Data Collection Survey on Forestry Sector in India

Final Report

August 2011

Japan International Cooperation Agency (JICA)

IC Net Limited

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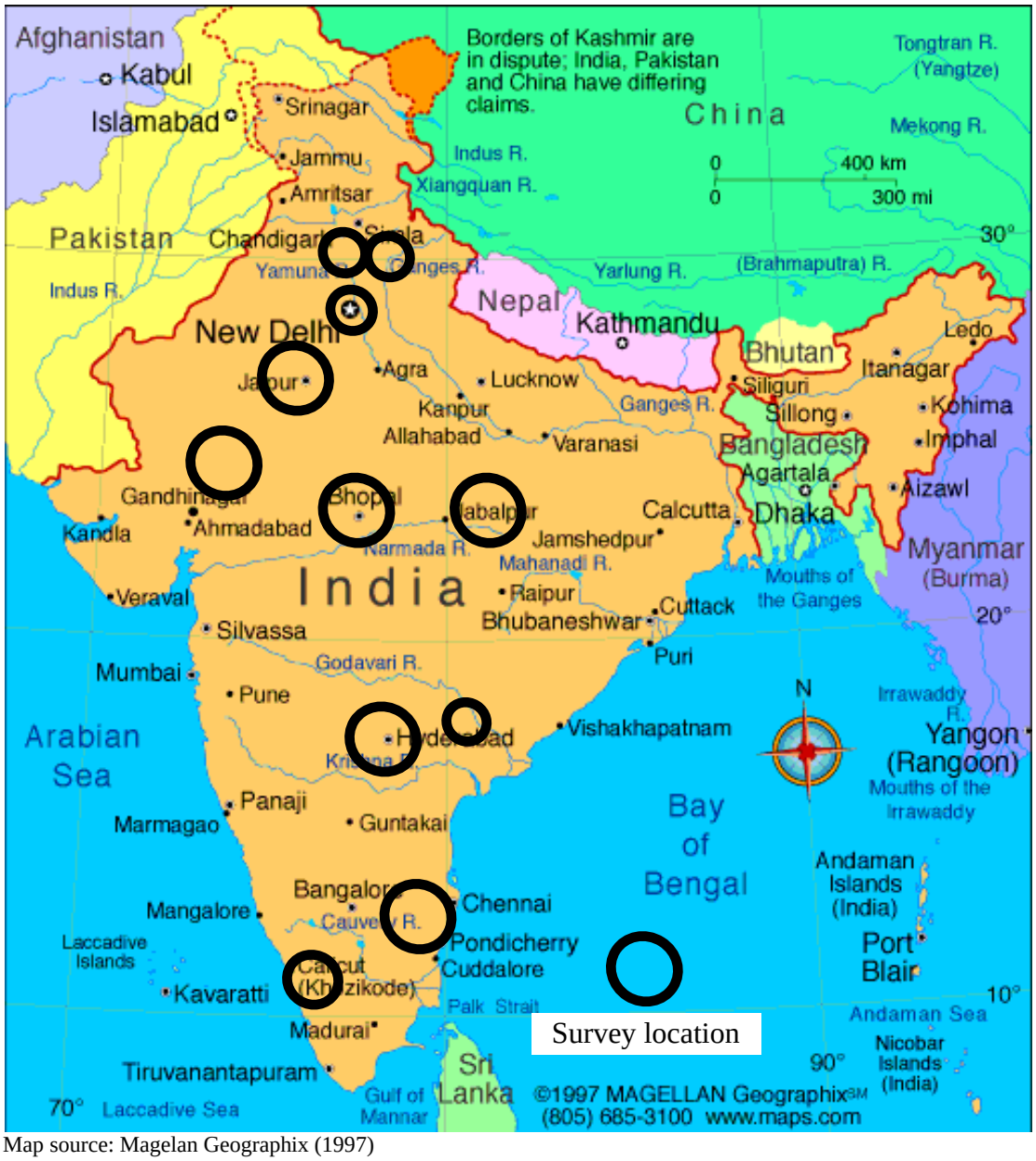

Map source: Magelan Geographix (1997)

Map of India with survey locations

Abbreviations and acronyms

AAP	Aravalli Afforestation Project
ADB	Asian Development Bank
APCCF	Additional Principal Chief Conservator of Forest
AR-CDM	Afforestation and Reforestation Clean Development Mechanism
BHS	Biodiversity Heritage Sites
BMC	Biodiversity Management Committee
BPL	Below Poverty Line
CBD	Convention on Biological Diversity
CCA	Community conserved area
CCF	Chief Conservator of Forests
CDM	Clean Development Mechanism
CDW	Community Development Works
CEC	Central Empowered Committee (of the Supreme Court)
CER	Certified Emission Reductions
CF	Conservator of Forests
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species
COP	Conference of Parties
CPS	Country Partnership Strategy
DFO	District Forest Officer
DRDA	District Rural Development Agency
EC	European Commission
EDC	Ecodevelopment Committee
EIA	Environmental Impact Assessment
EPA	Entry Point Activity
ESA	Ecologically Sensitive Areas
ETF	Elephant Task Force
EU	European Union
FAMS	Fire Alert Messaging System
FAO	Food and Agriculture Organization of the United Nations
FDA	Forest Development Agency
FIRMS	Fire Information Resource Management System
FRO	Forest Range Officer
FSI	Forest Survey of India
FUG	Forest User Group
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	greenhouse gas
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOI	Government of India
GPS	Global Positioning System
HPC	High Power Committee
IBRD	International Bank for Reconstruction and Development
ICFRE	Indian Council of Forestry Research and Education
ICT	information and communication technology

IDA	International Development Association
IFS	Indian Forest Service
IGA	Income generation activities
IGNFA	Indira Gandhi National Forest Academy
IIFM	Indian Institute of Forest Management
IT	Information Technology
IUCN	International Union for Conservation of Nature
JBIC	Japan Bank for International Cooperation
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
JICA	Japan International Cooperation Agency
LPG	Liquefied Petroleum Gas
MDG	Millennium Development Goals
MFP	minor forest produce
MOEF	Ministry of Environment and Forests
MOTA	Ministry of Tribal Affairs
MRV	measurement, reporting, and verification
NAP	National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NBA	National Biodiversity Authority
NBAP	National Biodiversity Action Plan
NCA	National Commission on Agriculture
NDC	National Development Council
NGO	non-governmental organisation
NREGS	National Rural Employment Guarantee Scheme
NTFP	non-timber forest product
ODA	Official Development Assistance
PBR	Peoples Biodiversity Register
PCCF	Principle Chief Conservators of the Forest
PDA	Portable Digital Assistance
PESA	Panchayats (Extension to the Scheduled Areas) Act, 1996
PRA	Participatory Rural Appraisal
REDD	reducing emissions from deforestation and forest degradation
RFBP	Rajasthan Forestry and Biodiversity Project
SACON	Salim Ali Centre for Ornithology and Natural History
SBB	State Biodiversity Board
SFDA	State Forest Development Agency
SFS	State Forest Service
SGP	Small Grants Programme
SHG	Self Help Group
SIDA	Swedish International Development Authority
TAP	Tamil Nadu Afforestation Project
TCPL	Tree Cultivation in Private Land
TOF	trees outside forests
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

USAID	United States Agency for International Development
VCS	Verified Carbon Standard
VDF	Village Development Fund
VFC	Village Forest Council
VFDF	Village Forest Development Fund
VFPMC	Village Forest Protection and Management Committee
WB	The World Bank
WII	Wildlife Institute of India
WLPA	Wildlife (Protection) Act 1972
ZSI	Zoological Survey of India

List of local terms

Adivasis	Scheduled Tribes
Gram Panchayat	Village level primary unit of Panchayat Raj Institutions set up with minimum population of 300
Gram Sabha	Village level governance body formed by adult male and female village residents whose names are recorded in the electoral rolls
Panchayat	Village council for local administration
Panchayati Raj	System of governance in which village councils are the basic units of administration
Van Panchayats	Village-level committee to manage community forest found in Uttarakhand State

Currency equivalents

(As of 1 August 2011)

USD 1.00	=	JPY 76.87
USD 1.00	=	INR 44.86
INR 1.00	=	JPY 1.75

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CHAPTER 1 Objective of the Survey

1.1 Objective of the survey

The Data Collection Survey on Forestry Sector in India (Survey) was conducted to review the assistance strategy of the Japan International Cooperation Agency (JICA) for India's forestry sector. The outputs of the Survey will help JICA adjust its strategy according to the development of the sector along with India's recent robust economic growth. The Survey was conducted in close cooperation with the Ministry of Environment and Forests (MOEF) which facilitated the Survey team's field visits in the areas under the jurisdictions of concerned state forest departments.

The objectives of the Survey are to: 1) collect and review information from the Government of India, research and training institutions, international donor organizations, and international NGOs, regarding the situation and challenges in the forestry sector in India; 2) review the result of the activities of the projects supported by the Japanese Official Development Assistance (ODA) loans and propose an innovative approach for future project formulation; and 3) identify activities and potential target states for Japanese ODA loan supported projects or programs, and for technical assistance in consultation with MOEF.

To consider future cooperation by JICA, the Survey team reviewed the sustainability of Joint Forest Management (JFM) activities to enhance the effectiveness of JFM schemes, find out implications of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 or the Forest Rights Act 2006 on JFM arrangements, and reviewed the challenges and needs in biodiversity management. At the same time, the team collected information on the recent trends of supply and demand, and market structure of the forest products under the rapidly growing Indian economy. The team also looked into the government's priority programs and projects in the areas related to forestry and biodiversity, and possible contributions of Japan's experience and expertise to identified assistance needs.

1.2 Survey strategies

To achieve the objectives of the Survey, the team took the following strategies:

1) By reviewing lessons learned from forestry and biodiversity conservation initiatives of India, and other Asian countries, the Survey was implemented effectively. To find out the characteristics of participatory forest resources management in India, initiatives in South and Southeast Asian countries were compared by obtaining technical advice from the Regional Community Forestry Training Centre in Bangkok, Thailand.
2) By examining trends of forest products markets, and commercial timber production and supply from public and private land, the economic contribution of the forestry sector was examined. Social and economic sustainability of production of forest products from agroforestry and farm forestry practices in private land was also examined through literature survey and field data collection.
3) By reviewing the implementation of JFM programmes assisted by the past ODA Loan projects, local residents' perceptions on public services related to JFM were examined. A perception gap between public and private entities was identified in terms of purposes, incentive, and risk factors of forest management, and how to bridge such gap was considered.
4) By examining the international trends, policies of the Government of India, and Japan's position, ongoing international negotiations, and internationally accepted concepts regarding biodiversity conservation and climate change measures, the team examined the positions and policies of the Government of India.
5) By focusing on forest management strategy and institutional arrangement, the team examined

opportunities for Japan to contribute its know-how.

1.3 Survey procedures and methods

The procedures and methods of the survey are:

1) First Field Survey (Late March – Late May 2011)
   - Preparation of the survey including selection of national consultants
   - Preparation and presentation of the Inception Report to the Ministry of Environment and Forest
   - Review of information on forest and biodiversity issues in India
   - Evaluation on the past Japanese ODA Loan projects in the forestry sector
   - Identification of priority areas and states
   - Consultation with GOI on priority areas and states
2) Second Field Survey (June – Early July 2011)
   - Preparation of the Interim Report
   - Discussion with stakeholders on the Interim Report
   - Selection and reconnaissance survey in two priority states
   - Recommendations on assistance strategy in priority areas
   - Discussion on contribution of Japan's experience and expertise
3) Third Field Survey (Mid – July 2011)
   - Preparation of the Draft Final Report
   - Discussion with stakeholders on the Draft Final Report
   - Finalization of the Final Report

Survey methods applied are:

1) Literature review
2) Key informant interviews
3) Simplified value chain analysis for sample JFM Committees (JFMCs) and their members
4) Micro enterprise diagnostic analysis on JFMC members
5) Field reconnaissance of selected protected areas and ecodevelopment activities

Evaluation and analytical criteria are:

1) Survival rate of planted trees and sustainability of JFM-related activities after completion of Japanese ODA loan supported projects
2) Effective monitoring of activities of JFMCs and projects sites
3) Community participation process
4) Effectiveness and profitability of income generation activities
5) Management effectiveness of protected areas

Components of Japanese ODA Loan supported projects examined are:

1) JFM-related activities
2) Income generation activities
3) Local small-scale infrastructure development
4) Farm forestry and agroforestry in private land
5) Biodiversity conservation activities
6) Climate change
7) Institutional, infrastructure, and capacity development of the Forest Department

CHAPTER 2 Current status of forestry and biodiversity and their institutional framework

2.1 Current status of forest resources

(1) Recorded forest area, forest cover, and tree cover

The relationship between legal and physical status of forest land is summarized in Table 2-1. In terms of legal status of forest land the geographical area of India is divided into recorded forest area[1] and outside of recorded forest area, whereas from the point of view of physical status, geographical areas of India is separated into forest cover, scrub, and non-forest. Due to incomplete availability of boundary data which defines geographical locations of reserved forests, protected forests, and unclassed forests, distribution of physical status of forest cover such as very dense forest and moderately dense forest within these legal classifications of forests are not provided (FSI, 2009). Keeping this constraint in mind, legal and physical status of forest classifications presented in the Table 2-1 will be used to describe the current status of forest resources in India.

Table 2-1 Recorded forest area, forest cover, and tree cover in India

Physical status \ legal status				Recorded forest area Physical status included				Outside of recorded forest area		Total area (reported in 2009)	
				Reserved Forests	Protected Forest	Unclassed Forests	Total	Physical status included	Trees outside forests (TOF)	(km^2)	% to total
Forest cover	Very dense forest (canopy density more than 70%)			Included	Included	Included	Included	Included	Present	83,510	2.5%
	Moderately dense forest (canopy density between 40-70%)			Included	Included	Included	Included	Included	Present	319,012	9.7%
	Open forest (canopy density between 10-40%)			Included	Included	Included	Included	Included	Present	288,377	8.8%
	Forest cover total[*1]			Included	Included	Included	Included	Included	Present	690,899	21.0%
Scrub (canopy density less than 10%)				Included	Included	Included	Included	Included	Present	41,525	1.3%
Non-forest[*2]	Non-forest in recorded forest area			Included	Included	Included	Included			(no data)[*3]	
	Non-forest outside of recorded forest area	Cultivable non forest area	Tree cover					Included	Present	92,769	2.8%
			Non tree cover					Included		(no data)[*3]	
		Wetlands, riverbeds, and snow mountains						Included		(no data)[*3]	
	Non-forest total							Included	Present	2,554,839	77.7%
Total area (km^2)				430,582	206,219	132,711	769,512	2,517,751		3,287,263	100.0%
	% to total			13.1%	6.3%	4.0%	23.4%	76.6%		100.0%	
Growing stock (million m^3)				(no data)[*3]	(no data)[*3]	(no data)[*3]	4,499	(no data)[*3]	1,600	6,098	mill. m^3
	% to total						73.8%		26.2%	100.0%	

Note: 1) Include 4,639 km^2 under mangroves; 2) Excludes scrubs and includes water bodies; 3) 'No data' indicates the absence of disaggregated data; 4) 'Included' indicates presence of the physical status of forest cover in the legal classifications of forests, but area measurements are not provided due to incomplete availability of boundary data which defines geographical locations of such legal forest classifications; 5) 'Present' indicates presence of the trees in the legal classification of outside of recorded forest area.
Source: FSI (2009)

[1] Recorded forest area is same as 'forest area' which is geographic areas recorded as forests in Government record (FSI, 2009)

Forest cover

'Forest cover' denotes physical status of land irrespective of legal status indicated by classification of recorded forest area. The forest cover is classified into three canopy density classes: very dense forest with canopy density of more than 70%; moderately dense forest with canopy density between 40 and 70%; and open forest with canopy density between 10 and 40% (FSI, 2009). Forest land with canopy density less than 10% is defined as scrub, which is not counted as a part of forest cover. In 2007 assessment reported in 2009, very dense forest accounts only for 2.5%, moderately dense forest for 9.7%, open forest for 8.8%, and scrub for 1.3% of the total geographical area of India.

Forest cover trends

In the years after independence, large tracts of forests were diverted for non-forestry purposes such as agriculture, hydroelectric projects, and other development projects. It is estimated that the rate of diversion between 1950 and 1980 was about 1,500 km^2 per year (GOI, 1999 cited in 'Saigal et al., 2002'). In 1980, the central government enacted the Forest (Conservation) Act with the intention of arresting this process. The Act made it mandatory for the state governments to seek central government's approval prior to diverting any forest land for non-forestry use. This brought down the rate of forest land diversion to only about 250 km^2 per year between 1980 and 1995, with a further decline in the rate in recent years (ibid.).

Since 1987, the Forest Survey of India (FSI) has completed 11 assessments whose state-wise results are presented in Annex 1 and Annex 2. Due to different data resolution, technology, and procedures applied for data processing, direct comparison among the results of the assessments presented in the Annexes is not possible except the comparison between the revised 2005 assessment[2] and the 2007 assessment[3]. The advanced technology applied for the revised 2005 assessment and the 2007 assessment makes possible reliable comparison of the estimated forest areas of the two periods (FSI, 2009). Although it is prone to error, the FSI applied a number of correction methods to reassess and approximate the nationwide forest cover concluding, for example, that the decadal change between the 1997 reassessment[4] (659,550 km^2) and the 2007 assessment (690,899 km^2) is 31,349 km^2, which is a 4.75% increase from the 1997 reassessment.

Table 2-2 Forest cover change matrix by forest class between 2005 reassessment and 2007 assessment

Forest class	Very dense forest (VDF)*1		Moderately dense forest (MDF)*1		Open forest (OF)*1		Scrub		Non forest (NF)*2		2005 reassessment total	
	km^2	% to 2005 VDF area	km^2	% to 2005 MDF area	km^2	% to 2005 OF area	km^2	% to 2005 Scrub area	km^2	% to 2005 NF area	km^2	% to TGA*3
VDF	83,219	99.7%	127	0.0%	45	0.0%	5	0.0%	76	0.0%	83,472	2.5%
MDF	220	0.3%	315,608	98.6%	1,948	0.7%	42	0.1%	2,130	0.1%	319,948	9.7%
OF	35	0.0%	1,821	0.6%	280,560	97.8%	186	0.5%	4,149	0.2%	286,751	8.7%
Scrub	0	0.0%	15	0.0%	161	0.1%	40,828	98.9%	282	0.0%	41,286	1.3%
NF	36	0.0%	1,441	0.5%	5,663	2.0%	464	1.1%	2,548,202	99.7%	2,555,806	77.7%
2007 assess. total	83,510	100.0%	319,012	99.7%	288,377	100.6%	41,525	100.6%	2,554,839	100.0%	3,287,263	100.0%
% to TGA	2.5%		9.7%		8.8%		1.3%		77.7%		100.0%	
Net change	38		-936		38		38		-967		0	

Note: 1) Include mangroves. 2) Includes water bodies. 3) TGA means 'total geographical areas of India.'

Source: Source: FSI (2009)

[2] 2005 reassessment was done using data obtained in 2004, and its results are reported in 2009 State of Forest Report.
[3] 2007 assessment was done using data obtained in 2006-7, and its results are reported in 2009 State of Forest Report.
[4] 1997 reassessment was done using data obtained in 1994, and its results are reported in 2009 State of Forest Report.

Accurate forest class- and state-wise comparison of forest cover is only possible between the 2005 reassessment and the 2007 assessment which are presented in Table 2-2 and Table 2-3. Since the technology applied to both assessments is consistent, the areas are compared accurately. The change matrix given in Table 2-2 reveals that changes in area of each forest class result from improvement of lower forest classes and degradation of concerned class to the lower forest classes. Compared to the 2005 assessment, only small net changes are recognized indicating relatively stable forest cover in India in recent years. The largest negative net change is observed in moderately dense forest class showing 0.3% loss from 2005 area. In this case, there is an improvement of 1,821 km^2 of open forests, 15 km^2 of scrub and 1,441 km^2 of non-forest to moderately dense forest but there has also been degradation of 1,948 km^2 of moderately dense forest to open forests, 42 km^2 to scrub and 2,130 km^2 to non-forest resulting in a net loss of 936 km^2 of moderately dense forest (FSI, 2009).

Table 2-3 Change in the forest cover of States and Union Territories between 2005 and 2007 assessments

State / UT	2005 revised assessment reported in 2009 State of Forest Report				2007 assessment reported in 2009 State of Forest Report				Change between 2005 and 2007 assessment			
	VDF[*1]	MDF[*1]	OF[*1]	Total	VDF	MDF	OF	Total	VDF	MDF	OF	Total
Andhra Pradesh	820	24,805	19,606	45,231	820	24,757	19,525	45,102	0	-48	-81	-129
Arunachal Pradesh	20,859	31,632	14,981	67,472	20,858	31,556	14,939	67,353	-1	-76	-42	-119
Assam	1,464	11,653	14,641	27,758	1,461	11,558	14,673	27,692	-3	-95	32	-66
Bihar	232	3,253	3,322	6,807	231	3,248	3,325	6,804	-1	-5	3	-3
Chhattisgarh	4,166	35,146	16,617	55,929	4,162	35,038	16,670	55,870	-4	-108	53	-59
Delhi	7	50	120	177	7	50	120	177	0	0	0	0
Goa	511	626	1,019	2,156	511	624	1,016	2,151	0	-2	-3	-5
Gujarat	376	5,319	8,909	14,604	376	5,249	8,995	14,620	0	-70	86	16
Haryana	26	488	1,090	1,604	27	463	1,104	1,594	1	-25	14	-10
Himachal Pradesh	3,224	6,386	5,056	14,666	3,224	6,383	5,061	14,668	0	-3	5	2
Jammu & Kashmir	4,298	8,977	9,414	22,689	4,298	8,977	9,411	22,686	0	0	-3	-3
Jharkhand	2,595	9,892	10,235	22,722	2,590	9,899	10,405	22,894	-5	7	170	172
Karnataka	1,772	20,196	14,232	36,200	1,777	20,181	14,232	36,190	5	-15	0	-10
Kerala	1,443	9,404	6,437	17,284	1,443	9,410	6,471	17,324	0	6	34	40
Madhya Pradesh	6,648	35,035	36,056	77,739	6,647	35,007	36,046	77,700	-1	-28	-10	-39
Maharashtra	8,747	20,847	21,067	50,661	8,739	20,834	21,077	50,650	-8	-13	10	-11
Manipur	689	5,522	10,741	16,952	701	5,474	11,105	17,280	12	-48	364	328
Meghalaya	334	9,527	7,344	17,205	410	9,501	7,410	17,321	76	-26	66	116
Mizoram	134	6,384	12,082	18,600	134	6,251	12,855	19,240	0	-133	773	640
Nagaland	1,280	5,072	7,313	13,665	1,274	4,897	7,293	13,464	-6	-175	-20	-201
Orissa	7,077	21,421	20,257	48,755	7,073	21,394	20,388	48,855	-4	-27	131	100
Punjab	0	738	922	1,660	0	733	931	1,664	0	-5	9	4
Rajasthan	72	4,454	11,486	16,012	72	4,450	11,514	16,036	0	-4	28	24
Sikkim	500	2,161	696	3,357	500	2,161	696	3,357	0	0	0	0
Tamil Nadu	2,925	10,189	10,200	23,314	2,926	10,216	10,196	23,338	1	27	-4	24
Tripura	113	4,816	3,244	8,173	111	4,770	3,192	8,073	-2	-46	-52	-100
Uttar Pradesh	1,626	4,569	8,151	14,346	1,626	4,563	8,152	14,341	0	-6	1	-5
Uttarakhand	4,762	14,170	5,561	24,493	4,762	14,165	5,568	24,495	0	-5	7	2
West Bengal	2,992	4,646	5,332	12,970	2,987	4,644	5,363	12,994	-5	-2	31	24
A & N Islands	3,779	2,414	470	6,663	3,762	2,405	495	6,662	-17	-9	25	-1
Chandigarh	1	10	6	17	1	10	6	17	0	0	0	0
Dadra & Nagar Haveli	0	115	101	216	0	114	97	211	0	-1	-4	-5
Daman & Diu	0	1	5	6	0	1	5	6	0	0	0	0
Lakshadweep	0	16	10	26	0	16	10	26	0	0	0	0
Puducherry	0	14	28	42	0	13	31	44	0	-1	3	2
Total	83,472	319,948	286,751	690,171	83,510	319,012	288,377	690,899	38	-936	1,626	728

Note: 1) VDF, MDF, and OF mean Very Dense Forest, Moderately Dense Forest, and Open Forest, respectively.
Source: FSI (2009)

Table 2-3 shows the change in forest cover for each State and Union Territory for each of the three canopy density classes. The overall change at the country level as compared to the revised 2005 assessment is a gain of forest cover by 728 km^2. The States showing significant net increase in forest cover are Mizoram, Manipur, Jharkhand, Meghalaya, and Orissa, whereas significant net decrease in forest cover is seen in the States of Nagaland, Andhra Pradesh, Arunachal Pradesh, Tripura, Assam, and Chhattisgarh (FSI, 2009). As shown in Table 2-4, the reasons of increase in forest cover are summarized as: 1) protection by the JFMCs; 2) plantation of tree species by the JFMCs; 3) regeneration in abandoned shifting cultivation areas; 4) afforestation activity undertaken by the forest department; and 5) regeneration of bamboo in bamboo flowering areas. The main reasons for decrease in forest cover are as follows: 1) the forest department's felling in the eucalyptus plantation areas; 2) shifting cultivation; 3) encroachment in insurgency affected areas; and 4) mining activity. Shifting cultivation practice affects increase and decrease of forest cover significantly in North-Eastern States.

Table 2-4 Reasons of change in forest cover

State	Amount of change	Reasons of change in forest cover ascertained by concerned state forest departments
Andhra Pradesh	-129km^2	Decrease in forest cover is mainly due to departmental felling in the Eucalyptus plantation areas.
Arunachal Pradesh	-119km^2	Decrease in forest cover in the State is because of shifting cultivation.
Assam	-66 km^2	Loss of forest cover is mainly attributed to encroachment in insurgency affected areas of Sonitpur, Karbi Anglong, and Darrang districts. Forest cover in the hill districts of North Cachar Hills and Karbi Anglong has decreased on account of shifting cultivation.
Chhattisgarh	-59 km^2	The decrease in forest cover is mainly due to mining activity and encroachment in insurgency affected areas.
Jharkhand	+172 km^2	Increase in forest cover is mainly on account of effective protection by the village forest protection committees. Plantation of miscellaneous species in Deoghar and Dumka districts has also shown an increase in forest cover.
Manipur	+328 km^2	Increase in forest cover is mainly on account of regeneration in abandoned shifting cultivation areas.
Meghalaya	+116 km^2	Main reason for the increase in forest cover is the afforestation activity undertaken by the forest department and regeneration in the abandoned shifting cultivation areas.
Mizoram	+640 km^2	Increase of forest cover is mainly due to re-growth in the abandoned shifting cultivation areas and regeneration of bamboo in bamboo flowering areas.
Nagaland	-201 km^2	Decrease in forest cover is mainly due to shifting cultivation.
Orissa	+100 km^2	Main reason for the increase in forest cover is effective protection by the JFM committees and regeneration in shifting cultivation areas.
Tripura	-100 km^2	Decrease of forest cover is mainly due to shifting cultivation.

Source: FSI (2009)

Tree cover

Tree cover is a physical status comprises of tree patches outside the recorded forest area exclusive of forest cover and less than the minimum mappable area of 1 ha. Such small patches comprising of block, linear and scattered trees are not delineated as forest cover during the interpretation of satellite data (FSI, 2009). Tree cover in India is estimated to be 92,769 km^2, or 2.8% of the geographical area in 2007 (FSI, 2009).

Recorded forest area

Recorded forest area is a type of legal status of land classification. The area is comprised of reserved forests, protected forests, and unclassed forests. The area includes all the geographical areas statutorily recorded as 'forest' in government records. It is the legal concepts irrespective of actual situation; thus it does not necessarily have forest cover. Annex 1 and Annex 2 shows the state wise recorded forest area reported in 1987 and 2009. During this period, the national total of the area increased by 0.5% of the total geographical area (GA) due to various administrative reasons including subdivision of states. The recorded forest area is about 769,512km^2, or 23.4% of the total geographical area in 2007 (FSI, 2009).

Trees outside of forests

Trees outside of forests (TOF) are trees growing outside of recorded forest area (FSI, 2009). As indicated in Table 2-1 TOF include trees in forest cover, scrub forest, and tree cover. Because this concept is attributed to individual trees, their growing stock can be determined whereas the geographical area of TOF cannot be determined. Since TOF represents forest resources outside of recorded forest area, mostly in private land, TOF is receiving a particular attention as forest resource-base for wood-based industries which no longer be able to obtain sufficient raw material from recorded forest area.

Growing stock

According to FSI (2009), the total growing stock of the country in 2007 is estimated at 6,098 million m^3 comprising of 4,499 million m^3 in recorded forest area and 1,600 million m^3 outside recorded forest area. The growing stock outside of recorded forest area is equivalent to the growing stock of TOF. Average growing stock per hectare of recorded forest area is to be 58.46m^3. The total growing stock of the country and the average growing stock per hectare of recorded forest area decreased by 120 million m^3 and 1.33m^3, respectively, from 2005 to 2007 (FSI, 2007; FSI, 2009). *Mangifera indica* (mango) occupies the largest percentage (10.36%) of growing stock of TOF.

Table 2-5 Forest cover by forest type groups

Forest Type Group name	% to total forest cover
Group 1. Tropical wet evergreen forest	8.75
Group 2. Tropical semi-evergreen forest	3.35
Group 3. Tropical moist deciduous forest	33.92
Group 4. Littoral and swamp forest	0.38
Group 5. Tropical dry deciduous forest	30.16
Group 6. Tropical thorn forest	5.11
Group 7. Tropical dry evergreen forest	0.29
Group 8. Subtropical broadleaved hill forest	0.38
Group 9. Subtropical pine forest	5.99
Group 10. Subtropical dry evergreen forest	0.36
Group 11. Montane wet temperate forest	3.45
Group 12. Himalayan moist temperate forest	3.79
Group 13. Hymalayan dry temperate forest	0.28
Group 14, 15, 16. Sub alpine and alpine forest	3.79
Total forest cover	100.00

Source: FSI (2009)

(2) Forest type groups

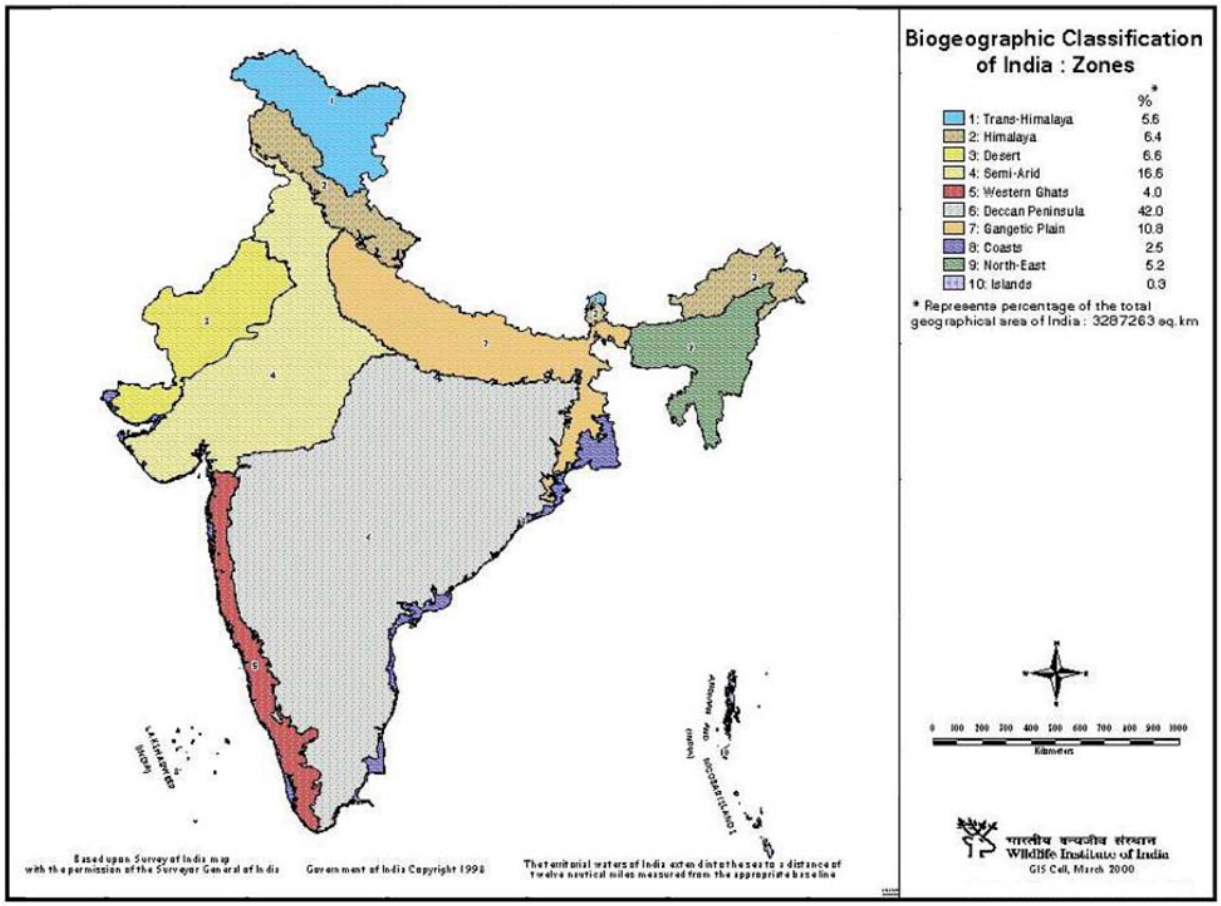
The area of forest cover by forest type groups provides a basis for characterization in terms of floristic composition and ecological value. Table 2-5 shows a summary of the forest type groups based on

Champion and Seth system of classification (1968). The classification provides a description of forest types of India in sixteen groups (FSI, 2009). The most dominant forest types in terms of area covered are 'Group 3. Tropical moist deciduous forest' and 'Group 5. Tropical dry deciduous forest' occupying 33.92% and 30.16% of the total forest cover, respectively. Two groups account for 64.08% of India's forest cover.

2.2 Status of biodiversity in India

India has a highly rich and varied biodiversity spread across its 3.29 million km² terrestrial area and waters. Occupying 2.4% of the world's land area, India has over 8% of the global biodiversity (MOEF, 2009). One of the 17 mega-diversity countries of the world, India's Himalayas and Western Ghats are globally recognized biodiversity hotspots.

Biogeographically, the country is divided into ten different zones as shown in Figure 2-1. The biogeographical provinces within each of these zones and their proportionate areas are given as Annex 3. The country has an array of ecosystems, from tropical rainforests to coral reef systems, that account for the high levels of species diversity.



Source: Rodgers and Panwar (1988)

Figure 2-1 Biogeographic zones in India

2.2.1 Ecosystem diversity

India, due to its varied physical features and its geographical location, experiences nearly all the different types of climatic regimes- from tropical to alpine and from desert to humid. Terrestrial

ecosystem diversity is a function of the climatic, biophysical, and geographic variations. Natural terrestrial ecosystems are of the following broad kinds: forests, grasslands, deserts, wetlands, and permanently snow-bound areas. The coastal and marine ecosystems also display a wide range of diversity.

(1) Forests

According to the Global Forest Resource Assessment Report of the Food and Agricultural Organization (FAO, 2010), India ranks among the top ten countries in terms of forest area, with 1.68% of the global forest area.

From Kerala and Assam's wet evergreen forests to the dry deciduous forests of the Eastern Ghats to the thorn forests of Rajasthan, a huge diversity of vegetation is found in the country. Gadgil and Meher-Homji (1990) provides an estimation of the forest distribution based on the dominant species complex. They estimate that the *Dipterocarpus-Mesua Palaquium* type in the wet evergreen forests has the maximum plant diversity of 1,700 species and the area covered by this vegetation pattern is about 11,660km^2. The *Tectona- Lagerstroemia lanceolata-Dillenia-Terminalia paniculata* vegetation pattern of the wet evergreen and teak transition zone has a plant diversity of 1,500 species in an area of about 12,400km².

India's forests are home to some of the world's charismatic megamammals, such as the Royal Bengal tiger (*Panthera tigris tigris*), the Asiatic lion (*Panthera leo persica*), the Asian elephant (*Elephas maximus),* Leopard (*Panthera pardus*), and the Sloth bear (*Melursus ursinus).* A variety of deer and antelope species are found across the forest types, including the Indian gazelle (*Gazella bennettii*), Blackbuck (*Antilope cervicapra),* Four-horned antelope (*Tetracerus quadricornis*), and the rare Swamp deer (*Cervus duvaucelii*). Forests are also home to Wild buffalo (*Bubalus arnee*) *and* the Indian bison (*Gaur*) (*Bos gaurus*), in addition to many smaller mammalian species. The birdlife of the Indian forest is also remarkably rich, including both breeding birds and migrants.

India's forests are also sites of high degree of endemism. Nearly all of the 36 endemic mammals are found in the forests. Some key endemic mammal species are the Lion-tailed macaque (*Macaca silenus*), Nilgiri Langur (*Trachypithecus johni*), Brown palm civet (*Paradoxurus jerdoni*), and Nilgiri tahr (*Hemitragus hylocrius*) (Alfred, 2006). Some endemic bird species of the forests are the Andaman Serpent-eagle (*Spilornis elgini*), the Nilgiri Woodpigeon (*Columba elphinstonii*), and the Mishmi Wren-babbler (*Spelaeornis badeigularis*) (Ali, 2002).

(2) Grasslands

Extensive grassland ecosystems composed of graminoids (grass and grass-like species) are found in different parts of India. The total area under grasslands in the country is 12 million ha, representing 3.9% of the land area. Approximately 1,256 species belonging to 245 genera are estimated to be found in these grasslands (TPCG and Kalpavriksh, 2005; MOEF, 1999). The high-altitude grasslands of the Himalayas known as *bugiyal* and the *banni* grasslands of the Kuchch saline desert are among the rich grassland habitats. These grasslands may or may not have a layer of trees or shrubs. Grasslands are often associated with marked seasonality in precipitation, occurrence of fire, and grazing by ungulates. Bamboo forests, although technically dominated by grasses, are not included under grasslands.

(3) Deserts

The desert ecosystem is characterized by very little rainfall (less than 600 mm), aridity, and very sparse presence of vegetation. Indian deserts can be broadly classified into the sandy warm desert of Thar in the far western region of Rajasthan, the saline desert Kuchch in the western region of Gujarat, and the cold desert in the trans-Himalayan region of Ladakh in Jammu and Kashmir and Lahaul-Spiti in Himachal

Pradesh. The last remaining population of the endemic wild ass (*Equus hemionus khur*) is found in the saline desert *Rann* of Kuchch. The Thar desert has some of the country's best grasslands and it harbours the endangered bird, the Great Indian Bustard (*Ardeotis nigriceps)*. Wildlife species in the cold desert include the Tibetan wild ass (*Equus kiang*), a close relative of the Indian wild ass, the snow leopard (*Uncia uncia*), and the wolf (*Canis lupus*).

(4) Wetlands

Wetlands can be considered transitional zones that occupy an intermediate position between dry land and open water. Wetlands include a diversity of habitats across the country, ranging from tanks and reservoirs in the Deccan peninsula, saline expanses of Rajasthan and Gujarat, Delta wetlands of the East Coast, marshes of the Gangetic plains, and lakes of the mountainous regions of Jammu and Kashmir. It is estimated that over 67,400 wetland bodies cover an area of over 40,600km^2 spread across the country, the greater number of these being man-made bodies (Garg et al., 1998). Wetlands play a critical role in the local hydrology and in groundwater recharge. The wetlands are rich in bird fauna and they serve as major wintering sites for migratory birds (Islam and Rahmani, 2004). India has designated 25 wetlands as Ramsar sites under the Ramsar Convention on Wetlands of International Importance. These sites cover an area of 6,771km^2 in total.

(5) Coastal and marine ecosystems

India has a coastline of about 8,000km. This coastline covers a wide range of coastal ecosystems, including estuaries, lagoons, mangroves, backwaters, salt marshes, rocky coasts, coral reefs, and sea grass beds. India is one of the few countries to have a substantial record of inventories of its coastal and marine biodiversity, which dates back to almost two centuries. An analysis of the data indicates more than 13,000 recorded species of marine biodiversity (MOEF, 1999).

Mangrove ecosystems form a bridge between terrestrial and marine ecosystems and are found in inter-tidal zones of sheltered shores, estuaries, creeks, backwaters, lagoons, marshes and mudflats. These are considered some of the most productive and biologically diverse ecosystems. Five % of the world's mangroves are found in India, spread over an area of 4,445km^2 (MOEF, 2009). The state of West Bengal has the largest mangrove cover in the country, followed by Gujarat and the Andaman Nicobar Islands.

Coral reefs are shallow-water tropical marine ecosystems. The water movement in these ecosystems gives rise to significant biomass production, and the thus-produced rich nutrients result in making these areas high in biodiversity (MOEF, 1999). The Ministry of Earth Sciences and the Space Application Centre have estimated the total area of coral reefs in India at 2,375km^2 (MOEF, 2009).

2.2.2 Species diversity

The tremendous diversity of habitats, the varied climatic profile of various regions, and the differing physiography provide India a rich diversity of fauna and flora, a good number of these being endemic to the country.

(1) Floral diversity

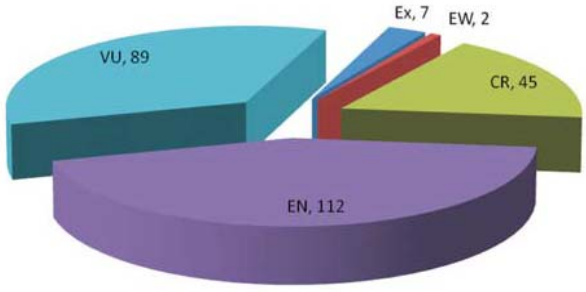
India ranks tenth in the world in floral diversity, representing almost 11 % of world's known plant species. The details of number of species of various floral groups in India and comparison to the world figures are shown in Table 2-6. There is a general understanding that many species of the lower groups such as bacteria, fungi, algae, lichens, and bryophytes are yet to be described, as are many located in rather inaccessible areas.

Table 2-6 Number of species in major groups of plants and microorganisms

Plant Groups	No. of species described		% of India to the world
	India	World	
Virus/Bacteria	850	8,050	10.6
Algae	7,175	40,000	17.9
Fungi	14,500	72,000	20.1
Lichens	2,223	13,500	16.4
Bryophytes	2,500	14,500	17.2
Pteridophytes	1,200	10,000	12.0
Gymnosperms	67	650	10.3
Angiosperms	17,527	250,000	7.0

Source: MOEF (2009)

Poaceae (grasses), *Orchidaceae* (orchids), and *Fabaceae* (legumes) are the dominant families in terms of number of species. Approximately 11,058 floral species are endemic to India. Among them, 6,200 belong to angiosperms (flowering plants) (MOEF, 2009). The eastern Himalaya and the Western Ghats are centres of endemism. The north-eastern region has about 2,500 endemics within its flora. The International Union for the Conservation of Nature (IUCN) Red List 2008 lists India as having 246 globally threatened floral species, which constitute approximately 2.9% of the world's total number of threatened plants. The number of Indian floral species in the various threat categories of IUCN is given in Figure 2-2.



[Legend] Ex: extinct; EW: extinct in the wild; CR: critically endangered; EN: endangered; VU: Vulnerable
Note: n=246
Source: MOEF (2009)

Figure 2-2 Indian plants in the IUCN threat categories

It is estimated that approximately 15,000 to 20,000 plants species have a significant medicinal value, out of which 30 % are endemic (Khanuja et al., 2006). Many of these plants are being reduced in distribution due to various threats. Some of these medicinal species are *Acorus calamus, Alpinia galanga, Commiphora wightii, Dendrobium nobile, Dendrobium pauciflorum, Dioscorea deltoidea, Diplomeris hirsuta, Gentiana kurroo, Nelumbo nucifera, Paphiopedilum druryi, Podophyllum hexandrum, Rauvolfia serpentina, Santalum album,* and *Saussurea lappa*.[5]

(2) Faunal diversity

India has so far recorded 91,212 faunal species, representing 7.43 % of the world's faunal diversity of about 1.2 million species. India has a total of 397 mammalian species and 1,232 bird species, both groups constituting a significant part of the global diversity of these groups. The total number of species in vertebrate groups in India and their proportions in relation to the global totals is given in Table 2-7.

[5] FAO website, http://www.fao.org/docrep/007/ad871e/ad871e09.htm, retrieved on 7 July 2011

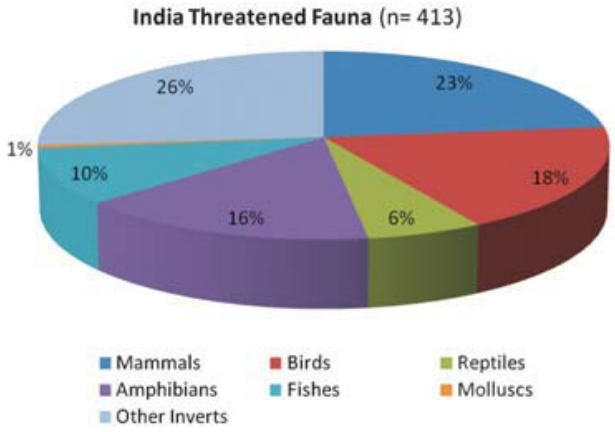
Table 2-7 Faunal diversity in India - Vertebrates

Taxonomic group	No. of species		% in India
	World	India	
Fish	21,723	2,546	11.72
Amphibians	5,150	240	4.66
Reptiles	5,817	460	7.91
Birds	9,026	1,232	13.66
Mammals	4,629	397	8.58

Source: MOEF (2008)

The Western Ghats and the Eastern Himalayas account for the large faunal diversity of India; both of these areas, the former in particular, are also centres of endemism. Endemism is high among reptiles and amphibians: 24.53% and 36.76%, respectively (Das, 2001). Endemism among mammals is rather low, with only 36 of the 397 species being endemic.

The Indian fauna also faces threats, as is the global trend. According to the IUCN Red List 2008, 413 faunal species occurring in India are globally threatened. Figure 2-3 gives the distribution of these species across the various faunal groups. This is approximately 4.9% of the total number of threatened faunal species worldwide. The most well-known mammal among the endangered species of India is the Royal Bengal tiger (*Panthera tigris tigris*) whose population has most recently been estimated at 1,706 (MOEF, 2011). The Asian elephant (*Elephas maximus)* is another endangered species, and its population has been estimated at 26,000 across the country (ETF, 2010), while the population of the Asiatic lion (*Panthera leo persica*), whose distribution is restricted to the state of Gujarat, is estimated by the state's forest department at 411. Among the larger animals that became extinct in India in the recent past are the Asiatic cheetah (*Acionyx jubatus veneticus*), Lesser one-horned rhino (*Rhinoceros sondaicus*), and Pink-headed wood duck (*Rhodonessa caryophyllacea*). More than 350 bird species of India are migratory, and the winters witness tremendous increase in the diversity of species and size of populations.



Source: MOEF (2009)

Figure 2-3 Representation of globally threatened Indian fauna

Inventorisation of species remains perceptibly incomplete, much like in other countries, since the estimates of unrecorded species are quite large, especially those belonging to invertebrates. New discoveries, however, continue to be reported. The Zoological Survey of India (ZSI) discovered 65 fauna species in 2007. In the same year, the National Bureau of Fish Genetic Resources recorded the discovery of 36 new fin fishes from across the country (MOEF, 2009).

2.2.3 Other forms of biodiversity

In addition to the natural ecosystems and biodiversity, there is also diversity arising from human-influenced ecosystems, including agricultural and pastoral lands. The diversity of domesticated plants and animals is one of the world's largest. India is considered one of the world's eight centres of origin of cultivated plants. India has also a great diversity of people. The Anthropological Survey of India has identified 91 eco-cultural zones in India inhabited by 4,635 communities, speaking 325 languages/dialects (Singh, 1992). In addition, 100 million of the about 220 million indigenous people in the world live in India. This makes India the country with the largest indigenous people's population, constituting 8.3% of the country's population and composed of about 461 different tribes. India's rich culture is known to rest on the strength of this tremendous diversity of people.

2.3 Institutional framework for forestry and biodiversity conservation

2.3.1 Development policies related to forestry and biodiversity conservation

(1) The Eleventh Five Year Plan 2007-2012

The Eleventh Five Year Plan 2007-2012 is the basic national development policy of the Government of India (GOI). It was formulated by the Planning Commission, and was approved by the National Development Council (NDC) in December 2007. The central vision of the Eleventh Plan is to achieve faster and inclusive growth whose process brings broad benefits to people and ensures equality of opportunity for all. In the Plan, the poor, Scheduled Castes/Scheduled Tribes, other backward castes, minorities and women are given due attention.

