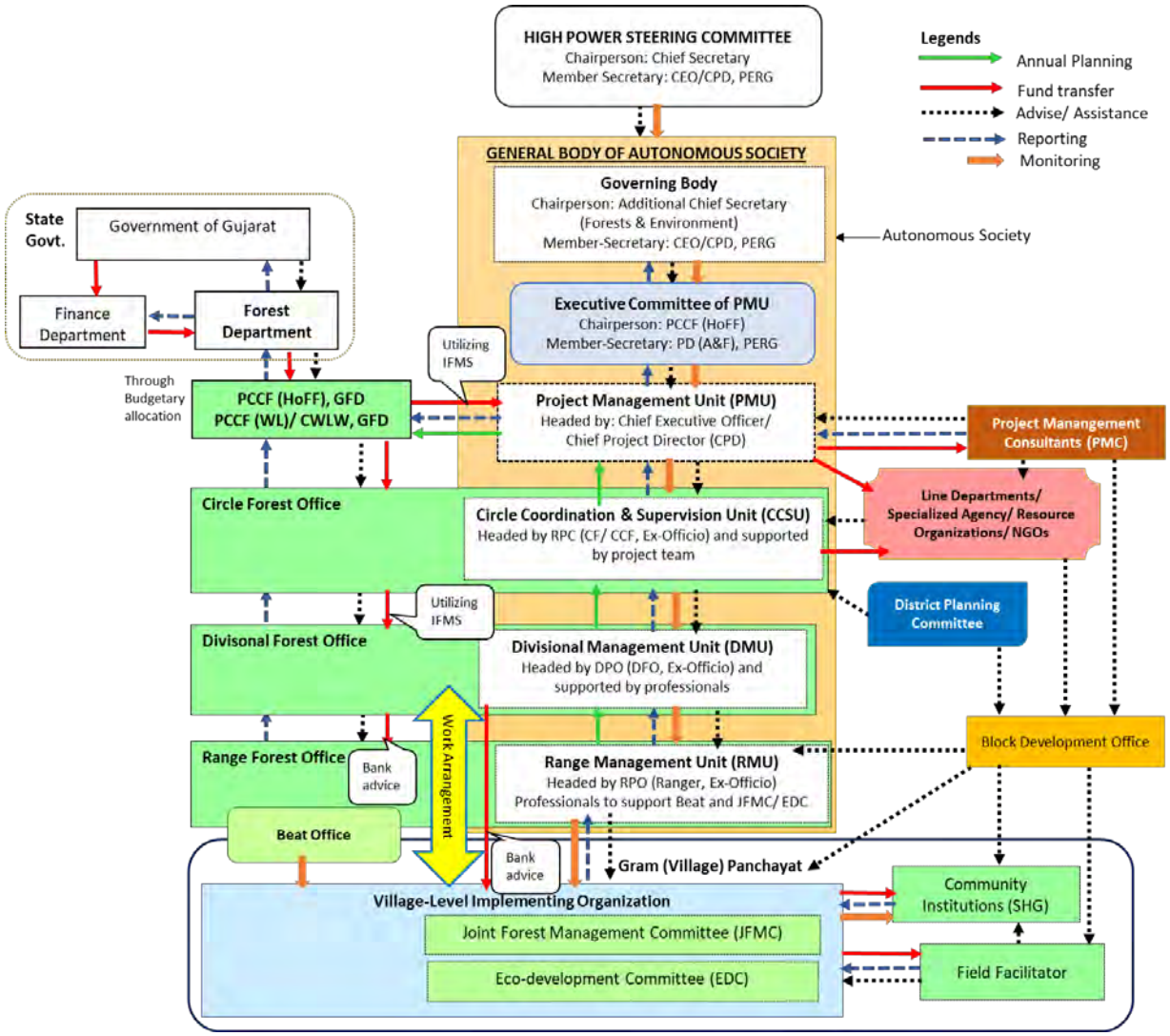
INR Million

Year	Economic Cost				Benefits																			Net Benefits (B-A)
					Co2 sequestration /Emission reduction					Coastal ecosystem - Net growing stock value				Benefits from Grassland	Benefits from Forestry production					Benefits due to reduction in HWC incidents	Benefits from Livelihood Activities			Total Benefits (B)	
	Investment Cost	O&M cost	Replacement Cost	Total (A)	Mangrove	Mangrove associated species	Costal Shelterbelts	Degraded Forest	Total	Mangrove	Mangrove Associated species	Coastal shelterbelts	Total		Teak Timber	Other Timber	Fuelwood	Fruits and NTFP	Total		Benefits from Eco Tourism activities	Benefits from Cluster related activities	Total		
1	600	0		600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	18	18	-582
2	915	0		915	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19	19	-896
3	1,219	0		1,219	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19	19	-1,200
4	1,537	0		1,537	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20	20	-1,517
5	1,645	0		1,645	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26	26	-1,619
6	1,424	0		1,424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	-1,397
7	941	0		941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	29	31	33	-908
8	674	0		674	9	1	19	44	74	26.4	3.6	0	30	19	0	0	0	0	0	2	2	30	32	158	-516
9	74	90		164	9	1	19	44	74	26.4	3.6	0	30	23	0	0	0	0	0	2	2	32	34	164	0
10		90		90	9	1	19	44	74	26.4	3.6	0	30	28	0	0	0	86	86	2	2	34	36	258	167
11		90		90	18	2	26	61	107	50.4	4.95	4	59.02	35	0	0	8	103	112	2	2	37	39	354	264
12		90		90	18	2	26	61	107	50.4	4.95	7	62.69	45	0	0	12	120	133	5	9	40	49	401	311
13		90		90	18	2	26	61	107	50.4	4.95	7	62.69	54	0	0	12	138	150	5	10	43	53	431	340