The Plan sets 27 national targets, covering six categories: 1) Income and Poverty; 2) Education; 3) Health; 4) Women and Children; 5) Infrastructure; and 6) Environment. The category of the Environment includes the forestry-related target, i.e. 'to increase forest and tree cover by 5 percentage points.' The Plan estimates that this target would require additional cover of approximately 16 million ha. It states that five million ha would be increased in the recorded forest area whereas the rest would be met through agroforestry outside the recorded forest area. To increase forest and tree cover, National Afforestation Programme (NAP), participatory forest management or JFM, and agroforestry are considered as key components.

Volume III, Section I, Chapter 3 of the Eleventh Five Year Plan indicates the policy directions and initiatives to be undertaken in the forestry and biodiversity conservation. The core strategies regarding the forestry sector are as follows:

1) The objective of enhancing forest and tree cover will be integrated with livelihood opportunities. To this end, JFM regime is to be strengthened.
2) The ultimate aim of the State forest management will be to achieve productive forests that can provide timber and non timber forest products (NTFPs).
3) The forests in the vicinity of habitations will be managed to meet livelihood needs of the neighbouring populations with adequate support and empowerment.
4) Harvesting of forest products will be based on the availability. Increasing the productivity will also be sought.
5) Protected areas will be managed to ensure the optimization of local community resources.
6) Support system for the above, including research and development, capacity building, information system, and other support mechanisms, will be evolved.

JFM is considered as the key institutional mechanism to enhance forest and tree cover under NAP as well as to link forest with local livelihood. The Plan states that there have been certain shortcomings regarding JFM in terms of the recognition of the existing informal traditional institutions. Empowering

all participatory institutions is considered critical for forest conservation. Such institutions include Forest Development Agency, Joint Forest Management Committees (JFMCs), *Van Panchayat*[6], *Gram Sabhas*[7], and other community forestry institutions.

Promotion of agroforestry is also considered significant to increasing forest and tree cover. The Plan recognises that the forward linkages with the user industry and facilitation by the state agencies have not existed, thus the problems of unorganised markets emerged (Paragraph 9.1.16 of Volume I). The Plan then prioritizes the ensuring impetus for agroforestry, organizing markets and facilitating fair trade, taking the large quantities of imported timber and pulp into consideration (Paragraph 3.17 of Volume III). It also mentions the necessity of reviewing concession for cheap and duty-free import of pulp, and informing market options and incentives for farmers. Research and development to enhance productivity and to develop indigenous alternatives to conventional agroforestry species are also centred.

Socio-economic and policy imperatives are emphasized in the Eleventh Five Year Plan. In this regard, State governments will be required to support the implementation of the Scheduled Tribes and other Forest Dwellers (Recognition of Forest Rights) Act (Paragraph 3.31 of Volume III). The Plan also requires the review of the existing mechanisms for dealing with NTFPs to maximize economic benefits of local communities (Paragraph 3.32 of Volume III).

Preservation of wildlife and forest biodiversity is one of the critical areas of the Plan. In this thematic area, initiatives to mitigate conflicts between wildlife and humans are focused. This includes compensation to local communities, wildlife habitat management outside protected areas, support to displaced communities, and strengthening and protection of indigenous knowledge (Paragraph 3.46 of Volume III).

In the context of the Scheduled Tribes, the Plan pays attention to the relationship between tribal populations and forest in Chapter 6 of Volume I. It states that the monopoly of corporations in certain items will be replaced by alternative market mechanisms including minimum price support to enable the tribal producers, collectors and consumers to have good transactions with cooperatives. Technological support for value addition and skill development will need to be provided. Quality and productivity improvement and regeneration of minor forest produces will be supported to ensure sustainability of tribal livelihood. The Plan also refers to the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 which grants such rights as those to cultivate forest land to the extent under occupation, and those to own, collect, use, and dispose of minor forest produce.

(2) Mid-Term Appraisal of the Eleventh Five Year Plan 2007-2012

The Mid-Term Appraisal of the Eleventh Five Year Plan 2007-2012, released by the Planning Commission in 2011, reviews the undertakings in the first three years of the Plan and seeks to identify areas where corrective steps may be necessary. The target, 'to increase forest and tree cover by 5 percentage points,' is reviewed in the Appraisal. Taking into account the historical record of forest and tree cover, the Appraisal pointed out that it is impossible to get huge areas of land under forest and tree cover till 2012. In fact, forest and tree cover has increased by less than one percent of the total geographical area from 1997-2007 (Planning Commission, 2011). Instead, it highlights the necessity to shift the focus from 'quantity' to 'quality' of forest. This means that the enhancement of the density of the existing forests, the regeneration of degraded forest land, and the restoration of ecosystem will be given more attention. The MOEF has declared its target of doubling the area to be used for the restoration and afforestation over the next 10 years, employing the new approach through participatory

[6] Village-level committee to manage community forest found in Uttarakhand State
[7] Village level governance body formed by adult male and female village residents whose names are recorded in the electoral rolls

and decentralized implementation. The Appraisal concludes that this target must be supported during the remaining period of the Eleventh Five Year Plan, and may be incorporated in the next Five Year Plan.

In relation to the Forest Rights Act 2006, the Appraisal admits that there are many concerns regarding the enforcement of the Act on the ground. It also states that there were tensions between the Forest Departments and the tribal people in the past. This may have negative impacts on the process of assessment of claims of forest rights. The Appraisal points out the needs of capacity development of the Gram Sabhas which handle such claims, and requires transparent decision making process at the block and district level committees, which screen the decisions of the Gram Sabha.

(3) The Twelfth Five Year Plan

The Twelfth Five Year Plan will be formulated by the Planning Commission in FY 2012-13. Before the release of the Plan, the Planning Commission usually prepares an Approach Paper. The Paper will describe basic structure of the next Five Year Plan, including the major targets, key challenges in meeting them, and broad approach to be employed to achieve them.

The Planning Commission made a presentation on key issues to be addressed in the Twelfth Five Year Plan at the Full Planning Commission Meeting on 21 April 2011. According to the presentation, the basic objective of the Plan is faster, more inclusive, and sustainable growth. There is no section explicitly mentioning forest and biodiversity management in the presentation material. Under the section of Agriculture and Rural Development, the Forest Rights Act 2006 is considered to have potential to enhance forest economies and tribal societies.

The Approach Paper is not yet formulated as on 8 May 2011[8], but will be prepared by the Commission soon. After the regional consultations with States, the paper will be discussed at the NDC meeting in July 2011[9]. JICA needs to observe the discussion process of the Twelfth Five Year Plan in formulating future ODA projects to align them with the new Plan. How the forest and biodiversity-related issues are described in the next plan should be confirmed.

2.3.2 Policies and laws for forestry and biodiversity conservation

(1) Historical development

The historical trend of forest policy in India indicates a shift of focus from production to conservation. The first Indian forest policy[10], issued in 1894 by the then British Colonial Government, aimed at enhancing timber production, and prioritized the conversion of forest to agricultural land. The first policy formulated after independence is the National Forest Policy 1952. The National Forest Policy 1952 aimed at maintaining one third of total area of the country under forests, 60% in the Himalayas, and 20% in the plains.

The 1952 Policy was replaced by the National Forest Policy 1988, the current policy. The 1988 Policy maintains almost the same target as the 1952 Policy. It declares that a minimum of one third of the total area should be under forest or tree cover, and for the hilly and mountainous areas, the target is two thirds. This national target has been kept to date, and the GOI has strived to increase forest and tree cover. However, the target has not been achieved so far.

Another critical trend to be featured is the prohibition on felling of trees. The Forest (Conservation) Act

[8] The Planning Commission has just launched the website to develop the Approach Paper, through which all stakeholders can submit their comments and proposals. However, no text is available at the moment.
[9] Prime Minister's Concluding Remarks at the Full Planning Commission Meeting at Yojana Bhavan on 21 April 2011
[10] Circular No. 22-F. of 19 October 1894

1980 declares that the felling of trees is allowed only when the State Forest Departments get approval from the MOEF in advance. The Supreme Court Order issued on 12 December 1996 reinforced the Act ordering the suspension of tree felling except in accordance with the working plans approved by the MOEF. Key policies and laws regarding forest and biodiversity are presented in Table 2-8.

Table 2-8 Historical development of forest law and policy in India

Year	Name	Description
1894	Circular No. 22-F. of 19 October 1894	• First forest policy in India issued by the British Colonial Government • Priority on timber production and agricultural activities
1927	Indian Forest Act 1927	• Consolidation of the preceding forest acts for forest reservation, regulation on forest produce, and duties on forest produce • Designation of Reserved Forest; Protected Forest; and Village Forest • Definition of offensive actions and penalties for the violation
1952	National Forest Policy 1952	• Target of one third of total area of the country under forest and tree cover (60% in Himalayas, and 20% in the plains)
1972	Wildlife (Protection) Act 1972	• Designation of protected areas: Sanctuary; National Park; Conservation Reserve; and Community Reserve • Prohibition of hunting wild animals, and trade or commerce of animal articles • Establishment of the National Tiger Conservation Authority, Indian Board of Wildlife, etc.
1976	Forty-Second Amendment to the Constitution	• Subject related to forest and wildlife is listed in the concurrent list, allowing the Central Government to make policy and legislation • Both the State and the citizens are called on to protect the natural environment, and safeguard forests and wildlife • Duty of every citizen is to protect and improve the natural environment including the forests, lakes, rivers and wildlife
1980	Forest (Conservation) Act 1980	• Requiring state governments to obtain prior approval from the Central Government when using forestland for non-forest purposes
1986	Environment (Protection) Act	• Umbrella legislation to protect and improve the environment • To control pollution and to regulate potentially polluting industries • Calls for the Establishment of ecologically sensitive areas, the Central Empowered Committee, etc.
1988	National Forest Policy 1988	• Target of one third of total area of the country under forest and tree cover (two thirds in hilly and mountainous areas) • Ensuring environmental stability and maintenance of ecological balance • Forest management in accordance with the management plan approved by the Central Government
1990	Circular concerning JFM, 1990, No. 6-21/89-P.P	• Institutionalisation of JFM • Access to forest land and usufructory benefits recognised to forest dependent communities
1992	Seventy-Third Amendment to the Constitution	• Definition of the composition, powers, and functions of Panchayat • Panchayat may, by state laws, be endowed with authority over social forestry and farm forestry, and minor forest produce
1996	Panchayats (Extension to the Scheduled Areas) Act 1996	• Extension of Panchayat system to the Scheduled Areas • Requiring state governments with the Scheduled Areas to amend their laws • Gram Sabha & Panchayats to have overall control over minor forest produce
1996	Supreme Court Order on 12 December 1996	• Suspension of tree felling except in accordance with the working plans • Restrictions on the saw mills and wood-based industries • Creation of new institutional mechanisms
1999	National Forestry Action Program 1999	• Comprehensive long-term strategic plan for the next 20 years • Identification of programmes to achieve sustainable forestry development in India

Table 2-8 Historical development of forest law and policy in India (Continued)

Year	Name	Description
2000	Guidelines for the Strengthening of JFM programme, No. 22-8/2999-JFM (FPD)	• Guidelines for state governments to strengthen the JFM programme • Clarification of basic matters on JFM: legal backup to JFMCs; participation of women; extension of JFM into good forest areas; preparation of micro plans; conflict resolution; and recognition of self-initiated groups
2002	Strengthening of JFM Programme, No. 22-8/2000-JFM(FPD)	• Guidelines for state governments to further strengthen the JFM programme • Guidelines for a Memorandum of Understanding (MOU) between state forest departments and JFMC; relationship with Panchayats; and capacity building for the management of NTFPs
2002	Biological Diversity Act	• Conservation, sustainable use of biodiversity and equitable sharing of benefits • Regulation of access to biodiversity and traditional knowledge • Establishment of the National Biodiversity Authority (NBA) and other organizations
2002	National Wildlife Action Plan	• Expansion of protected area network • Identification and restoration of degraded habitats outside protected areas • Capacity building of the staff of protected areas, and involvement of local communities
2006	Forest Rights Act 2006	• Recognising and vesting the forest rights in forest dwelling Scheduled Tribes and other traditional forest dwellers • Gram Sabha as the primary institution to determine the nature and extent of forest rights
2006	National Environment Policy 2006	• Legal recognition of traditional entitlements of forest dependent communities • Increase of forest and tree cover through afforestation of degraded forest land, wastelands, and tree cover on private or revenue lands • Increase of protected area coverage, and protection of biodiversity hotspots
2008	National Biodiversity Action Plan	• Integration of biodiversity conservation, sustainable use, and equitable benefit sharing objectives • Steady expansion of the protected area network, more species-focussed protected areas • Enhancement of the natural resource base and its sustainable use
2008	National Action Plan on Climate Change	• Promotion of climate change measures that yield co-benefits • Identification of eight missions including ‘National Mission for a Green India’ and ‘National Mission for Sustaining the Himalayan Ecosystem’
2010	Wetlands (Conservation and Management) Rules	• Protection of important wetlands including the Ramsar sites • Making the Central government’s prior permission a requirement for the conversion of wetlands • Establishment of the Central Wetland Regulatory Authority
2011	National Mission for a Green India (Draft)	• Increasing forest & tree cover on 5 million ha of forest and non-forest lands • Improving the quality of forest cover on another 5 million ha • Increasing forest-based livelihood income for about 3 million forest dependent families
2011	National Mission for Sustaining the Himalayan Ecosystem (Draft)	• Developing the national capacity to continuously assess the Himalayan Ecosystem, enabling policy bodies in policy-formulation functions, and assisting States in the Himalayan Region • Continuous monitoring of ecosystems; database generation; ecological modelling; developing climate change scenarios; vulnerability assessments; identification of adaptation measures
2011	Guidelines for Ecotourism in and around Protected Areas (Draft)	• Ecotourism is to be designed to conserve biodiversity and improve the livelihood of local communities • Focus on the selection, planning, development, implementation and monitoring of ecotourism around protected areas • Each state is to develop its own ecotourism strategy • To develop an ecotourism plan for each protected area

Source: Survey team

Major policies and laws regarding forestry and biodiversity conservation are summarized in the following subsections.

(2) The Constitution

Protection of the natural environment

The Constitution of India requires both the State and the citizens to protect the natural environment. Article 48 A of the Constitution obliges the State to 'endeavour to protect and improve the environment and to safeguard the forests and wild life of the country' as a directive principle of State policy. The article was introduced in 1976 by the Forty Second Amendment. The Forty Second Amendment has also brought the subject of forest and wildlife from State jurisdiction to concurrent jurisdiction which allows both the central and State governments to enact legislation on the subject[11]. The central laws have the powers to supersede state legislation in the event of any contradiction between the two. The Forty Second Amendments also added the 'Fundamental Duties' of every citizen to the Constitution. Article 51A (g) makes it a duty of every citizen to protect and improve the natural environment including the forests, lakes, rivers, and wildlife.

Decentralisation

Other key articles of the Constitution relate to decentralisation. The Seventy Third Amendment of 1992 inserted Part IX, which defines the composition, powers and responsibilities, and functions of *Panchayat*[12]. There are three tiers of Panchayats, i.e., at the village, intermediate or block, and district levels. The village level Panchayats are called Gram Panchayats. A Gram Panchayat sometimes covers two or more villages when the population of the individual villages is small. Panchayat members are elected by local people, and no less than one-third of the total number of seats is reserved for women (Article 243 D). Seats are also reserved for the Scheduled Castes and the Scheduled Tribes as per the proportion of their population to the total population. The state government may, by law, endow the Panchayats with powers and authority in relation to the preparation of plans for economic and social development, and the implementation of economic and social development schemes listed in the Eleventh Schedules of the Constitution (Article 243 G). In the context of forestry, social forestry and farm forestry, and minor forest produce are listed in the Schedule.

Within the area of Gram Panchayat, a Gram Sabha is constituted as a body comprising of all people registered in the electoral rolls (Article 243 (a)). A Gram Sabha may exercise powers and perform functions that are defined by a state law (Article 243A). The Constitution does not provide detailed functions and powers of a Gram Sabha, and provisions of respective state laws differ greatly among states.

(3) Key laws and policies regarding forest management

a) Forest (Conservation) Act 1980 and Forest (Conservation) Amendment Rules 2004

The Forest (Conservation) Act 1980 was promulgated in 1980, providing the legal framework for the conservation of forests. The key feature of the Act is to require the state governments to seek prior approval of the central government with respect to the following events (Section 2):

- Reserved forests or any portion thereof cease to be reserved.
- Any forest land or any portion thereof is used for non-forest purpose. Non-forest purpose here

[11] 17 A and B of List III, the Seventh Schedule of the Constitution

[12] The Article 243ZC states that Part IX of the Constitution shall not be applied to the Scheduled Areas defined by the Fifth Schedule, and tribal areas defined by the Sixth Schedule. The Panchayats (Extension to the Scheduled Areas) Act, 1996 or PESA was therefore enacted in 1996. See (3) e) of 2.3.2 for the details of the PESA.

means that the cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural crops or medicinal plant, and any purpose other than reforestation.
- Any forest land or any portion thereof is assigned to any private person, authority, corporation, agency, or any other organization by way of lease or otherwise.
- Any forest land or any portion thereof is cleared of naturally growing trees for the purpose of reforestation.

The procedures for obtaining approval from the central government are detailed in the Forest (Conservation) Amendment Rules 2004.

The Act also establishes the Forest Advisory Committee to advise the Central Government with regard to 1) granting of approval to State governments; and 2) any other matter relating to the forest conservation to be addressed by the Central Government. The composition of the Committee was defined by the MOEF Order issued on 28 May 2008. The Committee is chaired by the Director General of Forests, MOEF. Officials from Ministry of Agriculture, and wildlife, sociology and other experts are appointed as members of the Committee, and the Inspector General of Forests (Forest Conservation) is the member secretary.

b) National Forest Policy 1988

The National Forest Policy 1988 is the basic policy statement regarding forest management. It was formulated by the MOEF based on the review on previous policies. The basic objectives of the 1988 Policy include 1) maintenance of environmental stability; 2) conservation of the natural heritage; 3) prevention of soil erosion, denudation, and sand dune extension; 4) substantial increase in forest and tree cover; 5) fulfilment of the requirements of rural and tribal people for fuelwood, fodder, minor forest produce, and small timber; 6) encouragement of efficient utilization of forest produce; and 7) creation of massive people's movement to achieve the above objectives and minimise pressure on existing forests (Section 2.1).

The principal aim of the policy is to 'ensure environmental stability and maintenance of ecological balance' (Section 2.2). The policy explicitly declares that this principle aim sets the priority over the derivation of economic benefit. Conservation of the natural environment, including biological diversity, is considered the essence of forest management.

The National Forest Policy 1988 sets the national goal to have a minimum of one-third of the total land area under forest or tree cover. For hilly and mountainous regions, the target is to sustain two thirds of the total of such land area. To achieve the target, afforestation and tree planting on forest and non-forest land are underscored. Tree planting along roads, railway lines, rivers and canals, and other unutilised lands are encouraged. The Policy also enhances the development of tree crops and fodder resources in village and community lands.

With regard to the state owned forests, the Policy states that forest should be managed in accordance with the approved management plan. The central government is responsible for issuing necessary guidelines for such management plan, and monitor the compliance of the state governments with them. To meet the growing needs for forest resources, the Policy emphasizes enhancing forest cover and productivity of forests. The Policy also requires the state governments to carefully examine the necessity for the diversion of forest lands for non-forest purposes.

The National Forest Policy 1988 pays due attention to wildlife conservation, particularly in the context of establishment of protected area network through providing corridors for wildlife. The policy also focuses on welfare and development of tribal people, and provision of alternative livelihood means for shifting cultivation. Moreover, it requires forest-based industries to raise trees and raw materials needed,

and extract forest resources only within the capacity of forests to provide raw material. Finally, the Policy promotes forest- and wildlife-related research.

The Policy also underlines the need to protect the rights and concessions enjoyed by the tribal communities and other poor living within and near forests. It affirms that their domestic requirements of fuelwood, fodder, minor forest produce and construction timber should be the first charge on forest produce.

c) Supreme Court Interventions

The Supreme Court of India has played a critical role in forest conservation in India. Since the 1990s, the Court has issued various orders including those relating to redefinition of the meaning of forest; suspension of tree felling except in accordance with the working plans; restrictions on the saw mills and wood-based industries; and creation of new institutional mechanisms such as High Power Committee[13] (HPC) and Compensatory Afforestation Fund Management and Planning Authority.

One of the most significant orders is the order issued on 12 December 1996 in relation to the Writ Petition filed by T. N. Godavarman Thrumulpad. The order clarified certain provisions of the Forest (Conservation) Act 1980 and also extended its scope (Dutta & Yadav, 2011). The main features of the order include the following:

1) Forest to be defined as per dictionary meaning, i.e., the Forest (Conservation) Act 1980 is applicable to all forest irrespective of ownership, notification, or classification;
2) All ongoing activities in forests without prior approval of the Central Government to be ceased;
3) Tree felling in all forests to be suspended except in accordance with the working plans approved by the MOEF; and
4) Ban on movement of timber from north eastern states to other states.

Suspension of tree felling

The suspension of the felling of trees had particularly significant impacts on the management of state forests (Dutta & Yadav, 2011). The Supreme Court directed that the state governments shall prepare working plans for all forest divisions, and shall obtain approval from the Central Government, i.e., the MOEF. Without the working plans approved by the MOEF, the state government cannot harvest trees from their forests. The working plans are not yet formulated for all forest divisions. For instance, an application filed in 1999 in Meghalaya State seeking permission for felling of trees from plantations without the working plan was dismissed by the Court (ibid). Such interventions by the Supreme Court lead the state governments to preserve trees in forest areas. Consequently, the state governments tend to focus on forest conservation rather than production of timber.

The Court Order on 12 December 1996 exerts the influence on lands other than the recorded forest areas, including private, government-owned, and community lands. The Order states that the Provision of the Forest (Conservation) Act 1980 'must apply to all forests irrespective of the nature of ownership or classification'. However, the court exempted the felling of trees planted in areas that were not converted from natural forests in the recent past. The ban, therefore, will not be applied to the felling in private plantation where trees are planted in any area which is not a forest.

Regulation on wood-based industries

With respect to regulations on saw mills and other wood-based industries, the Supreme Court stated through its order dated 12 December 1996 that the operation of saw mills of any kind of wood products, such as plywood or veneer mills, were not allowed without prior approval from the Central Government.

[13] The Supreme Court constituted a High Power Committee (HPC) on 4 March 1997 to oversee the enforcement of the Court orders.

The Court also directed the complete ban on the movement of cut trees and timber from north eastern states to the other states. For instance, the order on 15 January 1998 pointed out that the 'proliferation of wood-based industries has been the main cause of degradation of forest in the North Eastern States'. The Court directed 1) suspension of licenses given to all wood-based industries; 2) renewal of licenses of wood-based industries only when no illegality is found; 3) determination of the number of wood-based industries based on availability of timber that can be felled annually in a sustainable manner; and 4) a complete moratorium on the issue of new licenses for the next five years.

The order issued on 29 October 2002 directed that the existing saw mills, veneer and plywood industry with no licences be closed and no permission be given to wood-based industry units without the prior permission of the Central Empowered Committee (CEC).[14] The Supreme Court noticed in its order on 16 March 2007 that 1,607 sawmills and 207 plywood and veneer units had been functioning without valid licenses. It emphasised that the operation of plywood and veneer units were permissible only in case the available quantity of timber is enough to sustain good environmental condition. The CEC was directed to conduct a study on the quantity of timber available for sawmills, and plywood and veneer units. For instance, in the Bihar State, the CEC prepared a feasibility report on the licensing for sawmills, and plywood and veneer units. The CEC advised the Supreme Court that the Government of Bihar should re-examine the availability of timber, including one from a non-forest area and one imported from the other states and countries. As described above, the regulation of wood-based industry ordered by the Supreme Court is very stringent, and a technical and scientific study on availability of timber is required.

d) Guidelines for Joint Forest Management

The MOEF first issued the guidelines for JFM through the circular concerning JFM, No.6-21/89-P.P dated 1 June 1990. The guidelines sets the modalities for the implementation of JFM, as per the provisions of the National Forest Policy 1988 that envisages people's involvement in the development and forest protection in degraded forest areas. The major provisions are 1) setting an enabling mechanism for village communities' participation and a collaborating framework for NGO participation; 2) providing forest-related usufructory benefits, including grasses, lops and tops of branches, and minor forest produce, to participating beneficiaries; 3) admitting village communities to plant fruit trees, shrubs, legumes and grasses as well as trees for fuel, fodder and timber in accordance with a working scheme; 4) benefit of JFM-related activities to be given to the village communities and not to commercial interests and middlemen; and 5) memorandum of understanding (MOU) between state forest departments and village communities to be made for defining roles and responsibilities. Based on the national guidelines described above, state governments established their own guidelines for the implementation of JFM.

The national guidelines for JFM 1990 were reviewed in consultation with state governments, NGOs, and other stakeholders. In 2000, the revised guidelines were issued by the MOEF through the letter No.22-8/2000-JFM (FPD). The guidelines 2000 are featured with 1) JFMCs to be registered under the Societies Registration Act 1860; 2) facilitating women's participation in JFM programme with specific requirements[15]; 3) extension of JFM in good forest areas; 4) preparation of a micro plan in JFM areas, through appropriate local consultations, to meet the consumption and livelihood needs of the local communities; and 5) establishment of the village development fund for meeting the conservation and development needs.

In 2002, the MOEF further issued a letter, No. 22-8/2002 dated 24 December 2002, to strengthen the JFM programme. The major features of the guidelines 2002 include 1) clarification of the contents of MOU between forest departments and JFMCs; 2) strengthening of the relationship between

[14] The CEC is a panel of experts, constituted by the Supreme Court of India with effect from 9 May 2002.
[15] For instance, the guidelines stipulate that at least 50 % of the members of the JFM general body should be women.

Panchayats and JFMCs to ensure better coordination with Panchayat raj institutions; 3) capacity development for the management of non-timber forest products (NTFP).

With respect to the involvement of the Panchayat institutions in JFM, the MOEF issued a letter to the Chief Ministers on 29 October 2010[16]. The letter states that, as a result of discussions with various stakeholders on the functioning of JFMCs in the context of the decentralisation of forest governance envisaged in the 73rd Amendment of the Constitution and PESA the Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA), the following strong conclusions have emerged:

- Existing JFMCs should function under the overall guidance and supervision of the Gram Sabhas and new JFMCs are to be formed by the Gram Sabhas.
- JFMCs should be recognized as organs of the Gram Sabha under the relevant state Acts relating to Panchayati Raj Institutions.
- JFMCs should function as Standing Committees of Gram Panchayats for social forestry, farm forestry and minor forest produce.
- Operation of development funds of JFMCs should be approved by the Gram Sabhas.

The letter requested state governments to make appropriate amendments of relevant state acts, rules, and executive orders relating to JFMCs and Panchayati Raj institutions accordingly.

e) Panchayats (Extension to the Scheduled Areas) Act 1996

The Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA) was enacted and came into force on December 1996. The Act extended the provisions of Part IX of the Constitution regarding the Panchayats to the Scheduled Areas of the Constitution[17]. The Scheduled Areas are the tribal areas within nine states, namely Andhra Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, and Rajasthan[18]. These states are required not to make any law which is inconsistent with features defined under Section 4 of PESA. The features in the context of forestry include, among other things, that the Panchayats at the appropriate level and the Gram Sabha be endowed with the 'ownership of minor forest produce' (Section 4 (m) (ii) of PESA). This implies that, when the state law is amended as per the spirit of the PESA, the Gram Sabha and Panchayats at the appropriate level will take overall control over the minor forest produce, although the definition of 'ownership of minor forest produce' is not clearly provided.

In reality, however, the implementation of the PESA can be said to be 'rather dismal', according to the Sub-committee for preparing Model Guidelines to vest Gram Sabhas with power as envisaged in the Provisions of the PESA[19]. The Sub-committee identified several reasons for such failure: 1) A lack of appreciation concerning the place of the Schedule V to be read with the PESA in tribal affairs and confusion about its legal status; 2) Virtually isolated functioning of the Two Responsible Ministries, the Ministry of Panchayati Raj and the Ministry of Tribal Affairs; 3) A lack of information and understanding about the PESA; and 4) Virtually no effort to convey and disseminate the spirit of the PESA. Taking into account such unfavourable situations, the Ministry of Panchayati Raj issued letter No.

[16] As an example, the letter sent to the Chief Minister of Jharkhand State is available online, http://moef.nic.in/downloads/public-information/jharkhand-29-10-2010.pdf, retrieved on 3 July 2011.
[17] Article 243 ZC (1) of the Constitution stipulates that nothing in Part IX shall apply to the Scheduled Areas and tribal areas, and Article 243 ZC (3) stipulates that the Parliament may, by law, extend the provisions of this Part to the Scheduled Areas and the tribal areas.
[18] The states are defined by the Section 6 of the Schedule V of the Constitution, and subsequent constitutional orders including the Scheduled Areas (Part A States) Order 1950, the Scheduled Areas (Part B States) Order 1950, the Scheduled Areas (Himachal Pradesh) Order 1975, and the Scheduled Areas (States of Bihar, Gujarat, Madhya Pradesh and Orissa) Order, 1977.
[19] The Ministry of Panchayati Raj constituted the Sub-committee on 3 August 2006 for preparing Model Guidelines to vest Gram Sabhas with powers as envisaged in the PESA. The report is available online, http://www.downtoearth.org.in/dte/userfiles/images/bdsharma-guidelines.pdf, retrieved on 30 June 2011

N-11012/1/2007-PESA (Pt) on 21 May 2010 to the Chief Secretaries of the concerned states for the effective implementation of the PESA. The letter describes the powers and roles of the Gram Sabha, and the steps to be taken for implementation. It clearly requires urgent action to incorporate the definition of minor forest produce[20] as provided in the Forest Rights Act 2006.

f) Forest Rights Act 2006

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, or the Forest Rights Act 2006, was enacted in December 2006, and came into force on 31 December 2007. The Act provides a legal framework to recognise and vest the forest rights in forest dwelling Scheduled Tribes and other traditional forest dwellers, to define types of forest rights, and to set the procedures for vesting such rights. Forest dwelling Scheduled Tribes are defined as 'the members or community of the Scheduled Tribes[21] who primarily reside in and who depend on the forests or forest lands for bona fide livelihood needs and include the Scheduled Tribe pastoralist communities' (Section 2 (c)). 'Other traditional forest dweller' means any member or community who has been living for at least three generations, or 75 years, prior to 13 December 2005. The detailed implementation rules are provided in the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Rules 2008 gazetted in January 2008. The Ministry of Tribal Affairs is responsible for the implementation of the Act.

Types of forest rights
The Forest Rights Act 2006 defines several types of forest rights that have been traditionally enjoyed by the traditional forest dwellers (Table 2-9).

In addition to the forest rights described in Table 2-9, the rights for basic facilities, such as schools, dispensary or hospital, electric and telecommunication lines and others, water or rain water harvesting structures, minor irrigation canals, and roads, are recognised (Section 3(2)). The construction of such facilities shall not involve felling of trees exceeding 75 trees per ha. In addition, the forest land to be converted shall be less than one ha in each case.

Recognition of forest rights
Section 4 (1) of the Forest Rights Act 2006 explicitly states that the Central Government recognises and vests forest rights in the Scheduled Tribes and other traditional forest dwellers. Such rights are vested only if the forest dwelling Scheduled Tribes and other traditional forest dwellers had occupied forest land before 13 December 2005 (Section 4 (3)). With respect to the rights of individual or common occupation of forest land, such land shall be under the actual occupation as of 31 December 2007, and such rights are to be recognised up to four ha (Section 4 (6)). The rights recognised and vested under the Act are heritable, but neither alienable nor transferable. Furthermore, forest rights are recognised in national parks and sanctuaries as well, but the forest rights recognised in critical wildlife habitats of national parks and wildlife sanctuaries may be modified or resettled to some extent. (Section 4 (2)).

Duties of forest rights holders are also stipulated (Section 5). The holders of any forest rights, Gram Sabha and village level institutions are empowered to:

- Protect the wildlife, forest and biodiversity;
- Ensure that adjoining catchment areas and other ecological sensitive areas are adequately protected;

[20] Section 2 (i) of the Forest Rights Act 2006 defines minor forest produce as 'all non-timber forest produce of plant origin including bamboo, brush wood, stumps, cane, tussar, cocoons, honey, wax, lac, tendu or kendu leaves, medicinal plants, herbs, roots, tubers and the like'.
[21] The term 'Scheduled Tribes' is defined in Section 366 (25) of the Constitution, and several constitution orders have been issued to define the Scheduled Tribes in each state.

- Ensure that habitat of right holders is preserved from any form of destructive practices; and
- Ensure that the decisions taken in 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.

Table 2-9 Type of Forest Rights

Forest Rights	Reference
Right to hold and live in the forest land under the individual or common occupation for habitation or for self-cultivation for livelihood	Sec. 3 (1) (a)
Community rights including nistar rights or rights to grazing and collection of minor forest produce	Sec. 3 (1) (b)
Rights of ownership over and access to collect, use, and dispose of minor forest produce	Sec. 3 (1) (c)
Community rights of uses or entitlements such as fish and other products of water bodies, grazing, and traditional seasonal resource access of nomadic or pastoralist communities	Sec. 3 (1) (d)
Community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities	Sec. 3 (1) (e)
Rights in or over disputed lands	Sec. 3 (1) (f)
Rights for conservation of pattas or leases or grants on forest lands to titles	Sec. 3 (1) (g)
Rights of settlement and conversion of all forest villages, etc., into revenue villages	Sec. 3 (1) (h)
Right to protect, regenerate or conserve or manage any community forest resources	Sec. 3 (1) (i)
Rights which are recognised under any State law or other local laws, or which are accepted under traditional and customary laws	Sec. 3 (1) (j)
Right of access to biodiversity and community rights to intellectual property and traditional knowledge	Sec. 3 (1) (k)
Any other traditional right customarily enjoyed by the forest dwelling scheduled tribes or other traditional forest dwellers, excluding the rights of hunting, trapping or extracting a part of the body of wild animals	Sec. 3 (1) (l)
Right to in situ rehabilitation including alternative land for individuals and communities who have been illegally displaced from forest land prior to 13 December 2005.	Sec. 3 (1) (m)

Source: Forest Rights Act 2006

Procedure for vesting of forest rights

The Gram Sabha has a critical role in the implementation of the Forest Rights Act 2006. It is mandated to initiate the process for determining the nature and extent of forest rights to be given. The Gram Sabha receives the claims, consolidates and verifies them, and prepares a map delineating the area over which the rights are approved, and pass a resolution on claims (Section 6 (1)). The resolution shall be forwarded to a Sub-Divisional Level Committee organized by each state government, and the Committee will examine the resolution and prepare the record of forest rights. A District Level Committee is also established to consider and give final approval on the record of forest rights. Furthermore, the state government shall constitute a State Level Monitoring Committee to monitor the process of recognition and vesting of forest rights.

The Gram Sabha elects the Forest Rights Committee to assist in receiving and processing the forest rights claims. The Forest Rights Committee consists of 10 to 15 members elected by the Gram Sabha (Section 3 of the Forest Rights Act Rules 2008). The Scheduled Tribes and women shall consist of at least one third of the Committee members respectively. The Forest Rights Committee assists the Gram Sabha in its functions to receive the claims, prepare the record of claims and evidence, verify the claims, prepare a list of claimants, pass a resolution on the claims, and present its findings on the nature and extent of the claims.

g) National Mission for a Green India

The National Mission for a Green India[22] (Green India Mission) is one of the eight missions under India's National Action Plan on Climate Change (NAPCC). The latest version of the draft was approved by the Prime Minister's Council on Climate Change in February 2011. Currently a series of consultation workshops are held for brainstorming, experience sharing, preparation of the planning manual and operational guidelines, and preparation of the State level plans. A tentative action plan for the implementation of the Green India Mission during the year 2011-2012 (Table 2-10) was proposed in March 2011, and INR two billion are to be allocated for the implementation of the action plan.

Table 2-10 Tentative Action Plan for Implementation of the Green India Mission

Activity	Timeline
Brainstorming on 'National Mission for a Green India'	Mar 2011
Selection of a team of consultants for developing Planning Manual and Operational Guidelines for implementation of Green India Mission	Apr 2011
Constitution of Governing Council for Green India Mission	Apr 2011
National/Regional level workshop with states and other stakeholders	Apr 2011
Release of the Planning Manual and Operational Guidelines by MOEF	Jun 2011
Setting up of consultant team(s) for Green India Mission by each state	Apr to Jul 2011
State level workshops in each state	Jul to Sep 2011
Finalisation of one year bridging plan for the year 2011-12 and its implementation	Oct 2011
Second state level workshops in each state for finalisation of 5-10 year Perspective Plan for Green India Mission	Jan to Mar 2012
Finalisation of Perspective Plan for 5-10 years of states	Feb 2012
Second national level workshop to present Perspective Plans and other state documents	Mar 2012

Source: Adapted from MOEF (2011), *National Mission for a Green India*. Brochure of National Mission for a Green India.

In parallel to the workshops, reviews on the Green India Mission by cabinet members are ongoing. According to the MOEF, minor changes may be added to the draft Mission based on the reviews, but the overall framework and major contents will remain the same. The Green India Mission is expected to be finalized in June or July 2011 with consent from all cabinet members.

The objectives of the Green India Mission include to increase forest and tree cover on five million ha of forest and non-forest lands, and to improve the quality of forest cover on another five million ha. A total of 10 million ha is covered by the Mission. It also aims at improving ecosystem services such as biodiversity, hydrological services, and carbon sequestration from the said 10 million ha of forest and non-forest land, and aims to increase forest-based livelihood income for about three million forest dependent families. The annual carbon sequestration by 50 to 60 million tones by 2020 is also declared as the objectives. Such numerical targets are summarized in Table 2-11.

The Press Brief on the Green India Mission[23] emphasized the following key innovations of the Mission:

1) The Mission promotes a shift of focus from increasing the forest and/or tree cover to enhancing the quality or density of forests.
2) The Mission pays due attention to enhancing biodiversity, ecosystem restoration as well as carbon sequestration by tree planting.
3) The Mission proposes the decentralization of forest governance. It states that, at a local level, the

[22] The contents of this section is based on the latest version as on 3 May 2011, a draft submitted to Prime Minister's Council on Climate Change.
[23] Press Brief titled 'India Finalises National Mission for a Green India with People-Centric Forestry at its Core' by the MOEF, released on 23 February 2011

Gram Sabha is the overarching institution to facilitate the implementation of the Mission, and the JFMC will be set up by Gram Sabha.

4) The Mission will adopt a landscape-based approach, which promotes an integrated approach to tackle forests and non-forest areas simultaneously.

Table 2-11 Numerical indication of Sub Missions

Sub Mission	Area (ha)	Reference
Enhancing quality of forest cover and improving ecosystem services	4.9 million	Sub Mission 1
Ecosystem restoration and increase in forest cover	1.8 million	Sub Mission 2
Enhancing tree cover in urban and peri-urban areas (including institutional lands)	0.2 million	Sub Mission 3
Agro-Forestry and Social Forestry	3.0 million	Sub Mission 4
Restoration of wetlands	0.1 million	Sub Mission 5

Source: The Green India Mission

(4) Key laws and policies on biodiversity management

a) Wildlife (Protection) Act 1972

The Wildlife (Protection) Act 1972 (WLPA), amended in 1982, 1986, 1991, 2003, and 2006, is the focal legislation governing the management of wildlife and its habitats in the country. Protected areas are designated through this Act and it also prohibits the hunting, catching, and trapping of all species, except those listed as vermin or pests in Schedule V of the Act. The State governments shall designate protected areas 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.

Table 2-12 Categories of protected areas and their legal characteristics (as per the WLPA)

Categories	Statutory features
Sanctuary	• Settlement of claims to rights by District Collector: 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 Warden with the approval of the State government, and should be intended to improve the habitat management. • Cattle grazing and movement of cattle may be permitted. • Provision to establish a local advisory committee for each sanctuary.
National Park	• Stricter controls than sanctuaries; 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.
Conservation Reserve	• Declared on any area owned by the government, particularly areas close to existing Protected Areas; establishment of management committee to advise the Chief Wildlife Warden on the management of 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 (council); committee elects its chairman; reserve management according to a management plan prepared by the committee and approved by the government.

Source: Wildlife (Protection) Act 1972

The key legal features of the four categories of protected areas as provided in the WLPA are given in Table 2-12. The first two categories of protected areas are very much oriented to preservation, leaving little room for community resource use. In the case of sanctuaries, the continuance of 'any right of any person in or over any land within the limits of the sanctuary' may be allowed as part of the settlement of claims, whereas such rights are not allowed in the case of national parks. The boundaries of protected areas shall be altered only with the prior approval of the National Board for Wildlife. The latter two categories (conservation and community reserves), introduced by the 2003 amendment, allow varying degrees of community participation, but protected areas in these categories are just beginning to be established. The Act also provides for the formation of advisory committees for the sanctuaries, which is a step towards making the management of sanctuaries consultative. The law also provides for penalties for infractions. The management of the four categories of protected areas are outlined below.

Sanctuaries and national parks

The establishment and management of sanctuaries and national parks are handled at the national level by the Additional Director General of Forests (Wildlife) at the MOEF. Funding and capacity building support, as well as management guidelines, are provided by the MOEF. At the state level, the Chief Wildlife Warden, vested with statutory powers, is in overall charge of all the protected areas of the state. Each protected area in turn has its own manager and field staff from the Forest Department. Wildlife Divisions are established in each state with consideration for the number and location of protected areas. Each protected area is expected to have a management plan that runs for a period of ten years, though in practice nearly half of them have not developed a plan.

Conservation reserve

Conservation reserves are declared in accordance with Section 36A of the WLPA. The state government may, after consulting with the local communities, declare any area owned by the government, particularly the areas adjacent to existing protected areas and corridor sites between protected areas, as a conservation reserve for protecting landscapes, seascapes, biodiversity, and habitats. A conservation reserve management committee is set up by the government to advise the chief wildlife warden on the management of the reserve. The committee shall be composed of a representative of the forest department who will also act as the committee's secretary, one representative each from the concerned village panchayats, three NGO representatives and one representative each from the agriculture and animal husbandry departments.

Community reserve

Introduced by the 2003 amendment to the Wildlife (Protection) Act, this category of protected areas provides provisions for resource use within the reserve. It also vests a local committee nominated by the Panchayat with the management responsibility. Up to now only four such reserves have been established in the country. According to Section 36C of the WLPA, community reserves can be declared in community or private lands, outside the existing protected areas, where the community or individual has volunteered to conserve wildlife and its habitat to protect fauna, flora, and traditional conservation practices. The authority for the management of community reserves is vested in a management committee composed of five members nominated by the local panchayat(s) and one representative of the Forest Department. The land and resource use in the area will be based on the management plan prepared by the management committee and approved by the government.

Interpretations of 'community land' vary significantly among stakeholders. One interpretation of 'community land' excludes forests designated to be potential sites for community reserves, whereas another interpretation recognizes that any forest land or other area (other than national parks or sanctuaries) where a community has been holding traditional resource use rights could be declared as a community reserve.

Establishment of specialised wildlife agencies
The 2006 amendment to the Act created the National Tiger Conservation Authority, a body with vast powers to promote the conservation of Tiger. It also provides for the establishment of Tiger Conservation Foundations by State governments in each of the Tiger Reserves, with the objective of the ecological and socioeconomic development of the Tiger Reserves by involving the local stakeholders. The Act has also established a Wildlife Crime Control Bureau to help prevent and address crimes related to the tiger and other endangered species. The Indian Board for Wildlife and the State Boards for Wildlife are also created by the Act.

This Act is also the principal tool by which the Convention on International Trade in Endangered Species (CITES) is implemented in the country. It also serves as the legal basis for the national implementation of the Convention on Migratory Species and the natural part of the World Heritage Convention, India being a Party to these international treaties.

b) Environment (Protection) Act (1986)

The Environment (Protection) Act, 1986 (EPA) is an umbrella legislation to protect and improve the quality of the environment and to prevent, control and abate environmental pollution. The key provisions of the Act include the development of a nation-wide programme for the prevention, control and abatement of environmental pollution; and setting standards for various aspects of quality of the environment such as emission or discharge of pollutants and handling of hazardous substances. Other provisions include restrictions of areas while setting up industries and ensuring safeguards where industries are being set up. It also empowers the government to inspect facilities and issue directions as well as penal provisions. These provisions have resulted in regulations such as the Coastal Regulation Zone Notification to regulate activities along coastal stretches, and the Environmental Impact Assessment of Development Projects Notification and the Wetlands (Conservation and Management) Rules. The Centrally Empowered Committee, constituted upon the direction of the Supreme Court, and a few other environmental bodies are established under Section 3.3 of the EPA.

Ecologically Sensitive Areas
Section 3.2.v. of the Act provides for the protection of environmentally sensitive areas by preventing inappropriate development in the area. To do this, sites can be declared as Ecologically Sensitive Areas (ESAs) by considering their ecological sensitivity, and with a view to restricting certain types of developmental activities to protect the sites' ecological integrity. A total of eight ESAs have been declared so far. These include Murud-Janjira (1989), Doon Valley (1989), Dahanu (1991), Aravalli (1992), Numaligarh (1992), Taj Trapezium Authority (1998), Mahabaleshwar-Panchgani (2000) and Matheran (2003) (Kapoor, et al., 2009). In some cases, a monitoring committee is set up under Section 3.3 of the EPA to oversee the implementation of the controls imposed in the area. This can be an area-based committee or an existing agency. Monitoring bodies are lacking in the case of a few ESAs.

c) Supreme Court interventions

The Supreme Court interventions have strengthened the preservationist nature of the Wildlife (Protection) Act. In an interim order in an ongoing case, the Centre for Environmental Law vs. the Union of India, issued on 14 February 2000, with subsequent amendments and clarifications, the Supreme Court directed that no national park or sanctuary shall be de-reserved without its prior approval. It has also prohibited non-forest activities in national parks and sanctuaries even if the approval as required by the 1980 Forest (Conservation) Act had been obtained. The Court has also banned the removal of dead and/or decaying trees, grass, driftwood, etc. from national parks and sanctuaries. By another order, the Supreme Court created a CEC in 2002 to advice the Court on the implementation of its orders in this respect. The CEC has come to play a critical role in the management of protected areas in the country; most of the interventions in the protected areas require the prior consent of CEC.

d) Biological Diversity Act 2002

The Biological Diversity Act, legislated in 2003, has the triple objective of conservation, sustainable use of biodiversity, and the equitable sharing of the benefits derived from its use. This law was created for the national implementation of the Convention on Biological Diversity (CBD), which was ratified by India in 1993. The key features of this Act are as follows:

- Regulation of access to biodiversity and traditional knowledge, which is provided based on the conditions of prior informed consent, mutually agreed terms, and equitable benefit sharing.
- Establishment of National Biodiversity Authority (NBA) and State Biodiversity Boards (SBBs).
- Establishment of Biodiversity Management Committees (BMCs) and Local Biodiversity Funds at the village level.
- Establishment of Biodiversity Heritage Sites.

The Act entails the government to develop national strategies and plans for the conservation and sustainable use of biodiversity, carry out environmental impact assessments for projects that are likely to affect biodiversity, integrate biodiversity management into sectoral programmes, and protect traditional knowledge related to biodiversity. Biodiversity Heritage Sites are designated by the state governments and they shall frame rules for the management of all such sites. The functions of the NBA at the state level are to be carried out by SBBs. The BMCs at the local level, which is a totally new concept in conservation governance in the country, are given a mandate to promote conservation and sustainable use of biodiversity as well as its documentation within the areas of their jurisdiction. Local Biodiversity Funds are to be established by state governments in the areas of local self-government (panchayats), and the funds accrued to these agencies shall be used for the purposes of conservation of biodiversity and for the benefit of the local communities within their respective areas of jurisdiction.

In addition to the CBD and its protocols on bio-safety and access and benefit sharing, India is a party to the following multilateral environmental treaties on wildlife and biodiversity as well:

- Convention on Migratory Species (Bonn Convention);
- CITES;
- Convention on Wetlands of International Importance (Ramsar Convention);
- UN Convention to Combat Desertification; and
- Convention Concerning the Protection of the World Cultural and Natural Heritage.

e) National Environmental Policy 2006

The Policy, approved by the Cabinet in 2006, 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 programme, through the means of ecodevelopment in particular. A significant part of the wildlife remains outside the protected areas, and therefore the Policy calls for serious measures for the protection of wildlife outside protected areas. It stresses the need to protect biodiversity hotspots and protect traditional knowledge associated with biodiversity.