14		90		90	25	2	33	76	137	72	6.15	0	78.15	64	0	0	0	155	155	5	10	47	57	495	405
15		90		90	25	2	33	76	137	72	6.15	0	78.15	76	0	0	0	172	172	5	11	50	61	529	438
16		90		90	25	2	33	76	137	72	6.15	0	78.15	90	0	0	0	189	189	5	11	12	23	522	432
17		90		90	32	3	39	91	166	91.2	7.35	0	98.55	95	0	0	0	206	206	5	12	13	25	595	505
18		90		90	32	3	39	91	166	91.2	7.35	0	98.55	100	0	0	0	224	224	5	13	14	27	620	530
19		90		90	32	3	39	91	166	91.2	7.35	0	98.55	106	0	0	0	241	241	5	13	16	29	645	555
20		90		90	39	3	46	107	195	110.4	8.55	0	119	112	0	0	0	258	258	5	14	0	14	702	612
21		90		90	39	3	46	107	195	110.4	8.55	1,288	1,407	119	0	0	17	275	292	5	15	0	15	2,031	1,941
22		90		90	39	3	46	107	195	110.4	8.55	2,576	2,695	125	8,498	363	25	292	9,178	5	16	0	16	12,213	12,123
23		90		90	53	4	53	122	231	148.8	9.75	2,576	2,734	132	12,746	545	25	310	13,626	5	16	0	16	16,745	16,654
24		90		90	53	4	56	130	242	148.8	10.5	0	159.3	140	12,746	545	0	327	13,618	5	17	0	17	14,182	14,092
25		90		90	53	4	56	130	242	148.8	10.5	0	159.3	148	0	0	0	344	344	5	18	0	18	917	826
26		90		90	64	4	59	137	264	180	10.95	0	191	156	0	0	0	344	344	5	19	0	19	979	889
27		90		90	64	4	59	137	264	180	10.95	0	191	175	0	0	0	344	344	5	77	0	77	1,056	965
28		90	**324**	414	64	4	59	137	264	180	10.95	0	191	175	0	0	0	344	344	5	77	0	77	1,056	641
29		90		90	53	4	59	137	253	148.8	10.95	0	159.8	175	0	0	0	344	344	5	78	0	78	1,013	923
30		90		90	53	4	56	130	242	148.8	10.5	0	159.3	175	0	0	0	344	344	5	78	0	78	1,003	912
31		90		90	53	4	56	130	242	148.8	10.5	0	159.3	175	0	0	8	344	352	5	78	0	78	1,011	921
32		90		90	47	4	56	130	237	134.4	10.5	0	144.9	175	0	0	12	344	356	5	78	0	78	996	905
33		90		90	47	4	53	122	226	134.4	9.75	0	144.2	175	0	0	12	344	356	5	78	0	78	983	893
34		90		90	47	4	53	122	226	134.4	9.75	0	144.2	175	0	0	0	344	344	5	78	0	78	971	881