The Policy recognizes that the 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 tribals, over the protected areas,’ and calls for the underlying causes of the conflicts to be addressed.

f) National Biodiversity Action Plan 2008

The National Biodiversity Action Plan (NBAP) was developed by India in 2008 as required by the CBD, as well as the Biological Diversity Act. It draws on the National Biodiversity Strategy and Action Plan that was developed earlier but was not adopted as an official document. 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. NBAP seeks a steady expansion of the protected area network and establishment of more species-focused protected areas. 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 also lays out ways to strengthen the institutional mechanism for biodiversity management and promote capacity building, and provides for the valuation of the economic benefits of the goods and services provided by biodiversity. It has delineated a subset of activities for each action component, identified the coordinating agencies for each action component and provided a time frame appropriate to each activity, either short term (5 years), medium term (5-10 years) or long term (more than 10 years).

g) National Wildlife Action Plan 2002-16

National Wildlife Action Plan 2002-16 (NWAP) was adopted by the Indian Board of Wildlife in 2002, building on an earlier version. This calls for strengthening and expanding the protected area network by including the Conservation and Community Reserve categories. While the final notification of protected areas in many cases is still pending, it calls for the early completion of the legal procedures for the final notification. It recommends the development of action plans for key threatened species and to declare areas around protected areas as ecologically sensitive areas under the Environment (Protection) Act.

NWAP further calls for the identification and restoration of degraded habitats outside protected areas, and for the promotion of research in protected areas and the incorporation of the results in the formulation of the management plans. The document identifies the capacity building of the protected area staff as a priority; it also calls for expanding the involvement of the local communities in protected area management.

h) Ecodevelopment and Ecodevelopment Committees

Ecodevelopment was initiated through a centrally sponsored scheme to address the livelihood needs of the local communities in and around protected areas. All ecodevelopment activities are implemented through Ecodevelopment Committees (EDCs). Ecodevelopment was conceived as an attempt to reconcile the conservation needs and livelihood concerns of forest-dependent communities in and around protected areas, and was incorporated in the Eighth Five-Year Plan (1992-97). Ecodevelopment was given a boost with the launch in 1997 of the India Ecodevelopment Project financed by the World Bank and Global Environmental Facility.

The increasing social conflicts around protected areas on the one hand and the lessons emerging from the practice of the JFM program on the other have prompted the emergence of ecodevelopment as a means to promote the livelihood of the forest-dependent communities in and around the protected areas. The $ 67 million World Bank-supported project, implemented in seven protected areas across the country, had as its key components the improvement of the protected area management and village ecodevelopment (World Bank, 1996). Many states have subsequently taken up ecodevelopment in the protected areas, and issued their own guidelines for implementation. In

general, ecodevelopment sets the following objectives:

- Improve the livelihood security of the communities residing in and around the protected areas, within the legal restrictions on resource use, and thus provide them with an alternative that would take the pressure off the wildlife and forests
- Improve protected area management by involving the local communities
- Resolve conservation-community conflicts in an ecologically and socially acceptable manner

Ecodevelopment is implemented by EDCs according to guidelines developed by each State. Some common features of the guidelines are:

- EDCs have an elected executive committee, while the secretary is a forest department staff.
- Activities are based on a micro plan covering five years prepared through a participatory process.
- Types and quantity of activities would depend on the locale and the availability of funds. Some typical activities are: fodder development, planting works, provision of drinking water, construction of check dams and other soil or water conservation structures, boundary marking, creation of access paths, health care camps, income generation activities, provision of new breeds of cattle, etc.
- Support forest departments in law enforcement and forest management activities
- No harvesting of forest resources inside the protected areas in deference to the wildlife law.

i) Community conserved areas

Community conserved areas (CCAs) are areas traditionally protected by local communities through exercises of customary norms and social sanctions to achieve conservation and sustainable use of the forest resources and to meet social and religious needs. Examples of such areas are introduced in Annex 4.

2.3.3 Organisations for forestry and biodiversity conservation

(1) Agencies for forest and biodiversity governance

a) Ministry of Environment and Forests

The Ministry of Environment and Forests (MOEF) is the focal agency responsible for environmental conservation and natural resource management at the national level. It is in charge of planning, promotion, implementation, coordination and overseeing the policies and programmes regarding the environment and forestry. The overall objectives of the MOEF include conservation and survey of flora, fauna, forests and wildlife; prevention and control of pollution; afforestation and regeneration of degraded areas; protection of the environment and ensuring the welfare of animals. The functions of the MOEF are supported by a set of laws and policies as outlined in Section 2.3.

The MOEF has 33 divisions including functional divisions on subjects such as climate change, desertification control, conservation and survey, pollution control, environmental education, environmental impact assessment, environmental information, forest conservation, forest policy, forest protection, forest services, and wildlife. It also includes Project Tiger, Project Elephant, and the National Afforestation and Ecodevelopment Board. The MOEF has regional offices at seven locations across the country and it also oversees the Wildlife Crime Control Bureau.

The MOEF has under its ambit a set of subordinate offices, autonomous organisations, and statutory authorities as mentioned in Table 2-13. In addition, the MOEF also sponsors a network of ten centres of

excellence on various environmental themes. The total expenditures of the MOEF during the Tenth Five Year Plan (2002-2007) have been INR 51,550 million against an approved outlay of INR 59,450 million. For the Eleventh Five Year Plan (2007-12), the MOEF has been allocated an outlay of INR 100,000 million.

Table 2-13 Subordinate offices and institutions under the MOEF

Organisation type	Name of Organisation	Location
Subordinate Office	Forest Survey of India	Dehradun, Uttarakhand
	Botanical Survey of India	Kolkata, West Bengal
	Zoological Survey of India	Kolkata, West Bengal
	Indira Gandhi National Forest Academy	Dehradun, Uttarakhand
	Directorate of Forest Education	Dehradun, Uttarakhand
	National Institute of Animal Welfare	Faridabad, Haryana
	National Zoological Park	New Delhi
	National Museum of Natural History	New Delhi
Autonomous Organisation	Gobind Ballabh Pant Institute of Himalayan Environment & Development	Almora, Uttarakhand
	Indian Council of Forestry Research and Education	Dehradun, Uttarakhand
	Indian Institute of Forest Management	Bhopal, Madhya Pradesh
	Indian Plywood Industries Research and Training Institute	Bangalore, Karnataka
	Wildlife Institute of India	Dehradun, Uttarakhand
Authority	Central Zoo Authority	New Delhi
	National Biodiversity Authority	Chennai, Tamil Nadu
	National Ganga River Basin Authority	Newly constituted in February, 2009
	National Tiger Conservation Authority	New Delhi

Source: Website of the MOEF, http://moef.nic.in/index.php, retrieved on 15 June 2011

b) The Indian Board for Wildlife and State Boards for Wildlife

These bodies are established as per the Wildlife (Protection) Act. The Indian Board for Wildlife is the key statutory advisory body for wildlife conservation and is chaired by the prime minister. It has also established a standing committee chaired by the forest minister. Critical policy decisions on protected areas and wildlife, including decisions on proposals for changes in the boundary of the protected areas, are made by this body. Following a decentralized structure, there are State Boards for Wildlife that help formulate wildlife-related policies at the state level. They also recommend proposals for the establishment of new protected areas. The State Board is chaired by the chief minister and the state forest minister serves as its vice chair.

c) National Tiger Conservation Authority

The National Tiger Conservation Authority (NTCA) was created as a statutory body by an amendment of the Wildlife (Protection) Act in 2006. This was in line with the recommendation of the Tiger Task Force appointed by the prime minister to delineate measures to address the crisis caused by the declining population of the species (MOEF, 2005). The NTCA is chaired by the forest minister and has official and expert members, including two experts on tribal affairs. The NTCA is designated to deal with the ecological and administrative issues related to the conservation of tigers. The NTCA is also authorized to enforce guidelines for tiger conservation and strengthen institutional mechanisms for better protection of the tiger population (MOEF, 2008).

d) Wildlife Crime Control Bureau

The Wildlife Crime Control Bureau was established by the GOI in June 2007 as a statutory body under the WLPA. The Bureau works with the state governments and other enforcement agencies to combat wildlife crime in the country. The Bureau collects and collates intelligence related to wildlife crime and feeds this information to various enforcement agencies; it also facilitates the coordination of actions by various agencies. The Bureau is also responsible for the implementation of obligations under international conventions in this respect.

e) National Biodiversity Authority and State Biodiversity Boards

India's Biological Diversity Act (BDA) 2002 is meant to regulate the management of biological resources and related knowledge, both for sustainable use and conservation. To achieve this, a three-tiered structure has been established. The National Biodiversity Authority (NBA) is at the apex and was established in 2003 at Chennai in Tamil Nadu. The NBA regulates access to biodiversity and related knowledge by foreign entities based on the triple principles of prior informed consent, mutually agreed terms and equitable benefit sharing. The NBA is also required to advise the GOI on various aspects of biodiversity management as well as the protection of traditional knowledge. The NBA is composed of a chairperson, ten ex-officio members representing various government agencies, and five expert members.

State Biodiversity Boards (SBBs) are set up in each state. The SBBs are established by State Governments and include a chairperson, five ex-officio members from the concerned departments and five members considered experts in conservation, sustainable use and equitable benefit sharing. The key function of the SBBs is to give advice to state governments on matters relating to the management of biodiversity. They are also responsible for regulating access to biodiversity for commercial use by Indians. At the village level are the BMCs. These bodies are responsible for the conservation and sustainable use of biodiversity locally and the documentation of biodiversity that includes habitats, land species, varieties, cultivars, and traditional knowledge relating to biodiversity. The BMCs are directed to have a chairperson and six nominated persons, of whom at least one-third should be women and 18% should be from the scheduled castes and tribes.

Furthermore, Biodiversity Heritage Sites are designated under Section 37 of the Biological Diversity Act. A set of guidelines has been issued by the NBA for the declaration and management of such sites, according to which both wild and agricultural sites would be considered as Biodiversity Heritage Sites. The BMCs and other relevant community institutions such as Gram Sabhas, panchayats, forest protection committees and tribal councils can recommend such sites to the SBBs for declaration under this Act. The management of these would be carried out by BMCs or other community institutions.

(2) Research and educational organizations for forestry and biodiversity

a) Indira Gandhi National Forest Academy

The Indira Gandhi National Forest Academy (IGNFA) was established in 1987 by reorganising the Indian Forest College created in 1938. It is located in Dehradun, Uttarakhand. It is the national educational institute for the Indian Forest Service (IFS) officers under the administrative control of the MOEF. To impart expert knowledge and skills to manage forests and wildlife, the IGNFA provides several training courses for different levels of IFS officers: 1) professional training of IFS probationers; 2) mid career training programme for IFS officers; and 3) skill upgrading courses for the IFS officers promoted from State Forest Service (SFS) officers.[24] Table 2-14 demonstrates major contents of such trainings.

[24] Website of the IGNFA, http://www.ignfa.gov.in/, retrieved on 30 May 2011

Table 2-14 Training programmes provided by the IGNFA

Training	Description
Professional training of IFS probationers	• 20 months probationers' course at IGNFA and 2 months at the Lal Bahadur Shastri National Academy of Administration • Main contents: core forestry (silviculture, mensuration, utilization, etc.); ecological sciences; wildlife and biodiversity conservation; engineering sciences (geology, soil science, botany, etc.); applied sciences (GIS, remote sensing, computer application); and others
Mid career training programme	• IFS officers whose service years are following. - 7 to 9 years: 8 week programme - 16 to 18 years: 8 week programme - 26 to 28 years: 4 week programme • Contents: contemporary issues (climate change, environmental impact assessment, etc.); economic issues (ecotourism, livelihood, etc.); resource management (genetics and tree improvement); human resource management; basic issues (protected area management); and social issues (agroforestry)
Skill upgrading courses for the promoted IFS officers	• 10 week course for inducted officers from SFS to IFS • Contents: a wide range of forest and wildlife management issues combining the contents of the above two modules

Source: Material presented by the IGNFA during the meeting on 5 April 2011

In addition to the above constituted courses, various thematic training programmes and workshops are also organized. Themes recently covered are threats to ecological security and wellbeing, global warming and climate change, combating desertification, and biodiversity conservation.

b) Directorate of Forest Education

The Directorate of Forest Education is, under the direct administrative control of the MOEF, responsible for planning, coordinating and managing training courses of the State Forest Service (SFS) officers and the Forest Range Officers (FRO). The objectives of the Directorate, among others, include the following [25].

1) Provide induction training for recruited SFS officers and FROs
2) Provide short-term and theme-based in-service training for SFS officers and FROs
3) Cater to the training needs of SFS officers and FROs as well as candidates sponsored by various public and private sectors, universities, or foreign countries
4) Ensure standard and quality of training for forest officers
5) Assist in developing appropriate and relevant training contents and evaluation standards for forest-related training at various levels
6) Assist the central and state government to develop training policy for human resource management and development

There are three colleges for the SFS officers and one for forest rangers, as listed below, under the administrative control of this Directorate. Through these colleges, necessary trainings are provided to SFS officers and FROs.

- Central Academy for State Forest Service, Dehradun, Uttarakhand
- Central Academy for State Forest Service, Coimbatore, Tamil Nadu

[25] Website of the Directorate of Forest Education, http://dfe.gov.in/Home_80.html, retrieved on 30 June 2011

- Central Academy for State Forest Service, Burnihat, Assam
- Eastern Forest Rangers College, Kurseong, West Bengal

The Directorate started organizing short-term general refresher courses and theme-based workshops and seminars for the SFS officers and FROs from 1992 onwards. According to the Director, a total of 24 short-term refresher and theme-based courses for the SFS officers and FROs are undertaken per annum on average.

Furthermore, the Directorate also provides short-term training courses and capacity building workshops and seminars for the SFS officers and FRO, and the other forest officers like the Deputy FROs, foresters and forest guards. Furthermore, it started supplementing the state governments' trainings by organising two-week refresher training programmes for the frontline staff, namely, Forest Guards, Foresters, and Deputy Rangers from 2004.

c) Forest Survey of India

The Forest Survey of India (FSI) is created in 1981. It is a government organization under the administrative control of the MOEF. The FSI is mandated to conduct survey on and assessment of forest resources in India. More specifically, the major objectives of the FSI are described below[26]:

- Prepare a State of Forest Report once in every two years, which assesses and monitor the latest forest cover and changes
- Conduct inventory on forest and non-forest areas, and develop database on forest resources
- Collect, compile, store and disseminate spatial database on forest resources
- Prepare thematic maps based on the interpretation of aerial photographs and satellite data, and ground verifications. Such thematic maps describe forest types, major species composition, density of forest and tree cover, and land use pattern
- Provide training of forest officers in application of technologies such as resource survey, remote sensing, and GIS
- Strengthen research and development infrastructure, and to conduct research on applied forest survey techniques
- Support State or Union Territory Forest Departments in forest resources survey, mapping and inventory
- Undertake forestry related special studies or consultancies and custom made training courses for State or Union Territory Forest Departments and other organisations on project basis.

The FSI is also monitoring forest fires of the whole country by using remote sensing data system developed by the University of Maryland[27] and MODIS Rapid Response System[28]. Once forest fires are detected through the said system and GIS analysis, the coordinates of all fire spots are sent to the relevant State Forest Departments through facsimile or email.

The headquarters of the FSI is located in Dehradun, Uttarakhand. It has four regional branches, located at Shimla, Kolkata, Nagpur, and Bangalore. The regional offices are to arrange field-work to collect inventory data, interpret aerial photographs, and undertake wood consumption studies.

d) Indian Council of Forestry Research and Education

The Indian Council of Forestry Research and Education (ICFRE) was constituted in 1986 under the MOEF. It is located in Dehradun, Uttarakhand. The ICFRE aims to conduct forestry research, transfer

[26] Website of the FSI, http://www.fsi.org.in/, retrieved on 30 May 2011.
[27] http://maps.geog.umd.edu
[28] http://rapidfire.sci.gsfc.nasa.gov/

forest technologies to State Forest Departments and other agencies, and to provide forestry education.

Table 2-15 Research institute and centres of the ICFRE

Institute or centre	Location	Function
Forest Research Institute (FRI)	Dehradun, Uttarakhand	• To cater to forest research needs of Punjab, Haryana, Chandigarh, Delhi, Uttar Pradesh and Uttarakhand with regard to silviculture, ecology, pathology, entomology, chemistry, NTFP, genetics and tree breeding, and forest soil and land reclamation • To provide academic education including PhD. and M.Sc. degree and Post-Graduate Diploma Courses
Arid Forest Research Institute (AFRI)	Jodhpur, Rajasthan	• Research on biodiversity conservation and bio-productivity enhancement in Rajasthan, Gujarat, and Dadra and Nagar Haveli, focusing on arid and semiarid regions
Tropical Forest Research Institute (TFRI)	Jabalpur, Madhya Pradesh	• Research on eco-restoration of hilly and mountainous regions; development of agroforestry models; forest protection; bio-fertilizers and bio-pesticides; NTFP; and planting stock improvement in four central Indian states, Madhya Pradesh, Orissa, Maharashtra, and Chhattisgarh
Institute of Forest Genetics and Tree Breeding (IFGTB)	Coimbatore, Tamil Nadu	• Research on forest genetics and tree breeding for improving productivity of forest tree species, such as genetic improvement, genomics, clonal propagation, productivity and nutrient cycling, and integrated disease and pest management
Himalayan Forest Research Institute (HFRI)	Shimla, Himachal Pradesh	• To cater to the research needs of Himachal Pradesh and Jammu and Kashmir pertaining to eco-restoration of cold deserts and mined areas, regeneration of coniferous and broad-leaved forests, and management of temperate and alpine forests
Rain Forest Research Institute (RFRI)	Jorhat, Assam	• Research for north-eastern states, i.e., Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, on ecosystem conservation, management of shifting cultivation areas and community forests, practices for eco-restoration, and sustainable management of bamboos and rattans
Institute of Forest Productivity (IFP)	Ranchi, Jharkhand	• Research on productivity of flora and fauna resources, biodiversity conservation, eco-restoration of degraded lands, protection of fragile ecosystem, and agroforestry models in states of Bihar, Jharkhand, Sikkim, and West Bengal
Institute of Woods Science and Technology (IWST)	Bangalore, Karnataka	• Research on wood properties, properties and uses of timber species, essential oils and other NTFP, pests and diseases
Forest Research Centre (FRC)	Hyderabad, Andhra Pradesh	• Research on tree improvement including biotechnology and mass propagation; research and demonstration of agroforestry models; biodiversity conservation; eco-restoration of mangroves; and soil sciences
Centre for Forestry Research and Human Resource Development (CFRHRD)	Chhindwara, Madhya Pradesh	• Forestry research in the specialized areas like biodiversity conservation, non-wood forest products, forest protection, socioeconomics, silviculture, and tree improvement • Development of human resources in forestry sector through vocational training
Centre for Social Forestry and Eco-Rehabilitation (CSFER)	Allahabad, Uttar Pradesh	• Research on social forestry and eco-rehabilitation in Eastern Uttar Pradesh, North Bihar and Vindhyan Region of Uttar Pradesh and Madhya Pradesh
Advanced Research Centre for Bamboo and Rattans (ARCBR)	Aizawl, Mizoram	• To cater the bamboo and rattan related research needs of all the eight north eastern states, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim.

Source: Website of the ICFRE, http://www.icfre.org/, retrieved on 30 May 2011

The ICFRE has eight research institutes and three advanced research centres to conduct research in different ecological and geographical zones of the country[29]. Such institutions are presented in Table 2-15.

e) Indian Institute of Forest Management

The Indian Institute of Forest Management (IIFM) was founded in 1982 at Bhopal, Madhya Pradesh. It is a registered society under the Societies Registration Act at Bhopal. The IIFM is mandated to meet the growing need for managerial human resource in forest and related sectors. It is currently functioning as an educational, research, training, and consultancy institute. The major objectives of the IFFM are the following:[30]

- Provide training in management and related subjects for the central and state government officers, and forest related industries
- Select and prepare young persons for careers leading to management responsibility in forestry and the forest-related system
- Cater to the need of forestry and forest-related industry and commerce for the latest information on forestry management through research, consulting, and publication
- Support, institute and carry out research activities regarding the use of management and related techniques and methods

The major activities of the Institute include education and training activities, including two-year post graduate programme in forest management, and one-year post graduate course in natural resource management; research and consultancy activities in forest management; dissemination of research-based information and knowledge; and development of databases and information systems relating to forestry, environment and related sectors (MOEF, 2007).

f) Wildlife Institute of India

The Wildlife Institute of India (WII), located in Dehradun, Uttarakhand, was established in 1982 under the MOEF. The WII provides training programmes, academic courses and advisory services in research on wildlife, and management. The areas of research include biodiversity, endangered species, wildlife policy, wildlife management, wildlife forensics, spatial modelling, ecodevelopment, and climate change. Remote sensing and GIS are also important areas for the research. The major objectives of the WII are presented below:

- Develop scientific knowledge on wildlife resources
- Train personnel at various levels for conservation and management of wildlife
- Conduct research on wildlife management including the technical development
- Provide information and advice on specific wildlife management issues

Ongoing research projects cover the broad areas. The research themes include animal ecology and conservation biology, ecodevelopment planning, endangered species management, habitat ecology and others.

g) Sálim Ali Centre for Ornithology and Natural History

The Sálim Ali Centre for Ornithology and Natural History (SACON) is an autonomous organization

[29] Website of the ICFRE, http://www.icfre.org/, retrieved on 30 May 2011.
[30] Website of the IIFM, http://www.iifm.ac.in/index.html, retrieved on 30 May 2011.

supported by the MOEF and was established in 1990 to commemorate the eminent ornithologist Dr Salim Ali. Located at Coimbatore, it is recognised as a national centre of excellence in ornithology and natural history, and pursues the mission of research education and enabling community participation for the conservation and sustainable use of biodiversity with a focus on birds. SACON has a Governing Council comprised of 16 members and is chaired by the Secretary of the Ministry of Environment and Forests. SACON conducts research in ornithology and biodiversity across the country and the data is often input into management exercises. It conducts doctoral courses and plans to establish M.Phil. and masters courses. It is in the process of establishing a national data bank on Indian ornithology.

CHAPTER 3 Current status of and issues in forestry and wood-based industries

3.1 Trends of forest products market

(1) Status of forestry and wood-based industries in Indian economy

Table 3-1 presents the trend in share of forestry and manufacturing of wood, wood products, and furniture in GDP. The table clearly shows the share has decreased especially in the last two decades. A main reason for the decrease is the rapid economic growth in India boosted by manufacturing industry and service sectors. Overall GDP has grown by 5 to 6 % annually since 1980 while GDP in forestry has grown by less than 1.4%. It can be concluded that the relative status of forestry and wood-based industries has declined in the entire economy in India because of the rapid economic growth.

Table 3-1 Status of forestry and wood-based industries in Indian economy

	1950-59	1960-69	1970-79	1980-89	1990-99	2000-06
Share in GDP*						
Forestry	2.0%	1.9%	1.9%	2.0%	1.2%	0.9%
Manufacturing of wood, wood products[1], and furniture[2]	2.1%	2.1%	1.6%	1.0%	0.6%	0.3%
All agriculture	47.9%	42.6%	38.9%	32.0%	27.6%	20.7%
All manufacturing	12.1%	14.3%	15.7%	16.6%	16.3%	15.6%
Growth rate of GDP**						
Forestry	0.2%	2.7%	-0.1%	0.4%	0.9%	1.4%
Overall GDP	3.6%	4.0%	2.9%	5.6%	5.7%	6.5%

Note: Years in this table are fiscal years. For example, '1950' means FY1950/51. 1) Wood products do not include pulp or paper. 2) Furniture includes not only wooden furniture but all kinds of furniture.

Source: *Adapted from Ministry of statistics & programme implementation (2007, 2008, 2009); **Kishwan, Sohal, Nautiyal, Kolli, & Yadav (2008)

(2) Traded volumes

The value of output from forestry and logging in FY 2008/09 amounts to INR 1,052.41 billion consisting of INR 482.51 billion from Industrial wood (or industrial round logs), INR 423.43 billion from fuel wood, and INR 146.47 billion from minor forest products (Table 3-2). Recent growth of population and economy in India has increased demand for industrial wood. Output from manufacturing of wood and wood products such as sawn timber, wooden panel, and furniture, which requires industrial wood, was INR 465.70 billion and INR 342.07 billion in FY 2008/09, respectively. Since industrial wood is a key to the wood-based industries and is relevant to tree plantation especially outside recorded forest area, the rest of this section below focuses on industrial wood and wood products.

Table 3-2 Value of outputs from forestry and wood-based manufacturing (FY 2008/09)

(billion INR at current price)

Economic Activity	Output
Forestry and logging	1052.41
Industrial wood	482.51
Fuel wood	423.43
Minor forest products	146.47
Manufacturing of wood and wood products	465.70
Manufacturing of furniture	342.07

Source: Ministry of Statistics and Programme Implementation (2010)

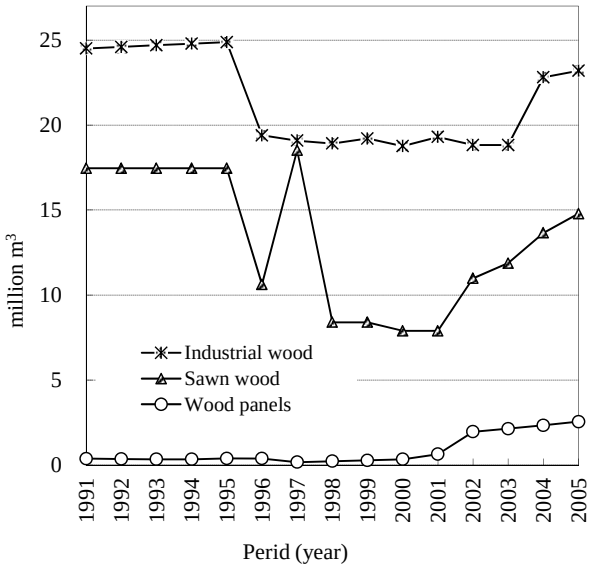
Industrial wood were produced in the range of about 24 million m^3 annually from 1991 to 1995 (Table 3-3, Figure 3-1). In 1996, however, the production suddenly declined to 19.395 million m^3. This decline was caused by the Supreme Court Order in 1996 that banned felling of trees in forests in north-eastern states, which were a main source of forest wood for the wood-based industries. After declining in 1996, the production was around 19 million m^3 annually until 2003 and suddenly increased to 22.810 million m^3 in 2004. According to Pandey (2008), about 80% of wood production is estimated to be produced in outside of recorded forest area under private ownership, while 50% of wood production is estimated to be from outside of recorded forest area according to Saigal, Arora, and Rizvi (2002). After the Supreme Court order made it very difficult to cut trees in recorded forest area, tree plantation outside recorded forest area, especially in private land, has had a significant role in supplying industrial wood (Pandey & Rangaraju, 2008).

Production of sawn wood and wood panels, which form a demand side of industrial wood, is presented in Table 3-3 and Figure 3-1. Production of sawn wood shrank in 1996-1998,[31] and production of wood panels declined in 1997. This decline resulted from the Supreme Court order in 1996. A number of industries were forced to shut down due to shortage of wood supply caused by the order (Saigal et al., 2002) and due to a ban by the order to prohibit wood processing near forests in north-eastern states where wood-based industries prospered. After the sharp decline, the production remained flat or slightly increased until 2001 and rose rapidly from 2002. The rapid rise may reflect the relocation of wood processing industries from the north-eastern states to north and central states and may be supported by increasing import and production of industrial wood in the early 2000s. Restrictions on wood supply from forests, promotion of tree plantation, which is, for example, stipulated by the National Forest Policy in 1988, and import liberalization policy changed wood-based industries, which now depends on tree plantation and imported timbers for raw material supply (Pandey & Rangaraju, 2008). According to Ahmed (2005), 60% of total raw materials procured by wood-based industries is from open market including imports, 10% is from farm forestry and social forestry, and 30% is from government forests.

Table 3-3 Production of industrial wood, sawn wood, and wood panels

Year	Industrial wood (million m^3)	Sawn wood (million m^3)	Wood panels (million m^3)
1991	24.501	17.460	0.378
1992	24.597	17.460	0.357
1993	24.691	17.460	0.348
1994	24.785	17.460	0.348
1995	24.879	17.460	0.396
1996	19.395	10.624	0.388
1997	19.089	18.520	0.172
1998	18.918	8.400	0.231
1999	19.208	8.400	0.285
2000	18.761	7.900	0.349
2001	19.299	7.900	0.645
2002	18.825	10.990	1.969
2003	18.828	11.880	2.146
2004	22.810	13.661	2.341
2005	23.192	14.789	2.554

Source: FAO (2011)



Source: Adapted from FAO (2011)

Figure 3-1 Production of industrial wood, sawn wood and wood panels

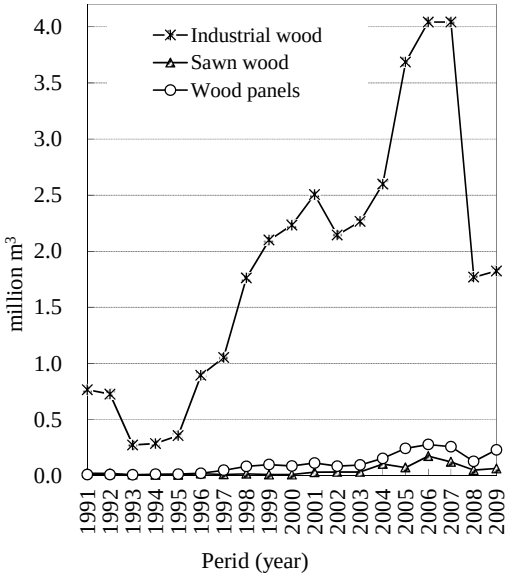
[31] Production of sawn wood heavily reduced in 1996, but in 1997 returned to a level higher than before 1996, and dropped again in 1998. The reason of this sharp and strange swing is unclear, but one of possible reasons is error of data.

Trade of industrial wood, sawn wood, and wood panel is presented in Table 3-4. The amounts of the export have been small, because export of wood (logs, timber, stumps, roots, bark, chips, charcoal, etc.) has been totally banned and export of wood products has been restricted (Pandey, 2008). On the other hand, import of industrial wood, sawn wood, and wood panel have been considerable, especially recently. Industrial wood have formed the bulk of the total import whereas import of sawn wood and wood panel is relatively small. The reasons that processed wood has been imported in relatively small volume are higher import tariff on processed wood to protect wood-based industries, inexpensive cost of sawmilling, and lack of strict standard in timber size (Panwar, Knowles, & Hansen, 2007). Table 3-4 also shows continuous increase in the import. One of the main reasons for the increase is liberalisation of the import since 1992 (Pandey, 2008). Under the liberalisation, restrictive import licensing was simplified, import under Open General License has been permitted since 1996, and import tariffs were drastically reduced. For example, tariffs on industrial wood and on sawn wood were reduced to 10% and 30%, respectively, in FY 1996/97 from 85% in FY 1993/94, and became 5% and 25% in FY 2002/03, respectively (Muthoo, 2004). As well as the trade liberalisation, shortage of log supply is also a main reason for the increase in the import. In fact, after drop in log and wood products supply in 1996-1998 brought about by the Supreme Court order, import of the industrial wood grew continuously from 0.894 million m^3 in 1996 to 4.03 million m^3 in 2007. This fact indicates that importing industrial wood as well as planting trees in private land is an important source of industrial wood (Saigal et al., 2002). The fall in import of industrial wood, sawn wood, and wood panel in 2008-2009 might be due to a global financial crisis in late 2008 and, therefore, can be considered a temporary shock.

Table 3-4 Trade of industrial wood, sawn wood, and wood panes

Year	Industrial wood (million m^3)		Sawn wood (million m^3)		Wood panel (million m^3)	
	Import	Export	Import	Expor	Import	Expor
1991	0.765	0.037	0.021	0.035	0.009	0.014
1992	0.726	0.003	0.018	0.006	0.008	0.021
1993	0.272	0.002	0.008	0.006	0.006	0.019
1994	0.285	0.006	0.006	0.008	0.012	0.044
1995	0.356	0.006	0.007	0.017	0.013	0.042
1996	0.894	0.018	0.017	0.027	0.020	0.020
1997	1.052	0.017	0.010	0.018	0.047	0.014
1998	1.761	0.000	0.016	0.014	0.082	0.012
1999	2.099	0.000	0.009	0.010	0.098	0.014
2000	2.232	0.003	0.009	0.010	0.086	0.011
2001	2.505	0.003	0.030	0.010	0.112	0.016
2002	2.144	0.006	0.032	0.008	0.084	0.034
2003	2.265	0.006	0.032	0.007	0.094	0.062
2004	2.597	0.004	0.103	0.015	0.153	0.086
2005	3.685	0.007	0.072	0.015	0.242	0.110
2006	4.043	0.003	0.173	0.019	0.277	0.072
2007	4.043	0.003	0.122	0.015	0.257	0.063
2008	1.768	0.014	0.048	0.040	0.126	0.065
2009	1.823	0.008	0.063	0.017	0.229	0.047

Source: FAO (2011)



Source: Adapted from FAO (2011)

Figure 3-2 Import of industrial wood, sawn wood, and wood panel

(3) Traded prices

Table 3-5 and Figure 3-3 present a wholesale price index for wood products consisting of timber planks and plywood commercial planks. This index leapt by 32.54% from 1997 to 1998. Monthly data on the index reveal that the leap took place from September 1997 until December 1997. This fact indicates that the leap stemmed from the ban of the Supreme Court order that reduced wood and wood

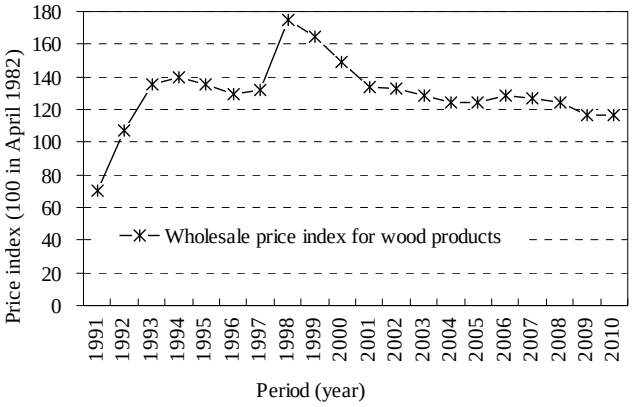
products supply. After the leap in late 1997, the index was on a downward trend until 2004 and was stable since 2004. This transition of the index implies that huge gap between demand and supply in wood products resulting from the court order was gradually filled. In 2009, the index fell by 6.67%, which can be interpreted as a temporary shock caused by the global financial crisis arising in late 2008. In fact, this interpretation is supported by monthly data showing that from April 2010 the index returned to the level before the fall.

Table 3-5 Whole sale real price index for wood products

(100 in April 1982)

Year	Index	Year	Index
1991	70.4	2001	133.9
1992	107.4	2002	132.9
1993	135.7	2003	128.4
1994	139.5	2004	123.9
1995	135.7	2005	124.1
1996	129.5	2006	128.2
1997	131.9	2007	126.8
1998	174.9	2008	124.5
1999	164.4	2009	116.2
2000	149.0	2010	116.3

Source: Adapted from Ministry of Commerce and Industry (2011a, b)



Source: Adapted from Ministry of Commerce and Industry (2011a, b)

Figure 3-3 Whole sale real price index for wood products

(4) Projection of demand for industrial wood

Table 3-6 presents projection of demand for industrial wood. According to the projection, the demand will rise from 95.00 million m^3 in 2010 to 153.00 million m^3 in 2020 with the annual growth rates of 5.89% in 2010-2015 and of 4.88% in 2015-2020. Gaps between the projected demand and domestic production in 2000 and 2005 were 39.24 million m^3 and 50.81 million m^3, respectively. Trade of industrial wood filled 2.23 million m^3 and 3.68 million m^3 of the gaps in 2000 and 2005, respectively. Therefore, gaps between the projected demand and actual supply in 2000 and 2005 were 37.01 million m^3 and 47.13 million m^3, which are huge, about double of the annual production. Since the demand will grow by about 5% yearly until 2020 according to the projection, a gap in industrial wood between demand and supply supplemented by import will continue expanding enormously in the next decade unless domestic production of industrial wood as well as import grow by a considerable rate.

Table 3-6 Projected demand for and demand-supply gap in industrial wood

(million m^3 industrial wood equivalent)

Year	2000	2005	2010	2015	2020
Projected demand (a)	58.00	74.00	95.00	123.00	153.00
(annual growth rate)		(5.52)	(5.68)	(5.89)	(4.88)
Domestic production (b)	18.76	23.19	NA	NA	NA
Gap between projected demand and domestic production (c)=(a)-(b)	39.24	50.81	NA	NA	NA
Net import (d)	2.23	3.68	NA	NA	NA
Gap between projected demand and actual supply (e)=(c)-(d)	37.01	47.13	NA	NA	NA

[Legend] NA: not available
Source: Ahmed (2005)

3.2 Role of the private sector in Indian forestry

Farmers and the private sector play a major role in Indian forestry. Most of the wood-based products are produced by the private sector, and nearly 50% of the raw materials required by the sector are supplied by farmers involved in farm forestry. The role of farm forestry differs state by state. For example, in Kerala, 90% of its raw materials are supplied from trees outside designated forest areas (Krishnankutty et al., 2008). Although annual fuel wood consumption is large, estimated to be 199 million tonnes per year (Singh, 2008a), it is excluded from the discussions presented in this chapter. This is because farm forestry is driven by demand from wood-based industries and not by demand from fuel wood markets.

Since the 1970s, the development, stagnation, and revival of the farm forestry sector has been influenced by the government's extension efforts and demand from wood-based industries. The performance of these sectors has also been influenced by government policies and changes in the market conditions of raw materials. India's recent economic growth set a trend increasing the demand of wood-based products which intern contributed to the revival of farm forestry which had declined since the 1980s. The following factors will be introduced in this section: 1) the policy and legal environment influencing farm forestry and wood-based industries; 2) a brief history and current status of farm forestry developed outside of the recorded forest areas; and 3) the corporate private sector involvement of forestry. Such recent developments of the forestry and wood-based industries are heavily dependent on the trees outside forests (TOF).

The farmers consider farm forestry to be a part of their commercial farming activities, including the utilization of marginal farm land for production and economic security purposes. Wood-based industries are commercial activities producing a wide range of forest products such as sawn wood, veneer, plywood, pulp, paper, safety matches, furniture, sports goods, and musical instruments. While some government-owned enterprises were started after independence, most of the processing of forest products is manufactured in the private sector (GOI, 1999 cited in 'Saigal et al., 2002').

3.2.1 Policy and regulatory environment for private sector participation

Central and state governments, local communities, farmers, the private sector, and external donor agencies are all key players in the forestry sector in India. The governments and local communities residing on the fringes of the recorded forest areas are the sole players for the conservation and management of the public forest areas. On the other hand, outside of the recorded forest areas, the government, farmers, and the private sector are the key players for the production of raw materials for wood-based industries.

The establishment of the national forest policy in 1988 and the market liberalization programme started in 1991 have fundamentally altered the direction of forestry. The forest policy has changed the government objectives for managing the forests, from timber production and revenue generation to conservation and meeting the subsistence needs of forest dependent communities. Under the regime of market liberalization, the import of forest raw materials has been made easier, and the domestic forest-based industry has to face competition from foreign companies (Saigal et al., 2002). Before the 1988 forest policy and the market liberalization policy in 1991, the private sector enjoyed subsidised supplies and protected markets of wood-based raw materials (ibid.).

The markets for wood-based products reacted sharply against the 1996 Supreme Court order which placed a ban on felling trees in forests. The markets gradually adjusted their demand and supply structure by increasing imports of forest products and the supply of raw materials from the private forestry sector, particularly from the farm forestry sector. Generally speaking, forest management of public land has become conservation-oriented forestry participated by rural communities through JFM schemes. The private forestry sector working outside of the recorded forest areas has adopted a

commercial-oriented forestry model by landed farmers. In this section, the evolution of the latter, i.e., 1) the farm forestry sector outside the recorded forestry areas, and 2) wood-based industries, is elaborated on.

(1) Farm forestry outside of recorded forest area

Since the 1970s, farmers have emerged as important players within the forestry sector. It is estimated that currently half the wood supplied in the country comes from outside of recorded forest areas (GOI, 1999). While the farmers have been traditionally growing trees on farms to meet their subsistence needs, official efforts to promote farm forestry on a large scale have started only recently.

Although the National Forest Policy envisages a major role for the private sector in planting on these land, numerous state-level forest laws and rules, that regulate use rights of the land and its produce, act as major disincentives for the involvement of the private sector. In addition, a range of national- and state-level policies outside of the purview of the forestry sector negatively influence decisions to invest in plantations. Examples of such policies include the following: land ceiling restrictions, export restrictions of some woods and wood products, pending legislation for *sui generis* (an isolated specimen), and the protection of breeder's rights (Saigal et al., 2002).

(2) Wood-based industries

In the past, the private sector was a major player in timber production in the recorded forest areas. However, the provisions of the Forest (Conservation) Act 1980 and the National Forest Policy 1988 have effectively ended the direct role of the private sector in the recorded forest areas. In earlier years, many large companies were either given forest land on lease or were allotted forest areas within the recorded forest areas for logging to meet their raw material requirements (Saigal et al., 2002).

The role that the private sector can play outside the recorded forest areas is restricted as it is unable to raise large-scale plantations in these areas due to statutory land ceilings on agricultural land. The ceiling limits which are also applied to the holdings of individuals vary from state to state, and for different categories of land (Saigal et al., 2002).

The national Forest Policy does not envisage a role for the private sector in forestry research and development work. Forestry research in India has been the sole responsibility of the forest departments, government research institutions, and a limited number of universities. Because of weak protections for intellectual rights, there is no mechanism for the certification of seeds from forestry species or the registration of clones. The protection of breeder's rights is still pending. However, although the policy and the legal environment do not encourage the private sector to get involved in research and development, a significant part of the recent success of farm forestry is dependent on the research and extension efforts made by the sector.

The current status of forest-based industries is influenced by the larger context of industrial policy. Economic and policy reforms have drastically reduced industrial licensing requirements, removed restrictions on investment and expansion, and have facilitated easy access to foreign technology, and foreign direct investment (Saigal et al., 2002). However, although numerous measures that once restricted or protected industry have been removed since 1991, some of these remain in the case of small-scale industries. A total of 821 items are reserved for the small-scale sector. Such items include sawn timber, wooden crates, tea chest plywood, seasoned woods, wooden furniture and fixtures, miscellaneous paper products, sandalwood oil, pine oil, resin, safety matches, pencils, and brushes. Small-scale industries are provided certain special treatments such as priority sector lending, concessional crediting, and preferential purchase arrangements by central and state government organizations (Saigal et al., 2002).

Licensing is now required by only seven types of industries which do not include the paper and pulp industry as was the case until recently. Industries are free to select project locations as long as they are at least 25 km from standard urban limits (Saigal et al., 2002). The industries also need to observe other rules and regulations concerning the environment, pollution, investments, and trade.

3.2.2 Farm forestry - a brief historical review

In India, farmers have traditionally grown trees along with their agricultural corps mainly for the purpose of meeting their subsistence needs. Concerted official efforts to promote farm forestry on a large scale began in the 1970s. Farmers are the main players in agriculture and forestry production in India. There are 107 million operational farm holdings covering an area of 166 million ha (Ministry of Agriculture, 1991). In recent years, farmers have also started plantations of tree crops, mainly for sale, and are now important producers of raw materials for wood-based industries. It is estimated that 50% of the wood supply in the country is coming from outside of the recorded forest areas (GOI, 1999). The average production of timber from outside the recorded forest areas amounts to 14 million m^3 per year. The total growing stock of trees outside of forest resources are estimated to be 1.6 billion m^3 which includes volumes raised by the farm forestry sector (Pandey, 2008). Typically, farmers grow commercial tree crops on part of their land or on filed boundaries. The rotation period is generally under ten years. Farm forestry produces mainly timber and pulpwood sold to the local traders, who then supply them to various wood-based industries (Saigal et al., 2002).

In this report the term ‘farm forestry’ is used to describe commercial production practiced by landed farmers outside of recorded forest area. On the other hand, the term ‘social forestry’ is used for programmes or projects implemented by state governments or private companies such as ITC Limited to promote tree plantation and production of forest products. Some of them are supported by donor agencies. The social forestry programmes in general involve free or subsidised distribution of seedlings, and the provision of technical and extension services to farmers and local communities. Social forestry programmes can be implemented to support establishment and expansion of farm forestry by farmers.

(1) Origin and spread of farm forestry

The origin of farm forestry outside of the recorded forest areas including private farm land, village common land, and government wastelands can be traced to the report of the National Commission on Agriculture (NCA), which was released in 1976. After the issuance of the NCA report, farm forestry and common land plantations were aggressively promoted by the government during the 1970s and 1980s. However, most farmers abandoned farm forestry by the end of the 1980s. While constraints continue to hamper the revival and growth of farm forestry in most regions of the country, there are regions where farm forestry either did not decline or has picked up recently.

The NCA recommended the implementation of a tree plantation programme which later came to be known as the social forestry programme. Contrary to the current forest policy, the NCA’s main concern in promoting social forestry at that time was to free government forests (the recorded forest areas) from the pressure of meeting the subsistence needs of the local communities, and instead make government forests available for raising a high-yielding production forestry industry. For the NCA, the social forestry programme was a subsidiary activity to help achieve this goal.

During the 1980s, a large investment was made to promote social forestry through internationally funded projects. For example, between 1981/82 and 1985/86, 16 projects totalling INR 9.9 billion supported by the Canadian International Development Agency (CIDA), Denmark (Danish International Development Assistance), the Overseas Development Administration of the United Kingdom, SIDA (Swedish International Development Cooperation Agency), USAID (United States Agency for International Development), and the World Bank were initiated in 14 states (MOEF,

1989). Several incentives such as free or subsidised seedlings and soft loans were provided, and extension activities were intensified under the projects.

(2) The initial success and decline of farm forestry

The farmers adopted farm forestry enthusiastically. However, they were not only planting trees for meeting their fuel wood and fodder needs as initially anticipated by the planners; they were also producing wood for the market. The popularity of farm forestry in the 1980s can be gauged from the fact that over 9 billion trees were planted on private land between 1980 and 1989 (Saxena & Ballabh, 1995, cited in 'Saigal et al., 2002').

The acceptance of farm forestry was not uniform throughout the country. Its popularity was confined to the region characterized by commercial agriculture, largely in north-west India. It failed to take off in the subsistence agriculture-oriented eastern states such as Orissa, Bihar, eastern Uttar Pradesh, and Madhya Pradesh. Similarly, farmers in the semi-arid millet growing regions of Maharashtra, Andhra Pradesh, Tamil Nadu, and Karnataka did not take to tree planting in a large way, except in the commercialised parts (Saxena & Ballabh, 1995, cited in 'Saigal et al., 2002').

Most farmers planted commercial species for sale in the market. On the whole, eucalyptus was the most popular species. It was the main species in the north-western region comprising Gujarat, Punjab, Haryana, and western Uttar Pradesh (Pathak, 1994, cited in 'Saigal et al., 2002'). In the southern states eucalyptus, casuarina, and *subabul* (*Leucaena leucocephala*) were the major species. The response of the farmers was overwhelming and farm forestry targets were exceeded in most states. For example, in Gujarat, 696 million seedlings were distributed between 1980 and 1985 against a target of 150 million (Government of Gujarat, n.d., cited in 'Pathak, 1994').

The success of farm forestry, even in commercialised areas, was short-lived. Farmers began to abandon it by the mid-1980s as they did not obtain the level of returns they expected (Saxena & Ballabh, 1995, cited in 'Saigal et al., 2002'). For example, Punjab farmers were unable to obtain even INR 15 for a seven- to eight-year old tree, whereas the forest department had earlier hinted at a price of INR 100 (Das, 1988, cited in 'Saigal et al., 2002). This led to a rapid decline in new plantations by the farmers. In Gujarat, eucalyptus seeding distribution fell from a peak of 134 million in 1984 to only 12 million 1988 (Government of Gujarat, 1989, cited in 'Saigal et al., 2002'). Similarly in Haryana, the distribution of seedlings fell from a peak of 43 million in 1984 to a 4 million 1988 (*The Indian Express*, 1 November 1988, cited in 'Saigal et al., 2002'). A similar decline was also observed in Punjab (Kapur, 1991, in 'Saigal et al., 2002').

(3) Reasons for the decline of farm forestry in the 1980s

The reasons for the decline of farm forestry in the 1980s are summarized into four categories: 1) technical problems, 2) marketing problems, 3) disabling laws and policies, and 4) the loss of agricultural production.