Year	Economic Cost				Benefits																		Net Benefits (B-A)
					Co2 sequestration /Emission reduction					Coastal ecosystem - Net growing stock value				Benefits from Grassland	Benefits from Forestry production					Benefits due to reduction in HWC incidents	Benefits from Livelihood Activities			Total Benefits (B)	
	Investment Cost	O&M cost	Replacement Cost	Total (A)	Mangrove	Mangrove associated species	Costal Shelterbelts	Degraded Forest	Total	Mangrove	Mangrove Associated species	Coastal shelterbelts	Total		Teak Timber	Other Timber	Fuelwood	Fruits and NTFP	Total		Benefits from Eco Tourism activities	Benefits from Cluster related activities	Total		
35		90		90	37	3	46	107	193	105.6	8.55	0	114.2	175	0	0	0	344	344	5	78	0	78	908	818
36		90		90	37	3	46	107	193	105.6	8.55	0	114.2	175	0	0	0	344	344	5	78	0	78	908	818
37		90		90	37	3	46	107	193	105.6	8.55	0	114.2	175	0	0	0	344	344	5	78	0	78	909	818
38		90		90	31	3	39	91	164	86.4	7.35	0	93.75	175	0	0	0	344	344	5	78	0	78	859	769
39		90		90	31	3	39	91	164	86.4	7.35	0	93.75	175	0	0	0	344	344	5	78	0	78	859	769
40		90		90	31	2	33	76	142	86.4	6.15	0	92.55	175	0	0	0	344	344	5	78	0	78	836	746
41		90		90	24	2	33	76	135	67.2	6.15	2,891	2,965	175	0	0	33.3	344	377	5	78	0	78	3,735	3,645
42		90		90	24	2	26	61	113	67.2	4.95	5,783	5,855	175	15,296	1,963	50.0	344	17,652	5	78	0	78	23,878	23,787
43		90		90	24	2	26	61	113	67.2	4.95	5,783	5,855	175	22,943	2,944	50.0	344	26,281	5	78	0	78	32,507	32,416
44		90		90	17	1	20	46	84	48	3.6	0	51.6	175	22,943	2,944	0	344	26,231	5	79	0	79	26,625	26,534
45		90		90	17	1	20	46	84	48	3.6	0	51.6	175	0	0	0	344	344	5	79	0	79	737	647
46		90		90	17	1	13	30	62	48	2.4	0	50.4	175	0	0	0	0	0	5	79	0	79	370	280
47		90		90	9	1	13	30	54	26.4	2.4	0	28.8	175	0	0	0	0	0	5	79	0	79	341	251
48		90	**324**	414	9	1	10	22	42	26.4	1.8	0	28.2	175	0	0	0	0	0	5	79	0	79	328	-86
49		90		90	9	1	10	22	42	26.4	1.8	0	28.2	175	0	0	0	0	0	5	79	0	79	328	238
50		90		90	4	1	10	22	37	12	1.8	0	13.8	175	0	0	0	0	0	5	79	0	79	309	219
EIRR																								**11.90%**
NPV @ 8.5% discount Rate																								**INR 5,807.2**