Technical problems

One example of the technical problems incurred was in inappropriate planting densities. The forest departments encouraged farmers to plant with close spacing, as its objective was to increase fuel wood production for which close spacing was ideal. This led to very poor and small dimensional output that was not suitable as timber and was often only usable as fuel wood. The low quality of seedlings provided by the departments, and the lack of farmers' experience with plantation forestry also resulted in poor yields and general low quality production (Arnold et al., 1989, cited in 'Saigal et al., 2002').

Marketing problems
The initial eucalyptus crop was sold as poles for which there was demand from the construction industry for use in erecting scaffolding and as roof support (Saxena, 1995). The farmers who got their produce on to the market early received good returns, and this raised the expectations of other farmers. The market for poles was limited, saturated quickly, and collapsed. Small dimensions, low density, and the unevenness of the wood quality also contributed to the low eucalyptus timber price. The traders also preferred to buy timber in bulk from government depots rather than to deal with a large number of scattered farmers.

The produce of farm forestry enterprises was suitable for use as pulpwood, but paper mills were getting a subsidised supply from the forest department. Thus no competitive market was available for farmers. Paper mills bought pulpwood from the farmers only if they did not manage to obtain their full requirement from the forest department. The mills preferred to buy pulpwood from the forest department as its supplies were much cheaper and available in bulk. The farmers could not fully tap this market for three more reasons. Firstly, many paper and pulp mills in India are designed for bamboo rather than wood. Secondly, most of the mills are situated in areas near forests, and not close to farm forestry areas. Thirdly, paper mills had been granted import concessions by the government and were obtaining low-priced imports (Pathak, 1995, cited in 'Saigal et al., 2002').

Disabling laws and policies
The cumbersome laws and procedures concerning tree felling, transport, and sales played an important role in reducing the farmers' returns from, and enthusiasm for, farm forestry. There are also several restrictions on the felling of trees standing on private land. The nature of the restrictions varies in terms of species, region, type of land holding and end use. The procedure for seeking permission for felling is cumbersome and complicated, and often provided room for rent seeking. Permission is also required for transporting timber and every movement of timber has to be accompanied by a transit pass issued by the relevant authority (Pathak, 1995, cited in 'Saigal et al., 2002').

In the later years, several states lifted some of the restrictions on popular farm forestry species. Gujarat removed restrictions on eucalyptus and casuarina in 1984. Rajasthan, Uttar Pradesh, Tamil Nadu, and Andhra Pradesh also relaxed regulations for the commercial species (Pathak, 1994, cited in 'Saigal et al., 2002').

Loss of agricultural production
The unanticipated loss in agriculture production also contributed to the abandonment of farm forestry (Pathak 1995, cited in 'Saigal et al., 2002'). Farmers were hoping to obtain some extra income by planting trees on their farm boundaries but had not anticipated a loss in agriculture yields.

(4) Revival of farm forestry

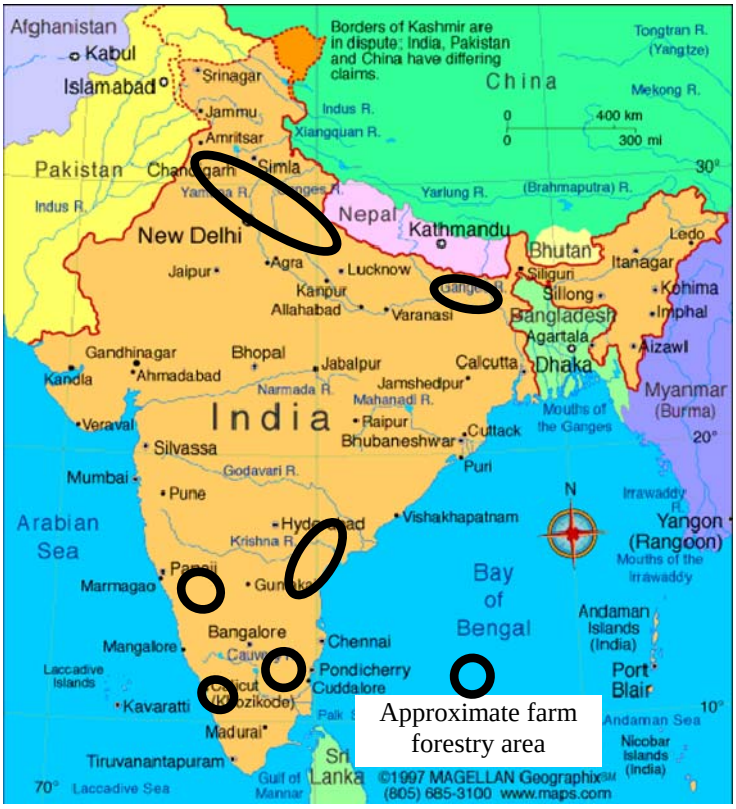
In the 1990s, farm forestry had come back and become popular again with farmers. While the popularity of farm forestry is limited to certain regions of the country, its contributions towards meeting the demands for wood in the country is significant. Some of the reasons for the decline in farm forestry have been eased due to changes in the country's trade policies, forestry policies, underlining economic developments, and technical advancements. However, only those areas, where socioeconomic and natural conditions are suitable for the establishment of commercially viable farm forestry, have shown such revival. Meanwhile, India's robust economic growth is a driving factor in the expansion of wood-based industries. Accordingly, by providing raw materials to these industries, the farm forestry sector has the opportunity to expand its coverage to the areas where farm forestry is still in an early stage of development.

The areas where farm forestry is currently popular are indicated in Figure 3-4. The areas include: 1)

Western Uttar Pradesh along with parts of Punjab and Haryana; 2) coastal Andhra Pradesh; 3) parts of Tamil Nadu; 4) parts of Karnataka; 5) Kerala; and 6) north Bihar areas. The case studies carried out in Western Uttar Pradesh and the costal Andhra Pradesh areas found the following reasons for the popularity of farm forestry (Saigal et al., 2002).

Facilitative government policies

Facilitative government policies have played a crucial role in encouraging and sustaining farm forestry. These government policies have encouraged farm forestry in two ways: 1) by the reduction or stoppage of raw material supplies to the wood-based instructors from government forests; and 2) through the removal of legal and procedural bottlenecks in the way of tree farming. After the 1988 forest policy, several state governments have reduced the supplies of raw materials to industries from state forests. In a number of states, felling and transport of important farm forestry species have been made easy and paperwork has been reduced to a minimum (Saigal et al., 2002).



Map source: Magelan Geographix (1997)

Figure 3-4 Farm forestry area

Commercialised agriculture and enterprising farmers

In the farm forestry areas, agriculture was already commercialised and farmers were growing agriculture cash crops for sale in the Market. Such farmers understood the functioning of the market, and it was easier for them to adopt commercial farm forestry. The farmers are willing to try out new crops and combinations if they feel that such crops and methods are going to bring them higher returns on their investment (Saigal et al., 2002).

Climatic and edaphic factors

The climate and edaphic conditions play an important role in the spread of farm forestry. For example, popular plantations require fertile soil, good surface drainage, easy availability of irrigation, and suitable climate. Poplar has very exacting requirements and all of these are fulfilled, for example, in Haryana state. In other areas, farmers began tree farming because the climatic and edaphic conditions

are such that the choice of crops available to the farmers is limited. For example, due to a combination of low rainfall, saline-alkaline soils, saline groundwater, and lack of irrigation facilities, farmers selected *subabul* in order to utilise wastelands on which they were not able to raise any crops (Saigal et al., 2002).

Higher profitability and lump sum money
The cost of production covering conventional agriculture has increased considerably over the years because of increasing input costs such as the price of fertilisers, diesel, and pesticides. Farm forestry is lucrative to farmers as it requires lower inputs and the profit margins are higher. Another attraction for farmers is the lump sum income, which they get at the time of harvest. The farmers find it difficult to make small savings from the annual returns from agricultural crops, and prefer the lump sum income from trees that can be used for major family expenses such as marriage, home construction, and purchase of land, tractors, or trucks. Farmers tend to view trees as a form of insurance or savings which can be used in times of need (Saigal et al., 2002).

Risks associated with alternative crops
Whereas agricultural crops carry considerable risks which have increased in recent years due to erratic rainfall, the emergence of new pests, and volatile markets, trees are comparatively less risky. Trees are not so easily damaged and these can be retained on the farm in case the market price falls. Even if trees fall during a storm, the farmer can still get some money by selling the wood, whereas agricultural crops usually get completely damaged. Thus, farmers prefer to grow a combination of trees and agricultural crops in order to combine low- and high-risk crops (Saigal et al., 2002).

Availability of suitable tree species
The availability of suitable fast-growing species that fit in well with the local climatic and edaphic conditions and cropping patterns was an important reason for the adoption of farm forestry (Saigal et al., 2002).

Research and development efforts by private sector companies
The research and development efforts by companies in developing suitable clones of tree species have played an important role in the promotion of farm forestry. Eucalyptus farming has become more popular among large scale farmers after the introduction of a new variety. While the higher productivity of clones is important, other factors such as disease resistance, and suitable morphology and phenology have been realised by the research and development activities of the public and private sectors (Saigal et al., 2002).

Demonstration effect/extension effort by the private sector
Many farmers adopted tree farming after seeing other farmers in their neighbourhoods earning profits from the sale of their tree harvests. Extension efforts by the companies, which included the setting up of various demonstration plots, offering free technical advice, and educating farmers, have been instrumental in the adoption of farm forestry.

Readily available markets and market infrastructure
The ready availability of markets for wood, owing to the presence of a number of wood-based industries near farm forestry areas, is also a major reason for the popularity of farm forestry.

3.2.3 Wood-based industries

(1) Overview of wood-based industries

The wood-based industries which produce sawn wood, veneer, plywood, pulp, paper, safety matches, sports goods, building materials, and wood crafts have traditionally been in the private sector. While some government-owned enterprises were started after independence, more than 90% of the

wood-based products are manufactured in the private sector (GOI, 1999 cited in 'Saigal et al., 2002').

While the actual number of units involved in wood-processing is not available, Table 3-7 presents the number of medium and large units of major wood-based industries. It is estimated that the total consumption of wood by the wood-based industries is in the range of 24 to 30 million m^3 per year (GOI, 1999).

Table 3-7 Number of units of medium and large[1] wood-based industries

Industry	Units
Sawmills[2]	23,000
Paper mills[3]	21
Newsprint	5
Rayon grade pulp	5
Paper grade pulp	1
Paper board	305
Plywood[4]	61
Veneer[5]	14
Block boards and flush doors	98
Particle board[5]	11
Fibre board[5]	5
Safety matches	5

Notes: 1) Industries with an investment between INR 50 and 100 million are classified as medium industry; those with investments over INR 100 million are classified as large industry (Bose et al., 2006). 2) The total number of sawmills including smaller units (up to 3,000 m^3 log intake per year) that constitute 98% of all sawmills. 3) The total number of paper mills including the small ones is about 380. 4) The Federation of Indian Plywood and the Panel Industry estimates that there are 62 medium and large plywood units and 418 small-scale plywood units. 5) The total annual capacity of decorative veneer units is estimated to be 32,857,000 m^2. The total annual capacity of particle board and fibreboard units is estimated to be 207,674 metric tons.
Source: Saigal et al., 2002 (GOI, 1999) and the Federation of Indian Plywood and Panel Industry n.d.

(2) Trade policy changes and wood based-industry

Until the mid-1980s, the domestic market for most goods was closely protected by import restrictions and administered prices. Liberalization of trade intensified rapidly after the launch of the economic reforms programme in 1991 and India's ratification of the World Trade Organization agreement in 1994. Trade policy reforms have progressively simplified India's restrictive import licensing and reduced tariff protections. The basic duty on all other items has been reduced substantially. This has affected the wood-based industries which have started facing increasing competition from overseas. Such competition has resulted in greater stresses on the overall efficiency in the industry, including in raw material procurement and use. In addition, as described in the previous section, there is a limited scope for the private sector's direct involvement both in the recorded forest areas and outside the recorded forest areas due to changes in the forest policy. These changes have led the wood-based industries to secure raw material supplies from the farm forestry sector and enter into various partnerships with farmers. Some companies have also invested significantly in the research and development of improved higher-yielding clones (Saigal et al., 2002).

(3) A case of farmer-pulp and paper industry partnerships for industrial wood production

Table 3-7 indicates an overview of India's wood-based industries. Among the industries cited in the table, information on the pulp and paper industry is relatively abundant in the literature. Thus, in this section, an example of the industry is introduced to indicate the recent development of linkages between farm forestry and wood-based industries.

The impressive growth rate of the Indian pulp and paper industry is mirrored in the gross domestic product which is growing 8% per year (Gopalratnan, 2007, cited in 'Kulkarni, 2008'). The operating capacity of the industry was assessed at 8.5 million tonnes and consumption at around 8.3 million tonnes with a per capita consumption of 8.3kg. The contribution of the industry to the Indian economy is significant. The industry is providing employment to nearly 1.5 million people (Suri, 2007, cited in 'Kulkarni, 2008'). The growth in demand for all grades of paper at present is between 7 and 9 % a year. Two other trends are: 1) the printing industry is growing fast with a compound annual growth rate of 14 %; and 2) the government is investing heavily in education with an allocation of the budget equivalent to 6 % of GDP. These trends indicate that more rapid growth in the pulp and paper industry in India is expected, which will ultimately require more wood as a critical raw material (Kulkarni, 2008).

However, of the 660 paper mills in India, 26 are wood- and bamboo-based[32] and face challenges with supply of forest-based raw material (Toland, 2006, cited in 'Kulkarni, 2008'). Under the Forest Conservation Act (1980), the National Forest Policy (1988), and the National Forest Commission founded in 2003, the supply of raw materials to the pulp and paper industries was phased out. According to the policy guidelines, the participation of the private sector in the reforestation of degraded forest land and joint forest management within the recorded forest areas is not allowed (Kulkarni, 2008). Therefore, the industry must seek sources of raw materials from land outside the registered forest areas or seek imports. In the National Forest Policy of 1988, the industry was advised to encourage agroforestry for raising plantations to meet the raw material demand.

As shown in Table 3-8, the Indian wood-based pulp and paper mills are located in 12 states. There are four mills in Andhra Pradesh State, and two each in Assam, Karnataka, Orissa, and Tamil Nadu States. The Indian mills produce 1.9 million tonnes of pulp from wood-based raw materials annually. The wood required for the production of pulp amounts to 6.8 million tonnes (FAO, 2005, cited in 'Kulkarni, 2008'). Nearly 20% of the raw materials are obtained from government sources and 80% from non-governmental sources. The bamboo and wood requirements are 1.77 and 5 million tonnes per year, respectively, and most of the wood-based industries are largely dependent on farm-grown wood. Over a period of 18 years, the paper industry has promoted nearly 490,000ha of plantations by distributing seedlings. The plantations are estimated to produce 29.4 million tonnes of wood at 60m^3/ha yield. Apart from the industrial efforts, farmers are raising plantations on their own. In recent years, for example, several private eucalyptus coronal nurseries have sprung up and an additional 20,000ha are planted every year in Andhra Pradesh. Hence, the annual industrial wood demand of 6.8 million tonnes is met through farm forestry plantations (Kulkarni, 2008).

In addition to pulpwood, farm-grown wood is required for mine props, scaffolding, plywood, particleboard, and biomass-based energy industries, which are creating stiff competition to the paper industry. As a result, there has been a drastic increase in pulpwood prices from USD 25 to USD 45 per tonne in the span of six years. Paper companies are closely scrutinizing the farm forestry sector to cut down on the landed cost of wood. With transportation costs accounting for nearly 30% to 50% of the cost of delivered wood, the development of farm forestry plantations near the manufacturing units is being vigorously pursued by the mills (Kulkarni, 2008).

[32] The rest are agro- and recycled-fibre-based paper mills.

Table 3-8 Wood requirements and paper mills and farm forestry

	Company and paper mill unit	Location of unit (State)	Wood pulp production (000' ton)	Wood requirement Bamboo (000' ton)	Wood requirement Wood (000' ton)	Wood requirement Total (000' ton)	Farm forestry Area planted (000' ha)	Farm forestry Wood generation (million ton)
1	ITCLtd.	Andhra Pradesh	240	160	640	800	80	4.80
2	Tamil Nadu News Print Ltd.	Tamil Nadu	30	nil	100	100	6	0.36
3	Centuary P & P Ltd.	Uttarakhand	100	60	240	300	21	1.26
4	JK Corp							
	JK Corp Orissa	Orissa	100	50	350	400	62	3.72
	JK Corp Gujarat	Gujarat	50	80	70	150		
5	Orient Paper Mill Ltd.	Madhya Pradesh	50	120	100	220	35	2.10
6	Star Paper Mill Ltd.	Uttar Pradesh	60	100	130	230	41	2.46
7	Mysore Paper Mill	Karnataka	60	30	190	220	45	2.70
8	Sirpur Paper Mill Ltd.	Andhra Pradesh	70	100	230	240	20	1.20
9	BILT							
	Ballarpur Asthi	Maharashtra	100	200	200	400	45	2.70
	Sewa	Orissa	70	40	220	260		
	Yamunanagar	Haryana	70	46	200	246		
	Chowdwar	Orissa (closed)	30	16	70	86		
	Kamalapur	Andhra Pradesh	100	nil	400	400		
10	Seshasai P & B Ltd.	Tamil Nadu	50	nil	200	200	1	0.06
11	Andhra Pradesh Paper Mill Ltd.	Andhra Pradesh	240	160	640	800	67	4.02
12	West Coast Paper Mill Ltd.	Karnataka	270	nil	900	900	35	2.10
13	Hindustan News Print Ltd.							
	Kottayam	Kerala	100	200	150	350	32	1.92
	Nagaon	Assam	50	250	nil	250		
	Cachar	Assam	50	250	nil	250		
Total			1,890	1,862	5,030	6,802	490	2.94

Source: Kulkarni (2008)

3.2.4 Corporate-farmer partnerships

(1) Types of partnership schemes

The efforts of the companies to promote farm forestry by farmers can be broadly classified as follows (Saigal et al., 2002):

1) Supply of free or subsidised seedling with or without a buyback guarantee
2) Bank loan schemes under which the company helps the farmer in getting a bank loan to plant trees and provides planting stock, technical extensions and buyback guarantees
3) Leasing of share cropping schemes under which the company raises and maintains plantations on farmer's land and pays them a fixed lease rent or a share in the crop
4) Intensive research and development, and commercial sale of improved clonal planting stock with or without buyback guarantees

These schemes started by the industry have two major achievements. Firstly, they have generally popularized the concept of farm forestry, and secondly, they have directly contributed to the cultivation a large number of commercial trees on private land. However, most companies restrict their extension efforts to areas in close proximity to their plant sites. They prefer to create their raw material base near the plant site because of savings on the transport costs, and because most of the produce in far-away sites is likely to be diverted to other plants in and around those areas (Saigal et

al., 2002).

(2) Emerging experiences from corporate-farmer partnerships

Although many companies have taken up partnership schemes, they still generally prefer raising their own captive plantations, for example, in the recorded forest areas, rather than deal with farmers as elaborated below:

Experiences with free/subsidised seedling schemes
Most companies start efforts with the supply of free or subsidised seedlings to farmers. However, farmers tend not to take adequate care of the seedlings supplied to them free or at heavily subsidised rates. As a result, many companies have either reduced or stopped providing subsidizing seedlings (Saigal et al., 2002).

Experiences with bank loan schemes
Bank loan schemes appeared to be the second stage in the evolution of company-farmer partnerships as the subsidised seedling approach was known to be ineffective. Under bank loan schemes, farmers were provided loans by the banks for raising tree plantations while the companies provided improved planting stock, technical extensions and buyback guarantees. These bank loan schemes were not considered very successful due to problems below:

- Cumbersome loan sanctions and instalment release procedures
- A lack of understanding of the terms of conditions of the schemes by farmers
- High charges for seedlings and technical extensions provided by companies
- The diversion of the loan amount by farmers for other purposes
- Shorter rotation periods and lesser buyback volumes than anticipated by the schemes

Although there have been problems, the availability of loans, the packages of technical services, buy-back guarantees and extension efforts made by companies convinced many farmers to try tree farming for the first time. Many, who found it to be a profitable venture, continued even after the closure of the schemes. The immense popularity of poplar farming in northwest India even after the closure of the Wimco scheme is a good example of this case (Saigal et al., 2002).

Experiences with leasing/share cropping schemes
Some companies have tried leasing or share cropping shames. Under these schemes, contiguous patches of land belonging to several farmers are obtained by the company on lease or a share cropping basis for raising plantations. In this way, these companies have attempted to overcome the land ceiling restrictions. However, these schemes were increasingly becoming subjects of litigation, and certain arrangements were declared illegal by the district authorities as per the provisions of certain laws relating to transfer of immovable property from tribes to non-tribes. A number of court cases were filed against the companies.

Experiences with research and development, and the commercial sale of seedlings
Several companies have changed their strategies. Instead of forming a direct partnership with the farmers, they are concentrating their efforts on research to develop high-yielding clones, which they produce and sell to the farmers at commercial rates. Companies are favouring this approach as it is less cumbersome. One-off sale of seedlings is much simpler than signing agreements with the farmers and there is no follow-up requirement or risk of getting embroiled in litigation. In addition, as the productivity of clonal plants is far higher than seed route plants, the companies can have their materials supplied from a smaller area which reduces the extension and transportation costs to be borne by the companies. However, the high investment needed for raising and maintaining clonal plantations limits participation to the better-off farmers. This also suits the companies as large and/or

well-to-do farmers, as compared to small and marginal farmers take better care of their plantations (Saigal et al., 2002).

3.2.5 Case studies on farm forestry and wood-based industries

(1) Farm forestry in JICA-supported projects - Tamil Nadu and Rajasthan cases

In this section, the observations of farm forestry during the field surveys in Tamil Nadu and Rajasthan States are used to characterize the farm forestry of the surveyed households. Detailed descriptions and analyses of the farm forestry under the Tree Cultivation in Private Land (TCPL) of the Tamil Nadu Afforestation Project (TAP) and the farm forestry component in the Rajasthan Forestry and Biodiversity Project (RFBP) are presented in Chapter 4.

The main characteristics of farmers who adopted TCPL implementation in Tamil Nadu include the partial conversion of labour and input from intensive agricultural production to labour extensive and time consuming teak plantation, perception of scarce labour and farm inputs indicated by their high wage rates and prices, and their ability to recognise the function of the teak timber market. The observation also indicates that the farmers are commercial or commercially oriented ones who select low input tree crops to utilise their marginal farmland. Their awareness of production and market risks can be inferred from their diversification of farming by selecting teak which allows intercropping, and willingness to participate in TCPL through which the Forest Department provides initial and maintenance costs of tree plantation. These subsidies should lower farmers' perceived risks associated with the introduction of new (tree) crops. Introduction of perennial and labour extensive crops to agricultural practice is commonly observed in aging farming households, and this is consistent with the observation that two out of the five respondents obtain pension in the surveyed village.

In Rajasthan, under the farm forestry component in RFBP, the establishment of seedling markets for *Neem*, *Mango*, *Amla* (Indian gooseberry), and *Ber* (Indian plum) is observed. This indicates economic potential for farm forestry in the surveyed area. However, it is also observed that subsistence farming prevails in the area due to small and unproductive land holdings. Contrary to the farmers participating in TCPL in Tamil Nadu, the farmers' farming practices in the area are less commercially oriented. Although there are demands for the tree seedlings, the demands seem to come from home consumption needs, not from commercial farm forestry which is not observed in the area. The surveyed farmers seem unaware of markets for produce from these tree crops.

The comparison of the results of the farm forestry programmes in Tamil Nadu and Rajasthan States confirms that farm forestry discussed in this report should be a part of commercial farming where farmers make explicit production decisions with respect to current and anticipated conditions of labour, factor, and farm forestry produce markets. In this sense, tree planting in Tamil Nadu can be called farm forestry, but tree planting in Rajasthan cannot.

(2) Farm forestry in Andhra Pradesh

Andhra Pradesh is one of the states where farm forestry is well established. The farm forestry meets raw material demand particularly from wood-based paper mills operating in the state. Currently four large paper mills are operating in the state. The main species grown in farm forestry are *eucalyptus*, *casuarina*, and *subabul*, which are planted mainly for pulpwood production. Both the Forest Department of Andhra Pradesh and the private sector represented by ITC Limited have contributed to development of farm forestry in the state.

a) Major players promoting farm forestry

The Forest Department of Andhra Pradesh

In Andhra Pradesh, farm forestry has been promoted by the social forestry programme implemented by the Forest Department. The Department implemented the Social Forestry Project from 1983 to 1988 supported by CIDA. The project succeeded in promoting farm forestry in the coastal areas of the state. Subsequently, the department implemented the Andhra Pradesh Forestry Project (1994-2000) and the Andhra Pradesh Community Forest Management Project (2002-2010), both of which were backed by the World Bank. The department produces and distributes 300 million seedlings annually to meet the needs of farmers and government, and considers linking up farm forestry with wood-based industries to enhance wood-based raw material and products markets.

ITC Limited

ITC Limited established a paper mill in Khammam District of Andhra Pradesh in 1979. Expecting decline of wood supply from the Forest Department, the company launched the promotion of farm forestry in 1982 to attain self-sufficiency in raw material consumption. The company succeeded in promoting farm forestry, and now it is able to obtain annually 1.2 million tons of greenwood harvested from 115,000 ha of farm forestry area. Having experienced failure in free seedling distribution, subsidized loan, and buyback guarantee at agreed prices, the company has worked hard on research and development of clonal planting materials to sell to farm forestry farmers at commercial prices. The research and development achieved remarkable results: productivity of pulpwood plantation has improved from 6-10 tons/ha/year to 20-58 tons/ha/year; a harvest cycle has been reduced from seven years to four years; a survival rate for the whole harvest cycle has risen from 30-50% to 90-95%. The clones developed by the company are called ITC Bhadrachalam clones and adopted by not only farmers but also Forest Departments, Forest Development Corporations, and other paper companies across the country.

b) Case study subjects

The subjects of the case study include farmers participating in the following two programmes implemented by ITC, and farmers participating in the Forestry Department's social forestry programme.

Farm Forestry Programme

This programme is commercially operated. The company sells clonal seedlings at commercial rates. It provides customers with free technical assistance, logging and transportation services at commercial rates at the time of harvesting, and buyback guarantee at prevailing market rates. Currently, farmers receive INR 2,000 (net amount) per ton of harvested wood. It is not compulsory for farmers to sell trees only to the company, but almost all farmers sell them to the company. Now 35,000 farmers (i.e. farming households) take part in this programme.

Social Forestry Programme

This programme was launched in 2002 as ITC's corporate social responsibility (CSR) activity. It focuses on utilization of marginal agriculture land and poverty reduction of economically backward communities. The beneficiaries of the programme are small landholders. To be eligible for the programme, a farmer must have a landholding size of less than 0.4 ha per family member. The programme provides participating farmers with free clonal seedlings which otherwise cost at INR 9 at the nursery. Other schemes such as free technical assistance and buyback guarantees at market rates are the same as the Farm Forestry Programme. Participants are responsible for pitting, planting, and tendering of planted trees. A special feature of the programme is involvement of NGOs which provide facilitation and coordination services. The number of participating individuals (i.e. not farming households) is 30,000.

c) Case study results and analysis - types of farm forestry

The survey team conducted site visit in two areas: Khammam district where the Farm Forestry and Social Forestry Programmes have been promoted by ITC limited, and a suburb of Hyderabad where Forestry Department has promoted social forestry programme. From the perspective of farmers' production decision-making with respect to prevailing labour and factor markets and land productivity, three types of farm forestry can be identified. Table 3-9 shows the observed field characteristics of the three types.

Table 3-9 Brief status of three types of farm forestry observed in the site visits

Type 1 farm forestry: Eucalyptus plantation for paper by marginal farmers in marginal farming land under the Social Forestry Programme of ITC, Khammam district • Eucalyptus for paper production is planted in marginal agricultural land. Productivity is relatively low at 50 tons/ha per four-year harvest cycle. The land under eucalyptus plantation that the survey team visited had been idle for 40 years before the plantation. • Most farmers are poor. On average each household holds 2 ha of land, and 0.8 ha out of the 2 ha is used for eucalyptus plantation. • Incomes generated by eucalyptus plantation have improved their living standard. Incomes are used to buy land, improve housing, and meet expenses for marriage.
Type 2 farm forestry: Large scale eucalyptus plantation for paper in fertile land under the Farm Forestry Programme of the ITC, Khammam district • A farmer interviewed buys eucalyptus clonal seedlings from ITC and sells trees to it. • He operates 34 ha of land. He plants eucalyptus in 30 ha and raises paddy rice in 4 ha. He started the plantation in 4 ha in 1986 and increased land for tree plantation. He grew cotton, chilli, groundnut, and tobacco based on expectations on market conditions. • Productivity of eucalyptus plantation is high: 100 tons/ha per four-year harvest cycle. • The farmer faces labour scarcity. The wage is increasing, and he implements mechanization.
Type 3 farm forestry: Line plantation of teak on boundary land by farmers focusing on high profit vegetable production, 30 km west of Hyderabad • In a visited village, 90% of farmers plant teak along boundary of land. Only 3 farmers have block plantation out of 270 farming households. The rotation of teak plantation is 20 years. • Average landholding size is 1.6 to 2 ha. • Land is intensively utilised for vegetables such as tomato, cabbage, carrot, flowers. Their production near large city such as Hyderabad is highly labour and input intensive, and profitable. Recently, supermarkets in the city directly purchase vegetables from them to avoid involvement of middlemen. • A village chief introduced and disseminated teak plantation to farmers last year. Thus percentage of farmers planting teak increased from 4-5% to 90%. • 2 to 3% of farmers work in Hyderabad on weekdays and at farm on weekend.

Source: Survey team

Based on the field observations, it is fair to assume that commercial farmers seek an optimal choice on cropping pattern and land utilisation that maximises net profit with manageable risks. Adoption of farm forestry is a result of this economic decision-making with respect to prevailing and anticipated market conditions. In light of this assumption, the characteristics of the three types of farm forestry are summarized below:

Type 1 farm forestry

Type 1 farm forestry is done in marginal agricultural land. Although per ha productivity of this farm forestry is relatively low, the opportunity cost of farmers opting to practice the farm forestry is low, and the farm forestry is insensitive to market and economic conditions. Eucalyptus clones developed by ITC made it possible to cultivate trees with a reasonable cost in marginal agricultural land that had been too unproductive to grow agricultural crops. Since the farmers would gain an additional profit from the land with a low opportunity cost of alternative land uses such as grazing, the farmers prefer farm forestry. Their perceived production risks are partially hedged by free distribution of clonal seedlings, and technical and facilitative services provided under the Social Forestry Programme of

ITC. Provision of market, financial, and technical information to farmers by NGOs has facilitated farmers' decision-making to opt for farm forestry.

Type 2 farm forestry

Type 2 farm forestry is done in fertile agricultural land. This type of farm forestry shows high per ha productively, but its opportunity cost is also high, and it is sensitive to market and economic conditions. If a tree crop is just an option for farmers' farming portfolio, then the inclusion of the crop in the portfolio is dependent on labour, factor, and produce market conditions, and risks associated with the crop. This means that type 2 farm forestry is sensitive to market conditions, and alternative crops may be chosen after harvest of farm forestry produce as a result of farmer's optimal production decision-making. Such cases are observed in the field where a farmer uprooted eucalyptus plantation to covert back to agricultural production.

According to the field observations, there are two major factors for further expansion of eucalyptus plantation by replacing crops such as chilli, tobacco, and cotton under the current market conditions. The first factor is the rising labour cost. The nominal wage rate was INR 40 per day four years ago; now it is INR 120-150 per day due to employment creation by National Rural Employment Guarantee Scheme (NREGS) in the rural area and high labour demand of other economic sectors. Since the higher labour cost increases the profitability of tree plantation compared to labour-intensive agricultural crops[33], the optimal decision for farmers is to expand farm forestry by reducing land for the crops. Perceived labour scarcity (i.e. high labour wage rate) in the area is consistent with the popularity of agricultural mechanization recognised in the area. The second factor is to mitigate risk of price fluctuation. It was reported that a price of eucalyptus is more stable than these of agricultural crops. Apart from the major factors, provision of harvesting services by contractors under ITC's Farm Forestry Programme and anticipated expansion of the milling capacity of ITC also contribute to farmers' decisions to opt for farm forestry in the study area.

Type 3 farm forestry

Type 3 farm forestry is done in boundaries of productive agricultural land where no other uses are expected. According to the field observations, farmers seem not to expect high per ha productivity, and the opportunity cost of the farm forestry must be low due to lack of expectation of alternative use of boundary land. This low opportunity cost of tree plantation on boundary land infers that type 3 farm forestry is market insensitive. Farmers are likely to perceive that farm forestry in the boundary land and agriculture in their farm land are different production exercises, and are not interchangeable. In the survey site, vegetables are highly profitable crops because of the large demand in Hyderabad City. In this situation, concentration of labour and capital intensive vegetable production with acceptable risk is an optimal choice for the farmers. The scarce labour and high return of the production have led farmers to use machinery and herbicide. Their choice of this input intensive vegetable production in their farmland is consistent with a statement of farmers that block teak plantation in their farmland is not attractive because of the lower profit than that of vegetable. Only three out of 270 farmers in the visited village carry out block plantation.

On the other hand, 90% of the farmers in the village adopted farm forestry with teak on boundary land. According to the villagers, teak grows well in the boundary which otherwise cannot be used for other crop production, and its plantation needs little labour. Farmers accepted the 20-year teak plantation rotation, and said that they plant teak when children are born to meet future expenses such as dowry for their marriage. This indicates that farmers are aware of and anticipate a highly appreciated teak timber market, and consider type 3 farm forestry as a long-term saving or asset accumulation scheme for future expenses. It should be also noted that the effort of the village chief to disseminate teak plantation and the Forest Department's incentive scheme play an important role in

[33] In the surveyed sites, eucalyptus for paper requires 300 person-days per ha per four years of harvest cycle, whereas chilli, cotton, and tobacco requires 150 to 300 person-days per ha per six to seven months of harvest cycle.

achieving such high adoption of type 3 farm forestry in the surveyed village.

Table 3-10 summarizes the characteristics of three types of farm forestry.

Table 3-10 Characteristics of three types of farm forestry

Characteristic item	Type 1	Type 2	Type 3
Land	Marginal agricultural land	Productive agricultural land	Boundary land between productive (or marginal) agricultural land
Opportunity cost of land use	low	high	low
Productivity of farm forestry per ha and per year	medium	high	low
Farmer's crop choice set	tree crops	tree and agricultural crops	tree crops
Sensitivity to market conditions	low	high	low
Probability of farm forestry altered to other crops	low	relatively high	low
Management time horizon	medium (less than 10 years)	short (less than 5 years)	long (longer than 10 years)
Farmer's awareness of farm forestry produce market	aware (purchase by ITC)	strongly aware (purchase by ITC)	aware
Prevailing economic condition	Labour scarcity (increasing wage rate)	Labour scarcity (increasing wage rate) Mechanization	Labour scarcity (increasing wage rate) Urbanization Mechanization

Source: Survey team

Table 3-11 Land holding class of participating farmers in Farm Forestry Programme and Social Forestry Programme of ITC

Classification of farmers by farm size		Andhra Pradesh*				Programmes of ITC**			
Farm size class	Average size(ha)	Number		Area (ha)		Farm Forestry Programme		Social Forestry Programme	
		Unit= 1,000	% to total	(ha)	% to total	No. of farmers	% to total	No. of individuals	% to total
Marginal (<1 ha)	0.44	7,417	62%	3,287	23%	0	0%	30,000*1	100%
Small (1 - 2 ha)	1.41	2,639	23%	3,730	26%	17,500	50%		
Semi-medium (2 - 4 ha)	2.66	1,444	12%	3,835	27%			0	0%
Medium (4 - 10 ha)	5.66	487	4%	2,759	19%	14,000	40%	0	0%
Large (10 ha and above)	15.66	56	1%	878	6%	3,500	10%	0	0%
All	1.20	12,044	100%	14,489	100%	35,000	100%	30,000	100%

Note:1) All farmers planting trees under the Social Forestry Programme are classified as marginal or small farmers in this table assuming that target households of the programme have less than or equal to five household members with less than 0.4 ha of agricultural land per family member. 2) Farmers and individual participants in the programmes are mainly located in Andhra Pradesh State.

Source: * Government of Andhra Pradesh (2006); ** ITC Limited

d) Case study results and analysis - benefit distribution of farm forestry

Table 3-11 shows the farm size class of the participating Farm Forestry Programme and Social Forestry Programme of ITC. To compare the distribution of farm size class of the participants, the Andhra Pradesh State-wise distribution is also presented in the table. The distribution of farm size class of the participants in the Farm Forestry Programme is skewed toward larger farm size class where small, semi-medium to medium farm size farmers occupy 90% of the total participants. On the

other hand, due to farm size conditionality imposed in the Social Forestry Programme, only marginal and small farmers take part in the programme with initial investment support by ITC. This implies that farm forestry can be a practical production option not only for large farmers but also for marginal and small farmers if initial investment needs are resolved.

The availability of quality seedlings and a relatively secure farm forestry produce market due to the presence of ITC seem to be positive factors for the participants in both programmes to opt for farm forestry. As for the marginal and small-scale farmers, an additional economic incentive should help them choose farm forestry to derive the best economic benefit out of their marginal agricultural land. Participants in the Social Forestry Programme mainly practice type 1 farm forestry whereas the participants in the Farm Forestry Programme tend to practice type 2 farm forestry. Since the opportunity cost of type 1 farm forestry is low, the added value to the economy from type 1 farm forestry, and thus the Social Forestry Programme, must be significant.

(3) Wood-based industries in Andhra Pradesh and Haryana

a) Overview of wood-based industries

In both Andhra Pradesh and Haryana, farm forestry and wood-based industries have developed along with expansion of the wood market. However, the farm forestry and wood-based industries in the two states differ with respect to market structure. In Andhra Pradesh, the four large paper mills have significant influence over the market of wood-based raw material. In the state, other than the four large paper mills, wood-based industries are not well developed. Farm forestry supplies wood mainly for the paper mills, and raw material demands except those from the paper mills for farm forestry produce seem minimal. On the other hand, in Haryana, not only paper mills but also other wood-based industries, particularly wooden board industry, play significant roles in operation of the wood-based raw material market. In the state, farm forestry provides raw materials to sawmills, the wooden board industries as well as paper mills. Poplar wood is supplied exclusively to the wooden board industries.

Table 3-12 Status of Andhra Pradesh and Haryana

	Andhra Pradesh		Haryana	
Basic information				
Population (mill., year=2010)*	83.96	100.0%	25.02	100.0%
Urban	23.24	27.7%	8.29	33.1%
Rural	60.73	72.3%	16.73	66.9%
GDP (bill. INR at current price, year = 2009/10)**	4,066	100.0%	2,095	100.0%
Agriculture	1,040	25.6%	439	21.0%
Forestry and logging	21	0.5%	12	0.6%
Industry	1,039	25.5%	635	30.3%
Service	1,988	48.9%	1,021	48.7%
No. of wood-based industries***				
Sawmills	4,175[1]	96.6%	4,173	85.6%
Wooden board (plywood, board, and veneer)	123	2.8%	687	14.1%
Paper mills	22	0.5%	15	0.3%

Note: 1) According to the Andhra Pradesh Federation of Timber Merchants, Saw Millers, and Allied Industries, the number of sawmills belonging to the federation is about 6,000 which may include those without license.

Source: * Ministry of Statistics and Programme Implementation (2011) ** Ministry of Statistics and Programme Implementation (unknown) *** Andhra Pradesh Federation of Timber Merchants, Saw Millers, and Allied Industries; Andhra Pradesh Forest Department (2009); Haryana Forest Department website (http://www.haryanaforest.gov.in/WoodBasedIndustries/WoodBased.aspx)

Table 3-12 shows the differences between the two states with respect to the structure of wood-based

industries. In Andhra Pradesh, sawmills constitute 96.6% of the industries in terms of the number of industries, whereas wooden board industries constitute only 2.8%. The share of sawmills in Haryana is 85.6% and that of wooden board is 14.1%. This indicates that the structure of wood-based industries in Haryana is more diversified than that of Andhra Pradesh.

b) Major consumers of wood-based raw material

Farm forestry in Andhra Pradesh supplies a small amount of wood to sawmill and wooden board industries. Historically, farm forestry has focused on producing wood for paper industries with short rotation of four years. This is because the farm forestry has been promoted mainly by the paper mills and the large market of woods for paper mills is well established. Activities of the Forest Department of Andhra Pradesh with regard to farm forestry have also focused on trees for paper industries. The Forest Development Corporation has supplied wood and bamboos mainly to paper mills as well.

c) Wood-based industries in Andhra Pradesh

In Andhra Pradesh sawmill and wooden board industries, which belong to wood-based industries, suffer from shortage in raw materials. According to the Andhra Pradesh Federation of Timber Merchants, Saw Millers, and Allied Industries, 80 to 90% of raw materials are procured from aboard such as African countries, Malaysia, Myanmar, and Uruguay. The federation said that only 50% of the current capacity of industries is utilised due to the insufficient supply of raw materials and scarce labour supply. Some sawmill and wooden board industries in Hyderabad have started using mango trees from coastal areas of Andhra Pradesh, which are more than 250 km away, although mango trees are usually not suitable for wood-based products due to their branchy shapes. The rapid growth of population and economy in India reportedly contributes to the expansion of wood-based products. Thus the federation has high expectations for farm forestry as a future supplier of raw materials. The federation expects that farm forestry will shift wood production from the paper industry to production for sawmill and wooden board industries. In this case, the trees need to be larger, requiring a longer rotation period. However, it is uncertain whether farm forestry farmers will adopt a longer rotation period than the current four-year one for pulpwood production. Since the federation is willing to pay INR 3,500 per ton for eucalyptus wood, a higher rate than the current rate offered by paper mills, the farmers may apply the six-year rotation period.

d) Diversification of farm forestry and enhancement of wood-based industries

Since farm forestry in Andhra Pradesh concentrates on pulpwood production for only a few large paper mills, efficiency of a competitive market may not materialise. More specific concerns include the oligopolistic nature of the market, and the high dependence of farm forestry on the operation and market of a single paper industry. The farm forestry can be affected negatively if the production of the paper industry declines due to such factors as negative changes in the world paper market. The Forest Department shares the same concerns and believes it is necessary to diversify the market of farm forestry produce by promoting the demand for raw materials from sawmill and wooden board industries in the state. Therefore, enhancement of the industries results in diversification of farm forestry in Andhra Pradesh.

If the expectations for growing demand for wood-based products prove correct, then the wood-based industries will grow and generate high demand for domestically produced wood. According to this scenario, it is rational to diversify farm forestry produce by introducing, for example, a longer tree rotation period to produce large timber suitable for sawmill and wooden board industries. The survey team's estimation on profit from eucalyptus plantation with a longer rotation period shows a higher per year profit than that of wood production for paper mills[34]. Diversification of farm forestry

[34] See Annex 5 for detailed calculations.

produce will give farm forestry farmers a wider option of buyers, promoting more competitive farm forestry produce markets.

e) Synergies of farm forestry and wood-based industries development

Table 3-13 shows estimated employment and value added per year from one ha farm forestry with eucalyptus plantation. Cases of farm forestry for paper mills with a four-year rotation period and farm forestry for sawmill and wooden board industries with a six-year rotation period are simulated based on data from ITC and the Andhra Pradesh Federation of Timber Merchants, Saw Millers, and Allied Industries. In farm forestry, paper mill wood production and operation require 113 and 52 man-days, respectively, and the total requirement for employment is 164 man-days. For farm forestry for sawmill and wooden board industries, wood production and wood processing require 83 and 80 man-days, respectively, and the total requirement of employment is 163 days. This implies that farm forestry for sawmill and wooden board industries requires more employment for wood processing and manufacturing than that of farm forestry for paper mills, and that strengthening of sawmill and wooden board industries may result in shift of agriculture employment to manufacture sector employment. However, as shown in Table 3-12 the economic size of the forestry and logging sector and associated wood-based industries may be small; and in Andhra Pradesh State, the magnitude of employment shift is expected to be relatively small. Although the impact of enhancement of the wood-based industries is relatively small, the development of industries is likely to accelerate the transformation of an agrarian economy to an industrial one. At the same time, the development of the industries and farm forestry complement each other through enhancement of the raw material wood market.

Table 3-13 Estimated employment generated and value added by tree plantation of one hectare

	Estimated employment (man-day)		Output from one rotation	Estimated value added from production and processing of trees from one rotation (INR)
	For one rotation period	Annual ave-rage		
Farm forestry for paper mills (One rotation: 4 years)				
Wood production by farm forestry	450	113	90 metric ton of debarked industrial wood	97,678
Paper mill operation	207	52	45 metric ton of paper and paperboard	N.A.
Total	657	164		
Farm forestry for sawmill and wooden board industries (One rotation: 6 years)				
Wood production by farm forestry	500	83	120 metric ton of debarked industrial wood	137,851
Wood processing and manufacturing	480	80	1,600 wooden doors	280,000
Total	980	163		417,851

Note: Employment for agricultural crops: 300 person-days/ha for chilli, and 150 person-days/ha for cotton and tobacco
Source: Survey team

3.3 Issues in the promotion of farm forestry and wood-based industries

The following discussion will concentrate on farm forestry and wood-based industries excluding large paper mills. The large paper mills have their own resources to adapt to the changing economic environment whereas sawmill and wooden board industries still need public support to reduce investment risks and strengthen their manufacturing capacity and quality.

3.3.1 Laws and policies

(1) Farm forestry

Discouraging laws and policies
In recent years, facilitative government policies are encouraging farm forestry. The government policies have encouraged farm forestry through the removal of legal and procedural bottlenecks in the way of tree farming. In a number of states, felling and transport of important fast growing farm forestry species have been made easy. Examples are *eucalyptus*, *casuarina*, *popular*, and *Acacia nilotica* which are legally considered cash crop, and are exempted from, for example, transport passes in Andhra Pradesh and Haryana. However, other farm forestry species such as *teak* are not exempted from the cumbersome procedures concerning tree felling, transport, and sales. The procedure for seeking permission for felling is complicated, and often provided room for rent seeking. These excessive regulations and rent seeking reduce farmers' interest in farm forestry.

(2) Wood-based industries

Research and analysis of raw material and wood-based products market and licensing
A Supreme Court Order dated 16 November 2002 has important and detrimental influence on wood-based industries, specifically sawmill and wooden board industries, across the country. The details of the order are presented in Annex 6. As per the order, operation and expansion of units need prior permission from the Central Empowered Committee (CEC), which advises the court in forest matters. In procedure to grant licences, which is established by each state, applicants specify quantity and source of woods, which are verified by Forest Departments. Forest Departments need to apply appropriate methods to assess capacity of all tree sources such as farm forestry and recorded forest area to supply woods so that newly established or expanded industries are appropriately and smoothly permitted. However, such assessment is not easily done. Granting of new licences and licences for expansion has been stopped in Andhra Pradesh where wood-based industries are exempted from obtaining marketing support, entrepreneurship and skill development programmes, and credit support from the Department of Industries and Commerce of Andhra Pradesh State. This situation is detrimental to the development of the wood-based industries to improve economic and technical efficiency of their operations.

Funding for thorough reviews for the forest and wood-based industry policies, subsidy schemes, pricing of raw materials, trade policies, and other schemes influencing the farm forestry and wood-based industries are limited. Detailed wood balance study needs to be done in order to issue and control licensing of sawmills. Weak statistical and market reporting data on the forestry sector must be improved.

Coordination mechanism for promotion of wood-based industries
The Forest Department in Andhra Pradesh recognises importance of wood-based industries in order to secure and promote farm forestry by diversifying consumers of wood-based raw materials. However, it does not have direct jurisdiction of industrial promotion and thus has difficulty in promoting the wood-based industries alone. It has to work on the promotion together with the Department of Industries and Commerce of Andhra Pradesh, which is given the jurisdiction and which said it can support wood-based industries with the Forest Department.

3.3.2 Works of market

(1) Farm forestry

Price fluctuations
Trees are comparatively less risky and less susceptible to price fluctuations. Trees can be left growing

in the farm when the price is low, and farmers can wait until produce gains agreeable prices. However, since farm forestry takes at least four to five years to complete a rotation, farmers' expectation of price fluctuations may significantly affect their decisions to opt for farm forestry. In the past, market of farm forestry produce collapsed due to market saturation.

Government's intervention to farm forestry produce market

The competitor of the farm forestry was the forest department which provided subsidised supply to the wood-based industries. Paper mills preferred to buy pulpwood from the forest department as its supplies were cheaper and available in bulk. Thus, for farmers, no competitive market was available in the past. This situation has changed and the forest department is no longer a major supplier of wood-based raw materials. However, although the probability is small, the forest department may again become a competitor in the future.

Another possible competitor is imported wood supply. Trade policy reforms in the 1990s simplified India's restrictive import licensing and reduced tariff protections. This has affected the wood-based industries which have started facing increasing competition from overseas. A wood-based industrialist confirmed that raw material supply by import is costlier than domestic materials, although the latter are in short supply. However, as shown in Table 3-14, the duty rate of wood in the rough, plywood, veneer, particle board, and medium density fibreboard is 16% which could be lowered to alleviate their short supply in India's growing economy.

Table 3-14 Import duty rates of wood and wood-based products

Item	Duty rate
Fuel wood	16%
Wood in the rough	16%
Sawn wood	0%
Plywood, veneer, particle board, medium density fibreboard	16%
Pulp	0%
Paper and paperboard	16%
Wooden furniture	16%

Source: Central board of excise and customs. Central excise tariff 2009-10, retrieved on 1 July 2011 from http://www.cbec.gov.in/excise/cx-tariff0910/ cxt0910-idx.htm

The last possible competitors are industries which may establish a large scale industrial plantation. India's current land and forest policies do not allow industries to possess a large tract of land for forestry, and lease recorded forest area for such enterprise. However, these policies may change, and there is a risk that these industries will become competitors to farm forestry farmers. The above discussion suggests that government interventions to farm forestry produce market may be necessary to secure appropriate market and profit share of farm forestry whenever necessity arises.

(2) Wood-based industries

Short supply of raw materials

In Andhra Pradesh, only 50% of the current capacities of sawmill and wooden board industries is utilised due to the insufficient supply of raw materials and scarce labour. Eighty to 90% of raw materials are imported from overseas at a high cost. Industries' adaptation to this situation is inferred by the fact that some sawmill and wooden board industries use mango trees which are branchy and unsuitable for wood-processing. Since demand for wood-based products is expected to grow, this supply issue needs to be resolved. Currently farm forestry in the state only produces pulpwood with a minimum rotation of four years. The industries require larger industrial wood, and expect that the farm forestry will diversify their produce to cater to raw material demands by extending tree's rotation period.

The reported short supply of raw materials from the domestic market in Andhra Pradesh corresponds to the projected country-wide demand and supply gap reported in section 3.1. The short supply indicates a lost opportunity for farmers to obtain profits from farm forestry on their productive and/or marginal agricultural land. In this case, the short supply also prevents the expansion of tree cover outside of recorded forest area, and increase in employment opportunities in farm forestry and wood-based industries.

Competitors
Possible competitors are wood-based industries themselves. It should be noted that competition is necessary for improving the industries' products. They must compete with foreign sawn wood, plywood, veneer, particle board, medium density fibreboard, and wooden furniture listed in Table 3-14. The duty rates of these products are low, and could be lowered depending on India's trade policies.

(3) Market-wide issues

Market failure
An example of possible market failure is the farm forestry produce market in Andhra Pradesh. The market seems oligopolistic, and is concentrated on pulpwood production for only a few large paper mills. The efficiency of a competitive market may not be present. The high dependence of farm forestry on the operation of the four large paper companies may be a constraint to farm forestry farmers' opportunity to diversify timber production for sawmill and wooden board industries. This diversification would increase their negotiation power in the farm forestry produce market. At the same time, needed raw materials by sawmill and wooden board industries would enhance the diversification. Currently, tree species suitable for timber production for the industries have been identified and tree improvement research has been carried out.

Transaction costs of inter-state trade
Inconsistent and isolated national and state-wide laws, rules, and procedures are constraining the commerce of farm forestry produce across state boundaries. Inter-state arrangements and approaches to address regional market wide issues do not yet exist. National and interstate wide market information is poorly consolidated, which seriously hampers choice and implementation of market wide regulatory and enhancement measures.

3.3.3 Technical development and extension

(1) Farm forestry

Technical development and extension
According to ITC's experience, technical development and extension are important to promote farm forestry in Andhra Pradesh. ITC's research on such matters as clonal seedling production and pest control measures has been successful in securing farmers' income generation opportunities and stable supply of pulpwood to the company. ITC employs 25 extension workers and hired NGOs to conduct the Social Forestry Programme and the Farm Forestry Programme successfully. These programmes targeted different social groups who chose to practice Type 1 farm forestry with initial investment support and Type 2 farm forestry without subsidies.

On the other hand, the Forest Department of Andhra Pradesh has just begun research on and extension of tree species suitable for timber production. For example, the Andhra Pradesh Federation of Timber Merchants, Saw Millers, and Allied Industries identified *Melia dubia* and right wood eucalyptus as suitable fast growing timber species which require a rotation period of about ten years. Whether the farm forestry farmers will adopt these species as their farm forestry tree crops is dependent on supply of quality clonal seedlings and provision of technical and market advice through extension activities to ensure profitable farm forestry for farmers. Allocation of public funding for research and extension

work on suitable clones and indigenous species is insufficient and is urgently needed. At the same time, to enhance private research activities, registration of clones must be implemented.

Awareness and capacity development
Extension work for awareness and capacity development of farmers and facilitation among stakeholders are necessary to realise the potential of farm forestry. Many farmers still do not know or are not convinced of advantages of farm forestry. Thus they miss opportunities to improve their livelihoods by farm forestry. Dissemination of farm forestry through demonstration is necessary. Capacity development for farmers on farm forestry is also necessary. They need to know which species are suitable for their land and how to take care of them. In fact, planted tamarind failed to bear fruits because the wrong clones were chosen. Better communication among stakeholders such as Forest Departments, traders, and local institutions is also necessary to enhance the function of the markets.

Formation of a farm forestry association
It is critical to form a farm forestry association. The association should help promote partnerships between farmers, the private sector, and the public sector. It also allows small landed farmers to share technical and market information and begin farm forestry by reducing transaction costs of collective arrangements. The association should also function as a lobbying organisation to support the government's policy formulation process.

(2) Wood-based industries

Productivity, quality, and technology issues
Wood-based industries, particularly sawmill and wooden board industries, suffer from inefficient operations and poor quality of products resulting in loss of markets (Saigal and Bose, 2003). Field observations indicate that the sawmilling operation is inefficient and not well organized with a low conversion rate. It is estimated that the conversion yield from log form to graded sawn timbers is only 45-50%, as compared to 55-65% in developed countries. Only 560 sawmills follow the Indian Standards on grading and produce only 2.4% sawn graded timber (Saigal and Bose, 2003). Although many other technical and productivity issues hamper improvement of wood-based industries, public and private investment to address the issues seems limited. In addition, industrialists state that no extension services to the industries are provided. The public sector does not address the industries' needs for investment.

Labour and safety issues
The workers of wood-based industries generally face poor working conditions. They work in the hazardous and untidy factories. Field observations revealed that workers and machines use either no or rudimentary protective gear. Wood processing involves a series of dangerous steps in which workers can be exposed to toxic chemicals, heat, vibration, and dust, but sufficient remedial measures are not taken. The government has not taken adequate measures to address safety issues. A small amount of investment to address the working condition issues will significantly improve industries' productivity.

3.3.4 Capacity development of forestry officials

To help develop farm forestry and wood-based industries, it is necessary to understand players and behaviours of wood-based products markets. Farm forestry and operations of the industries are market and profit driven, and face risks of default and shutdown. Thus farm forestry farmers and industrialists are risk averse, and they will adopt recommended technologies and investment only when they are confident that risks are manageable. Extension personnel should understand and share clients' perceived business risks. This requires significant knowledge and experience. Since the forestry department does not have enough experience in extension activities to the private sector, capacity development of forestry officials as extension workers is essential. Because the forestry

department must work with other departments such as the department of industry and commerce, the forestry department officials must know the industrial and market policies, implementation instruments, and develop an information base.

CHAPTER 4 Current status of and issues in Joint Forest Management

4.1 Introduction

Joint Forest Management (JFM), introduced in 1990 in India, is considered to be one of the most innovative programmes as it has a provision to involve local communities in the management of state forests. Under JFM, the Forest Department and the village community enter into an agreement to jointly protect and manage state forests adjoining the village, and share the responsibilities for, and benefits from, these forests. The community gets greater access to a number of non-timber forest products (NTFP) and a share in timber revenue. In return, it takes increased responsibility for the protection of forest from fire, grazing and illicit harvesting and poaching. Normally, a forest management plan, that includes village development activities, commonly called a micro-plan, is prepared and funds are provided by the Forest Department for its execution. The details vary from state to state as each state has issued its own JFM resolution. In all states, the ownership of the land remains with the government and only management responsibility and a share of the forest offtake belong to the community.

4.2 Case study in Tamil Nadu and Rajasthan

4.2.1 Survey methodology

(1) Objectives and methodology of the survey

The overall objective of the survey in Joint Forest Management was to evaluate the past Yen Loan Projects in the forestry, especially in the aspect of sustainability. The survey was done through 1) literature reviews, and 2) conduct of the field survey in two states, Tamil Nadu and Rajasthan, where JICA has been financing over the past 20 years. The field survey was conducted from 17 April to 4 May 2011 in Tamil Nadu, and from 25 April to 21 May 2011 in Rajasthan. The field survey aimed at analyzing the achievement and sustainability of JFM in two states and finding out implications for JICA's future assistance strategy.

The respondents of the survey were officers of the Forest Department (Conservators of Forests, District Forest Officers (DFOs), Forest Rangers, Foresters, and Forest Guards), representatives of the Village Forest Council (VFC) in Tamil Nadu, the Village Forest Protection and Management Committee (VFPMC) and the Ecodevelopment Committee (EDC) in Rajasthan, Self Help Group (SHG) (mainly women), Non-Governmental Organisations (NGOs), and an individual VFC/VFPMC member (mainly scheduled tribes and castes, if any), and farmer engaged in farm forestry. There were totally 44 respondents in Tamil Nadu and 54 respondents in Rajasthan. With the use of questionnaires, three surveyors conducted individual interviews. Secondary data such as micro plans and plantation area details were also obtained from the Forest Departments. The survey team processed and analyzed all the collected data and information.

(2) Survey sites and respondents

Table 4-1 and Table 4-2 show the lists of the surveyed villages. In total, 22 VFC/VFPMC/EDC were targeted in the field survey. No EDC was surveyed in Tamil Nadu, as there is none in Vellore circle surveyed. In Rajasthan, two EDCs were included in the survey. The selection of survey villages was done based on the recommendations by the Tamil Nadu and Rajasthan Forest Departments. No random sampling method was applied in this case study. To obtain their recommendations, the survey team requested each Forest Departments to consider: 1) accessibility and travel time (less than about 2 hours) to these JFMC or EDC villages for smooth implementation of the surveys; 2) JFMC or EDC villages under different stages of rural development; and 3) JFMC or EDC villages with good and poor

performance based on the department's criteria.

Table 4-1 Target villages in Tamil Nadu

No.	Division	Range	Year of the project, Name of target village	Distance for the Forest Department
1	Social Forestry Division, Vellore	Vellore	2000, Salamanatam	Within 30 km
2			2001, Santhanakottai	Within 30 km
3			2003, Kalamburankottai	Within 30 km
4		Arakkonam	1997, Kalpudur	Within 30 km
5	Crash Plantation Project Division, Vellore	Vellore 1	2004, Malmanguppam	Within 30 km
6		Vellore 2	1999, Edatheru	Within 30 km
7		Gudiyatham	2007, Lakshmiammal puram	Within 30 km
8	Afforestation Division, Tiruvannamalai	Arani	1997, S.U. Vanam	Within 28 km
9			1998, Vinayagapuram	Within 28 km
10	Tiruvannamalai	Santhavasal	2000, Padavedu	Within 30 km
11	Tirupattur	Ambur	2005, Sankarapuram	Within 50 km

Source: Survey team

Table 4-2 Target villages in Rajasthan

No.	Division	Range	Year of the project, Name of target village	Distance for the Forest Department
1	Udaipur	Chokhatia	2003, Popalti	19 km
2		Gokunda	1992, 1993, 1998, 2004, 2005, Palasma	Around 50 km
3		Salumber	1993-1996, 1999, 2001, 2004, Gavdapal	80 km
4		Ogna	2003-2007, Attatia	Around 90 km
5		Palasia	1993-2002, 2004-2005, Karel	86 km
6	Pratapgad	Baansi	1995, 2005-2006, Baleecha	Around 90 km
7			2004-2005, Gujjaron Ka Guda	90 km
8			1997, 2004, Dhani Talai	93 km
9	Chittodgarh	Bassi	2006, Mehsara EDC	Around 144 km
10			2003, Mewasa EDC	Around 157 km
11	Udaipur	Tehsil Sarada	1992-1997, 2003-2004, Kewra VFPMC	Around 25 km

Source: Survey team

4.2.2 Survey results in Tamil Nadu

(1) Tamil Nadu Afforestation Project

The Tamil Nadu Afforestation Project (TAP) is a JFM-based afforestation project. Its Phase-I, also known as the TAP-I, was launched in 1997-98 with the financial assistance from the Japan Bank for International Cooperation (JBIC). The TAP-I implementation continued for eight years from 1997-98 to 2004-05. The project was implemented on a watershed basis with active participation of people. Ecological upgrading of the degraded forests and poverty alleviation were the main objectives of the project. These objectives were to be achieved through: 1) massive plantation of tree seedlings; 2) meeting NTFP requirements of the local people; and 3) providing them with alternate income generation opportunities. After completing the TAP-I, a follow-up Phase-II of the project named TAP-II was started in 2005-06 for a period of eight years. Financial assistance to the TAP-II was also provided by JBIC. The TAP-II also focused on similar objectives where JFM is the mechanism to achieve project goal. The project was implemented under different components such as afforestation, income generation activities, and small scale infrastructure development, and supporting activities.

(2) Achievement of JFM

a) Effectiveness of project activities

Afforestation

For afforestation, the entire watershed was divided into three zones: 1) lower zone; 2) middle zone; and 3) upper zone. In the lower and middle zones, tree seedlings of NTFP such as small timber, fuel, and fodder were planted. All the seedlings were planted and raised in water catchment pits and semi-circular bunds. In the upper zone, seedlings of native tree species were planted in a similar fashion. Most commonly planted species are *Pungan, Sissoo, Bamboo, Nelli, Eluppai, manipungan, Achan, Naval, Redsanders, Neermathi,* and *Velvel*. The species planted in the forest area was determined through a series of methods applied by the Tamil Nadu Forest Department. It began with collecting historical data and consulting local people to establish a list of the species for plantation. This was closely compared with expected succession processes of the local flora with the references to literature. Then, Pair Analysis of the species was done which was succeeded by Ecology Auditing. Finally, a list of the species of ecological significance and economic importance was prepared and circulated to concerned Range Officers for seedling production in the field. The average plantation area in surveyed villages is 300ha in a range from 100ha in Vinayagapuram village to 350ha in Kalpudur village.

Soil moisture conservation works

To rejuvenate forest vegetation, improvement of water holding capacity of the soil, checking of soil and water erosion, water collection measures, and various soil and moisture conservation works were carried out in the lower parts of the forest-dependent villages. Check dams, check walls, and percolation dams were constructed to impound rain water to increase the water storage capacity. To give villagers and VFC members extra income sources, aquaculture was also started by releasing fish seeds in one of the dams. The right to sell fish was also given to VFC.

Entry point activity and income generation activity

With the objective to provide and improve infrastructure to meet minimum needs of the villagers, income generation activities (IGAs) and Community Development Works (CDWs) as entry point activities (EPAs) were carried out. IGA obtained more budgets (67% of the total budget for the village) than these of CDW (remaining 33%). Provision of loan for SHGs and individuals was made to initiate alternate employment activities. The activities undertaken in each village were identified by villagers during Participatory Rural Appraisal (PRA) exercise which were subsequently documented in micro plans of all the VFCs.

IGA were financially supported by the Village Forest Development Fund (VFDF). In some cases, local NGOs provided the members with technical assistance on SHG formulation and organisation management, skill training, and marketing. Loans were distributed to VFC members and SHG members to start their own businesses.[35] In all surveyed VFCs, the majority of the members purchased an improved breed of milk cows to replace the local breeds. There are from three to 20 SHGs in each surveyed village of which most of them are still active. SHG members are composed of those who have social and economic homogeneity in status. SHGs are engaged mainly in microfinance and also in IGA such as bamboo handicraft production, coconut mat making, incense stick making, candle making, palm leaf craft production, shoe making, coconut and banana rope making, floriculture, and running hotel. The activities are done mostly by an individual, not a group. Only a few SHGs were engaged in group activities such as vermin-composting and running a retail shop.

[35] The Guideline for Buffer Zone Activities by the Forest Department stipulates that loan should be given only for activities that will result in income generation of the forest dependents and poor.

Lack of technical assistance in marketing is an issue in SHGs' business operation, as many SHGs have stopped the business due to a lack of market linkage. NGOs hired by the Forest Department provided SHGs with technical assistance, and still provide training to put up a business. Even after the expiration of contracts with the Forest Department, some NGOs have arrangements with SHGs to provide raw materials, purchase finished products, and pay some labour charges. The sustainability of the SHGs depends largely upon the assistance from the NGOs. In Salamnanath village, the vermin-composting unit has been constructed by VFC as a part of CDW. EXONARA, a local NGO, helped these SHGs in the production of vermin-compost by lending cows and technical training. Only the Forest Department purchased the vermin-compost from the SHGs. Presently, the Forest Department has stopped purchasing the vermin-compost. As the SHGs are not able to get profits from this business, they also stopped running this business. However, they are interested in continuing this business if they get proper marketing facilities at a profitable rate.

To encourage participation in JFM and create alternative employment opportunities, CDW was carried out with the assistance from Panchayat and other agencies such as the District Rural Development Agencies (DRDAs)[36]. CDW includes community hall, VFC building, library room, thrashing floor, vermin-compost unit, biogas unit, school compound wall, fair price shop, two bore wells with hand pumps, expansion of water line connection, sports equipment, and furniture to the school. Those facilities are well maintained by the VFCs.

Village Forest Development Fund

For providing VFC members with alternate sources of income generation, pool of funds was provided by the Forest Department as departmental loan in varying instalments. This pool was organized as the VFDF which is jointly managed and operated by the Chairperson and the Secretary of the VFC, and audited by the DFO annually. The VFDF consists of: 1) membership fees; 2) money levied as fines and penalties for grazing and lopping in the JFM area; 3) NTFP's sales; 4) money of timber sale proceeds realized in accordance with the Memorandum of Understanding; and 5) recovery of loans and advances given to individuals from the buffer zone funds. The VFDF is utilized for any contingent or ancillary expenditure, extending loans to members and organizing income generation training by the Executive Committee. Every member of the VFC is entitled to receive financial assistance for starting his or her own business on a first-come-first served basis. The microfinance was distributed at a low interest rate such as 0.4%, 0.5% and 0.75% per month for 18 to 24 months. Distribution of loan was recommended by the Executive Committee members, while preference was given to households who highly depended on forests and needed immediate help for earning a living.

All surveyed VFCs have managed the VFDF efficiently in such a way that the credit goes to the members who have a good track record. This is enhanced by a high rate of loan return (above 70%) except a few VFCs (30% in Vinyagapuram village). Through bank interest and loan interest, a revolving fund has increased substantially in some cases. In the Malmangkuppam VFC, the fund increased from INR420,000 (2004-05) to INR1,475,000 (2010-11). The members are satisfied with the VFDF that provide them with timely loans at a very low interest rate and meet their financial needs. The rules and regulations differ depending on VFC. The interest rates ranged from zero to one percent per month, but mostly 0.5% per month. Before the VFCF was introduced, the villagers often took a loan from money lenders at a very high interest rate. As a result of the project, the members no longer have to struggle to meet a bank's requirements for a loan; nor do they have to take a loan from a money lender. The Malmangkuppam VFC has also taken steps to augment the VFDF fund by lending creating assets such as vessels and shamiyana (tent) to villagers for ceremonies and rituals.

[36] DRDAs are district-level development execution and monitoring agencies created under the Indian Societies Registration Act chaired by the District Collector. Substantial rural development funds of the government of India were transferred and routed through them under various Centrally Sponsored Schemes. The DRDAs are vital institutions at the district level both for securing financial resources and advancing rural development.

Farm forestry

Aside from the project fund provided from JICA, the Tree Cultivation in Private Lands (TCPL) scheme was launched in 2007-08 to enhance tree cover for protecting the environment. This scheme includes planting tree seedlings in the holdings of small and marginal farmers as inter crops, alley crops in vacant fields, thus covering the waste lands in their holdings. Tree seedlings were supplied at no cost to the identified beneficiaries who are VFC members for planting them on farm bunds. The beneficiaries were also provided with grants from maintenance of planted seedlings. In the survey, five out of 11 villages were identified as target areas under this scheme.

Table 4-3 shows the survey results with five respondents in five villages, i.e., Kalpudur, Malmaguppan, Edatheru, Laksmiammlpuram, and SU Vanam, under the TCPL scheme.

Table 4-3 Sample survey of the TCPL scheme

	Farmer A (Kalpudur)	Farmer B (Malmaguppan)	Farmer C (Edatheru)	Farmer D (Laksmiam -malpuram)	Farmer E (SU Vanam)
Area Planted (acre)	2.5	No data	2.0	2.0	3.0
Species	Teak	Teak	Teak	Teak	Casuarina, Eucalyptus
Volume (seedling)	400	350	NA	240	NA
Harvest (year)	15-20	20	20	20	5-6
Year Planted	2008	2010	2009	2007	2007
Price for Sale (INR)	15,000/tree	600/cubic ft	600/cubic ft	Not known	3000/t

[Legend] NA: not available
Source: Interview with TCPL beneficiaries

Before the TCPL scheme was introduced, all respondents used their lands for agriculture. Crops for cultivation in the lands were paddy, sugarcane, and groundnut. According to the respondents, the reasons for planting trees lie mainly in agricultural labour shortage and higher costs of agricultural inputs. The main source of income for all respondents is farming. In addition, two out of the five respondents obtain pension. The Forest Department officers encouraged them to plant trees, telling them that tree plantation would bring about more profits with less inputs and labour, and higher market values in the future. One respondent in SU Vanam village learned the scheme in a newspaper and came to the Forest Department. Although the beneficiaries or respondents are entitled to choose species of trees, most of them prefer to plant teak due to its high market value. All of them are aware of the present market price of planted trees, expecting that the price will increase upon harvesting.

b) Effectiveness of implementation and monitoring mechanism

Implementation mechanism

The implementation mechanism of IGA and CDW is stipulated in the *Guidelines for Buffer Zone Activities under TAP Phase II* formulated by the Forest Department. The guidelines include the following: 1) selection criteria of beneficiaries for CDW and IGA and for SHGs; 2) guideline for operation of microfinance such as maximum loan amount and repayment of loan; 3) cost recovery mechanism for maintenance of the CDW assets; and 4) role of VFC in execution of the CDW including accounts and audits. Priority of assistance through IGA and a microfinance scheme is given to VFC members according to a level of forest dependency. To maximize the benefits of limited funds under IGA, the guidelines stipulate that the front line forest officers of the Forest Department would devise a suitable mechanism so that individual borrowers can leverage IGA funds to access other sources such as bank finance and other government schemes.

Inter-sectoral linkage

Inter-sectoral linkage has been established for overall development of the village. The orders for *'Forests – Constitution of Committees on Joint Forest Management at State and District Levels for Effective Coordination'* were issued in November 1998 by the Government of Tamil Nadu. The purpose of linkage is to pool the resources so as to enhance the project effectiveness. The State Level Committee[37], chaired by the Chief Secretary to Government, is held one in a year. The District Level Committee[38], chaired by the District Collector, is held once in two months. All the line departments that provide welfare schemes were asked to implement their schemes in project target areas on priority basis. During project implementation, the Collector held a meeting almost every month and reviewed the progress. Some funds were allocated by DRDA through Gram Panchayats[39], the primary unit of Panchayati Raj Institutions, for constructing infrastructure in the project villages, and by the Health Department for conducting health camps and the Veterinary Department for cattle camps. This mechanism is still operational for both old and new VFCs at the district level.

Monitoring of Village Forest Councils by the Tamil Nadu Forest Department

The DFO concerned monitors the functioning of the Executive Committee of the VFC and sends monthly reports to the Conservator of Forests. The officer also has the authority to disband the committees and order for reconstitution if, in his or her view, the committees are not discharging their duties properly. The Conservator of Forests is the appellate authority whose decision on the appeals against the DFO's order is final. The mandatory meetings of the VFC and Executive Committee provide space for downward accountability as the members can question and discuss the commissions and omission of the office holders.

In the surveyed villages, the Forest Department conducts monitoring on a regular basis. The monitoring system differs by territorial division. Some foresters and guards visit forests daily, while other foresters patrol weekly and Forest Rangers do so once or twice a month. Forest watchers, who monitor forests daily, were deployed by the Forest Department for the project duration. Some of them are still hired by the Forest Department. One VFC, i.e., Kalamboorankottai, has a paid watcher deployed by Srinivasan Services Trust. VFC members still engage in voluntary watching but they have no strict rules and regulations on this activity. It is important to note that plantation areas range from 100ha to 350ha, while the number of the VFCs are from 80 to 350. Only a few cases of illicit cutting in the forest, and no illicit case by villagers within the village, have been observed. In most VFCs, a fine for illegal cutting is imposed. The fine rates differ by VFC. In Padaveedu VFC, the fines are INR 3,000 for tree cutting and INR 500 for grazing. The collected fine is put in a bank account of VFC. With the efforts of forest protection by the Forest Department and the VFCs, the survival rates of planted trees under the project are at a fairly high level of over 70% on average in all but a few of the surveyed villages, i.e., Kalpudur and Lakshmiammalpuram.

The project has developed a close relationship between the Forest Department and villagers. By implementing CDW, providing employment opportunities and IGA, the Forest Department has built

[37] The main functions of the committee are to: 1) guide, monitor and review of the JFM; 2) monitor and review the functioning of the VFC; 3) integrate various sectors and departments in all the programme villages in district; 4) review the half-yearly report prepared by District Collectors. The members of the committee are secretaries of: 1) the Environment and Forests Department; 2) the Finance Department; 3) the Social Welfare Department; 4) the Adi-Dravidar and Tribal Welfare Department; 5) the Agriculture Department; 6) the Animal Husbandry Department; 7) NGOs; 8) the MOEF; 9) the Principal Chief Conservator of Forests; and 10) the Chief Wildlife Warden and Chief Conservator of Forest (Member Secretary).

[38] The main functions are to: 1) identify the areas of integration; 2) review the integration of various activities by departments and suggest improvements; 3) review the functioning of JFM and VFC; 4) review the progress in the implementation; and 5) prepare a half-yearly report. The members includes representatives from: 1) District Rural Development Agency; 2) the Agriculture Department; 3) the Animal Husbandry Department; 4) the Social Welfare Department; 5) the District/Divisional Forest Officer; 6) NGO; 7) five representatives from VFC; and 8) the Divisional Forest Officer (Member Secretary).

[39] The gram panchayat is the foundation of the Panchayat System. A Gram Panchayat can be set up in villages with a minimum population of 300. Sometimes two or more villages are clubbed together to form a group-gram panchayat when the population of the individual villages is less than 300.

good rapport and has gained confidence over forest dependent villages. The Forest Department had been seen as the police controlling people by force. Now the Department has succeeded in having the villagers understand that their participation is vital for forest conservation and enhancing overall development of the village. VFC members help the Forest Department in protecting forests against fire, grazing, and illicit cutting of trees. They inform the Forest Department of such incidences and render their help by involving in control or protection measures. The VFC president and other Executive Committee members are motivated to take care of the forests as they are aware of the importance of forest resources and the damage caused by grazing, cutting, and lopping branches for fodder or fuel wood. Throughout the collective process, the villagers developed a sense of belonging in the community. Thus social fencing, protection by the villagers, has been effective.

NGO involvement

At the initial stage of project implementation, local NGOs, who were well versed in respective villages, were hired at a rate of INR 2,000-6,000 per month for the first year of the project. Terms of reference were formulated based on the needs in the village and the availability of appropriate NGOs in the locality. The main role given to NGOs was awareness raising in the following 1) importance of forests; 2) damage done by community members and their cattle; 3) significance of afforestation programmes; 4) prevention and protection measures to help reverse the process of degradation; 5) uninterrupted growth of plants and natural regeneration; and 6) conservation of all forest resources. The NGOs also conducted the PRA, collect socioeconomic data, formulate SHGs, and gave technical assistance and training to the VFC and related SHG members for account and record keeping.

Padavedu village shows a successful case of cooperation between the Forest Department and a NGO. Srinivasan Services Trust[40], a NGO, helped form six SHGs in the year 2000. Then, 68 women SHGs and 16 men SHGs were formed in the following years, although the NGO had been engaged in community development in the respective villages with its own fund before the project. Training programmes were arranged for SHGs on such matters as apiculture, carpentry, vermin composting, handicrafts from banana fibre, horticulture, and mushroom cultivation. One of the SHGs secured a saving of INR 862,960 and credit linkage of INR 7,935,400. 79 SHG members have petty shops. Now 225 members are engaged in banana fibre handicraft making, while about 1,000 members are rearing milk animals and engaged in horticulture. One SHG received the best SHG award from the Government of Tamil Nadu with the prize money of INR 50,000. Moreover, the average income for each member of SHG has reached INR 2,000-4,000 per month. According to the baseline survey in 2000, 190 out of the 652 households were identified as the Below Poverty Line (BPL) families. In 2010, no BPL family was observed in the evaluation study conducted by the NGO.

Village Forest Council organisation management and participation process

For implementation of the project with the involvement of villagers, VFC, the people's representative body, was formed in every selected village to be fully involved in the planning and execution of works, protection, harvesting, and benefit sharing in the management unit. Each VFC is registered under Societies Registration Act, 1975. Every member of the family, whether male or female, was enrolled as a member of the VFC in all VFCs except a few VFCs. According to the interviews with the Executive Committee members in Melmanguppam and Vinayagapuram villages, some residents were unable to join the VFC, as their residence is far from the meeting places or the JFM related activities. In Padavedu village, some residents are not interested in becoming members as they are economically well-off and not dependent on forests. The number of the members has increased in most surveyed VFCs. The increase is due to population growth in the villages and realization of the benefits that the members are able to access loans, afforestation-related services, and non-timber forest products (NTFP). No intended exclusion of a particular group of the people in the villages is observed.

[40] The social arm of Sundaram Clayton Limited and the TVS Motor Company.

With regard to the management structure, the Executive Committee members were selected mostly by the members but in some cases the officers of the Forest Department, though all the Executive Committee Chairpersons were elected. The Forest Ranger of the concerned forest range is the Member Secretary of the VFC. Elected members of the Gram Panchayat are ex-officio executive members of the VFC. The number of VFC members vary from 80 (Vinayagapuram VFC) to 350 (Kalpudur VFC), reflecting the total population in the village. Every VFC has almost equal representation of male and female members. It was mandatory for the Executive Committee of every VFC to have women representatives. The number of the Executive Committee members varies from 7 (Edatheru VFC) to 23 (Pedavedu VFC) with women representatives from as low as zero (Vinayagpuram VFC) to as high as seven (Melmangkuppam VFC). Those who belong to Schedule Tribes or Schedule Castes are also the members of the Executive Committee if they are residents in the respective village. It is observed that socially disadvantaged groups of the people in the village are included in the decision-making process.

The VFC organisation management is undertaken by the Executive Committee. All surveyed VFCs are still conducting a monthly Executive Committee meeting. The attendance rates range from 70-80%. Here are the main topics to be discussed in the meeting: 1) financial management of the VFDF; and 2) forest management. Further, in the Salamanath VFC, the members discuss the needs for development scheme in the village that has to be requested to the District Collector. This indicates that the VFC functions as a local government institution for community development. Decision-making is done mostly by consensus among all Executive Committee members except a few VFCs where the Chairperson makes a decision. All surveyed VFCs keep the minutes of a meeting that are taken by forest officers. Each VFC has a bank account under the name of the VFC, while signatories from both the Chairperson and the Forest Ranger are required for a withdrawal from the bank account. A general meeting among all the members is conducted quarterly or irregularly in most cases. Topics for the meeting are the same as the Executive Committee meeting. The attendance rates tend to be lower than the ones of the Executive Committee. Most VFCs in the surveyed villages are still active due to loan availability. Decisions made by the Executive Committee might not necessary be well informed to all members.

(3) Impact of project intervention

a) Agriculture

After implementation of the project, a significant change has been observed in the cropping pattern. Agriculture area has increased, because dry and fallow lands were put to cultivation. Ground water table has raised and water in the wells is available for a longer duration in a year. In Melmaguppam village, ground water table increased from 15 meters to 8 meters in a period of six years. This has become possible due to soil moisture conservation works and afforestation efforts which have checked soil and water run-off considerably. Farmers have started double cropping and introduced sugarcane, paddy, and vegetables. They are growing fruit crops such as banana, coconut, and mango in combination with agricultural crops (Agri-horticulture system). Farm income of almost all the target villages has increased, as the main source of income for most villagers is agriculture. It is reported that farmers have doubled revenue from the same piece of land. There are recognisable positive changes in the lifestyle of the people in the survey area.

b) Forest

With the results of soil moisture works and reduced biotic interference from human and cattle through social fencing, perceived changes in the forests are reported. The survival rates of the species raised under the project are around 70% on average in the surveyed villages, though the rates vary from 33% in Kalpudur (planted in 1997-98) to 91% in Padavedu (planted in 2000-01). By and large, natural regeneration of the forest has also improved. Further, with respect to forest cover, the Forest

Department has conducted a sample plot study of the forest areas under the project. It was observed that numbers of species and individuals per species have increased. For example, while a certain forest area had only seven to eight species before the project implementation, the number of species increased to more than 15 after its implementation. Thus the project contributed to the vegetation cover increase.

With the introduction of project activities, forest dependency of the people in the target villages has decreased considerably. Before the project, most of the families in the village were rearing goats which depended on grazing in the forests. Plants, especially young seedlings, were damaged by trampling, grazing, and browsing. After the project, these families became aware of the damage done by the animals. They were encouraged to sell their goats and buy milk cows with the provision of microfinance. As a result, the goat population decreased considerably while the cow population increased. All the VFCs reported that there are no or few goats in the villages at present. For example, in Melmanguppam, a village of 145 households, each household had 10 goats on average while only 15 households had a cow before the project. Now each household has one or two goats and two or three cows. Furthermore, by rearing milk cows and selling milk locally, the households are able to supplement their income.

Before the project, almost every household had collected fuel wood from the forest because no other fuel source such as liquefied petroleum gas (LPG) was available. Some households had used kerosene but most had collected firewood. They had also cut green branches or young trees, dried them, and used them later. Consequently, there was pressure on the existing forest resources and new plantation was unable to survive or take root due to high biotic pressure from both people and goats. After households received free LPG from the Government of Tamil Nadu and purchased gas cylinders at a subsided rate[41], demand for fuel wood became almost negligible. Although usage of LPG differs by village due to accessibility to the government scheme, more than half the households in the surveyed villages use LPG. Besides LPG, minimum demand of fuel wood is met by agricultural residuals and trees (*Prosopis juliflora)* growing in their fields.

c) Other impact

The quality of life of the VFC members, especially those with access to microfinance, has improved. Both male and female members of the family contribute to household income. As women were given an opportunity to participate in capacity development programmes, some of them engage in different types of IGAs such as flower business and coconut mat making as a group, or shoe making and handicraft individually. More importantly, women have started monthly savings in SHG and use their own savings for a family requirement for a loan. They feel that they are now better equipped to deal with any emergency needs because they can get a loan from a SHG or VFC. As a SHG is formed, commercial or government banks also provide SHG members with a loan on a subsidized basis[42], which was not done before the project. According to female interviewees, SHG members feel more secure than before by obtaining cash and controlling financial resources. In addition, women were organized as a homogenous group to develop a team spirit by learning and working together. The process contributed to building social capital among the members and strengthening social coherence.

[41] In 2006-07, the free LPG gas and stove provision scheme was launched by then Chief Minister of Tamil Nadu to provide energy security to households and protect women from the adverse health effects of using fuels like fire wood and cow dung. During the years 2006-10, the State Government issued 2.3 million free gas cylinders with free stoves to beneficiaries, and issuing another 600,000 was proposed for 2010-2011. They were initially provided to BPL ration card holders, and then to those Above Poverty Line (APL) who did not have gas connection. The current gas cylinder price is INR370 per unit. A cylinder is sufficient for use by an average family of five for a month. This price is made possible with the subsidy of INR150 per unit by the Government of India.

[42] At least one SHG in the village uses the microfinance scheme by the Indian Bank with the interest rate of 0.5-2% per month. Some SHGs obtain a loan from the Indian Overseas Bank.

(4) Sustainability of JFM

a) VFC function

At the initial stage of project implementation, the functions of VFCs were to plan and implement various project activities such as plantation and Buffer Zone Activities (so-called IGA and EPA) as management units. In particular, the Executive Committee of the VFC was a key in: 1) mobilizing the members; 2) managing the activities; and 3) facilitating collaborative work between the Forest Department and the members. VFCs were expected to be in charge of forest management, especially managing the right to access forests and NTFP after the project activities are completed. However, the functions of the VFCs have also diversified according to the needs of the members and the change of the surrounding socioeconomic environment.

To assess sustainability of JFM and compare the VFCs in Tamil Nadu with the VFPMCs in Rajasthan, the following four functions of the VFC/VFPMCs are identified: 1) an institutional mechanism for managing access to forest resources and forest protection; 2) an institutional mechanism for receiving and managing subsidies; 3) a financial institution of seed funds and an accrediting institution to SHGs' microfinance activities; and 4) a conflict management mechanism for use among the members.

Table 4-4 Functions of VFC in Tamil Nadu

Types of functions of VFC for analysis*	Survey results
Financial and accrediting institution to VFC members and SHGs to provide microfinance	• VFCs have functioned as a financer to VFC members and SHG to provide microfinance and as an accrediting institution for SHGs to get access to commercial banks. • SHGs manage microfinance by enhancing their members' creditworthiness. As a result of their strict credit management, SHGs can be an accrediting agency for other financing agencies and institutions.
Institutional mechanism for receiving and managing funds	• VFCs have functioned as an institutional mechanism for receiving and managing funds provided by not only the Forest Department but also Panchayat and other government agencies. • VFCs also receive public services, implement government's projects, and facilitate the government's service delivery.
Institutional mechanism for management of access to forest resources	• VFCs have been regulating grazing in plantation areas and controlling forest fires through social fencing in cooperation with the Forest Department. • In the areas where economic development is significant and public services have increased, the people's demand for access to forest resources has been diminishing, resulting in a lesser extent of access management by VFCs.
Conflict management mechanism for use among the members	• VFCs do not need to function as a conflict management mechanism among the members due to members' low dependence on forest resources.

*The types of functions of VFC addressed in the table are ordered by a degree of importance identified by the VFC members.
Source: Survey team

The survey results show (Table 4-4) that the main function of the VFCs in Tamil Nadu is to protect forests in cooperation with the Forest Department. In return for forest protection, the VFCs obtain various benefits such as NTFP or Minor Forest Product (MFP), government service, and microfinance. The VFCs also function as: 1) a financial and accrediting institution for the VFC members and SHGs to provide microfinance; and 2) an institutional mechanism for receiving and managing funds and public services and programmes provided not only by the Forest Department but also other government agencies such as Panchayat. The VFC functions reflect commercial banks'

willingness to extend loans to the VFC members and their SHGs even without a VFC's direct assurance. The VFCs have helped their members obtain loans from banks and government schemes, helped the members establish business, and cater to their financial needs. Here are the main responsibilities of the Executive Committee of the VFC: 1) maintaining loan records; 2) identifying new beneficiaries; 3) giving assurance to loan; and 4) selecting IGA.

One of the important functions of the VFC is to manage forests, MFP, and NTFP. However, it is notable that the function, i.e., access management to forest resources, has diminished in accordance with low forest dependency of the people, especially those in the areas where economic development is significant and other public services and programmes have been provided. While VFCs play an important role in forest protection by closely monitoring the forest resource usage, most of the VFC members in the surveyed villages collect grass and firewood without any restrictions due to relatively low intensity of their forest resource extraction. In Padavedu village, 150 households harvest seasonal fruits such as berry in the forest. Although each family generates an economic value with about INR 5,000 per season, the VFC role in controlling the NTFP is minimal. In only one Vinayagapuram VFC, the Executive Committee puts up cashew nut[43] for auction, and deposits the income in the VFC fund's account that can be used for loan distribution to its members.

b) Incentive mechanism

The villages under the TAP were provided USD 12,000 for village development to cover buffer zone activities over a period of three years. The fund aimed to reduce the dependence of villagers on forests by alternate IGA. At the inception stage, to motivate the people to work with the Forest Department for JFM, community infrastructures, soil moisture conservation structures, and employment opportunities in the construction and plantation sites above were provided based on the micro plan that the VFC members formulated. The villagers were also given a small departmental loan which was then distributed among the VFC members on a nominal interest rate for starting some IGA.

The VFPMC members have maintained incentives for forest conservation in return for access to resources such as microfinance, government programmes, and NTFP and MFP. With the loans, the members purchased milk cows to get extra income by selling milk and engage in other IGA. Besides, as a result of forest conservation and soil moisture conservation structure, water availability improved and helped increase agriculture production. VFCs have also introduced central- and state-government sponsored programmes and banking service into the villages through their strength as groups. This made the VFCs influential enough to affect the local governing body election. In Padavedu, the agreement of the VFC chairperson leadership in the Panchayat union made the VFC successfully carry out its decision-making with the support of the local body. With those incentives, the Tamil Nadu Forest Department has succeeded in transforming livelihoods so that woodcutters and grazer take up other viable vocations and need not revert to illicit activities in the forest.

(5) External factors influencing evolution of JFM

a) The National Rural Employment Guarantee Scheme

In 2005, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) was

[43] Cashew nut has been growing since the early 1970s in the Srinivasaudyanavanam reserve forest. Initially, the tender that was started in 1984 was vested in the Forest Department. After the VFC was set up in 1998 in this village, the rights to announce tender for the plantation have been vested in the VFC by the protest of the VFC members, and the benefit has been collected in the VFC common fund. Through the introduction of JFM, the output from the plantation has greatly decreased because of the infestation of forest plants such as throne plants due to the restrictions and ban of any plantation activity in the forest. In the year 1994, the plantation had 1,100 cashew trees; now it has only 600 trees. The tender amount and yield were also reduced from INR 80,000 (4,800 kg) in 1984 to INR 15,000 (400kg).

established with the aim of enhancing the livelihood and security of rural areas by guaranteeing 100 days of wage employment per financial year to adult members of rural households. The MGNREGA stipulates that work must be targeted towards a set of specific rural development activities such as: water conservation and harvesting, afforestation, rural connectivity, flood control and environmental protections such as construction and repair of embankments. The digging of new tanks/ponds and percolation tanks and the construction of small check dams are also given importance. The employees are also given work such as land levelling, and tree plantation. First a proposal is given by the Panchayat to the Block Office, and then the Block Office decides whether the work should be sanctioned. Under the Act, the National Rural Employment Guarantee Scheme (NREGS) was established. The Scheme is implemented as a Centrally Sponsored Scheme on a cost-sharing basis between the Centre and the States as determined by the Act.

The local employment opportunities are given to target villagers under the project. In the State of Tamil Nadu, one household is able to earn INR 110 to 120 a day, and obtain 100 days of employment in a year. It provides landless families with secure income. On the other hand, the scheme has a negative impact because agricultural activities have declined due to lack of agriculture labourers who obtain less than the NREGS daily wage rate. Work in farms is far more labour-intensive than the work given by the scheme. Since agricultural labourers have diverted their work towards NREGS, they are not available during the peak season of farming. Therefore, landholders are switching to perennial crops such as *teak, casuarina,* coconut and mango, as shown in the case of TCPL beneficiaries.

With the advent of NREGS, migration for earning livelihoods to other places has substantially decreased in all the surveyed villages. People are able to obtain labour opportunities either in their own village or neighbouring villages. They are also given the transportation fee. Hence most villagers are content with NREGS. However, this might have a negative impact on JFM. For example, many SHGs have stopped IGA (Salamanatham VFC) and gone to work under NREGS for making a living, through SHGs are still actively conducting group work through monthly saving. Besides, some VFCs find it difficult to hold meetings since the VFC members and the Executive Committee members are busy with secured labour. Thus NREGS has had both positive and negative impacts in rural society. The scheme has made the villagers change their employment status and lifestyle, made them less dependent on forests, and caused them lose interest in JFM.

b) Other central and state government programmes

Aside from the NREGS, central and state government programmes in the JFM target villages have been implemented. With an inter-sectoral mechanism at the district level, JFM villages have been provided with government services from different departments. As mentioned above, in 2006-07, the free LPG distribution and stove provision scheme was launched by then Chief Minister of Tamil Nadu to provide energy security to households and protect women from the adverse health effects of using fuels like firewood and cow dung. From 2006 to 2010, the State Government issued 2.3 million free gas connections with free stoves for BPL families. Those government assistance schemes have brought about synergistic effects in the JFM villages by providing alternative means of livelihood.

Regarding SHGs, the Government of Tamil Nadu spearheaded the SHG concept by forming SHGs in 1989 with the assistance from the International Fund for Agricultural Development. The Tamil Nadu Corporation for Development of Women was established in 1983 to promote inclusive growth by ensuring equal rights, equal opportunity, and progress for all women with a special focus on the poor and marginalized sections of the society. The formation, grading, and training of Women's SHG are being done by the Corporation. The respondents revealed that SHGs were organized by the state government initiative of SHG schemes called 'Valtnhukattalam project.' These SHGs were later adopted by the Forest Department under JBIC supported project with the objective of starting IGAs in groups so as to enhance the socioeconomic status of its members. As a result, many SHGs were

formulated and gained confidence from the government bank as long as they are organized as a group under VFCs.

c) Forest Rights Act 2006

As of May 2011, the Forest Department has received a stay order from the Madras High Court against the implementation of this Act. Thus no influence of the Forest Rights Act 2006 has been observed in the surveyed villages. Out of the 44 respondents in the survey, only four, i.e., three VFC chairmen and one NGO worker, are aware of the Forest Rights Act 2006. Among the four, none is aware that Gram Sabhas formed the Forest Rights Committee at the Panchayat level. Accordingly, no claim has been issued in the surveyed villages since the Forest Rights Act 2006 was enforced.

4.2.3 Survey results in Rajasthan

(1) Forest related projects

In Rajasthan, JBIC financed four projects in the forestry sector: 1) the Aravalli Afforestation Project (1995-2000); 2) the Afforestation and Pasture Development project along the Indira Gandhi Canal Area (1991-2002); 3) the Forestry Development Project (1995-2002); and 4) the Rajasthan Forestry and Biodiversity Project (2003-2010). The overall objectives are to: 1) check desertification and to restore the ecological status in the Aravallis; 2) provide infrastructure; 3) conserve the gene pool; 4) augment the availability of fuel wood and fodder to generate employment opportunities; and 5) elicit people's participation. Udaipur district, the target district in the case study in Rajasthan, is mainly under the Aravalli Afforestation Project (AAP) and the Rajasthan Forestry and Biodiversity Project (RFBP). As shown in Table 4-2, about half of the surveyed villages are covered by the two projects to "sustain" JFM related activities. The projects were implemented under different components such as afforestation, biodiversity conservation, EPA, IGA and supporting activities. However, the AAP did not have EPA and IGA components[44], while the RFBP provided EPA and IGA to most VFPMCs and SHGs surveyed[45]. Under the AAP, wages earned by villagers through plantation work were the initial economic benefits that the VFPMC/EDC members enjoyed from JFM.

(2) Achievements of JFM

a) Effectiveness of project activities

Afforestation

The Aravallis, one of the oldest mountain ranges in India, divides the Rajasthan state into two parts. A vast expanse of arid and semi-arid land lies in the west of the Aravallis, known as the Thar Desert. Continued deforestation and soil erosion have converted the once densely forested hills into a barren rocky structure. Expanding desert areas are engulfing productive land every year in the south. This has resulted in a deterioration of the environment of the Aravallis. Given the conditions, JFM was introduced in Rajasthan in the early 1990s with financial assistance from JBIC (now JICA). Under the JICA projects, the area designated for plantation was divided into 50 ha blocks to maintain uniformity in the plantation pattern. The number of plants in the blocks varies by size and girth. The total plantation area under one VFPMC/EDC within the surveyed villages ranges from 50 ha under the Mahsara EDC to 1,100 ha under the Gavdapal VFPMC with an average of 356 ha.