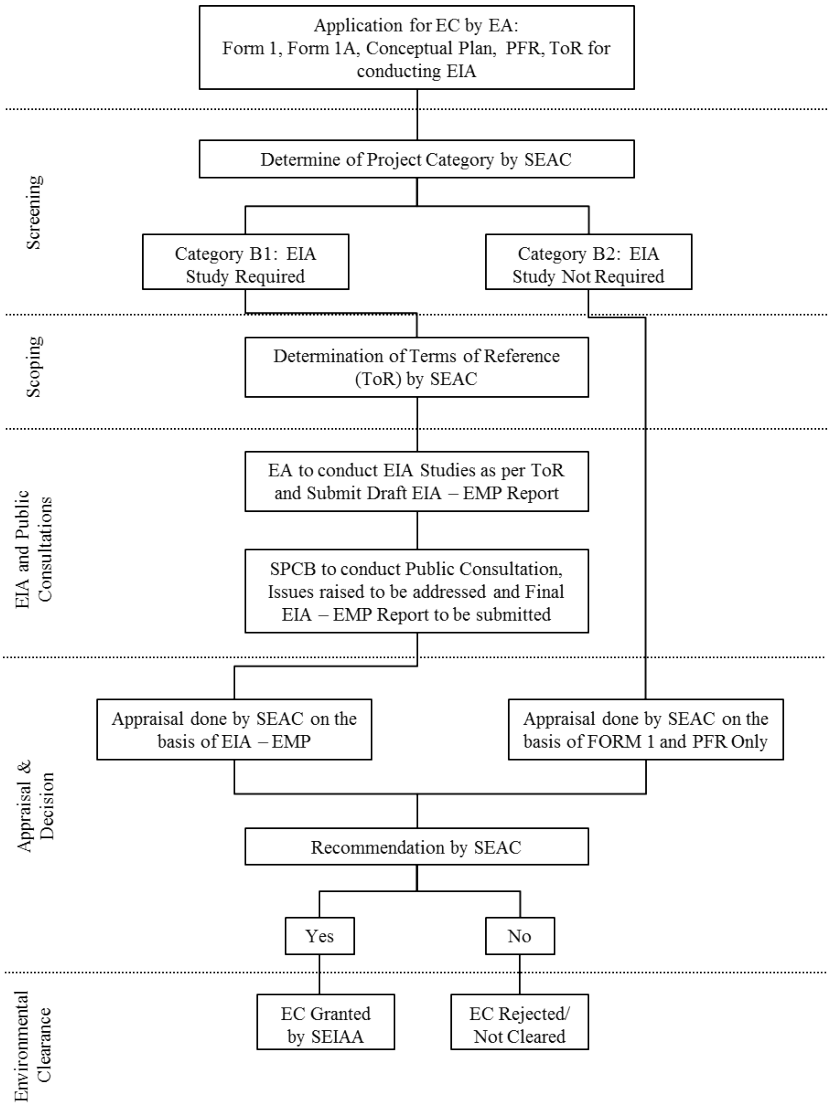
Source: JICA Survey Team (2019)