The most commonly planted species are *Amla, Baheda, Bamboo, Belpatri, Ber, Chitrak, Churail,*

[44] The Rajasthan Forest Department added EPAs in a few villages in the Project by making use of a food-for-work programme run in parallel by the World Food Programme (JBIC, 2003)

[45] Some infrastructure for water conservation such as water harvesting structures and anticuts were provided by the budget of the Rajasthan Forest Department.

Desibabool, Giloi, Gogal, Hawan, Imli, Jamalghota, Jamun Kachnaar, Karanji, Katkaranj, Kattha, Kher, Kotbadi/kont, Mahua, Mujjal, Neem, Paras Peepal, Regna, Rudraksha, Semal, Shisham, Siras, Sitaphal. At the initial stage of JFM, the species planted in the forest areas were determined primarily by technical factors such as climate, soils and topography. Later, the selection of species was done more in favour of the villagers. Even so, the species planted in the forest areas were determined through discussions among the VFPMC members, the Forest Department, and villagers. As a result, the planted species have shifted from timbers to medicinal plants and fruit trees such as *Mango, Amla, Neem, Berries, Karanj* (oil), *Tendu* (local bidis).

Soil moisture conservation works

Soil moisture conservation works have been carried out in all surveyed villages. With the use of the EPA funds from JICA and the Rajasthan Forest Department, check dams, check walls, and percolation dams were constructed to increase the water storage capacity. Percolation dams are recharged structures constructed on small streams with adequate catchment for impounding surface runoff. These dams are used for quickly recharging groundwater. In addition, anicuts (both temporary and permanent), which are a small water harvesting masonry dams, were constructed across streams to hold sufficient water and submerge the upstream area during the rainy season. The stored water is used for irrigation and recharging groundwater in adjacent wells for drinking. *Pachayats* also allocated some funds to construct anicuts in a few villages.

Entry point activity and income generation activity

Under the RFBP, the funds for EPAs and IGAs were allocated to all surveyed VFPMCs in a range from INR 100,000 to INR 500,000. Fund allocation was determined based on the needs of the villagers. EPAs were primarily intended to: 1) build trust among villagers with the Forest Department; 2) provide the forest officers and the villagers with opportunities to understand the importance of the people's participation; and 3) motivate villagers to participate in forest protection. The types of EPAs were mostly community halls (7 out of the 11 VFPMCs/EDCs), followed by meeting platforms, hand pumps, irrigation facilities, anicuts, and check dams. According to the interviews with the VFPMC Executive Committee members, the type of the infrastructure under the EPAs were determined by the Forest Department together with consensus among the villagers, and were not based on the micro plants that they formulated in the beginning. Only one VFPMC in Karel used its own funds for EPAs. In view of the VFPMC/ECD members, the micro plans were formulated by the Foresters and Forest Rangers. Regardless of the level of the people's participation, the facilities provided by the projects have met the objectives and are well maintained by the VFPMCs/EDCs.

Box 4-1 *Aloe Vera* business by the Attatia VFPMC in Udaipur district

The Attatia VFPMC shows a successful case of IGA in relation to forest products. The villagers obtained two benefits out of the plantation, i.e., wage labour for the plantation work (INR 80 per day); and 2) income from the business operations from growing *Aloe Vera*. In total, 120,000 seedlings of *Aloe Vera* were planted over 25 ha under the AAP and 100 ha under the RFBP. In 2006, the VFPMC set up an *Aloe Vera* juice production unit under the guidance of the Forest Department. The processing building was granted by the Forest Department to house the machinery for the extraction of juice. Initially, Maharaja Pratap University based in Udaipur lent machinery to the VFPMC to start up the operation through the coordination of the Forest Department. Due to the income generated, the VFPMC returned the machinery and bought three machines with its own funds, about INR 100,000. The factory has provided the villagers with employment opportunities. Five VFPMC members were able to obtain permanent employment and an additional 10 members were able to get work on a temporary basis. In this year, the VFPMC expects to garner a net profit of INR 375.000 from the sale of *Aloe Vera* juice and powder. The local contractors purchase the products from the VFPMC and sell them to the retailers in Udaipur City. Half of the net income goes to the VFPMC fund, while the other half is utilised for the plantation and upkeep of *Aloe Vera*.

Source: Interviews with the Attatia VFPMC Executive Committee members

On the other hand, IGAs were not implemented at the initial stage of the project's implementation. This resulted in the front line forest officers not knowing how to utilise the funds under the IGA component, and some of them were afraid of failing business operations. As a result, some forest rangers deposited the funds in the bank account of the VFPMCs/EDCs. Lately, IGAs have been initiated by the Forest Department and the VFPMCs with technical and financial assistance from the Forest Department. No NGOs were involved in the process except for a few NGOs that had their own funds. The Forest Department provided registered SHGs with INR 20,000 as an initial capital investment. The repaid money has been utilised as a revolving fund for other beneficiaries. The activities include: 1) *Agarbatti* (incense) stick making in the Dani Talai VFPMC; 2) *Aloe Vera* juice extraction in the Attatia VFPMC; 3) dairying in the Baleecha and Gujjaron Ka Guda VFPMCs; and 4) a grocery shop under the SHG in Mehsara village. *Aloe Vera* juice is the only forest related activity. The key factor for successful business operations lies mainly in the establishment of marketing. The forest officers have taken a vital role in finding a market linkage for the VFPMCs.

With respect to the effectiveness of EPA and IGA, the forest officers gave us mixed views. The Forest Ranger in Baleech revealed that the RFBP has been more beneficial than AAP for forest fringe villages to improve their living conditions, as it had the funds which could provide them with public infrastructure such as community halls and water pumps. On the other hand, the Forest Rangers in Karel stated that the AAP has been more beneficial than the RFBP in terms of forest conservation, as the fund was allocated mostly towards plantations. As Table 4-2 shows, half of the surveyed VFPMCs had received funds for plantation purposes several times to expand their plantation areas. According to the DFO in Udaipur, *"the Forest Department has to keep providing the VFPMCs with financial and technical assistance. Otherwise, the VFPMCs will not be able to sustain themselves."* The response from the forest officers indicates that the objectives of the project along with the future direction of JFM, especially about what the VFPMCs should be doing in the future, are not necessarily shared by all the forest officers.

Village Development Fund

All VFPMCs/EDCs created the Village Development Fund (VDF) and the Corpus Fund[46] to manage the daily forest-related activities and any exigencies that the village or a particular member might face. The VFPMCs have accumulated their funds from: 1) membership; 2) money levied as fines and penalties for grazing and lopping in the JFM areas; 3) NTFP's sales (Bamboo in all VFPMCs and Amla in Dani Tali VFPMC); 4) access charges to forests; 5) commission from the profits of business operations; and 6) donations from members (INR3-5 per household per day). Eight out of the 11 VFPMCs/EDCs agreed to charge annual fees (entrance fees) for grass collection and lopping per household in a range from INR10 in the Palasma VFPMC to INR 100 in the Baleecha and the Dani Talai VFPMCs per household per year. The Karel VFPMC, which was established in 1999, and has INR 650,000 in its account accumulated from: 1) the collection of access charges; 2) sales of processed pulses (VFPCM business operation); and 3) donations from its members (INR 3 per day). The funds have been utilised for: 1) purchasing and upgrading the machinery for the pulse processing unit; 2) developing the community hall; and 3) providing loans to the villagers.

Despite the large amount of the VDFs. i.e., in a range from INR 100,000 to INR 700,000 with the average of INR 150,000, the ultimate decision making concerning fund disbursement is still the hands of the Forest Department. In particular, an issue lays in how to utilise the Corpus Fund in most VFPMCs/EDCs. The VFPMCs/EDCs members, and even the forest officers, except for a few

[46] According to the interviews with the forest officers and the VFPMC Executive Committee members, the VFPMC/EDC has a single bank account, but it maintains a separate register where the money is put under different headings such as the Village Development Fund and the Corpus Fund. The VFPMC Executive Committee members often seem confused as to the flow of money. According to the Foresters, the money put under the Corpus Fund is not used by any member and is kept flowing in but not out. It is saved to meet requirements during unforeseen future damages or problems, while the money under the VDF is utilised for the development of villages and forests such as building anicuts and drinking water facilities.

VFPMC/EDC members, have no clear ideas as to what it should be used for. Besides, the Forest Department tends to consider the size of the VFPMC's bank account as a vital indicator of their success. Furthermore, the VFPMC/EDC members perceive that there is a necessity for external control which can ensure checks and balances in the funding process. This indicates that the VPFMCs/EDCs do not have the capacity to handle the funds on their own. On the other hand, the VFPMCs/EDC in Karel, Baleecha and Mahsara villages set up lending schemes to the SHG members and to their individual members with a low interest rate, i.e., 1% per month. The Baleecha and Mahsara VFPMCs obtained initial capital from the Forest Department, while the Karel started it with its own funds.

Farm forestry

Under the farm forest component in the RFBP, seedlings such as *Neem, Mango, Amla, Ber* were raised in the Forest Department nurseries to distribute to farmers, schools, Panchayat, government institutes and requested them to plant them on their lands. The VFPMCs were given the option of whether the seedlings were to be sold or given away. The Dani Talai VFPMC had sold 190,000 seedlings at a price varying from INR 3 to INR 7 per seedling from 2007 to 2011, and generated INR 534,000 in revenue. The sales numbers demonstrate the economic potential that farm forestry has at the individual and collective levels. On the other hand, the land holding patterns in most villages in Udaipur are, unlike Tamil Nadu, small, rain fed, rocky and undulating. This leaves few options for farm forestry on a large scale. In fact, only a few trees such as *Mangos* and *Neems* were planted on the edges of their farmlands. The farmers opt for agricultural products such as wheat and maize to meet the demand of home consumption and get immediate income. Considering the noticeable interest in fruit trees among the VFPMC members in the plantations, farm forestry can be pushed through on private lands to provide farmers with a little extra income and food for home consumption. Further, planting trees within or close to agricultural fields can actually improve agricultural production by: 1) fending against wind; 2) increasing nitrogen levels in the soil through the nitrogen fixing properties of the roots; and 3) improving soil structure through biomass contribution (JBIC, 2003).

b) Effectiveness of implementation and monitoring mechanisms

Implementation mechanism

No special project management unit was created for the AAP and the RFBP. Instead, the projects were implemented using the existing strength of the Rajasthan Forest Department. Unlike Tamil Nadu, no particular guideline for the implementation of EPA and IGA was formulated. The JFM Order, *"A Scheme for mobilising the Support of Village Communities and Voluntary Agencies for Rehabilitating Barren and Degraded Forestlands"*, issued in 2000, was considered the guideline to implement the projects.

Inter-sectoral linkage

The inter-sectoral linkage was not formally established at the state and district levels exclusively for the purpose of implementing the projects. Within the existing institutional framework, Panchayat was supposed to coordinate with the VFPMCs/EDCs and the sectoral departments to provide the villagers with public services and to implement the projects with their own funds. However, the Panchayats in the surveyed villages have rarely been involved in the decision making process and monitoring. Initially, only two VFPMC/EDCs in Palasma and Mewasa shared the micro plans formulated by the Forest Department together with VFPMCs/EDCs with the respective Panchayats. The Mewasa EDC shows a case of cooperation among those stakeholders. The micro plan of the Mewasa EDC was formulated with the assistance of the Veterinary Department (veterinarians) and the Land Inspecting Authority. Also, the Panchayat at Gujjaron Ka Guda VFPMC funded about INR 600,000 for the construction of an anticut. The degree of Panchayat involvement in project activities is determined by local politics. If the Chairperson or a member of the VFPMC/EDC has been the head of the Panchayat, the Panchayat then tends to assist the VFPMC/EDC and facilitate the process as observed

in the Palasma VFPMC. As such, the Panchayat is the key actor needed to strengthen the inter-sectoral linkage.

Monitoring of VFPMCs by the Rajasthan Forest Department

The DFO monitors the functioning of the Executive Committee of the VFPMC and sends monthly reports to the Conservator of Forests. Unlike the Tamil Nadu case, the officer does not have the authority to disband the committee and order for the reconstitution in accordance with the JFM Order. The Forest Rangers or the Assistant Forester, the ex-officio secretary of the Executive, have no voting power.

The Forest Department conducts monitoring on a regular basis. The monitoring system differs by territorial division, although the reporting on forest protection and the VFPMC/EDC status is undertaken in a hierarchical order starting from a Forest Watcher/Cattle Guard/Forest Guard, Forester to a Forest Ranger. Each forest officer has certain responsibilities towards forest protection. The Forest Rangers are in charge of: 1) arranging the Executive Committee and general meetings; 2) checking the damages in forests by illegal harvesting and livestock grazing; 3) looking after police cases such as poaching and the implementation of the Forest Rights Act 2006; and 4) paying payroll to the labourers who are given wage labour by the Forest Department. The Foresters also handle technical work such as trench and pit, digging and layout and plantation, while the Forest Guards and the Cattle Guards look after the status, protection and development of the forests. The Forest Rangers visit one village and the forest once every four to eight days, the Foresters do so once every two to five days, and the Forest Guards the Cattle Guards[47] and the Forest Watchers monitor the forests daily. In addition, the Forest Department appoints the Forest Friends who patrol forests daily for the EDCs, since the reserved forests under the EDCs have to be more sensitive than other protected forests.

The VFPMCs/EDCs have also contributed to forest protection by engaging in voluntary protection and hiring a Watchman. During the project implementation, the VFPMCs/EDCs appointed two Watchmen with funds from the project. Now some VFPMCs/EDCs have hired a watchman through the funds generated by the VFPMCs/EDCs. The EDCs have taken a special initiative in which they appoint a Forest Friend who ensures that no poaching and activities detrimental to the forests are taking place. The range of the monthly salaries for the Watchmen and Forest Friends are from INR 1,500 to 3,000 based on the VFPMC/EDC rules. The VFPMCs/EDCs have their own recruitment mechanisms for the Watchmen/Forest Friends. For example, the Baleech VFPMC has a bidding system where in the Gram Sabha any resident is allowed to bid for the position to work for a year. The person who bids the lowest is appointed. Normally around INR 20,000 is paid per year. All the VFPMC/EDC members have been actively involved in stopping forest fires if any occur.

Despite all the efforts by the Forest Department and VFPMCs/EDCs, the illegal felling of trees by the villagers from adjacent villages has been still evident, especially in Baleecha and Dani Talai villages. All VFPMCs/EDCs in the surveyed villages have their own rules and regulations on the sanction of violations. Any illegal harvesting or felling has an imposed a fine which varies by village. The rates range from INR 100 to INR 25,000. For example, the Baleecha VFPMC imposes a penalty of INR 2,500 for cutting five pieces of bamboo, while the Gujjaron Ka Guda VFPMC charges INR 151 for illegal cutting of grass and INR 501 for cutting tress. There was a case in the Kewra VFPMC where a chemical was spilled over onto the forest land due to an accident involving a truck carrying acidic chemicals. The chemical company was then levied a penalty of INR 11,000 which was equally shared between the Forest Department and the VFPMC. In the Mehsara EDC, the fine for hunting a wild boar is quite high with a rate of INR 25,000. A further example of how the penalty process varies is the Dani Talai VFPMC which is a unique case because, instead of charging any penalty for

[47] The Forest Guard and the Cattle Guard are permanent officers of the Forest Department who stay in the VFPMC checkpoints and go for the patrolling of covered forests.

illegal cutting and grazing, the family members of perpetrators are not allowed to enter the forests in the forthcoming season to cut grasses. The survey team verified that the rules have been enforced in most VFPMCs/EDCs.

The survival of trees is partially attributed to effective monitoring by the Forest Department and the VFPMCs/EDCs. The survival rates at the end of the project[48] in the surveyed VFPMCs/EDCs ranged from 50% to 85% with the average being around 75%. In the Baleecha VFPMC, the survival rates are 90% in the first year, 80-85% in the second year, 70-75% in the fourth and fifth years with the overall average being 80%. The main reasons behind the high survival rates are that: 1) dead individual trees in the first year were normally replaced by other trees; 2) seedlings were sow during the early monsoon season; 3) monitoring by the Forest Department and the VFPMCs/EDCs was effective. The survival rate is measured by dividing the area in several grids and subsequent marking (sprinkling ash on ground at tree point) of each individual tree in the plot. The VFPMCs/EDCs also help the Forest Department in the task of manual counting trees, and replacing dead or dried trees with the new ones.

At the initial stage, trust between the Forest Department and villagers was not built easily, and it was difficult to reconcile to the idea of being equal partners in managing a resource, as they were strictly kept away for so many years and the Forest Department protect forests by force. According to the interviews with the forest officers, it took time and effort to make the villagers realise the importance of forest conservation that had led to the small disputes between them. Over the years, however, the villagers came to realise the significance with tangible benefits given by the forests such as grass, firewood, water and other NTFP. At the same time, the forest officers have realised that forest conservation cannot be successful without the participation and cooperation of the villagers. During the whole process of the JFM-related activities undertaken over the years, the Forest Department and the villagers built more trust and confidence with a better understanding of each other.

NGO involvement

Despite the JFM Order[49] that stipulates the responsibilities of NGOs and voluntary agencies, cooperation with NGOs is not prominent at the field level. Without any guideline on NGO roles and responsibilities in the Rajasthan Forest Department, no systematic recruitment of NGOs and voluntary agencies was done during the project's implementation. Only a few NGOs have operated in the surveyed villages with their own funds. In Attatia villages, three NGOs, Seva Mandir, Redma Biap Sansthan, Gandhi Manav Kalyan Sanstha, have been active. They have been involved in afforestation, health and sanitation improvement, formation of anicuts, promotion of farm forestry, and improvement of agricultural practices. Further, Seva Mandir has run a play-way school which changed the informal school of the villagers who want their children to study in Popalti village, while Shyong Sansthan has provided the villagers with loans for purchasing more livestock in Beleecha village.

NGOs can play a crucial role in JFM, i.e., in building community stakes, rebuilding institutional mechanisms, promoting the bottom-up approach in national resource management, and in facilitating the devolution process. Research states that there is evidence to indicate that communities that have

[48] The forest officers provided us with the data at the end of the project, i.e., the fifth year from the start of the project, that are considered the important indicators for them. According to the interviewed forest officers, they still monitor the rates and report to the district offices, and do not carry the data.

[49] Section 9 of the JFM Order states that: 1) the NGOs and voluntary agencies in the area who are willing to play a role in the JFM programme of the state shall act to establish rapport and co-ordination between the VFPMC and the Forest Department; 2) the NGOs/voluntary agencies shall act as a catalyst in formation of VFPMC; 3) the NGO/voluntary agencies shall assist in formulation of micro-plans and management plants; 4) the NGOs/voluntary agencies shall act to disseminate information among the general public about the policies and rules of the forest department; 5) the NGOs/voluntary agencies shall play the role of mediators in resolving disputes about sharing of forest produce among the different sections of a VFPMC; 6) the NGOs/voluntary agencies shall be in touch with the villagers and shall convey problems and difficulties experienced by them to the 'departmental authorities'.

been supported by NGOs have fared better in forest protection (Ghate and Nagendra, 2005). However, it should be noted that NGOs are diverse in nature, and not a unified entity. If NGOs have their own financial resources involved in JFM, it is obvious that they are not a mere community mobiliser or catalyst as might be originally planned by the Forestry Department[50] but rather an independent driver for community forestry. For example, Seva Mand, a relatively large NGO based in Udaipur with a good reputation for community development, has provided guidance and technical support on a wide range of forestry issues including the introduction of the Forest Rights Act 2006. However, the Attatia VFPMC case shows that the activities have been strongly driven by the NGO. The respondents, the VFPMC members, have the perception that the NGO is the one who owns the VFPMC, selects the VFPMC members, and formulated the micro plan. This implies a lack of ownership of the members over JFM related activities and the VFPMC.

Village Forest Protection and Management Committee organisation management and participation process

The Village Forest Protection and Management Committee (VFPMC) was formed for every revenue generating village. All adults residing in the revenue boundaries of the concerned village are entitled to the usufruct of natural resources falling within the boundary of that village, and have the rights of being a member of the VFPMC (Government of Rajasthan, 2000). The JFM Order stipulates that the VFPMC is in charge of: 1) protecting forest and pasture lands; 2) evolving rules for harvesting and sharing forest products; 3) striving to protect forests, forestlands, pasture lands, plantations and wildlife in the area of operation; 4) assisting the forest personnel; and 5) preparing a plan for utilising the income received for replanting the existing areas.

The VFPMCs/EDCs came into the existence through the continuous efforts of the Forest Department. Now all VFPMCs/EDCs in the surveyed village are registered under the Societies Registration Act. Generally, one or two per household is/are member/s of the organisation. However, the VFPMCs/EDCs do not cover all households in all the villages, as some households, who do not depend on the forests, do not see the benefits from taking part in JFM. With respect to the membership of VFPMC/EDC, at the inception of the VFPMC formulation, the number of members ranged from 22 in the Karel VFPMC to 262 in the Kewra. VFPMC membership on the average is about 128, while the present number of the members ranges from 80 in the Gujjaron Ka Guda VFPMC to 700 in the Kewra VFPMC. This increase in number is result of population growth in the villages and the realisation of the benefits such as more grass, fodder and firewood. Now almost 85%-90% of the households in the villages are the members of the VFPMC/EDC. Those who are not included are mostly well off or are non-dependent on the forests. No unintended exclusion of a particular group of people in the villages was confirmed in the survey.

With the respect to organization management, the Executive Committee members were selected mostly by the members but in one case by the officer of the Forest Department. All the Chairpersons were elected. After that, no election has been held except in the Palasma VFPCM, although the JFM Order states that the tenure of the Executive shall be two years and reconstituted after the term. The Forest Ranger is the Member Secretary of the VFPMC/EDCs, while the elected members of the Gram Panchayat are ex-officio executive members. It was mandatory for the Executive Committee of every VFPMC to have less than 11 members who are elected from the VFPMC/EDC members by the Gram Sabha. The Committee also has to have at least one member each from the Scheduled Castes and Scheduled Tribes where the percentage of the population of each of these groups is more than 10%, and three women members. In the survey villages, each Executive Committee is composed of 11-13 members including three women, although none of the women hold any managerial positions. Women also participate less than men in decision-making. The social factors leading to this include low levels of literacy and information limit the engagement of women in public life. Concerning social status, a dominant caste in the village has more representatives in the Committee. The

[50] It is stated in the JFM Order in Rajasthan issued in 2000.

Executive Committee members are considered those who have leadership skills in the social context. However, some Executive Committee members including the Chairpersons, who are mostly illiterate, were not aware of the JFM related activities and referred to the forest officers during the interviews. It can be inferred that the educational levels of the Committee members affect organisation management to a certain extent.

Each Executive Committee carries out the organisation management with the Advisory Sub-Committee of Women only in the Kewda and Attatia VFPMCs, as stipulated in the JFM Order. All surveyed VFPMCs/EDCs still conduct a monthly or quarterly Executive Committee meeting. The average attendance rate is around 85%. Here are the main topics to be discussed in the meeting: 1) forest management (forest protection and grass harvest); 2) organization management; 3) financial management (loans); and 4) conflicts among the members[51]. In the case of the EDCs, the issues surrounding poaching for wildlife are also discussed. The members still refer to the micro plan to be implemented. Decision-making is done by consensus among all the Executive Committee members. All the surveyed VFPMCs/EDCs keep the minutes of a meeting that are taken by the forest officers. Each VFPMC/EDC has a bank account under the name of the VFPMC/EDC. A general meeting among all the members is conducted once or twice in a year or irregularly. Topics for the meeting are the same as the Executive Committee meeting. The discussion on forest management is still the most prioritised in the meeting. The attendance rates vary from 50% to 100%. It is deduced that the levels of activeness of the VFPMCs/EDCs' and people's participation also differs by the organisation. Most VFPMCs/EDCs are still active due to forest-related benefits.

(3) Impact of project intervention

a) Agriculture

Agriculture is the major source of income for the villagers in the surveyed villages. The landholding sizes range from 0.4 ha to 6 ha per household. Households under the EDCs tend to have a larger size than those under the VFPMCs due to peculiarity of the surveyed sites selected in this case study. The Projects had an indirect impact on agricultural yield. After the implementation of the project, a significant change has been observed in the cropping pattern. According to all Executive Committee members (11) of the VFPMCs/EDCs in the surveyed villages, the ground water table increased due to the water harvesting systems. Before JFM was introduced, the major crops were wheat and maize which do not require much water. JFM has contributed to diversifying agricultural crops such as *corn, jowar, jarlic, mustard, chilli, pulses,* and seasonal vegetables. Intercropping systems have taken place in some villages.

b) Forestry

JFM has enhanced the productivity of the forest eco-system by supporting bio-ecological inputs. Aside from the natural regeneration of forests, JFM has led to augmenting the local supplies of firewood, fodder, grass, and other NTFPs with soil moisture works and reduced biotic interference from people and animals through social fencing. The survival rates of the species are around 75% on average in the surveyed villages in a range from 55% in the Mahsara EDC to 86% in the Gujjaron Ka Guda VFPMC. A greater production of grass and its availability to livestock as a feed has had a direct impact on milk production. Together with the microfinance scheme through SHGs in some villages, the VFPMC members could purchase more buffaloes and increase income generated from milk, while the number of goats has decreased. In Baleecha village, each household had two or three buffaloes before 10 years, while each household has more than 10 buffaloes due to the availability of grass from the forests that is estimated to be at about 850t in total per year in the village.

[51] The discussions are related to personal conflicts among the members such as failures to repay money on time, and the destruction of crops due to accidental gazing of cows/goats.

However, no consistent trend in the changes of the number and type of livestock can be observed in the surveyed village. In Kare the VFPMC and the Mehsara EDC, the livestock population increased 10% and the population increase of goats was higher than cows and buffaloes. In Gujjaro ka Guda village, the number of goats and buffaloes increased, while the number of cows decreased. In Rajasthan, the number and type of livestock that the villagers own are determined not only by the availability of grass and fodder but also other external factors such as weather and disease. In Gavdapal village, the decreased number in livestock is attributed to famine and disease in the village. In the Mahsara and Mewasa EDCs, the number and type of livestock stayed the same before and after the project. This resulted in less dependency on the forests. As mentioned above, the villagers in EDCs are more focused on agriculture and able to meet the requirement of fodder and grass from their private agricultural fields.

The dependency on the forests is still high in the surveyed villages. Almost every household in one village except a few households which use LPG still collect firewood. The VFPMC/EDC members collect *Bar, Jamun, Amla, Mahua, Kahajor Leaves, Tendu Patta, Ratanjyot (Jatropha Carcass), Gum and Honey* mostly for home consumption. *Tendu Patta* and *Ratanjyot* are also sold at the rates of INR 2-3 per bundle[52] and INR 10.58 per kg respectively. *Amla* seeds raised in the Forest Department nursery by the Dani Talai VFPMC members are sold to the Forest Department at a rate of INR 2 per kg. Under the RFBP, the scheme of "Bamboo Culture Operation" launched in 2005. Within the scheme, *Bamboo* has been planted in all the surveyed villages. In the Baleecha VFPMC, half of the INR 4.2 million obtained through the sale of *Bamboo* was shared with the Forest Department. Table 4-5 shows the benefits from the forests in selected VFPMCs where the Survey team managed to obtain reliable data. Despite the high dependency on the forests, the pressure was not observed due to the forest management undertaken by the VFPMCs/EDCs.

Table 4-5 Benefits from the forests in selected VFPMCs

	Grass (tonnes per year) *market price: INR2/kg	Firewood (tonnes per year) *market price: INR1.5/kg	Last revenue from bamboo sales (INR)	Other NTFPs
Baleecah VFPMC	850	750	2 million	*Amla, Khair, Katkaranj*
Palasma VFPMC	200	900	2.2 million	*Amla, Khair*
Dani Talai VFPMC	400	360	90,000	*Amla, Tendu leaves*

Source: Interviews with the VFPMC members

c) Other impact

In terms of income, no drastic change can be confirmed in the surveyed villages except those VFPMCs that obtained employment opportunities from the Forest Department[53], and succeeded in IGA such as *Aloe Vera* Juice production, pulse processing mills and dairying. Women have benefitted from an increased supply of NTFP, as women are in charge of collecting them for dairy use. Due to less time needed for collection, women were able to reallocate their time towards IGAs and other activities. SHG formation could have a high impact on their livelihoods, by helping women who wish to take loans to purchase more cattle, and in procuring manure and seeds for their agricultural fields. Women's participation in SHG activities has given them a sense of pride and also a greater capability of handling family issues. Successful cases of SHGs include tea stalls and *gulal* production in Kewra village, and earthen wares and grocery shops in Mehsara village. Further, with group activities, JFM has been a platform where the villagers gather together to manage common properties that have led to strengthening a more socially amicable coherence.

[52] 1 bundle contains 40 leaves.
[53] This includes: 1) care of nurseries run by the Forest Department; 2) plantation work; and 3) forest watchmen.

(4) Sustainability of JFM

a) VFPMC/EDC function

At the inception of the projects, the functions of VFPMCs/EDCs were to plan and implement project activities such as plantations under the AAP, and plantations, EPAs and IGAs under the RFBP in cooperation with the Forest Department. In the same way as the Tamil Nadu case, the Executive Committee of the VFPMC/EDC initially played a key role in: 1) mobilizing the members; 2) managing the activities; and 3) facilitating collaborative work between the Forest Department and the members. According to the Forest Department, however, it took some time to convince the villagers to participate in JFM, since they were heavily dependant on the forests. VFPMCs/EDCs were expected to be in charge of forest management, especially managing the right to access forests and the NTFP after the project activities were completed.

As mentioned above, to assess the sustainability of the JFM project and compare the VFCs in Tamil Nadu with the VFPMCs/EDCs in Rajasthan, the following four functions of the VFCs/VFPMCs/EDCs are identified: 1) an institutional mechanism for managing access to forest resources and forest protection; 2) a financial institution of seed funds and an accrediting institution to SHGs' microfinance activities; and 3) a conflict management mechanism among the members; and 4) an institutional mechanism for receiving and managing subsidies.

Table 4-6 Functions of VFPMCs/EDCs in Rajasthan

Types of Functions of VFPMC/EDC for Analysis*	Survey Results
Institutional mechanism for the management of access to forest resources	• VFPMCs/EDCs have regulated grazing in plantation areas and are controlling forest fires through social fencing in cooperation with the Forest Department. • The VFPCM/EDC members still depend on the forests and need to utilise forest products. Thus the people's demand for access to forest resources is still high. This results in a large degree of access management by the VFPCMs/EDCs.
Financial and accrediting institution to VFPMC/EDC members and SHGs to provide microfinance	• VFPMCs/EDCs have functioned as a financer to VFPMC/EDC members and SHGs to provide microfinance only in the Karel, Baleecha, and Mehsara VFPMCs/EDC. However, this is not their major role. • VFPMCs/EDCs have not functioned as an accrediting institution to the members who whish to access loans.
Conflict management mechanism among the members	• VFPMCs/EDCs have functioned as a conflict management mechanism among the members. The issues of contention are not necessarily related to JFM.
Institutional mechanism for receiving and managing funds	• VFPMCs/EDCs have functioned as an institutional mechanism for receiving and managing funds provided by not only the Forest Department but also Panchayat and other government agencies. However, the function is minimal.

*The types of functions of VFPMC/EDC addressed in the table are ordered by a degree of importance identified by the VFC members.
Source: Survey team

The survey results in Table 4-6 show the functions of the VFPMCs/EDCs in the surveyed villages. The major function of the VFPMCs/EDCs is to protect forests in cooperation with the Forest Department and in return the VFPMCs obtain various benefits such as NTFPs or MFPs, and other government services. While VFPMCs/EDCs play an important role in forest protection by closely monitoring forest resource usage, most of the VFPMC/EDC members in the surveyed villages collect

grass and firewood without any restrictions[54]. All VFPMCs/EDCs put bamboo up for auction. Half of the income from the sale of NTFPs are shared with the Forest Department and is deposited in the VFPMC/EDC bank account and can be used for loan distributions to its members and for development work. Other functions such as financing loans and receiving funds from other agencies are minimal.

b) Incentive mechanism

With the awareness raising activities conducted by the Forest Department at the inception of the project, the villagers came to realise the importance of forest protection. Following this, the villagers were convinced to participate in JFM by gaining intermediate benefits such as NTFPs, MFPs, and employment opportunities through plantations and other public works related to JFM. The VFPMC/EDC members have still maintained the incentives for forest conservation due to the benefits that they have gained from the forests. This has resulted in a high dependency on the forests in Rajasthan after the projects, as was the case before the projects. Unlike Tamil Nadu, the benefits from other government programmes and access to loans are still minimal in Rajasthan. After the introduction of bamboo plantations and benefits sharing, access to loans has increased in some VFPMCs/EDCs in accordance with the increase of initial capital to start a lending scheme. In only those VFPMCs/EDCs, access to lending schemes has become one of the incentives of the members participating in JFM.

(5) External factors influencing the evolution of JFM

a) Forest Rights Act 2006

Contrary to the Tamil Nadu case, all respondents except for a few SHG members are aware of the Forest Rights Act 2006, while about half of them know that the Gram Sabha for the Act was conducted (Table 4-7). Villages which have not conducted the Gram Sabha have no claimant for obtaining forest rights. As of May 2011, the villagers under five VFPMCs have claimed the titles, since the villagers came to learn about the Act through the awareness campaign conducted by the Forest Department in 2007-08. At the village level, only those claims that were approved and accepted by consensus among all villagers through the Gram Sabha have preceded to the district level. Others that are viewed as illegal encroachments by the villagers have been opposed and have not proceeded to the next step. The villagers believe that the false claims will lead to dividing the forests and decreasing the resources derived from the forests.

Most claimants intend to obtain the rights for agriculture use. In consideration for topography and soil quality, these tribes will not get as much tangible benefit from the claims. However, they incline to have the registry of the lands to increase their security. In some cases, the registry of the lands under their names is perceived as a symbol of pride and prestige. In the Popalty VFPMC, 25 claimants have reported to get assurances over the possession of the lands even if it is not productive, although only two of them received the approval. Others have not been approved in lieu of the absence of proof. In the Gavdapal VFPMC, 18 claims; 11 from the Scheduled Castes and 7 from the Scheduled Tribes; have been under process, as these claims have been undertaken even before the Act was enforced. The tribes of the area were given a registry (*patta*) for agriculture activities that were not marketable to anyone before the Act. The VFPMC in Kawda had the highest claimants (173)[55] among the surveyed villages of which 132 claims were approved and the rest have been in proceedings[56].

[54] Only EDCs do not charge the villagers for the entrance fees. Thus anyone in the village can access the forests regardless of whether they are EDC members or not.
[55] All 173 belong to the Meena tribe that is the Scheduled Tribe.
[56] 15 claims are on households, 59 claims on both land and households and the rest are only on land acquisition.

Table 4-7 Status of Forest Rights Act 2006 implementation in the surveyed villages in Rajasthan

No.	VFPMC/EDC	Awareness of FRA*	Awareness of Gram Sabha for FRA*	No of Claimants**	No of Approval (year)**	Year of Approval**
1	VFPMC Popalti	Yes	Yes	25	2	2009
2	VFPMC Palasma	Yes	Yes	27	1	2009
3	VFPMC Gavda Pal	Yes	No	18	0	Not yet
4	VFPMC Attatia	Yes	No	0	N.A.	N.A.
5	VFPMC Karel	Yes	No	0	N.A.	N.A.
6	VFPMC Baleecha	Yes	Yes	7	Rejected by the villagers	
7	VFPMC Gujjaron Ka Guda	Yes	Yes	0	N.A.	N.A.
8	VFPMC Dani Talai	Yes	No	0	N.A.	N.A.
9	EDC Mehsara	Yes	No	0	N.A.	N.A.
10	EDC Mehwasa	Yes	No	0	N.A.	N.A.
11	VFPMC Kewda	Yes	Yes	173	132	2010

[Legend] FRA: the Forest Rights Act 2006
Note: *Interview with the VFPMC/EDC Chairpersons, **Interview with * and the forest officers
Source: Survey team

The false claims, however, have created some social tension among villagers that has led to the damaging of social coherence in the village. In the Palasma VFPMC, 27 claimants were reported, of which 25 were approved. However, the respondents, the VFPMC Chairperson and the concerned forest officers, addressed the issue that the claimants were new encroachers who lived on the edge of the village and thus other villagers opposed their claims. In the Baleecha VFPMC, seven tribes claimed titles to convert forest into agricultural land. For the sake of forest protection, the VFPMC members destroyed their farms and burned the tribal huts in the encroached forest area. As a result, no claim has been reported in the village since then. This incident can be attributed to mainly two factors, i.e., 1) a high level of people's commitment to protect common properties; and 2) a lack of conflict management mechanisms among the villagers.

The forest officers in charge of the surveyed villagers indicated intricate views towards the Act. Some officers think that the Act is beneficial for the tribes who have been living in the forest fringe areas for long time to provide them with the security of living there. On the other hand, other forest officers fear that tribes will prioritise illegal cutting and conversion from forest land to agricultural land based on motivation to secure their own survival rather than forest protection. They also opined that eventually the Forest Department will be able to protect the forests. One view in common to all forest officers is that false claims by the people alien to the lands and their approvals hamper the development in forest fringe areas. As the forest officers understand that whoever lived in the forest areas before December 2005 are eligible to claim the rights under the Act, they expect that more claimants will come out in the next few years.

b) The National Rural Employment Guarantee Scheme

Under the NREGS, one person per household can get paid at the rate of INR 119 for 100 days based on the latest guidelines in Rajasthan. The NREGS has contributed to adding an extra source of income for the poor. The net income of INR 11,900 in three months appears to be a lucrative option to them. It has also helped in less out-migration from the village by making the villagers work in and around the villages especially in Baleecha and Gavdapal villages[57]. As a result, the dependency on forests has decreased to some extent. The VFPMC members in the surveyed villages articulated the correlation between pressure on forests and employment opportunities, by saying that if he or she has

[57] The respondents were unable to determine the number of the percentage of outmigration before and after the project, from 10 years ago or the present.

a job, the person would not have time and motive to exploit the forests.

The NREGS, however, does not necessarily assist all the villagers to augment their income or stabilise the income status. The levels of impact by the NREGS are determined by other factors. In the Mahsara EDC, no villager is interested in working under the NREGS, because the work that is done in rocky and hot areas is too heavy for them. In the Kewra VFPMC, the villagers do not appreciate the NREGS, as they can gain the minimum wage of INR 135 for work at marble mines nearby and can earn as high as INR 200 for work in Udaipur. Even with the NREGS, out-migration amongst the villagers has been high or increasing in several villages. The rates reached to as high as 60% in Palasma village and as high as 50% in Attatia village. In Dani Talai and Gujjaron Ka Guda villages, the villagers claimed that there has been no work under the NREGS in the last two years. Some respondents in several villages pointed out a delay of payment and lower payments than the regulated rate (INR 40-60) by the Panchayat. Other social impacts were also observed in which many joint families have joined into nuclear families just to gain the opportunity to have employment under the NREGS. This has also led to decreasing the average number of cattle per household.

4.3 Implications in JFM implementation for future intervention

(1) Needs for capacity development of forest officers for facilitation and VFC/VFPMC/EDC for organisational management

The effectiveness of organisational management by VFC/VFPMC/EDC depends largely on the facilitation of the Forest Department and continuity of cooperation between the Forest Department and the forest village. The Forest Ranger as the Member Secretary of the VFC/VFPMC/EDC-Executive Committee has played a vital role in maintaining the bank accounts and records, and conducting the Executive Committee meetings. It is seen that power and authority remain in the hands of the forest officers[58].

The facilitation skill of the Forest Ranger is one of the key factors in determining the success of JFM. This skill is critical in improving the foresters' capacity for enhancing public participation, instilling a learning environment, and leading adaptive learning. Meanwhile, the Executive Committee has the authority to manage funds, make decisions, and distribute benefits. In most VFCs/VFPMCs/EDCs, however, the composition of the Executive Committee has not been changed since their establishment, and general meetings are held quarterly or irregularly with a low participation rate. It is inferred that that not all VFC/VFPMC/EDC members are aware of the status of JFM-related activities and benefits available to the members. To ensure equality of benefits among VFC/VFPMC/EDC members, decision-making should be done in a democratic and transparent way. Even if the forest officers might be required to take the initiative to run the organisation at the initial stage, the roles and responsibilities should be delegated to other members of the Executive Committees so that they can plan and implement development work to address local issues. Thus, capacity development is required for forest officers in their facilitation skills and for the VFC/VFPMC/EDC Executive Committee members in organisation and financial management.

(2) Role of NGOs in organisation management

NGOs may play a role in providing both the Forest Department and VFC/VFPMC/EDC members with technical assistance in organisational management, and facilitating the devolution of

[58] Tamil Nadu Government JFM Orders (1997) stipulates that the District/Divisional Forest Officer concerned will monitor the functioning of the Executive Committee of the VFC in his jurisdiction and send monthly report to the conservator of forests. He will also have the authority to disband the committees and order for reconstitution if, in his view, the committees are not discharging their duties properly. He will do so only after giving adequate opportunities to the committee members, except the Member Secretary, who may be dealt with under disciplinary rules. He will also be the Appellate Authority against the orders of E.C. expelling a member of Executive Committee/VFC.

management. It appears that most VFPMC/EDCs in Rajasthan, which did not get any technical assistance from NGOs, have organisational problems. Most of them have not set up rules and regulations on the management of microfinance or IGA that has caused the internal conflicts on benefit-sharing and equity of resource allocation among the members. Further, no effective conflict management mechanism inside and outside the village has not established. NGOs can also participate in the process as a trainer or facilitator to enhance the capacity of VFCs/VFPMCs/EDCs in the above areas through conducting hands-on training. Besides, NGOs can act as an arbitrator to resolve the contentious issues of forest management including shares of the final harvest between VFCs/VFPMCs/EDCs and the Forest Department. As shown in the case studies, however, the involvement of the NGOs does not necessarily ensure the expected outcome. The success or failure depends more on the mission and capacity of NGOs. NGOs are not standardised in executing JFM due to their inherent limitations. The Tamil Nadu case illustrates the diversity of the capacity of the NGOs. In the NGOs whose financial resources are limited to government agencies, their interventions are terminated upon the end of their contracts with the government[59]. Thus their efforts are often hampered by their limited commitment and funds.

(3) Need for inter-departmental institutional set-up for implementation

The Tamil Nadu case shows that the inter-sectoral committee, especially at the district level, effectively consolidated public resources to enhance the project effectiveness, monitored the status of all VFCs, and provided necessary supervision over the front-line officers. In fact, additional funds from other departments were provided to the target villages through Gram Panchayats based on the micro plans, and their applications were closely monitored by the district level committee. The respondents claimed that few public services or development programmes from other departments or the Gram Panchayat were provided before the project implementation. Under the project, however, the representatives from the Gram Panchayat, the ex-officio members of the Executive Committee, participated in decision-making at the Committee (this is mostly lacking) and the Gram Panchayat played a role in delivering public services to the forest villages based on their needs.

Contrary to the above, the coordination mechanism among the stakeholders including the VFPMCs/EDCs, Panchayat, other government departments and NGOs was not set up at the panchayat and district levels during project implementation in Rajasthan. As a result, no systematic cooperation among them has been put into place. Despite the EPA or IGA provided by the JICA funded projects, the amount is too limited to be extended to a comprehensive rural development programme. The impact of the EPA and IGA is to produce the minimal amount necessary to cover all VFPMC/EDC members and to uplift their living conditions with the funds of INR 100,000 to 150,000 per VFPMC/EDC. As shown in the Tamil Nadu case, aligning the JFM framework into an existing institutional framework is the key to producing the synergistic effect between the project and other department programmes, by setting up a coordination mechanism among the departments and the Gram Panchayat. Further, JFM is also expected to be aligned under the Gram Sabha's implementation mechanism. VFCs/VFPMCs/EDCs function as the technical arm of the Gram Sabha in charge of forest protection. The Gram Sabha, a de-politicised institution by nature, can allow villagers to participate in the decision making process with a higher degree of transparency and democracy.

(4) Need for an effective monitoring system and a reduction of pressure on the forests

Monitoring is essential to ensure the effective management of forests[60]. In particular, local monitoring and rule enforcement involving villagers in the process are associated with better forest

[59] The contract between the Tamil Nadu Forest Department and NGOs was only for the first one year.
[60] Other important factors for regeneration of forests are forest user group size, subsistence, the commercial importance of forests, and the size of forests (Chazdon, 2008).

conditions (Chate, 2005; Coleman, 2009; Gibson, 2005; Hiborn, 2006). In both Tamil Nadu and Rajasthan, the Forest Department monitors forests on a regular basis, while the villagers and VFC members are protecting the forests by refraining from grazing and harvesting within the forests. However, no regular patrolling is done by VFC/VFPMC/EDC members.

Although the survey results are not statistically valid, there is a certain degree of correlation between forest survival rates and rule enforcement in Tamil Nadu. According to the survey results, three VFCs are not enforcing the rules formulated by the VFCs (a penalty charge). The rules prohibit grazing, illicit cutting, and fire use in the forests. Under those VFCs, the survival rates of plantation trees are below 60% which is lower than the average of 70%. In addition, rights over the utilisation of the forest resources and dependence on forests can be important determinants of effective local monitoring and sanctioning. Three VFCs with lower survival rates of planted trees neither collect NTFP and MFP nor manage access rights to the forests. On the other hand, communities with a high level of dependence on forests show effective monitoring and local rule enforcement.

The Rajasthan case, however, does not indicate the correlation between the survival rate and rule enforcement, as all surveyed VFPMCs/EDCs except the Mahsara EDC have enforced the penalties. The rates are also affected by other factors, i.e., climate, selection of species, and the measurement methods. Furthermore, it should be noted that illegal cutting and grazing are still evident in Rajasthan due to the high dependency on forests and less opportunities for employment and government development programmes. Regardless of monitoring by the Forest Department and social fencing by the villagers, the incentives for illegal actions in Rajasthan are much higher than the ones in Tamil Nadu. Thus it is inferred that the reduction of human and animal pressure on forests is one of the key factors to maintaining the survival of trees by the means of providing alternative livelihoods and cooking devices as has succeeded in Tamil Nadu.

(5) Diversified sustainable mechanisms of JFM in Tamil Nadu and Rajasthan

The JFM literature claims that JFM has been a project-driven activity that comes to a standstill as soon as the project withdraws its support to EPA or IGA (Bhattacharya, et al., 2009). It has been reported that the initial three years of seed money for the VFCs was the primary motivation for villagers' participation in JFM in Tamil Nadu (Matta, 2005). To ensure the long-term sustainability of JFM, the benefit sharing arrangements of forest products and NTFP are given in the JFM guideline, highlighting the benefits that the VFC members can obtain in return for forest protection. However, for example, in the case of Tamil Nadu, although EPA and IGA are funded to secure villagers' cooperation with the Forest Department for JFM implementation, the communities' diminishing interest in taking part in JFM has become evident. Since the inception of JFM, the change in the lifestyle of villagers through rural development has resulted in the VFC/VFPMC/EDC members' diminishing interest in investing their time and effort to obtain rights to harvest fuel wood, fodder, and timber in the future.

The case studies carried out in Tamil Nadu and Rajasthan States indicate development and socioeconomic dynamics combined with JFM implementation resulted in different outcomes and sustainability mechanisms. Table 4-8 summarises the interpreted differences in JFM outcomes and consequent sustainability mechanisms observed in each case study site. The results infer that the evolution of JFM functions is dependent on status of rural development and market integration of the rural economy external to JFM implementation.

In Tamil Nadu, the survey results show that most of the surveyed VFCs are still functioning well due to their active provision of microfinance and alternative business development services in Tamil Nadu. Under microfinance schemes, the loan provision for EPA and IGA almost doubled over a period of three years, and 66% of the provided loans were given to IGA. The VFC members place more importance on income generation through IGA than income from forestry activities. Most of

the VFC members in the surveyed villages are satisfied with a microfinance scheme that can meet their financial needs to conduct IGA. The revolving fund mechanism used to secure and increase money for microfinance has been successfully implemented to sustain financial services to VFC members. In other words, VFCs are still functional by virtue of access to microfinance, and VFCs have become a forum for other government agencies to provide public services to the forest fringe dwellers. As long as the capital needed by VFCs for the microfinance and government service is sustained, this mechanism will also be sustained.

In contrast to the Tamil Nadu case, the VFPMCs/EDCs in Rajasthan are still functional by reason of forest conservation and rejuvenation. Given the conditions in the desert areas where villagers have smaller and unproductive agricultural lands, the villagers still have no alternative but to depend on the forests. Additionally, the provisions of government public services and other development schemes are less than the ones in Tamil Nadu. In such a case where most villagers depend heavily on the forest, JFM between the Forest Department and the villagers is likely to be still feasible. With a severe constraint on the funds for EPA and IGA provided by the project or the Forest Department, it might be strategic to allocate funds for those infrastructures or economic activities in relation to forest conservation and rejuvenation. For example, the setting up of water harvesting structures and production facilities for *Aloe Vera* juice could be more relevant activities which could generate the synergistic effects between forest conservation and the improvement of living conditions.