Annexure 16.1: Implementation Structure for Project



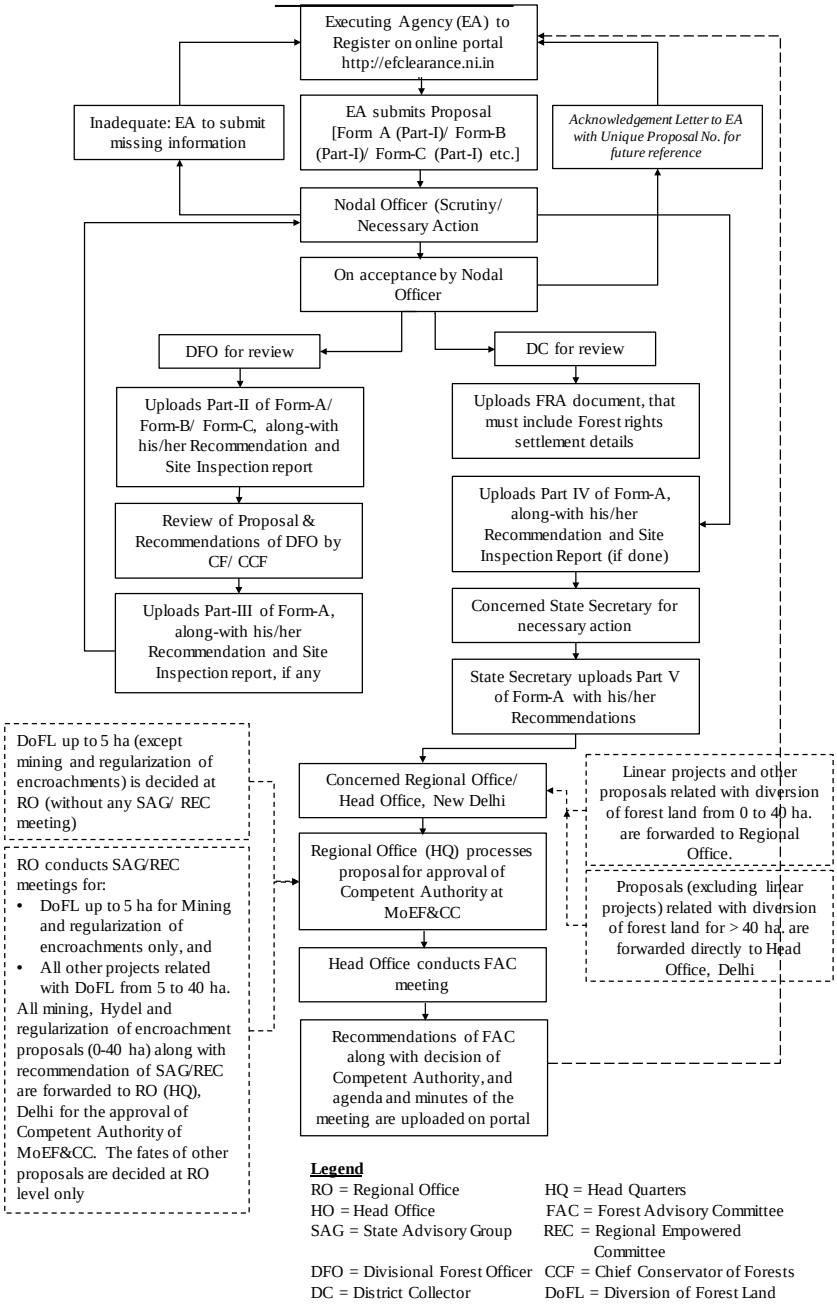
Source: JICA Survey Team (2019)

Annexure 16.2: Prior Environmental Clearance Process for Category B Project



Source: EIA Guidance Manual for Building, Construction. Townships and Area Development Projects 2010, MoEF

Annexure 16.3: Forest Clearance Process



Source: www.envfor.nic.in - MOEF&CC

Annexure 16.4: Categorization of Projects as per JICA Guidelines

- **Category A:** Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas. An illustrative list of sensitive sectors, characteristics, and areas is provided below:

  - Sensitive Sectors

    Large-scale projects in the following sectors:

    (1) Mining, including oil and natural gas development
    (2) Oil and gas pipelines
    (3) Industrial development
    (4) Thermal power, including geothermal power
    (5) Hydropower, dams, and reservoirs
    (6) Power transmission and distribution lines involving large-scale involuntary resettlement, large-scale logging, or submarine electrical cables
    (7) River/erosion control
    (8) Roads, railways, and bridges
    (9) Airports
    (10) Ports and harbors
    (11) Water supply, sewage, and wastewater treatment that have sensitive characteristics or that are located in sensitive areas or in their vicinity
    (12) Waste management and disposal
    (13) Agriculture involving large-scale land clearing or irrigation

  - Sensitive Characteristics

    Large-scale involuntary resettlement:

    (1) Large-scale groundwater pumping
    (2) Large-scale land reclamation, land development, and land clearing
    (3) Large-scale logging

  - Sensitive Areas

    Projects in the following areas or their vicinity:

    (1) National parks, nationally-designated protected areas (coastal areas, wetlands, areas for ethnic minorities or indigenous peoples and cultural heritage, etc. designated by national governments)
    (1) Areas that are thought to require careful consideration by the country or locality Natural Environment

    (1) Primary forests or natural forests in tropical areas

(2) Habitats with important ecological value (coral reefs, mangrove wetlands, tidal flats, etc.)
(3) Habitats of rare species that require protection under domestic legislation, international treaties, etc.
(4) Areas in danger of large-scale salt accumulation or soil erosion
(5) Areas with a remarkable tendency towards desertification

Social Environment:

(1) Areas with unique archaeological, historical, or cultural value
(2) Areas inhabited by ethnic minorities, indigenous peoples, or nomadic peoples with traditional ways of life, and other areas with special social value

- **Category B:** Proposed projects are classified as Category B if their 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.

- **Category C:** Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.

- **Category FI:** Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the Sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the Sub-projects cannot be specified prior to JICA's approval of funding (or project appraisal); and those Sub-projects are expected to have a potential impact on the environment.

When necessary, JICA can change a category even after screening. This might occur such as when a new significant impact has come to light as a result of the cooperation project process, or in other specific situations.

Annexure 16. 5: Indicative Outline of Annual Environmental and Social Performance Report to JICA

1. Basic Information

Name of Organization:		
Completed by (Name):		
Position in Organization:		
Reporting Period:	From:	To:
Completed in (MM/YY)		

2. Sub-projects using JICA Funds during the Reporting Period

Name of Sub-project approved during the reporting period	Industry Sector	Project Scope	Project Cost (JPY)	Approval Date	Environmental Category *	Reason of Categorization	Documents made (e.g. EIA, RAP, IPP)	Any outstanding environmental, IR or IP[1] issues
	Forestry							

* Please refer the Criteria of Categorization finalized by PMU which are in line with JICA Guidelines for Environmental and Social Considerations (April 2010), and in case of **Category B,** please fill out the table below for the specific activities (at ward or GP level).

Location Range	Location Village	Scope of the Activities	Specific Reason of Category B (Environmental/ Social Impact)	Implementing Agency

3. Sub-projects using JICA Funds to be Approved in the Next FY

Name of Sub-project approved during the reporting period	Industry Sector	Project Scope	Project Cost (JPY)	Approval Date	Environmental Category *	Reason of Categorization	Documents made (e.g. EIA, RAP, IPP)	Any outstanding environmental, IR or IP** issues
	Forestry							

* Please refer the Criteria of Categorization finalized by PMU which are in line with JICA Guidelines for Environmental and Social Considerations (April 2010), and in case of **Category B,** please fill out the table below for the specific activities (at ward or GP level).

Location Range	Location Village	Scope of the Activities	Specific Reason of Category B (Environmental/ Social Impact)	Implementing Agency

4. Environmental and Social Management System (ESMS)

Please describe if ESMS of your organization has changed in any way (e.g. establishment of a new division for environmental and social management) since JICA's appraisal.

[1] IR = Involuntary Resettlement, IP = Indigenous People

Annexure 16.6: Details of Villages Visited

Prep Team:	JIN/SF/OS		
Date of Visit:	19.07.2019	Time:	F/N
Village:	Ode	Range:	Bhiloda
Division:	Aravalli FD	JFMC:	Women Coopt Soc
Population:	~ 3500	No. of HH	700
Registered:	Yes	JICA II:	Yes
Adhikar Patra:	Yes	Tribal/ Non Tribal:	Tribal Bharada
Forest Area:	833.2	JFMC Area:	100 ha
No. of Members Exec Committee:		No of Members General Body:	297
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu and hort Sps
EPA Works :	Multipurpose hall under GPDP 2, Distribution of grafted horticulture plants , Vegetable's seeds, Milk can, Bamboo 's Baskets among members,	SHG:	Micro Finance, 2 groups.
Other Details:			
It is an old JFMC all women cooperative society. They have horticultural plants growing for fruits collection. Ladies do grass and fire wood collection from protected forest, increase in MFP benefits observed by members after protection of forests. Timru collection by members from forest. Khakhra leaves were used to make patra (utensils) pressing machine was also purchased by the SHG but there are no buyers for the same hence its redundant. Sewing machine and vermicomposting is done by members with the help of the society.			

Prep Team:	JIN/SF/OS		
Date of Visit:	19.07.2019	Time:	A/N
Village:	Mau Chappra	Range:	Bhiloda
Division:	Aravalli FD	JFMC:	JFMC M Chappra
Population:	4215	No. of HH	173
Registered:	Yes	JICA II:	Yes
Adhikar Patra:	Awarded	Tribal/ Non Tribal:	Non Tribal (SC/OBC)
Forest Area:	382 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	12	No of Members General Body:	153
Microplanning:	Yes	Women Participation:	No
Plantation Works	Yes	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu

EPA Works :	Multipurpose hall, Bore well	SHG:	Micro Finance, 2 groups.
Other Details:			
Village was covered under JICA II. Members are well aware of the JICA project. EPA assets present, SHG bank passbook present, SHG Individual oriented.			

Prep Team:	JIN/SF		
Date of Visit:	19.07.2019	Time:	A/N
Village:	Golvada	Range:	Vijaynagar
Division:	Sabarkantha FD	JFMC:	Golvada JFMC
Population:	500	No. of HH	173
Registered:	Yes	JICA II:	Yes
Adhikar Patra:	Given	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	1000 ha	JFMC Area:	50 ha
No. of Members Exec Committee:	11	No of Members General Body:	173
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu
EPA Works :	Machine for making powder of Keshuda flower and leaves, cooking utensils and tents	SHG:	Micro Finance, 2 groups.
Other Details:			
Village was covered under JICA II. Members are well aware of the JICA project. EPA assets present, SHG bank passbook present, SHG Individual oriented. Women go to get firewood and grass from the protected forest area. They also get MFP. Men and women are aware of benefits of protection and conservation of forests.			

Prep Study Team:	JIN/SF		
Date of Visit:	20.07.2019	Time:	F/N
Village:	Dholivav (04 hamlet)	Range:	Vijaynagar
Division:	Sabarkantha FD	JFMC:	JFMC Dholivav
Population:	500	No. of HH	95 – 100
Registered:	Yes	JICA II:	Yes
Adhikar Patra:	Given	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	270.41 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	11	No of Members General Body:	111
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu
EPA Works :	Vermiculture, Seeds distribution, Mahila Ghar, Utensils,	SHG:	Micro Finance, 2 groups. Seed money of Rs. 30,000/- was

	Multipurpose hall		given
Other Details:			
It is an all women JFMC. However, only a limited number of village households are member of the Committee. Village was covered under JICA II. Members remember the JICA project. EPA assets present, SHG bank passbook present, SHG Individual oriented.			

Prep Team:	JIN/SF		
Date of Visit:	20.07.2019	Time:	F/N
Village:	Kalvan (09 hamlet)	Range:	Vijaynagar
Division:	Sabarkantha FD	JFMC:	Shri Mahakali JFMC Kelva
Population:	~ 1500	No. of HH	
Registered:	No	JICA II:	No
Adhikar Patra:	Not given	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	290 ha, 130 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	11	No of Members General Body:	111
Microplanning:	-	Women Participation:	Yes
Plantation Works	Nil	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu
EPA Works :	Proposed by villagers Van talav, Common Purpose Hal for storing MFP (Proposed)	SHG:	Proposed by villagers – Microfinance, MFP Collection and selling to whole sale buyer, Horticulture, Minor Irrigation
Other Details:			
Villagers interested in working for wages most of them have farm lands and will work for plantation and creating S&M works like check dams, trenches, contour bunds, gully plugging etc. Will protect forest and anticipates in return grass and MFP from protected area. Prospective Village for JICA III			