Table 4-8 Difference in JFM outcomes and sustainability mechanisms

Factors to be considered	Tamil Nadu case	Rajasthan case
Economic environment for JFMC members	• Relatively advanced level of rural development • Sufficient business and livelihood opportunities other than subsistence agriculture due to high exposure to market economy	• Relatively early stage of rural development • Limited business and livelihood opportunities other than subsistence agriculture
JFMC members' dependence on forest resources	• Low dependence on forest resources due to alternative livelihood and energy sources (e.g., natural gas)	• High dependency on forest resources for subsistence use due to limited business and livelihood opportunities
JFMC members' dependence on forest department's services	• Low due to presence of other rural development schemes, and JFM members' higher level of economic status	• High due to limited presence of other rural development schemes, and JFM members' lower level of economic status
Development of JFM functions	• Dynamic: the current functions of JFM are beyond functions expected earlier	• Static: the current functions of JFM are the same as originally envisaged
Impact and contribution of JFM implementation	• Strengthening of institutional capacity of micro financing under JFM, particularly those of members' creditworthiness and of maintaining it • This attracts other institutional loan providers and hence leads to progressive development of income generation businesses by JFM members due to their low investment constraints	• Subsistence use of forest resourced by JFM members which eases constraints on their subsistence agriculture • Provision of additional cash income through forest management activities • Insufficient development of alternative livelihood through EPA and IGA due to low-level exposure to market economy
JFM sustainability mechanism	• Developed self-autonomous financing mechanism based on JFM's microfinance scheme • Mobilisation of government's other rural development schemes by JFM members	• Forest department's continuous support to JFM implementation • Continuous subsistence needs for forest resources

Source: Survey team

(6) Verification of high potential of farm forestry in specific areas

With the underlying economic growth in India, farm forestry has become popular among farmers.

Pull and push factors for timber production by farm forestry can be explained. As described in the case in Tamil Nadu, farmers who own the land have difficulty finding labour due to the increase in labour costs. In particular, the NREGS contributes to an increase in labour wages. Any adult who works for 100 days is guaranteed the pay rate of INR 100 per day, although the rate differs by state. In addition, the prices of agricultural inputs have also increased. Thus, elder farmers with a relatively large agricultural land can no longer maintain a sufficient profit margin with the high cost of agriculture labour and inputs. Therefore, farmers tend to practice labour- and input-efficient production methods such as farm forestry to gain higher labour productivity. This is considered the push factor to plant trees. The pull factors are as follows: 1) the availability of timber markets and wood-based industries; 2) the upward trend of timber prices in recent years; and 3) technical and financial assistance from the Forest Department and relaxed regulations on tree harvesting and transportation. Although farm forestry may not necessarily benefit landless agricultural labourers who are considered the poorest of the poor, the development of the wood-based industries will be able to absorb such excess rural labourers as factory workers. Farm forestry will also certainly contribute to increasing forest cover.

(7) Consideration for the impact on the Forest Rights Act 2006 in JFM implementation

After the Forest Rights Act 2006 came into effect in Rajasthan, the impact has been to gradually develop the JFM framework, especially in the last few years. As indicated in the survey results, the impact of the Act will more significantly have an effect in certain areas with a considerable number of claims. In managing common properties such as forests under JFM, the gains of the individuals come at the expense of community and, in many cases, the individual's long-term welfare as well. In other words, private benefit undermines the community's best benefit. For instance, if individual Scheduled Tribes or dwellers obtain the rights for agricultural use, or the usufructs of forest products in small pieces of land in a certain forest chunk, the forest would not be totally managed by VFCs/VFPMCs/EDCs or even the Forest Department. Such organisations are not able to adequately control the private properties. Further, once the claimants are entitled to live in the forests, they are also allowed to establish social infrastructure such as roads and health centres. As a result of biotic interference from human and animals in the forest, the whole area in the forest might be affected. With less benefit from the forest, the villagers would not have or sustain much incentive to participate in JFM.

(8) Consideration for the influence of external factors to JFM for project design

As public services have increased, the demand of the villagers to access forest resources has been diminishing, resulting in the extent of access management by VFCs/VFPMCs/EDCs to lessen. The current NREGS that guarantees wage employment on public works has greatly influenced rural society, especially in Tamil Nadu. The scheme either encourages or discourages villagers to participate in JFM. The scheme has provisions to conduct plantation, soil conservation, and the creation and upgrading of water sources for forest conservation. As a result, the VFC/VFPMC/EDC members are able to obtain additional and stable income throughout the year that leads to lowering forest dependency and reducing out-migration. On the other hand, the VFC/VFPMC/EDC members might lose interest in forest protection with the introduction of stable income, and consequently have less incentive to spend time and effort for JFM-related activities, and for bearing the opportunity costs for forest protection and additional travel time for firewood and NTFP collection. In the same way, the inflow of various government programmes into VFC/VFPMC/EDC villages might also negatively affect JFM, as the provision of EPA and IGA under JFM would not work as a strong incentive for villagers to join VFCs/VFPMCs/EDCs. This phenomenon is more prominent in Tamil Nadu than in Rajasthan, as the scheme has reached out to the rural society in Tamil Nadu in comparison to Rajasthan.

4.4 JFM and Forest Rights Act 2006

Recognising and vesting forest rights in the Scheduled Tribes and other traditional forest dwellers under the Forest Rights Act 2006 may affect the forest management regime, in particular the implementation of JFM in areas with large tribal and forest dweller populations. This section therefore overviews the implementation status of the Act, and discusses the implications on JFM.

Table 4-9 State-wise implementation status of the Forest Rights Act 2006

States	No. of claims received			No. of titles distributed			Extent of forest land for which titles distributed (in acres)		
	Individual	Community	Total	Individual	Community	Total	Individual	Community	Total
Andhra Pradesh	323,439	6,704	330,143	NA	NA	167,605	NA	NA	1,445,308
Assam	126,718	5,193	131,911	33,575	711	34,286	NA	NA	77,609
Bihar	NA	NA	2,311	NA	NA	22	NA	NA	NA
Chhattisgarh	487,332	4,736	492,068	214,668	775	215,443	536,303 *	1,773 *	538,076 *
Gujarat	183,136	8,909	192,045	NA	NA	25,771	NA	NA	NA
Himachal Pradesh	5,355	293	5,648	7	12	19	NA	NA	NA
Jharkhand	29,097	454	29,551	6,022	57	6,709	NA	NA	NA
Karnataka	160,305	2,785	163,090	6,521	1	6,522	NA	NA	8500
Kerala	36,125	1,369	37,494	NA	NA	15,705	NA	NA	19,333
Madhya Pradesh	429,110	8,750	437,860	NA	NA	134,955	NA	NA	359,502 **
Maharashtra	335,701	3,988	339,689	104,344	423	104,767	226,341	18,965	245,305
Orissa	447,364	2,159	449,523	260,787	713	261,500	NA	NA	301,629 ***
Rajasthan	60,019	334	60,353	30,038	45	30,083	44,457	417	44,863
Tripura	175,329	277	175,606	NA	NA	118,827	416,499	57	416,556 ****
Uttar Pradesh	91,089	317	91,406	10,084	8	10,092	NA	NA	10,427
West Bengal	129,454	7,824	137,278	27,665	108	27,773	15,833	50	15883
Grand Total			3,075,976			1,160,079			3,482,991

Note: Some total figures are not the exact sum of their elements, as some figures have been rounded off to the nearest tenth.
* Figures for 214,918 titles (214,668 for individual and 250 for community). ** Figure for 89,035 titles. *** Figure for 169,897 titles.
**** Figure for 116,100 titles.
[Legend] NA: not available
Source: MOTA (2011)

4.4.1 Implementation status of Forest Rights Act 2006

According to MOTA (2011), more than three million claims have been filed, and more than one million titles have been distributed as of 31st March 2011. A total of 2,613,884 claims have been disposed of so far. Table 4-9 shows the state-wise implementation status of the Forest Rights Act 2006.

States which have received more than 100,000 claims are Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tripura, and West Bengal. Many of them are located in the central or western part of India, and have 5 to 30 % of the tribal population (Table 4-10).

On the other hand, 10 states have not distributed any titles so far, and half of such states, namely Arunachal Pradesh, Manipur, Meghalaya, Mizoram, and Sikkim, are north eastern states that have larger tribal populations within their territories (MOTA, 2011). This may be because such states have already had certain legal and/or policy instruments to ensure the Scheduled Tribes' forest rights or to support their livelihoods, according to the Ministry of Tribal Affairs (MOTA).

The other feature is that most claims have been made individually. More than 90% of the claims in respective states are individual, though detailed figures are not available in some states (MOTA, 2011).

Table 4-10 State-wise population of the Scheduled Tribe as percentage of total population

No.	State	% of ST population	No.	State	% of ST population
1	Andhra Pradesh	6.63	15	Maharashtra	8.87
2	Arunachal Pradesh	64.63	16	Manipur	38.96
3	Assam	12.42	17	Meghalaya	86.42
4	Bihar	0.92	18	Mizoram	94.19
5	Chhattisgarh	31.82	19	Nagaland	88.98
6	Goa	0.04	20	Orissa	22.19
7	Gujarat	14.79	21	Punjab	NA
8	Haryana	NA	22	Rajasthan	12.57
9	Himachal Pradesh	0.04	23	Sikkim	12.42
10	Jammu and Kashmir	10.98	24	Tamil Nadu	1.05
11	Jharkhand	26.34	25	Tripura	31.13
12	Karnataka	6.55	26	Uttar Pradesh	0.07
13	Kerala	1.14	27	Uttarakhand	NA
14	Madhya Pradesh	20.26	28	West Bengal	5.49

[Legend] ST: Scheduled Tribes; NA: not available
Source: Adapted from MOTA (2010)

4.4.2 Implications of Forest Rights Act 2006 on forest management

The Forest Rights Act 2006 may affect the implementation of JFM. The forest areas where forest rights are vested in individual persons, in particular, may not be appropriate for JFM implementation. Joint Committee of MOEF and MOTA (2010) suggests that the interests of individuals and communities who have forest rights may conflict with those of existing groups or institutions for forest management. As such, in states or districts where many claims for forest rights have been filed and/or are expected to be made, there is a high possibility of such conflicts. This potential risk should be kept in mind in the formulation process of new Japanese ODA loan projects in the forest sector.

To address such risk, it may be effective to incorporate Gram Sabha into the decision making process regarding JFM. This is because Gram Sabha, with the assistance by its Forest Rights Committee, is mandated to resolve whether forest rights should be recognised and vested in claimants under the Forest Rights Act 2006. To the Forest Rights Committee, on the other hand, tasks except those defined by the Act cannot be assigned. However, the Gram Sabha can establish local level institutions and the Forest Rights Rules (Section 4 (3)) requires the state government to provide assistance to such institutions.

It is also pertinent to note that the forest rights are not limited to rights to forest lands but also usufruct rights to harvesting minor forest produce that forest dependent communities have traditionally enjoyed. The Forest Rights Act 2006 is therefore may have important implications in terms of designing livelihood support components of future JICA's assistance. Since it recognises and vested forest rights that are closely related to such components of JICA supported projects, the basic concept of the Act is in line with the JICA's assistance policy that pursues forest conservation and enhancement, and livelihood support for poverty alleviation.

In fact, recent policies and policy statements such as the Green India Mission declare the promotion of forest governance decentralization, and recognise Gram Sabha as a key institution in forest governance. The Mission states that Joint Forest Management Committee (JFMC) will function as a committee of Gram Sabha, and silvicultural management of forest areas assigned to JFMC should be as per the plan approved by Gram Sabha. Such policy trend has been already recognised by the MOEF, and the MOEF has considered that JFMC can function as the technical arm of Gram Sabha. Furthermore, the Minister of Environment and Forests has, through a letter issued on 29 October

2010, requested the state Chief Ministers to make appropriate amendments in the relevant state laws and policies to reflect the forest management-related functions of the Gram Sabha. The functions described in the letter include to give overall guidance to and supervision over JFMCs. However, it should also be noted that implementation of such policy on the ground will take more time. For instance, although the Forest Rights Act 2006 stipulated that bamboo is minor forest produce (Section 2 (i)) and rights over the minor forest produce are vested in the Gram Sabha, there was a case in which the Gram Sabha encountered difficulties to exercise the rights.[61]

Taking into account the above legal and policy direction, if future Japanese ODA loan projects are conceptualised in states where many claims under the Act are filed and/or are expected to be made, it may be effective to include Gram Sabha in its implementation mechanism. This may help make the implementation mechanism more functional, practical, and participatory on the ground. It is therefore crucial to conduct a field survey on the local socio-economic and ecological conditions and local institutional arrangements to see how the Gram Sabha can work in the Japanese ODA loan projects.

4.5 JFM programmes and projects supported by other donor agencies and relevant initiatives in South Asia

4.5.1 Programmes and projects supported by other donor agencies

(1) The World Bank

a) Country Strategy 2009-2012

The Country Strategy for India for FY 2009-2012 (Strategy 2009-2012), formulated in November 2008, provides a framework of the World Bank operations to deal with the development challenges. The Strategy 2009-2012 is in line with the GOI's development priorities presented in the Eleventh Five Year Plan. It aims at helping the GOI achieve its development goals through lending, dialogue, analytical work, engagement with the private sector, and capacity development. The three pillars of the Strategy are 1) achieving rapid and inclusive growth; 2) ensuring sustainable development; and 3) increasing the effectiveness of service delivery. The Strategy 2009-2012 proposes a total of USD 14 billion in loans for the next three years, of which USD 9.6 billion is to come from the International Bank for Reconstruction and Development (IBRD) and USD 4.4 billion from the International Development Association (IDA).

Table 4-11 Main state groups by per capita income

Low Income States	Special Category States	Middle-Income States
Bihar	Arunachal Pradesh	Andhra Pradesh
Chhattisgarh	Assam	Goa
Jharkhand	Himachal Pradesh	Gujarat
Madhya Pradesh	Manipur	Haryana
Orissa	Mizoram	Karnataka
Rajasthan	Meghalaya	Kerala
Uttar Pradesh	Sikkim	Maharashtra
	Uttarakhand	Punjab
		Tamil Nadu
		West Bengal

Source: World Bank (2008)

The Strategy recognises the large size and diversity of India, and takes a differentiated approach according to the characteristics of respective states. In low-income states and lagging regions of more advanced states, the World Bank will prioritise poverty reduction and achievement of the Millennium

[61] http://www.thehindu.com/news/national/article1818936.ece

Development Goals (MDGs). For more advanced states and at the central level, the focus will be put on removing barriers to maintaining high growth, and on strengthening of institutions. In addition, the strategy takes a differentiated approach to states classified by the GOI as Special Category States, which are mainly in the hills or north eastern states. For these states, specific thematic areas such as capacity building are highlighted. The classification of states in the Strategy is presented in Table 4-11.

In the Strategy 2009-2012, forestry and biodiversity conservation are not explicitly included. Although better management of natural resources and prevention of environmental degradation are highlighted under the pillar of 'ensuring development is sustainable,' the focus is on water and environmental pollution. Only farm forestry is mentioned, in the paragraph describing the strategy of the International Finance Corporation, as the potential areas where partnerships with the private sector and other donors will be pursued. In addition, no forest and biodiversity-focused programmes and projects are mentioned as pipeline projects in the Strategy 2009-2012.

b) Initiatives related to forest and biodiversity

The World Bank has provided a total of USD 918.14 million of financial assistance to the forest and biodiversity management sector to date. Table 4-12 demonstrates the list of forestry and biodiversity projects supported by the World Bank.

Table 4-12 List of forestry and biodiversity projects supported by the World Bank

No.	Project title	State	Commitment amount (USD million)	Approval Date	Closing date
1	Forest Assistance Project – Madhya Pradesh	Madhya Pradesh	4	30 Dec 1975	31 Dec 1982
2	Forestry Project – Social Uttar Pradesh	Uttar Pradesh	23	05 Jun 1979	31 Dec 1984
3	Forestry Project – Gujarat Community	Gujarat	37	11 Dec 1979	31 Dec 1985
4	Forestry Project – Social West Bengal	West Bengal	29	06 Oct 1981	31 Mar 1991
5	Forestry Project – Social Jammu, Kashmir, and Haryana	Jammu, Kashmir, and Haryana	33	03 Aug 1982	31 Mar 1991
6	Forestry Project – Social Karnataka	Karnataka	27	20 Dec 1983	31 Mar 1992
7	Forestry Project – Social Kerala	Kerala	31.8	31 Jul 1984	31 Mar 1993
8	National Social Forestry Project	-	165	18 Jun 1985	31 Mar 1993
9	Maharashtra Forestry Project	Maharashtra	124	14 Jan 1992	31 Mar 2000
10	West Bengal Forestry Project	West Bengal	34	17 Mar 1992	31 Dec 1997
11	Andhra Pradesh Forestry Project	Andhra Pradesh	77.4	24 Feb 1994	30 Sep 2000
12	Forestry Research Education and Extension Project	-	47	24 Feb 1994	31 Dec 2001
13	Madhya Pradesh Forestry Project	Madhya Pradesh	58	30 Mar 1995	31 Dec 1999
14	Ecodevelopment Project	-	28	05 Sep 1995	30 Jun 2004
15	Uttar Pradesh Forestry	Uttar Pradesh	52.94	09 Dec 1997	31 Jul 2003
16	Kerala Forestry Project	Kerala	39	24 Mar 1998	31 Dec 2003
17	Andhra Pradesh Community Forest Management Project	Andhra Pradesh	108	16 Jul 2002	31 Mar 2010

Source: Website of the World Bank, http://go.worldbank.org/YLPQAHBY40, retrieved on 27 June 2011

The latest forest-related project is the Andhra Pradesh Community Forest Management Project, which closed in March 2010. After the project, there are no pipeline projects in the forestry sector.

(2) Global Environment Facility

The Global Environment Facility (GEF), an international financial organisation, provides grants to developing countries in the fields of biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. Table 4-13 demonstrates major projects that the GEF funded or will fund.

Table 4-13 Major GEF projects related to forestry and biodiversity

Project Title	GEF Agency	Approval Date	GEF Project Grant (USD)
India Ecodevelopment	IBRD	03 May 1995	20,000,000
National Biodiversity Strategy and Action Plan	UNDP	01 Jan 1998	968,200
Conservation and Sustainable Use of the Gulf of Mannar Biosphere Reserve's Coastal Biodiversity	UNDP	07 May 1999	7,650,000
Andaman and Nicobar Islands: Ecologically-Sustainable Island Development	UNDP	19 Nov 2004	3,388,600
Mainstreaming Conservation and Sustainable Use of Medicinal Plant Diversity in Three Indian States	UNDP	13 Sep 2005	4,935,000
Biodiversity Conservation and Rural Livelihoods Improvement	IBRD	01 Aug 2006	11,500,000
SLEM: Sustainable Participatory Management of Natural Resources to Promote Ecosystem Health and Resilience in the Thar Desert Ecosystem	UNDP	16 Dec 2008	909,090
SLEM/CPP: Sustainable Land and Ecosystem Management Partnership Programme	IBRD	16 Nov 2007	0
SLEM/CPP: Institutional Coordination, Policy Outreach, and M & E Project under Sustainable Land and Ecosystem Management Partnership Programme	IBRD	17 Apr 2008	990,000
SLEM/CPP: Sustainable Land Management in Shifting Cultivation Areas of Nagaland for Ecological and Livelihood Security	UNDP	16 Nov 2007	3,600,000
SLEM/CPP: Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management	IBRD	16 Nov 2007	10,000,000
SLEM: Sustainable Land Water and Biodiversity Conservation and Management for Improved Livelihoods in Uttarakhand Watershed Sector	IBRD	13 Nov 2008	7,000,000
SLEM/CPP: Integrated Land Use Management to Combat Land Degradation in Madhya Pradesh	UNDP	23 Sep 2008	5,763,000
Capacity Building on Biosafety for Implementation of the Cartagena Protocol - Phase II under the Biosafety Programme	UNEP	27 Jan 2009	2,727,273
Strengthening the Implementation of the Biological Diversity Act and Rules with Focus on its Access and Benefit Sharing Provisions	UNEP	24 Jun 2009	3,561,000

[Legend] SLEM: Sustainable Land and Ecosystem Management; CPP: Country Partnership Programme
Source: Adapted from GEF website, http://www.thegef.org/gef/gef_country_prg/IN, retrieved on 8 July 2011

(3) Asian Development Bank

The India Country Partnership Strategy (CPS) 2009-2012 indicates the assistance strategy of the Asian Development Bank (ADB). It is designed to support the GOI's efforts to sustain inclusive growth as per the Eleventh Five Year Plan. The strategic pillars of the CPS are: 1) support for inclusive and environmentally sustainable growth; 2) catalyzing investment through the use of innovative business and financing solutions; 3) strengthening results orientation and emphasising knowledge solutions; and 4) supporting regional cooperation.

The CPS 2009-2012 puts priorities on agriculture and natural resource management, energy, finance and governance, transport, and water supply and sanitation. However, in relation to forestry and biodiversity, only one technical assistance project, titled 'Conservation and Livelihoods Improvement in the Indian Sundarbans', has been conducted to date. The project was financed by the Government of the United Kingdom, and operated by ADB from February to October 2002. It aims at securing biodiversity conservation in the Sundarbans in West Bengal State, and improving the livelihoods of local communities.

The latest Country Operations Business Plan 2011-2013, formulated in line with the CPS 2009-2012, describes the detailed operational plan. It states that the agriculture and natural resources management sector will be allocated 12% of the total amount of its lending. However, no forestry and biodiversity conservation programmes and projects are explicitly listed in the Plan.

(4) United Nations Development Programme

UNDP's cooperation is provided in accordance with the Country Programme for India (2008-2012). It stresses focus thematic areas, including democratic governance, poverty reduction, HIV and development, disaster risk management, and environment and sustainable development. The Programme identifies seven focused states: Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh.

In the context of environment and sustainable development, the Programme states that UNDP will support the GOI's initiatives to increase forest cover and arrest land degradation. UNDP has provided significant support in the context of forestry and biodiversity. The ongoing projects supported by UNDP are listed in Section 5.2.

(5) European Commission

The Country Strategy Paper 2007-2013 is the guiding document of development assistance by European Commission (EC). Recognising structural reform and poverty alleviation as India's two main challenges, the Strategy identifies two challenges: 1) achievement of the MDGs by supporting government led sector programmes in the social sector (health/education); 2) supporting India's pro-poor sector reform policies and dialogue in economic, civil society and culture, and academic areas of mutual interest.

The Strategy identifies several sectors, including the environment and sustainable management of natural resources. The Haryana Community Forestry Project has been conducted since December 1995, and is planned to be completed in June 2012. Under the Project, the small-scale AR-CDM project was formulated[62]. The ongoing or recently completed cooperation projects supported by EC are listed in Table 4-14.

Table 4-14 Recent EC-supported projects related to natural resource management

Title	Date of commitment	Planned date of completion	Amount	Description
Haryana Community Forestry Project	22 Dec 1995	30 Jun 2012	23,300,000	Reforestation activities
Community Based Natural Resource Management	1 Jan 2002	31 Dec 2006	1,000,000	Soil & water conservation; health awareness
Protection & Promotion of Forest for Economic Security among Tribes	29 Jul 2003	28 Jul 2006	654,798	Empower local panchayats for collective action
Integrated Watershed Management for Sustainable Village Ecosystem Development	1 Jan 2002	31 Dec 2006	557,025	Soil & water conservation; environmental health

Source: EC (2007)

(6) Germany

The German Development Cooperation (KfW) funded the 'Participatory Natural Resource Management in Tripura Project,' which was launched during 2008-2009[63]. The objectives of the project are 1) to improve natural resource condition supporting livelihood of forest dependent communities; 2) to improve the general standard of living of all sections of population, in particular Scheduled Tribes, Scheduled Castes, Minorities, and Backward Classes. The project started in 2009-2010, and will last for six years. The German Government has committed EUR 12 million, and up to EUR 3 million technical cooperation by GIZ. The major activities include land and non-land based income generating activities through JFM (11,250 ha) and outside the JFM area (3,750 ha).

[62] The title of the AR-CDM project is 'Small-scale Cooperative Afforestation CDM Pilot Project Activity on Private Lands Affected by Shifting Sand Dunes in Sirsa, Haryana.'

[63] Website of the IGDC project, Participatory Natural Resource Management in Tripura, http://www.tigproject.in/tig/IGDC/Citizen.pdf, retrieved on 30 June 2011

4.5.2 Community-based forest management in South Asia

(1) Overview

Many community-based forest management policies and programmes have been developed in South Asia to realize effective and sustainable forest resources management. In particular, community forestry in Nepal is the most prominent initiative, in addition to JFM in India. Other countries in South Asia such as Bangladesh, Pakistan, and Sri Lanka also implement community-based forest management initiatives, although their scales and achievements are in general considered smaller than those of Nepal and India.

This section outlines the initiatives related to community-based forest management in South Asia with particular focus on community forestry in Nepal, which contrasts JFM in many ways, and compares them with JFM in India. A comparative analysis on these initiatives is expected to contribute to putting JFM in proper context, and thus to identifying pros and cons of the programme and obtaining some implications for the improvement of the programme.

Community forestry in Nepal

The Master Plan for the Forestry Sector 1989 of Nepal provides the policy and planning framework of forest management. The long-term goals of the Master Plan include the following: 1) Meeting the people's basic needs for forest products on a sustained basis; 2) Conserving ecosystems and genetic resources; 3) Protecting land against degradation and other effects of ecological imbalance; and 4) Contributing to local and national economic growth (Bahuguna, no date). To achieve the goals, the Plan also envisaged that: 1) All the accessible hill forests of Nepal should be handed over to user groups to the extent that they are willing and capable of managing them; and 2) The role of the forestry staff should be changed to that of extension and advisory services (Rasul and Karki, 2009). Such main concepts of the Master Plan were incorporated in the Forest Act 1993 and the Forest Regulations 1995 (ibid).

Forest User Groups (FUGs) are organised to implement the Community Forestry Programme with support from the District Forest Office. The FUGs are recognised as self-sustained independent entities. Rasul and Karki (2009) identify the following key features of community forestry in Nepal.

- Any part of a government forest can be handed over by the District Forest Office to a community. Only the usufruct right is transferred, not ownership of the land itself.
- FUGs are required to manage community forests in accordance with their constitutions and operational plans that are approved by the District Forest Office.
- FUGs are recognised as independent and self-governing entities with perpetual succession.
- FUGs are allowed to plant short-term cash crops such as NTFPs.
- FUGs can fix prices for forest products under their jurisdiction and sell such products.
- FUGs can transport forest products under their jurisdiction anywhere in the country.
- The Executive Committee is set up within a FUG, and no forest officer is involved.

(2) Comparative analysis between JFM in India and Community Forestry in Nepal

a) Comparison of major characteristics

This section conducts a comparative analysis on Community Forestry in Nepal and JFM in India. Table 4-15 compares the main features of JFM and Community Forestry.

Table 4-15 Comparison of JFM with Community Forestry

Characteristics	JFM: India	Community Forestry: Nepal
Policy and legal framework	National guidelines by the central government, and implementation guidelines by state governments	Master Plan for the Forestry Sector 1989; Forest Act 1993; and Forest Regulations 1995
Institutional Arrangement	Village level Committee, called JFMC, VFC, FPC, etc.	Village level FUGs
Land tenure & Rights to forest products	State government land; JFMC without land tenure	Government land; FUGs without land tenure; Rights to forest products are handed over to FUGs
Management authority	State forest departments retain authority over forest land	FUGs have authority to protect, manage, and utilise forest products; Government as a regulator and facilitator
Management unit	Executive Committee of JFMCs with 10-15 members; Forest officer as Secretary	Executive Committee of FUGs with 7-11 members; No forest officer included
Benefit sharing	Sharing of revenue from forest produce varies from state to state, generally 10-20% for tree felling, and 20-100% for NTFPs after deduction of FD's costs	FUGs to take all products & income; in the case of timber sales, 15% of the revenue needs to be given to the Government

[Legend] FD: Forest Department; FUG: Forest User Group; FPC: Forest Protection Committee; JFMC: Joint Forest Management Committee; VFC: Village Forest Committee
Source: Adapted and modified from Rasul and Karki (2009)

As described in Table 4-15, although similar features are found in policy and legal framework, and institutional arrangement, many differences are observed through the analysis. The most significant differences are the involvement of forest officers in community groups, and benefit sharing. Whereas forest officers join JFMC as the Secretariat in India, no forest officers are involved in FUGs under the Community Forestry Scheme in Nepal. Thus, Community Forestry of Nepal is considered more devolved than JFM. In relation to this, more devolution in JFM may be considered as requested in the recent MOEF's letter issued on 29 October 2010. In such a case, however, it should also be noted that the capacity of community institutions needs to be carefully examined.

In terms of benefit sharing, under JFM, JFMCs will receive a predetermined portion of revenues after deduction of the Forest Department's costs. On the other hand, under the Community Forestry in Nepal, FUGs themselves decide price, and transport and sell forest products.

On the other hand, from the forest conservation point of view, Raul and Karki (2009) observe better achievements in JFM than in Community Forestry. This implies that more involvement by forest officers may result in better conservation, although other factors such as capacity for policy and law enforcement as well as socioeconomic status will need to be taken into account. In this respect, capacity development of FUGs for forest conservation may be necessary.

b) Discussion

Comparative analysis between Community Forestry in Nepal and JFM in India revealed that JFM is considered to be more of a government-led scheme, whereas Community Forestry is more devolutionary in terms of community participation. As compared with JFMCs, FUGs are vested with more authority over forest products. Such characteristic of Community Forestry of Nepal may provide FUGs with more opportunities to obtain economic benefits from their management of forests. However, with respect to forest conservation, the analysis also implies that more involvement by forest officers may be necessary for better conservation. It is therefore crucial to balance the degree of devolution and involvement of public authorities to realise both forest conservation and poverty alleviation in a compatible way.

It should also be noted that, even though FUGs are considered more devolutionary institutions, there are some cases observed in Community Forestry of Nepal that richer households gain the most, and equitable benefit distribution is not well achieved (SANDEE, 2004). This type of conflict can take place regardless of what is stipulated in policies and laws. Therefore, capacity development of community institutions to enable equitable benefit sharing is also necessary. Better intervention of forest officers may also help reduce such unequal cases.

Moreover, it should be noted that both Community Forestry of Nepal and JFM of India have evolved according to their respective legal systems, policy environments, administrative systems, and socioeconomic conditions. Therefore, it is impossible to simply introduce the Nepali system to India, and vice versa. In addition, no one can simply conclude which system is more desirable. This is because reliable primary data and information are very limited, as are well articulated criteria to assess their achievements.

In sum, the literature review on these two schemes has some implications that may be referred to for further improvement of the schemes, although simple comparison of the two has certain limitations. Such implications are listed below.

- Each system has its pros and cons, and further improvement will be required. More devolution may be necessary for JFM in the context of people's participation, whereas more intervention may contribute to better conservation in Community Forestry of Nepal.
- Capacity development of community institutions, i.e., JFMC of JFM, and FUGs of Community Forestry, will be required. Capacities of the forest departments of both countries also need to be enhanced.
- The above points should be interpreted in the context of the respective countries' political and socioeconomic situations.

CHAPTER 5 Current status of and issues in biodiversity conservation

5.1 Achievements in biodiversity conservation

India's vigorously pursued modern conservation programmes have set a firm basis for the protection of wildlife and habitats. These include the establishment of a system of protected areas and conservation programmes for critical species by the central and state governments. In many parts of the country, the local communities also protect important biodiversity sites for a variety of purposes ranging from subsistence use to cultural.

5.1.1 The protected area system

India has made remarkable achievements in *in-situ* conservation of biodiversity through its protected area system.

Table 5-1 State-wise breakdown of national parks and sanctuaries in India

State/Union Territory	No. of national parks	Area (km²)	No. of sanctuaries	Area (km²)
Andhra Pradesh	6	1,388.39	21	11,618.12
Arunachal Pradesh	2	2,290.82	11	7,487.75
Assam	5	1,977.79	18	1,932.01
Bihar	1	335.65	12	2,851.67
Chhattisgarh	3	2,899.08	11	3,583.19
Goa	1	107.00	6	647.91
Gujarat	4	479.67	23	16,619.81
Haryana	2	48.25	8	233.21
Himachal Pradesh	5	2,271.78	32	7745.48
Jammu & Kashmir	4	3,925.00	15	10,243.11
Jharkhand	1	226.33	11	1,955.82
Karnataka	5	2,472.18	22	4,003.42
Kerala	6	558.16	16	1,822.86
Madhya Pradesh	9	3,656.36	25	7,158.41
Maharashtra	6	1,273.60	35	14,152.70
Manipur	1	40.00	1	184.40
Meghalaya	2	267.48	3	34.20
Mizoram	2	150.00	8	1,090.75
Nagaland	1	202.02	3	20.34
Orissa	2	990.70	3	20.34
Punjab	0	0.00	12	323.79
Rajasthan	5	3,947.07	25	5,379.26
Sikkim	1	1,784.00	7	399.10
Tamil Nadu	5	307.85	21	3,521.95
Tripura	2	36.71	4	566.93
Uttar Pradesh	1	490.00	23	5,221.88
Uttarakhand	6	4,915.44	6	2,418.61
West Bengal	5	1,693.25	15	1,203.28
Andaman & Nicobar	9	1,153.94	96	389.39
Chandigarh	0	0.00	2	26.01
Dadra & Nagar Haveli	0	0.00	1	92.16
Daman & Diu	0	0.00	1	2.18
Delhi	0	0.00	1	27.82
Lakshadweep	0	0.00	1	0.01
Pondicherry	0	0.00	1	3.90
Total	102	39,888.00	500	119,930.00

Source: National Wildlife Database (http://oldwww.wii.gov.in/nwdc)

According to the National Wildlife Database developed by the Wildlife Institute of India (WII), the national parks and sanctuaries cover 602 sites and 159,818km², representing 4.86% of the area of the

country (WII, 2011). The 102 national parks cover an area of 39,888km² while the 500 wildlife sanctuaries cover 119,930km². Table 5-1 gives a state-wise breakdown of national parks and sanctuaries in the country.

The establishment of Conservation Reserves and Community Reserves is gaining momentum. A total of 47 Conservation Reserves have been declared so far, with the Jammu and Kashmir state having the highest number: 34 sites with a total area of 829.75km². Four Community Reserves have been established so far: two in Punjab and one each in Kerala and Karnataka. All the four categories of protected areas together cover 161,221.57km² in total, 4.9% of the area of the country. Although the proportion of land area under formal protected area coverage is less than the global average of 10%, it should be noted that the entire reserve forests of the country are *de facto* protected areas. Moreover, any form of hunting of wildlife is banned all over the country, extending far beyond the boundaries of protected areas.

5.1.2 Internationally designated reserves

As a Party to international treaties and programmes, India has designated many sites for special protection and resource management, although most of the sites are re-designated existing protected areas. These include the Biosphere Reserves, Ramsar Wetlands, and World Heritage Sites.

(1) Biosphere reserves

The United Nations Educational, Scientific and Cultural Organization (UNESCO), under its Man and Biosphere programme, initiated the concept of Biosphere Reserves in 1971. The Biosphere Reserve concept, introduced to India in 1986, promotes conservation at the landscape level, and provides for sustainable resource use and community involvement as well as research and education. India has designated a total of 17 sites as Biosphere Reserves covering a total area of 46,533km² (MOEF, 2011a). Out of the 17 sites, seven have been designated as part of the International Network of Biosphere Reserves, while the process for enlisting the remaining ones is in progress. A list of these sites is given in Annex 7. These reserves are large areas with one or more national parks or sanctuaries forming the core area, although the Biosphere Reserve itself is not a category recognized under the Wildlife (Protection) Act, 1972.

(2)World Heritage sites

An initiative of UNESCO to protect natural and cultural sites of outstanding universal value, the World Heritage Convention came into force in 1975. Five natural sites from India are inscribed as World Heritage Sites, in addition to several cultural sites. These are basically designation of existing national parks or sanctuaries and include Kaziranaga and Manas of Assam, Keoladeo Ghana of Rajasthan, Nanda Devi and Valley of Flowers of Uttarakhand, and Sundarbans of West Bengal. These sites together cover an area of about 2,900km².

(3) Ramsar Wetland sites

India became a party to the Ramsar Convention on Wetlands of International Importance in 1981. It is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. India has so far designated 25 wetlands as Ramsar sites, covering a total area of more than 12,000km². A list of Ramsar sites in India is given in Annex 8. These sites are critical bird habitats and wintering grounds of migratory birds. Central assistance is provided for the management of these sites and these are now governed by the Wetlands (Conservation and Management) Rules issued in December 2010.

5.1.3 Species-focused programmes

India has embarked on a number of initiatives to protect key wildlife species, particularly the endangered ones.

(1) Tiger reserves

Project Tiger for the conservation of the endangered Royal Bengal tiger (*Panthera tigris tigris*) was launched by the Government of India in 1973. In 1973-74, the project started with nine reserves. Today the number of Tiger Reserves has reached 39.[64] These areas cover a total area of 49,112km², 1.49% of the country's area[65], and form part of the already existing protected area network. Tiger Reserves are constituted under the Wildlife (Protection) Act as amended in 2006. This amendment was made particularly to strengthen the legal regime for tiger conservation. Nearly all of the tiger habitats in the country are now designated as Tiger reserves, and the protection accorded to tiger and its habitat is expected to help enhance the entire ecosystem as tiger is at the apex of the food chain in it.

(2) Elephant reserves

A specific scheme for the conservation of the Asian elephant (*Elephas maximus*) called Project Elephant was launched by the Government of India in 1992 as a Centrally Sponsored Scheme. The project aims to: 1) protect elephants, their habitats, and corridors; 2) address issues of man-animal conflict; and 3) look after the welfare of domesticated elephants. Under Project Elephant, financial and technical support is provided to states with elephant populations. The project is implemented in the following 13 States/Union Territories: Andhra Pradesh; Arunachal Pradesh; Assam; Jharkhand; Karnataka; Kerala; Meghalaya; Nagaland; Orissa; Tamil Nadu; Uttarakhand; Uttar Pradesh; and West Bengal. Marginal support is also given to Maharashtra and Chhattisgarh.[66] A total of 25 Elephant reserves have been established in the country, and seven are in the process of being established, including protected areas in the elephant habitats. These reserves comprise a total area of 65,270km² of which 18,732km² are statutory protected areas (ETF, 2010). Annex 9 gives a state-wise listing of the Elephant Reserves. The recent report (ETF, 2010) of a task force to study the elephant conservation issues has boosted the MOEF efforts in elephant conservation.

(3) Other endangered species programmes

India has made significant achievements in restoring and enhancing populations of several endangered species. A criterion for funding under the central scheme of Integrated Development of Wildlife Habitats, launched by the MOEF to assist protected areas, is the presence of endangered species or other critical species. India has successfully stemmed the decline of the Asiatic lion (*Panthera leo persica*). One-horned Rhinoceros (*Rhinoceros unicornis)* has been reintroduced in Dudhwa National Park, as part of a strategy for the long-term conservation of the species which is limited to Assam. Special measures for the protection of the Ganges soft-shell turtle (*Aspideretes gangeticus)*, including the declaration of a river sanctuary (*Kachchua* sanctuary in *Ganga*), have helped bring back the species. The habitats of Nilgiri tahr (*Hemitragus hylocrius*) are protected through measures including the establishment of Eravikulam National Park dedicated to the protection of this species. Several grasslands are protected in Gujarat and Maharashtra as habitats for the Great Indian bustard *(Ardeotis nigriceps*). The protection of the mass nesting sites (*arribada*) of the Olive Ridley turtle (*Lepidochelys oliveacea*) in Orissa helps sustain the breeding population of this endangered species. The recovery of Jerdon's Courser (*Rhinoptilus bitorquatus*), a bird that had been considered extinct but was rediscovered in the mid-1980s, is promoted through special programmes including the establishment

[64] http://projecttiger.nic.in
[65] http://oldwww.wii.gov.in/nwdc
[66] http://envfor.nic.in/pe/pe.html

of Lanka Malleshwar Sanctuary in Andhra Pradesh. Captive breeding of species such as Eusterine crocodile (*Crocodylus porosus)*, Pygmy hog (*Porcula salvania*), and endangered vultures, has seen positive results. Although outstanding challenges remain, the achievements of India in restoring its rare and endangered species are significant (MOEF, 2010a; MOEF & ZSI, 2011; www.envfor.nic.in).

5.1.4 Biodiversity Heritage Sites and Biodiversity Registers

In accordance with Section 37 of Biological Diversity Act 2002 that provides for the establishment of biodiversity-important areas as Biodiversity Heritage Sites (BHS), the following three small sites have so far been declared in the country, all of which are in the state of Karnataka[67]:

- Nallur Tamarind Grove, Bengaluru (22ha)
- Hogrekan, Chikmagalur, 1,015ha of dry deciduous vegetation rich in medicinal plants
- University of Agricultural Sciences, GKVK Campus, Bengaluru (167ha)

Village-level Biodiversity Management Committees (BMCs), established as per the Biological Diversity Act (2002), have been preparing Peoples Biodiversity Registers (PBRs) to document local biodiversity and chronicle the traditional knowledge about it. 419 villages have prepared such PBRs so far. These are valuable sources of information about biodiversity and associated knowledge and are expected to provide a shield against commercial misappropriation of traditional knowledge. Table 5-2 shows a state-wise listing of PBRs produced so far.

Table 5-2 Peoples Biodiversity Registers produced in different states

No.	State	No. of Peoples Biodiversity Registers documented
1	Andhra Pradesh	5
2	Karnataka	138
3	Kerala	74
4	Madhya Pradesh	50
5	Uttarakhand	139
6	West Bengal	13
	Total	419

Source: National Biodiversity Authority India (http://www. nbaindia.org/pbr/pbr.htm, retrieved on 31 May 2011)

5.1.5 Community conserved areas

Indigenous people and local communities have been protecting biodiversity primarily as a means of sustainable resource use. Many sites across the country are protected and used by the respective communities largely on the strength of traditional social customs and beliefs. Community conserved areas (CCAs) now receive increasing international recognition: examples include the International Union for Conservation of Nature's (IUCN) 2003 World Parks Congress' recommendations and the ecosystem approach delineated by decision V/6 of the Conference of Parties to the Convention on Biological Diversity as well as its Programme of Work on Protected Areas. Beltran (2000) has noted in an international assessment of CCAs that these sites have considerable management success in both resource conservation and livelihood support. Although a comprehensive documentation of these conservation sites is lacking, Pathak (2009) provides 140 case studies on community protected areas in India. Some of the examples are presented in Annex 4. Community conservation initiatives were often neglected. However, they are finding new relevance with the recent devolution of power to the panchayati raj institutions whereby the local assembly of people is empowered to make decisions related to the management of the natural resources of the village.

[67] http://www.nbaindia.org/ut.htm

5.2 Biodiversity conservation programmes and projects supported by other donor agencies

Biodiversity conservation continues to be supported by most of the key donor agencies.

(1) The World Bank

Ecodevelopment

The World Bank supported an ecodevelopment project between 1997 and 2004 in seven protected areas. Six were tiger reserves (Buxa, Nagarhole, Palamau, Pench, Ranthambhore, and Periyar). The seventh was the Gir National Park, which is the last and only home for the Asiatic lions.[68] The focus of this project was to ensure that the negative impact on protected areas is reduced by building the capacity of local people to seek alternate means of livelihood support. It was also meant to empower local communities by involving them in the management of these areas and strengthening their stake in conservation (Singh, 1997). This 67 million USD project has helped establish ecodevelopment as a conservation and development intervention.

Biodiversity Conservation and Rural Livelihoods Improvement Project

This project is still in the pipeline. The project proposes to build on the ecodevelopment project by expanding conservation initiatives to a landscape level, and integrating rural livelihoods into the protected areas management agenda. The project will also focus on landscapes surrounding select protected areas. This is to be achieved by scaling up successful conservation models to the landscape level, disseminating information about the values of biodiversity goods and services particularly significant for the development agenda, and exploring linkages between conservation and poverty alleviation in these landscapes. These experiences, once successful, could be replicated in other relevant landscapes as well. The planned project duration is six years and would be implemented through four components. The first component will focus on developing and testing tools that will promote biodiversity conservation and also facilitate capacity building. The two demonstration landscapes selected are the Little Rann of Kuchch in Gujarat and Askot Wildlife Sanctuary in Uttarakhand. The total project cost is estimated at 22.88 million USD.[69]

(2) United Nations Educational, Scientific and Cultural Organization

The United Nations Educational, Scientific and Cultural Organization (UNESCO) supports the network of Biosphere Reserves as well as World Heritage Sites in the country. UNESCO is at present also coordinating the UN Foundation/UNFIP supported 'Building Partnerships to Support UNESCO's World Heritage Programme in India' project, operational in the Manas, Kaziranga, Keoladeo Ghana, and Nandadevi National Parks. This programme is focused on strengthening biodiversity conservation in select protected areas by developing replicable models at these World Heritage Sites. The experience learned will be used in the management of other critical sites as well. The focus will be on enhancing the management capacity of the managers, improving communication for better protection, and engaging with the local communities to increase their stake in the protected areas.[70]

(3) United Nations Development Programme

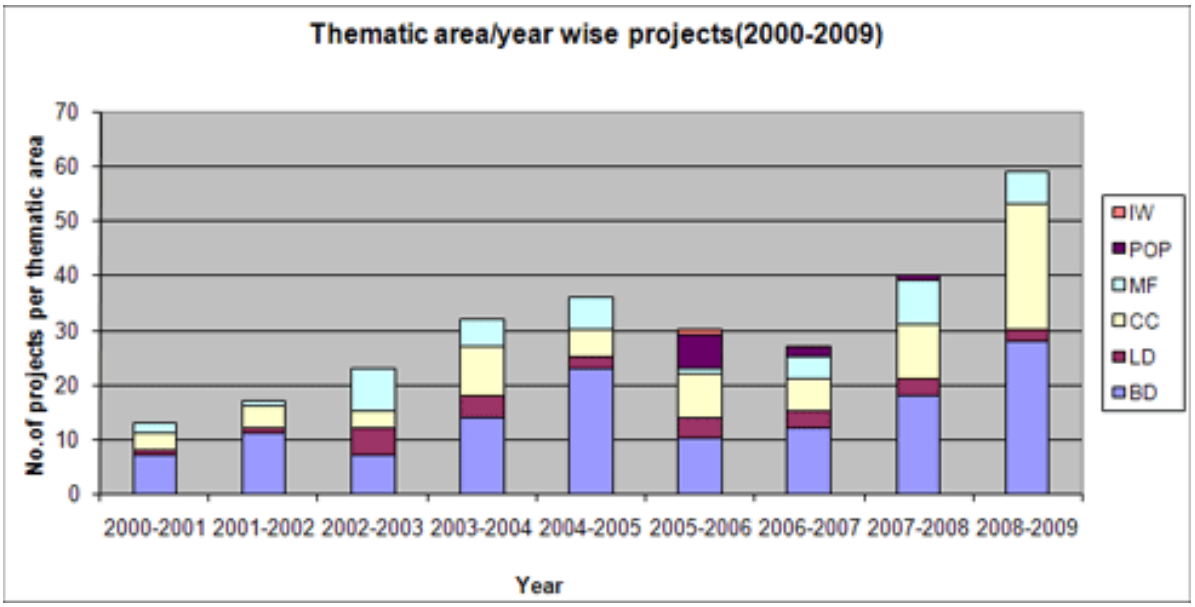
United Nations Development Programme's (UNDP's) mandate, particularly for the environment, is to assist vulnerable communities to better manage natural resources for more sustainable livelihoods. UNDP supports the Small Grants Programme of the Global Environment Facility (GEF), which has a

[68] http://web.worldbank.org/external/projects/main?pagePK=64312881&piPK=64302848&theSitePK=40941&Projectid = P036062

[69] http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P088520

[70] http://portal.unesco.org/geography/en/ev.php-URL_ID=6019&URL_DO=DO_TOPIC&URL_SECTION=201.html

strong biodiversity component and provides assistance to the government for the effective implementation of India's Biological Diversity Act 2002.