Prep Team:	JIN/SF		
Date of Visit:	20.07.2019	Time:	F/N
Village:	Kathroti (04 hamlet)	Range:	Vijaynagar
Division:	Sabarkantha FD	JFMC:	Kathrodi
Population:	1650	No. of HH	400
Registered:	Yes	JICA II:	No
Adhikar Patra:	Not given	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	213 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	11	No of Members General Body:	400
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Not taken	Species	Teak Mango Mahuvda Karuj, Drum stick, Sitafal and Jambu
EPA Works :	Proposed by villagers Van talav, Common	SHG:	Proposed by villagers – Microfinance, MFP

	Purpose Hal for storing MFP (Proposed)		Collection and selling to whole sale buyer, Horticulture, Minor Irrigation
Other Details:			
Villagers collect MFP like gum, mahuva, medicinal plants, etc., but sell it to local shops. Villagers are of the opinion that under JFMC they can make SHGs and collect individual collection of MFP into bulk and sell it to a whole seller will fetch good price. Registered for 04 years but no works done. Can be taken up for the JICA III works			

Prep Team:	JIN/SF		
Date of Visit:	20.07.2019	Time:	A/N
Village:	Bedi (05 hamlet)	Range:	Poshina
Division:	Sabarkantha FD	JFMC:	Sobhaji Van Vyavastha Samiti Bedi
Population:	1100	No. of HH	195
Registered:	Yes	JICA II:	
Adhikar Patra:	Awarded	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	600 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	11	No of Members General Body:	195
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Amla, Garmado, Khakhra, Desi Bawad, Kanji, Timru, Khajuri, Salai
EPA Works :	Van Talavdi, Contour Bunds, Check dams, mud bunds, etc	SHG:	2 SHG formed
Other Details:			
JFMC formed in 2005 -06. Individual oriented JFMC. Protection under supervision of forest department.			

Prep Team:	JIN/SF		
Date of Visit:	20.07.2019	Time:	A/N
Village:	Bedi (05 hamlet)	Range:	Poshina
Division:	Sabarkantha FD	JFMC:	Sobhaji Van Vyavastha Samiti Bedi
Population:	1100	No. of HH	195
Registered:	Yes	JICA II:	
Adhikar Patra:	Awarded	Tribal/ Non Tribal:	Tribal Dugli Garasia
Forest Area:	600 ha	JFMC Area:	100 ha
No. of Members Exec Committee:	11	No of Members General Body:	195
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Amla, Garmado, Khakhra, Desi Bawad, Kanji, Timru, Khajuri, Salai

EPA Works :	Van Talavdi, Contour Bunds, Check dams, mud bunds, etc	SHG:	2 SHG formed
Other Details:			
JFMC formed in 2005 -06. Individual oriented JFMC. Protection under supervision of forest department.			

Prep Team:	JIN/AMD		
Date of Visit:	22.07.2019	Time:	F/N
Village:	Kachhiyagala (Non reserved vidi)	Range:	Wankaner
Division:	Morbi FD	JFMC	Kachhiyagala JFMC
Population:	1192	No. of HH	247
Registered:	Yes	JICA II:	Yes
Adhikar Patra:	Not given	Tribal/ Non Tribal:	Non Tribal with SC and OBC Population
Forest Area:	30 ha	JFMC Area:	30 ha
No. of Members Exec Committee:	11	No of Members General Body:	247
Microplanning:	Yes	Women Participation:	Yes
Plantation Works	Yes	Species	Grass Sps seed sowing
EPA Works :	Utensils, tent, chairs RO plant in school	SHG:	2 SHG
Other Details:			
Villagers aware of JICA Project. Assets created under JICA still exist. Vidi is no more being handled by JFMC. JFMC not functional. All office bears are there. SHG individual oriented. Sustenance of JFMC not observed.			