[Legend] IW: international waters; POP: persistent organic pollutants; MF: multi-focal; CC: climate change; LD: land degradation; BD: Biodiversity
Source: SGP (http://www.sgpindia.org/index.html)

Figure 5-1 Thematic year wise projects under GEF SGP 2000-2009

Small Grants Programme funded by UNDP, Global Environment Facility

The Small Grants Programme (SGP) is funded by the GEF, and implemented by the UNDP. The SGP was launched in 1991 to support developing countries meet their commitment to protect the global environment. This programme is operating in 114 countries across the world. In India, the programme started in 1996-1997. The UNDP and the Government of India's MOEF administer the SGP. SGP has supported 303 projects to date across the country in five thematic areas, of which 131 were biodiversity projects (Figure 5-1). The thematic areas are climate change, persistent organic pollutants, land degradation, and international waters, in addition to biodiversity. The grant amount for each project can go up to 50,000 USD and is provided to non-governmental agencies. This could increase where there are co-financing commitments.[71]

UNDP provides significant support to several state governments for the sustainable management of biodiversity, including capacity building for the implementation of the Biological Diversity Act. These are listed in Table 5-3.

(4) European Union

The European Union (EU) has been a major donor in the environmental field in India. The EU's contribution for the period of 2007-2013 is EUR 470 million towards the 'modernization of the Indian economy while making its development inclusive and environment-friendly.'[72] Two relevant projects are[73]: 1) Livelihood Enhancement and Ecological Security in Orissa and 2) Medicinal Plants Project-Phase II. The former focuses on empowering local communities to sustainably manage and control Non-Timber Forest Products (NTFP). The EU Contribution for this project is EUR 300,000, which is 80% of the project cost. The EU will provide a contribution of EUR 4.2 million for Medicinal

[71] http://www.sgpindia.org/index.html
[72] http://eeas.europa.eu/delegations/india/projects/overview/index_en.htm
[73] http://ec.europa.eu/europeaid/documents/case-studies/india_forestry_ntfp_en.pdf

Plants Project-Phase II.

Table 5-3 Other UNDP supported ongoing projects

No	Title	Implementing partners	Location	Project period	Budget allocated (USD)
1	Sustainable Participatory Management of Natural Resources to Control Land Degradation in the Thar Desert Ecosystem	Government of Rajasthan, JalBhagirithi Foundation	Rajasthan (Jodhpur, Barmer, Pali)	2010 - 2013	909,091
2	Sustainable Land and Ecosystem Management in Shifting Cultivation Areas of Nagaland for Ecological and Livelihood Security	Government of Nagaland	Nagaland (Mon, Mokakchung, Wokha)	2009 - 2013	146 million
3	Integrated Land and Ecosystem Management to Combat Land Degradation and Deforestation in Madhya Pradesh	State Forest Department of Madhya Pradesh	Madhya Pradesh (Umaria, Sidhi, Betul, Chindwara, Singrauli	2010 - 2014	101,286,750
4	Conservation and Sustainable Use of Gulf of Mannar Biosphere Reserve's Coastal Biodiversity	Department of Environment & Forests, Government of Tamil Nadu	Tamil Nadu (Ramanathapuram,Thoothukudi)	2002 - 2012	7.65 million (GEF), 1 million (UNDP), 18.08 million (Govt. of Tamil Nadu & GOI)
5	Mainstreaming Conservation and Sustainable Use of Medicinal Plant Diversity in Three Indian States	MOEF	Arunachal Pradesh Chhattisgarh, Uttarakhand	2008 - 2014	11.4 million
6	Biodiversity Conservation Through Community Based Natural Resource Management	MOEF	Arunachal Pradesh, Chhattisgarh, Jharkhand, Orissa	2008 - 2010	3 million
7	Capacity Development Initiative	MOEF	Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Orissa, Bihar, Jharkhand	2008 - 2012	900,000
8	Mainstreaming Coastal and Marine Biodiversity in Production Sectors in East Godavari	MOEF	Andhra Pradesh	- 2015	Not indicated
9	Natural Resource Conservation outside Protected Areas	State Forest Departments of Madhya Pradesh and Orissa	Madhya Pradesh & Orissa	2009 - 2012	1,180,000
10	Strengthening Institutional Structures to Implement the Biological Diversity Act.	MOEF	Madhya Pradesh & Jharkhand	2009 - 2012	1,180,000

Source: UNDP (http://www.undp.org.in/whatwedo/environment_and_energy)

(5) Deutsche Gesellschaft für Internationale Zusammenarbeit

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) of Germany supports several biodiversity-related projects in the country.[74] One of the key projects is the Umbrella Programme on Natural Resource Management, for which the lead executing agency is the National Bank for Agriculture and Rural Partner Development. This project's term is 2008 to 2013. GIZ supports the government of Tripura for the socioeconomic empowerment of tribal and rural poor and protection of natural resources during the term 2009 to 2013. GIZ supports Protection of Sustainable Policy Initiatives in the Management of Natural Resources in the Hindu Kush Himalayas through the International Centre for Integrated Mountain Development. This project has been commissioned by the German Federal Ministry for Economic Cooperation and Development and the other partner countries are Afghanistan, Bangladesh, Bhutan, China, Myanmar, Nepal, and Pakistan. The project period is

[74] http://www.gtz.de/en/weltweit/asien-pazifik/3435.htm

2008-2012.

5.3 Brief review of the biodiversity component in the JICA assisted forestry projects

5.3.1 Overview of JICA assisted forestry projects

Biodiversity in the context of the JICA forestry projects refers to wildlife and protected area programmes. This review is done based on the documentation that was available to the team and the direct/telephone interviews the team had with the project implementation agencies in Tamil Nadu and Rajasthan and project implementation consulting agencies in Orissa, Tripura, and Uttar Pradesh.

Table 5-4 Proposed activities under the biodiversity component in selected ongoing JICA forestry projects

State	Activities under the biodiversity component	Implementation period
Orissa	- Ecotourism - Mitigation of human-wildlife conflicts - Habitat management - Biodiversity studies and surveys - Ecodevelopment - Establishment of Community Reserves and BHS	2006-07 to 2012-13
Gujarat	- Protected area management - Conservation and development of biodiversity hotspots - Ecotourism development - Ecodevelopment - Biodiversity research	2007-08 to 2015-16
Tripura	- Strengthening the protected area programme - Ecotourism development - Ecodevelopment - Biodiversity research - Biodiversity information system - Provision for wildlife related equipment	2007-08 to 2014-15
Uttar Pradesh	- Protected area management - Ecotourism development - Conservation of biodiversity - Hotspots outside protected areas - Ecodevelopment - Biodiversity research	2008-09 to 2015-16
Tamil Nadu	- Habitat enhancement - Protection - Mitigating human-wildlife conflicts - Community biodiversity registers - Ecodevelopment - Ecotourism	At the launching stage
Karnataka	(Information not available)	2005-6 to 2012-13
Rajasthan	Protected area management for 7 sites and Ecodevelopment included in the project plan but details were not available	At the launching stage

Sources: Special Assistance for Project Formation (SAPROF)/Preparatory Study documents of the concerned projects

The early generation of JICA forestry projects did not involve biodiversity as a serious component (JBIC, 2002). In the new stream of JICA forestry projects, biodiversity has been integrated as key component. The Orissa Forestry Sector Development Project was the first to introduce biodiversity conservation as a significant component. The forestry projects that followed, i.e., Gujarat, Tripura, Uttar Pradesh, Sikkim, and Tamil Nadu, all have biodiversity as a serious component. These projects typically have protected area habitat improvement programmes, eco-development, low-cost and low-impact ecotourism with community participation, and expansion of protected area networks by the establishment of Community Reserves and BHS. They also address such issues as human-wildlife conflicts and biodiversity research. Table 5-4 provides a profile of the biodiversity component of some of the JICA forestry projects.

The JICA forestry projects have all included ecodevelopment as a key item of activity under the biodiversity component, recognizing that mitigating the community-conservation conflict prompted by the restrictions imposed by the conservation regime could lead to a win-win situation for conservation and livelihood improvement. Another feature of these projects has been the introduction of the concept of Community Reserve, included in the Wildlife (Protection) Act in 2003, in order to seek community participation and to ease the restrictions on resource sharing in the two dominant categories of protected areas. Other new and significant provisions are those for establishing BHS as provided by the Biological Diversity Act and application-oriented field research.

5.3.2 Progress in implementation

The Orissa project, the oldest among the projects considered here, seems to have made significant progress in its implementation. The activities in ecotourism development and addressing human-wildlife conflicts have made substantial progress. The biodiversity research and inventory component of the Tripura project is also making significant progress (Biswas, 2010). This component is especially important given the paucity of data on the biodiversity of the state and the reluctance of outside researchers to undertake research here.

The slow rate of progress in implementing the biodiversity component, in particular across projects, is a common problem. The project monitoring data obtained from JICA shows that financial progress in implementing the biodiversity component in the Gujarat forestry project for the period 2007-2011 has been only 8.4%. One of the reasons for this trend is that the forestry officials are not sufficiently equipped to handle, or are not familiar with, the basics of some of the biodiversity-related project's activities. Moreover, the training programmes often do not happen as had been envisaged. It has also been often observed that slow implementation has been caused by the exclusion of the wildlife wing headed by an Additional Principal Chief Conservator of Forest (APCCF) with statutory powers (as Chief Wildlife Warden) from the project management unit. The field-level staff members of the wildlife wing take their instructions from the Chief Wildlife Warden rather than from the project management unit.

There is also the issue of resistance to new concepts. The establishment of community reserves as provided by Section 36C of the Wildlife Protection Act in the JICA-assisted forestry projects have shown very slow progress in spite of readily available funding and technical support for the projects. Part of the reason for this slow implementation is complex and time consuming process management perceived by forestry officials; the perception of complexity is largely because they are not accustomed to such process management and the envisaged training programmes in this respect either did not happen or were not effective. Mobilizing the local community to engage with the forest department to declare Community Reserve, having the management committee to establish the management plan, implement, and monitor such plan requires strong commitment of and trust between local institutions and forestry officials, and this once again underlines the need for proper training and orientation of the forest officials and local community members in pursuing innovative conservation and sustainable use approaches. The overall impression is that the biodiversity component of the JICA forestry projects in the country has improved wildlife/protected area management. The enhanced implementation of this component will significantly improve the biodiversity management regime.

5.4 Issues in implementing biodiversity conservation

As outlined earlier, India has robust laws and policies as well as an institutional system for the conservation and management of biodiversity across the country. While achievements are made by the country in protecting its rich and varied biodiversity, conservation is also constrained by several challenging issues.

5.4.1 Community-conservation conflicts

In the foreword to the State of Forest Report 2009 (FSI, 2009), the forest minister points out that over 200 million people are dependent on forests for meeting their subsistence and livelihood needs, and naturally the protected areas are home to people as well, especially the *Adivasis*, or the indigenous people. The establishment of protected areas resulted in the displacement of people, and those who continue to live in or around the protected areas are denied their traditional access to grazing, firewood, and forest produce in the protected areas, which has precipitated a livelihood crisis for the local communities and a perennial source of conflict in protected area management.

The establishment and subsequent expansion of protected areas has resulted in the displacement of approximately 120,000 forest-dwelling people (Rangarajan & Shahabuddin, 2006). Tiger Task Force (2005) points out that since the inception of Project Tiger in the 1970s, a total of 80 villages and 2,904 families, along with 46,341 livestock, have been relocated. Displacements often lead to the destitution and disenfranchisement of the already poor local communities. A long-term study of relocation carried out in Kuno Wildlife Sanctuary, Madhya Pradesh shows that the relocation has had an adverse impact on some of the relocated people's livelihoods. There was little attention paid to the sociological dimensions and many of the displaced wanted to move back to the sanctuary (Kabra, 2009). Most of the country's protected areas also have people living within them (Kothari et al., 1989), and their life is constrained and they live in perpetual conflict with the park management.

In declaring sanctuaries and national parks, the Wildlife (Protection) Act 1972 provides for the raising of claims (e.g., regarding their land or resource use rights) by affected persons and only after settling these claims can the final notification be issued. However, in many cases, the settling of claims and the final notification has not occurred. An important order issued by the Supreme Court in 1997 on this issue observed, 'Even though notifications in respect of sanctuaries/national parks have been issued under section 18/35 in all States/Union Territories, further proceedings are required under the Act, i.e. issue of proclamations under Section 21[75] and other steps is contemplated by the Act have not been taken' (ELDF & WWF India, 2009). The Court raised the same issue again in 2006. The petitioner pointed out that the process has not been completed in 14 out of 85 national parks and 170 out of 494 wildlife sanctuaries, as per the affidavits placed by the State Governments on record (ELDF and WWF India, 2009).

This situation can be addressed in an effective manner by employing the legal categories of 1) Conservation Reserve and 2) a Community Reserve as provided in the Wildlife (Protection) Act of 1972. Since the establishment of these two categories of reserves is slow, identifying the obstacles hindering both the government and the forest dependent communities in their effort to establish the reserves needs to be done with care. At the same time, the impacts of the implementation of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006 on the establishment of the reserves should be examined to clarify confusions over the conservation of resources and the individuals' rights which are established over them.

5.4.2 Human-wildlife conflicts

Human-wildlife conflicts involve incidences including crop raiding, injuring or killing livestock and attacks on humans, sometimes including deaths, which are caused by wildlife. Conflicts between humans and wildlife are increasing in several areas and are a threat to biodiversity as well as being a serious threat to human life and goods. Such species as elephants, tigers, sloth bears, leopards, wild boars, and blue bulls run into conflict with human populations in the adjoining villages. A national level summary of the human-wildlife conflict picture is given in Table 5-5.

[75] Section 21, 22, 23, 24 of WLPA deal with the raising of claims by the local people affected by the declaration of protected areas and the process of settling the claims.

Table 5-5 Human-wildlife conflicts across India

Species	Types of conflict	Areas of major conflict
Tigers (*Panthera tigris*)	• Cattle lifting • Injuries or death to humans/man-eating	All of India
Leopards (*Panthera pardus*)	• Livestock depredation • Injuries or death to humans/man-eating	All of India
Snow leopards (*Uncia uncia*)	• Livestock depredation	Ladakh, Himachal Pradesh, northern Uttaranchal, parts of North-East India
Lions (*Panthera leo*)	• Habitual livestock depredation • Injuries or death to humans	Gir Forest, Gujarat
Elephants (*Elephas maximus*)	• Crop raiding • Injuries or death to humans	All wild elephant bearing areas
Wolfs (*Canis lupus*)	• Livestock depredation	Pockets of Northern, Central, Western India
	• Child-lifting	Uttar Pradesh
Sloth bear (*Melurus ursinus*)	• Injuries or death to humans	All of India, particularly Central India
Deer, antelopes, wild cattle, and wild boars	• Crop raiding	All of India
Reptiles	• Injuries or death to humans	All India
	• Man eating (salt water or estuarine crocodiles)	Sundarbans
Birds/bats	• Crop raiding • Bird damage to aircraft through impacts	All of India

Source: Adapted from Gureja, et al. (2002)

Conflicts arise as a result of the reduction in size or quality of the native habitat, and as a result of the fragmentation of habitats (e.g. Elephant Task Force, 2010). There is also movement by animals to the nearby villages due to the easier availability of food and/or more palatable food. Some species may prefer to settle on the fringes of protected areas and thus closer to human settlements, as is the case with leopards. A reduction in the prey base also prompts predatory animals to foray into villages. Loss of habitats in the corridors of the seasonal movements of elephants is one major reason for elephant-related conflicts. However, human-wildlife conflict is not a recent issue. In the preface to the acclaimed Book of Indian Animals, first published in 1948, the author identifies this as a critical issue (Prater, 1971).

Scale of damages

It is estimated that on average 400 people are killed annually by elephants and 100 elephants are killed by people in retaliation (MOEF, 2010b). Annually, elephants also damage 0.8 to 1 million ha of crops, affecting over 50,000 families (Bist, 2002). In a three-year study in two elephant range districts of Assam, Davies et al (2011) found 1,761 cases of elephant-human conflicts that damaged crops in 359 ha area. According to the Madhya Pradesh Forest Department, 166 human deaths and 3,131 injuries from wildlife attacks occurred in the state during the five-year period of 1998-2003. 14,000 heads of cattle were also reported to be killed by carnivorous predators during this period.

According to information from the Tamil Nadu Forest Department, 259 human casualties occurred in the state during the period between 2002-03 and March 2010, 139 of which were caused by elephants. The Orissa Forest Department reported 3,425 cases of animal depredations during the period from 1994-95 to 2003-04 (Orissa Forest Department, 2004). In Gujarat, as noted by the forest department, there were 51 cases of deaths and 752 cases of human injuries caused by wildlife attacks during the period of 2000-05, mainly involving leopards and sloth bears. Blue bulls and blackbuck caused extensive damage to crops. In the Bhadra Tiger Reserve of Karnataka, 219 heads of livestock were lost to predators and crop damage on the order of INR 5,100 per household was caused, which is equivalent of 30% of the average annual income of a household. This occurred within the span of one year in five sample villages studied in the early 2000s (MOEF, 2010b). The official reports of damages

and mortalities caused by wildlife often miss many cases. The wildlife attacks, apart from their human and social costs, also turn affected communities against the wildlife species in question as well as the wildlife authorities.

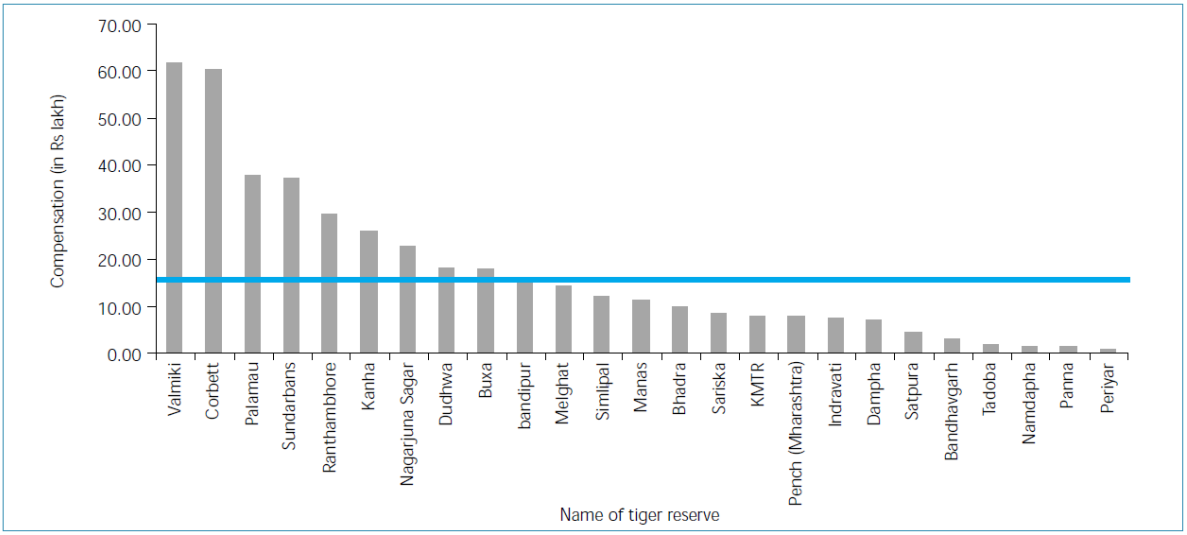
Compensation

The provision for compensations for death and injuries to human beings, agriculture and cattle has been introduced in nearly all states. The compensation system in various states is given in Table 5-6. However, the compensation amounts are considered inadequate and, as observed by Gureja et al (2002), are often not adhered to. The process to get compensation is so complex that communities do not usually pursue it. The Elephant Task Force (2010) has observed that more than two thirds of the funds spent on elephant conservation have been used on issues directly or indirectly related to elephant-human conflicts. The amounts paid as compensation in 25 of the Tiger Reserves in the country are given in Figure 5-2.

Table 5-6 Summary of compensation system for wildlife-related losses in various states

State	Crop damage (INR)	Livestock (INR)	Human deaths, permanent disability, other injuries (INR)	Loss of house, or other properties (INR)
Andhra Pradesh	At par with natural calamities or riots	Market value	Up to 20,000	At par with natural calamities or riots
Assam	-	-	20,000	-
Bihar	500 per acre	-	6,000-20,000	200-1,000
Gujarat	250-5,000	-	25,000-100,000	-
Jharkhand	2,500 per hectare	500-3,000	33,333-100,000	1,000-10,000
Karnataka	2,000 per acre	-	25,000-100,000	5,000
Madhya Pradesh	-	5,000	10,000-50,000	-
Maharashtra	-	3,000-9,000 (or 75% of market value, whichever is less)	50,000-200,000	-
Meghalaya	3,750-7,500 per hectare	100-1,500	30,000-100,000	5,000-10,000
Orissa	1,000 per acre	-	2,000-100,000	2,000-3,500
Tamil Nadu	Up to 15,000 per acre	-	20,000-100,000	5,000
Uttar Pradesh	150-2,500 per acre	-	5,000-50,000	400-3,000
West Bengal	2,500 per acre	70-450	5,000-20,000	500-1,000

Source: Pabla (2005) as quoted in Tiger Task Force (2005)



Source: Tiger Task Force (2005) (Notes: the amounts are in INR 100,000; KMTR= Kalakkad Mundanthurai Tiger Reserve)

Figure 5-2 Compensation paid by Tiger Reserves from inception till 2002

Preventive and mitigation measures

Preventive measures are location and species specific and therefore vary considerably. Elephant-proof trenches and electric fences are practices followed to prevent elephant depredation, but have varying degrees of success. The elephants in many cases eventually find ways to cross the trenches or to damage the electric fence, rendering such efforts ineffective. The application of chilly power laced fences has been found particularly useful to thwart elephants in Assam (Davies et al, 2011). Spotlights and fire crackers are used against different animals with varying degrees of success. Forest department officials in certain problem areas are equipped with tranquilising guns and trapping cages to capture and release the large wild predators. In the Sundarbans, mangrove forests which have a high level of tiger-human conflicts, the local residents have adopted using a human face mask on the backside of their heads as the animal is used to approaching from the back. This method has proven useful sometimes but the animals eventually understand the trick. Habitat improvement of protected areas, however, provides the best long term solution to the problem in relation to most species. Awareness building among the local population is also very important.

The MOEF has formulated the Guidelines for Human-Leopard Conflict Management (MOEF, 2011b), which also prescribes a protocol to be followed in the event of leopard attacks. The Elephant Task Force (2010) has recommended the formation of a permanent Conflict Management Task Force in areas of high conflicts, with experts in various related fields and stakeholders representatives to address the elephant problems in the area.

The fifth World Parks Congress of IUCN had recommended[76] the establishment of a multi-stakeholder global platform to address human-wildlife conflict issues and has called for international cooperation in developing measures to address the human-wildlife conflicts in conflict areas and called on international funding organisations to provide funding for the conflict prevention and mitigation programmes. A workshop on human-wildlife conflict held as part of the World Parks Congress had recommended the creation of a 'toolbox' of methods, strategies, and success stories for the use of practitioners on the conflict issues (Madden, 2004). It has also called for greater recognition of the human-wildlife conflict issues. The workshop had recognised that the failure to effectively address the conflict issues will render conservation projects ineffective and will result in the loss of the much needed local community support.

5.4.3 Undervaluing community conservation

Local communities across the country protect several thousand sites of biodiversity significance. Pathak (2009) documents a large number of such sites (Annex 4). The significance of these areas for biodiversity conservation has not been adequately acknowledged, nor does the formal conservation sector have means to recognize or support them. The importance of what are now known as community conserved areas (CCAs) has been realized internationally and these are now included in the Protected Areas Programme of Work under the Convention on Biological Diversity (CBD). The IUCN World Commission on Protected Preas recognises and promotes such areas managed by indigenous people and local communities[77] . Legally, India now has conservation reserve and community reserve as new categories of protected areas. These could potentially highlight community conservation; however, they are not being adequately applied. There is not enough documentation of these areas and initiatives for their biodiversity significance, nor has there been any study to ascertain what kind of support would be required to strengthen and sustain these efforts.

[76] WPC Recommendation V.20. Preventing and Mitigating Human-Wildlife Conflicts, http://www.iucn.org/

[77] World Parks Congress Recommendation V.17 (Recognizing and Supporting a Diversity of Governance Types for Protected Areas)

5.4.4 Ecodevelopment

Ecodevelopment aimed at both addressing the livelihood needs of the local communities in and account protected areas and conservation of protected areas. Ecodevelopment is implemented by Ecodevelopment Committees (EDCs) according to guidelines developed by each State. Although ecodevelopment was developed as an alternative to JFM in protected areas, more stringent control over utilisation of forest resources is applied.

The survey team has visited several protected areas and discussed with forest officials as well as EDC members. It received the impression during the visits to the protected areas from discussions with forest officials that the ecodevelopment programme has the inherent weakness of being constrained by the law, which prevents access to the forest resources, as well as being constrained by the institutional aspects of the wildlife management system itself, which conventionally took a policing approach towards the local communities. The funding available for ecodevelopment projects and/or programmes has also been small resulting in the non-sustainability of ecodevelopment activities.

5.4.5 Capacity development for wildlife management

Although India has developed extensive institutional arrangements for biodiversity management as described in Section 2.3.3, developing the capacity corresponding to the issues at hand remains a challenge. The country's senior positions in forest/wildlife management (from the Divisional Forest Officers to Director General of Forests) are held by officers of the Indian Forest Service (IFS). According to information from the Indira Gandhi National Forest Academy, the current number of cadres in the IFS is 2,800. Apart from their almos two-year inception training, the officers have to undergo three mandatory in-service training courses conducted by the Academy at various points during their career. However, these training courses are on a broad spectrum of forestry issues, none of which focuses on wildlife management. There is no specialized wildlife management cadre either; officers are transferred between wildlife and other divisions in the forest departments. The WII provides training in wildlife management to both IFS officers and lower-level officers through short-term training courses, in addition to a postgraduate diploma course where forest officers are also admitted. However, these opportunities are very limited.

According to the Directorate of Forestry Education, the state forest staff (Guards, Foresters, Range Officers, and Assistant Conservators of Forest) in the country totals 115,000. They also have limited opportunities for receiving training in wildlife management and are transferred across wildlife and other divisions. The low level of the training of wildlife management staff has been highlighted by several evaluation studies of protected areas. An evaluation of the 28 Tiger Reserves in the country conducted in 2006 has pointed out inadequate staff training as a management constraint in most of the reserves evaluated (Project Tiger Directorate, 2006). Newspapers also report that a similar evaluation exercise conducted in 48 protected areas in 2011 seems to point out the inadequacy of the wildlife training of forest staff, although the final report is not yet available. A 2008 meeting of the highest-ranking forest officials from all the states of the country has also set the training of frontline wildlife staff and protected area managers as a priority (Anon, 2008).

The WII offers short-term training programmes for state-level forest staff, although the programmes are limited in scale. Some states have also begun their own centres for wildlife training: the Maharashtra forest department has established a Wildlife Research Centre at the Ranidoh in Pench Tiger Reserve; a similar centre has been established at the Bandhavgarh Tiger Reserve in Madhya Pradesh; and Rajasthan has established a centre at the Ranthambore Tiger Reserve. These efforts are very recent and have been made with limited resources both in terms of infrastructure and training content.

Most protected areas in the country also need to improve their infrastructure, especially in the provision of state of the art instruments in wildlife management. Public awareness building, which is essential to the success of conservation, is at a satisfactory level mainly due to the involvement of a large number of NGOs.

Capacity development of Biological Diversity Act-related institutions

As described in Section 2.3.3, a number of institutions have been established under the Biological Diversity Act (BDA) including the National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), and local-level BMCs. The BDA marked a paradigm shift in conservation works by incorporating sustainable use and benefit sharing and by factoring in the local communities in biodiversity management. However, effective implementation of the law is possible only with the strengthening of the related statutory institutions. The NBA can fulfil its responsibilities as per the BDA only if it has the required technical capacity and infrastructure. 23 states have so far established SBBs but many lack the essential technical and infrastructure support needed to carry out the multiple responsibilities they are expected to discharge under the provisions of the BDA. 3,955 BMCs have been established in various states. Most of them are in Karnataka, and thousands of BMCs will be established across the country as the capacity of the SBBs increases. These bodies must strengthen their capacity in order to function effectively.

5.4.6 Application oriented research

Biodiversity research is carried out by a fairly large number of organisations including both government agencies and non-governmental bodies. The Botanical Survey of India and the Zoological Survey of India (ZSI) are two government agencies which have been cataloguing the country's flora and fauna since the colonial period. The WII and the Salim Ali Centre for Wildlife and Ornithology (SACON) are two major autonomous organisations funded by the MOEF. In the non-governmental sector, the Bombay Natural History Society is one of the most notable institutions. A few universities, such as the Aligarh Muslim University, conduct master's and research-level courses in wildlife biology.

The WII and SACON often engage in research work that is related to management. However, it is necessary to increase the quantity of research work in order to provide a sound basis for management interventions, especially in the area of social issues. The National Wildlife Action Plan 2002-16 also accords a priority for research. Alfred (1998) has pointed out the abysmally small number of animal taxonomists in a country with such a great diversity of species. The MOEF has recently launched an All India Coordinated Project on Capacity Building in Taxonomy. The purpose of this project is to augment the country's capacity to inventory and monitor biodiversity, and to enhance the capacity of field of taxonomy at all levels (MOEF, 2011a).

The Thematic Report on Protected Areas submitted by the MOEF to the Convention on Biological Diversity has mentioned that about half of the country's protected areas do not have management plans; the inadequate level of need-based research could be a reason for this. Capacity strengthening in wildlife research to an adequate level could significantly improve the management of complex wildlife issues. Research institutions suffer from infrastructure and funding constraints. For example, SACON could markedly improve its output if adequate resources were available to it. It is run on a modest annual grant of INR 15 million from the MOEF even as its estimated requirement was INR 41.9 million for the year 2010-11.

Increased support to capacity building in biodiversity management, in the form of training and infrastructure improvement, as well as to application-oriented biodiversity research could significantly help improve the biodiversity management in the country and address the problems associated with it, building on the excellent foundation for biodiversity management which already exists in the country.

5.4.7 Governance: Inadequate inter-sectoral coordination

Biodiversity management is a cross-sectoral issue that is not restricted to only one ministry or department. The MOEF is the focal ministry that handles biodiversity issues, but there is a need for inter-sectoral planning and coordination with other relevant ministries as well. Inter-sectoral planning with linkages to tribal development, tourism, rural development, agriculture, and small-scale industry development is clearly lacking at different levels; the provision for such a linkage could indeed have eased some of the management problems at the field level. Tourism, for example is primarily looked at by the Ministry of Tourism. Yet most of the 'ecotourism' is today taking place in protected areas that are managed by the state forest departments. Forests are home to most of India's 100 million *Adivasi* population, but MOEF has a limited role in addressing the welfare of this population. However, there are signs of change, as reflected in the implementation of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, where there is increasing cooperation between MOEF and Ministry of Tribal Affairs.

5.4.8 Contradictions in certain laws and regulations

India has strong conservation laws and sound policy instruments. There are, however, issues with the interpretation of certain provisions interpretation and implementation process. Sometimes there is also a mismatch between laws and policies related to the environment with others relating to industrial, agricultural, and rural development. Certain macroeconomic policies come into conflict with some sections of the National Forest Policy that focus on conservation and protection of forest-based livelihood rights. Certain aspects of the Panchayat (Extension to Scheduled Areas) Act, 1996 are in conflict with aspects of the Mines and Minerals (Development and Regulation) Act, 1957 (TPCG & Kalpavriksh, 2005).

The Environmental Impact Assessment (EIA) notification that arises out of the Environment (Protection) Act 1986 is short on the integration of biodiversity parameters in the evaluation, although the Biological Diversity Act 2002 calls for EIAs but has not set in motion an EIA process. The issues involved in the enforcement of the provisions in the Wildlife (Protection) Act 1972 to check poaching have been recognized by the MOEF (MOEF, 1994; MOEF, 1996b; MOEF, 1996a). The protected area management is constrained by the law (Wildlife Protection Act 1972) in allowing any form of resource use by the local communities or to formally involve them in the management of the park. In some ways, this pre-empts a win-win situation that could have been created by the participation of the local communities in the conservation enterprise.

CHAPTER 6 Current status of and issues in climate change measures

6.1 Climate change and forest sector

Climate change has been recently getting an increasing attention in the international arena, and the forest sector has potential to mitigate climate change by afforestation, reforestation, and sustainable forest management. Increasing forest and tree cover and enhancing the quality of forest cover will lead to increase in carbon sequestration. In addition, forests can help India adapt to adverse impacts of climate change. The enrichment of vegetation cover may, for instance, prevent flooding and soil erosion caused by extreme weather events.

In the context of carbon sequestration, Afforestation and Reforestation Clean Development Mechanism (AR-CDM) and Reducing Emissions from Deforestation and Forest Degradation (REDD) plus or REDD+ can be considered the potential schemes to be supported by the future Japanese ODA projects. In India, AR-CDM projects have been already implemented in some states like Haryana, Andhra Pradesh, and Tamil Nadu. On the other hand, REDD+ is not yet in the stage of the formulation and/or implementation of concrete programmes or projects at present.

With respect to adaptation to climate change effects, the highest priority is to enhance resiliency of forest ecosystem against changing climate. Prediction of potential climate risks, identification of vulnerable species and ecosystems, preparation and implementation of measures against adverse climate change impacts can be the major components. In this context, views of climate change adaptation need to be mainstreamed into the initiatives regarding forestry and biodiversity conservation.

In relation to JICA's support to the forestry sector in the near future, REDD+ and AR-CDM are considered the areas with higher potential. The following section mainly focuses on REDD+ and AR-CDM.

6.2 Institutional framework to address climate change

6.2.1 Policy framework to address climate change

(1) National Action Plan on Climate Change

The National Action Plan on Climate Change (NAPCC) was formulated by the Prime Minister's Council on Climate Change in June 2008. It outlines ongoing and future policies and programmes to address climate change issues through vulnerability and impact assessment, and mitigation and adaptation measures. Putting the priority to maintain high economic growth rates to improve living standards, the Plan emphasises the promotion of climate change measures that yield co-benefits, i.e., reducing greenhouse gases (GHGs) and meeting the country's development needs. The Plan also mentions that such measures would be significantly enhanced with assistance from developed countries which affirm their responsibility for GHG emissions and fulfil their commitments under the United Nations Framework Convention on Climate Change (UNFCCC). In relation to the country's target, NAPCC declares that the country's per capita GHG emissions will not exceed that of developed countries in the process of pursuing their development objectives.

NAPCC identifies eight national missions: 1) National Solar Mission; 2) National Mission for Enhanced Energy Efficiency; 3) National Mission on Sustainable Habitat; 4) National Water Mission; 5) National Mission for Sustaining the Himalayan Ecosystem; 6) National Mission for a Green India; 7) National Mission for Sustainable Agriculture; and 8) National Mission on Strategic Knowledge for Climate

Change. In the context of forest and biodiversity management, the National Mission for a Green India, which is explained in Section 2.3.2, is the most relevant.

(2) Stance of the Government of India on international negotiation

The delegation of the Government of India (GOI) expressed, in the speech at Cancun in the sixteenth Conference of Parties (COP) to UNFCCC, the intention to voluntarily and proactively address climate change, and constructively engage in the process of international negotiations. In the speech, the international commitment was reaffirmed that India will reduce the emissions intensity of its GDP by 20-25% by the year 2020 on a 2005 reference level. It also describes major achievements of the country, including diversification of energy, formulation of strategies on forestry and coastal management, setting up the Indian Network for Comprehensive Climate Change Assessment, and establishment of partnerships with neighbouring and other countries. In relation to the strategy in the forest sector, the Green India Mission is mentioned as the key policy.

With respect to REDD+, the GOI presents its views on REDD+ in the paper submitted to UNFCCC on 8 April 2011[78]. The basic position of the GOI is that, carbon sequestration service provided by forests is one of the co-benefits, and not the main benefit. It also pays due attention to the safeguards for the rights of the local communities including tribal peoples and other forest-dependent communities, and emphasises the involvement of civil society and state forest departments in working out the safeguards. The paper clearly states that local communities should be the primary beneficiaries of the incentives or benefits earned from a REDD+ scheme. According to the paper, guidelines on such financial flow from the central government to state governments and then to the district level will be developed by the MOEF. In the long run, guidelines on flow of funds from district level to the lower level will also be formulated.

A national reference level and a transparent national measurement, reporting, and verification (MRV) system are also highlighted in the paper. Fixing of the reference level for forest carbon stocks is given the highest priority to set baseline forest carbon stocks and incremental forest carbon stocks. The MRV system of the estimation methodologies are also given due attention. Research institutions like the Forest Survey of India, and Indian Council of Forestry Research and Education, and Indian Institute of Remote Sensing are expected to play critical roles in the estimation. Capacity building of stakeholders including state forest departments and local communities is also emphasised in the paper.

6.2.2 Climate change-focused organisations

(1) Prime Minister's Council on Climate Change

In India, the Prime Minister's Council on Climate Change is mandated to coordinate national action for the assessment of, adaptation to and mitigation of climate change. It was constituted in June 2008, and is chaired by the Prime Minister. The Council is composed of 26 members of relevant ministers and government officials, and other experts. Ministers involved include the External Affairs Minister, the Finance Minister, the Minister of Environment and Forests, the Minister of Agriculture, the Minister of Water Resources, the Minister of Science and Technology, the Minister of New and Renewable Energy, the Deputy Chairman of Planning Commission, and the Principal Secretary to the Prime Minister.

The main tasks of the Council include 1) coordination of climate change-related issues at the national level; 2) supervision of the formulation of action plans for the assessment of, adaptation to and

[78] The paper titled 'Views on implementing COP decisions on "Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" (REDD-plus)'

mitigation of climate change; and 3) periodical monitoring on key policy decisions. The Prime Minister's Office provides the secretariat functions, with assistance of the MOEF and other relevant ministries.

(2) REDD+ Cell of MOEF

The Green India Mission states that a REDD+ Cell will be established[79] under the supervision of the MOEF to develop stakeholders' capacity and to provide technical advice to the national authorities. Stakeholders include forest dependant communities that may be involved in REDD+ process at decentralized levels. A comprehensive national strategy for REDD+ and subsequent programmes and projects will be designed and formulated by the Cell. Technical advice may be on the development and implementation of monitoring, reporting and verification protocols and fair benefit sharing mechanisms in accordance with internationally agreed rules.

6.3 Initiatives to address climate change in the context of forest management

6.3.1 Projects for AR-CDM

AR-CDM is one of the potential areas that can bring co-benefits to the country since AR-CDM will contribute to both GHG sequestration and forest conservation. In terms of projects hosted by India, 663 Clean Development Mechanism (CDM) projects are currently registered with the CDM Executive Board of UNFCCC. Out of them, five AR-CDM projects are registered with the Board. Table 6-1 shows the status of AR-CDM projects in India.

Table 6-1 Status of AR-CDM projects in India

Registration date	Title	State	Other parties	Estimated reduction*
23 Mar 2009	Small-scale Cooperative Afforestation CDM Pilot Project Activity on Private Lands Affected by Shifting Sand Dunes in Sirsa, Haryana	Haryana		11,596
05 Jun 2009	Reforestation of severely degraded landmass in Khammam District of Andhra Pradesh, India under ITC Social Forestry Project	Andhra Pradesh		57,792
15 Jan 2010	The International Small Group and Tree Planting Programme (TIST), Tamil Nadu, India	Tamil Nadu	UK	3,594
28 Feb 2011	Improving Rural Livelihoods through Carbon Sequestration by Adopting Environment Friendly Technology based Agroforestry Practices	Orissa, Andhra Pradesh	Canada	4,896
04 Mar 2011	Himachal Pradesh Reforestation Project: Improving Livelihoods and Watersheds	Himachal Pradesh	Spain	41,400

Note: * Estimated emission reductions in metric tonnes of CO_2 equivalent per annum (as stated by the project participants)
Source: UNFCCC Website, http://cdm.unfccc.int/Projects/projsearch.html

In terms of the involvement of development partners, the project in Haryana State is a part of the Haryana Community Forestry Project, which is co-funded by Haryana State Government and the European Commission. Similarly the project in Himachal Pradesh is a part of the World Bank-funded project titled the Mid-Himalayan Watershed Development Project.

However, AR-CDM has some shortcomings, including technical difficulties and relatively unattractive financial incentives, compared with CDM projects aiming at reducing GHG emissions (IGES, 2011).

[79] Some officials of the MOEF informed the survey team that the Cell was already launched. However, the team could not confirm any notification or other official documents to establish the Cell.

In fact, the number of AR-CDM projects registered is only 27 whereas a total of 3,258 CDM projects are registered across the world[80]. In promoting AR-CDM, the following issues in general need to be given due attention at least:

- Non-permanence of AR-CDM projects
- Eligibility of lands for AR-CDM projects
- Technical difficulties including developing applicable methodologies and setting up of feasible monitoring mechanism

(1) Non-permanence of AR-CDM projects

AR-CDM projects cannot absorb CO_2 permanently. CO_2 being sequestered in trees could be released back into the atmosphere in the event of forest fire, tree death caused by pests, tree harvesting, and other events. The Certified Emission Reductions (CERs) to be approved under AR-CDM are, therefore, different from those of CDM projects to reduce GHG emissions. In the AR-CDM, temporary CERs (tCERs) and long-term CERs (lCERs) are approved and issued, but these CERs need to be replaced before its expiry date by the party. This requirement may make AR-CDM projects less attractive for project stakeholders since the other CDM projects to reduce GHG emissions do not have such limitation on CERs.

(2) Eligibility of lands for AR-CDM projects

The report of the 35th CDM Executive Board Meeting[81] outlines the procedures to demonstrate the eligibility for AR-CDM project activities. Project participants are required to present evidence that the land within the planned project boundary is eligible for an AR-CDM project by the following steps.

1) Demonstrate that, when the project starts, the land does not contain forest by providing transparent information that:
   - Vegetation on the land is below the forest thresholds adopted by the host country;
   - All young natural stands and all plantations on the land are not expected to reach the minimum crown cover and minimum height chosen by the host country to define forest; and
   - The land is not temporality unstocked, as a result of human intervention such as harvesting or natural causes.

2) Demonstrate that the proposed activity is a reforestation or afforestation project activity:
   - For reforestation project activities, demonstrate that the land was not a forest by demonstrating that the conditions outlined under 1) also applied to the land on 31 December 1989.
   - For afforestation project activities, demonstrate that, for at least 50 years, vegetation on the land has been below the forest thresholds adopted by the host country.

With respect to the forest thresholds, the GOI defines forests as lands having trees with 1) a minimum area of 0.05 hectare; 2) a minimum tree crown cover of 15%; and 3) trees of, or with potential to reach, the height of minimum of 2 meters[82]. The project participants need to provide information to distinguish between forest and non-forest land as per the definition of the forest threshold. This should be done by aerial photographs or satellite imagery complemented by ground reference data, land use or land cover maps or digital spatial datasets, or ground based surveys. If such information is not available, a written testimony to be produced through a Participatory Rural Appraisal (PRA) is

[80] UNFCCC Website, http://cdm.unfccc.int/Projects/projsearch.html, retrieved on 15 July 2011.
[81] UNFCCC Website, http://cdm.unfccc.int/EB/035/eb35rep.pdf, retrieved on 15 July 2011
[82] UNFCCC Website, http://cdm.unfccc.int/DNA/cdf/files/2008/0707_india.pdf, retrieved on 15 July 2011

required.

(3) Technical difficulties

Determination of the baseline and monitoring methodology for an AR-CDM project will require high technical and financial capacity. The technical difficulties to be addressed here include identification of feasible baseline scenario, estimation of carbon to be sequestered in trees, and monitoring of carbon sequestered by the project activities. Available methodologies for AR-CDM projects are limited so far. Only 11 methodologies and 2 consolidated ones for large scale AR-CDM project activities and 7 methodologies for small-scale projects are approved by the CDM Executive Board at present[83]. This may be a technical barrier for stakeholders when formulating a new AR-CDM project.

6.3.2 Projects to prepare for REDD+

REDD is an international scheme, currently under negotiation, to recognize a financial value for the carbon sequestration in forests. It provides incentives for developing countries to reduce emissions by deforestation and forest degradation as well as to pursue sustainable development. REDD plus or REDD+ is the modified concept, adding the concept of sustainable management of forests and afforestation and reforestation to enhance forest carbon stocks.

Although international framework is still under negotiation, various international initiatives have been launched to better prepare for REDD+. Such initiatives aim to enhance the readiness of REDD+ by developing the stakeholders' capacity, supporting the formulation of a national strategy, and supporting the identification of the national reference level. Major international initiatives are listed in Table 6-2.

Table 6-2 Major international initiatives regarding REDD+

Initiative	Overview
REDD+ Partnership	• Launched in May 2010 • An international platform for REDD+ stakeholders • 71 countries, including India, joined the partnership
Forest Carbon Partnership Facility (FCPF)	• Launched in October 2007, and managed by the World Bank • Composed of the following two funds - Readiness Fund: Capacity building for reference scenario, national strategy, and monitoring system for REDD+ - Carbon Fund: Pilot of carbon finance transactions for REDD+ 'ready' countries • 37 participants countries; India not included
Forest Investment Programme (FIP)	• Launched in May 2009, and managed by the World Bank • A Programme under the Strategic Climate Fund within the Climate Investment Fund (CIF) • Support to REDD+ readiness activities • 8 pilot countries selected for pilot activities; India not included
UN-REDD	• Launched in September 2008, and operated by UNDP, FAO, UNEP • Support to capacity development for REDD+ readiness • 29 partner countries, of which 13 are receiving support to National Programme activities; India not included

Source: Website of REDD+ Partnership, http://reddpluspartnership.org/en/, retrieved on 23 June 2011; Website of FCPF, http://www.forestcarbonpartnership.org/fcp/, retrieved on 23 June 2011; Website of FIP, http://www.climateinvestmentfunds.org/cif/node/3382, retrieved on 23 June 2011; and Website of UN-REDD, http://www.un-redd.org/, retrieved on 15 July 2011.

[83] UNFCCC Website, http://cdm.unfccc.int/Projects/projsearch.html, retrieved on 15 July 2011.

Out of the four initiatives above, FCPF, FIP, and UN-REDD are the financial mechanism managed by international organisations whereas the REDD+ Partnership is a platform among countries interested in REDD+. With respect to such multilateral financial mechanism, India is not included as a country eligible for support from such funds, although India shows a certain interest in accessing international financial mechanism[84]. Similarly, in terms of bilateral or regional initiatives[85], India is not involved in such schemes at present.

According to the MOEF, there are no ongoing and pipeline projects, but the MOEF considers that REDD+ would be a good opportunity for the country. In fact, in the paper submitted to UNFCCC on 8 April 2008, the GOI shows their intension to launch three types of pilot projects, subject to the availability of funding. Project types mentioned are those based on the concept of conservation, sustainable management of forest, and enhancement of forest carbon stocks. There are also ongoing discussions in the country to prepare REDD+. Several workshops organised by the government agencies and NGOs have been held for the sensitization of and capacity development for stakeholders[86].

[84] The paper submitted to UNFCCC on 8 April 2011 and the Green India Mission imply India's interests in accessing international financial initiatives.
[85] Examples of such bilateral or regional initiatives include Norway-Indonesia REDD+ Partnership, and Central African Forests Commission (COMIFAC).
[86] For instance, the workshop titled 'Integrating REDD-plus with poverty alleviation and development action' was organized by the International Union for Conservation of Nature (IUCN) on February 2010.

CHAPTER 7 Cross-cutting issues of forestry and biodiversity sector

7.1 Overview of cross-cutting issues

As cross-cutting issues in relation to forestry and biodiversity management, the Survey focused on three issues: 1) Application of Information and Communication Technology (ICT) including Geographical Information System (GIS) and remote sensing; 2) Capacity development of forest officers; and 3) Development and reinforcement of basic infrastructure such as forest roads and nurseries.

Among them, the need for the forest-related physical infrastructure development is site-specific. Necessary types, designs, and scales of infrastructure are depending on the natural and socioeconomic conditions as well as the status of infrastructure development in respective sites. Needs for infrastructure development should be therefore examined in the formulation process of respective projects. In fact, the state forest departments with which the survey team interviews admitted the significance of infrastructure development, but they did not specify or identify the types, designs, and scales of forest-related infrastructure[87] since such needs are greatly differ as per the site-specific conditions. Furthermore, infrastructure development itself is not usually to be a main component of JICA's cooperation projects. Thus the plan for infrastructure development needs to be developed as the supplementary components of future projects. This chapter, therefore, discusses the ICT application and capacity development of forest officers.

7.2 Current status of ICT application to forest management

Forest and biodiversity management involves large geographical areas. To manage such areas, ICT such as the Internet, mobile phone network, and GIS-based database is expected to contribute to the systematic planning, implementation, and monitoring of the forest department's operations.

Although the extent of ICT utilisation is very different from state to state, but the need for the application of ICT seems quite high. In fact, all state forest departments the survey team interviewed with were aware of the usefulness of the application of ICT to their operation. Among the states the survey team visited, Madhya Pradesh and Tamil Nadu Forest Departments have developed advanced GIS-based forest management system to enable effective and efficient forest management. This section briefly describes the current ICT-related initiatives of the two states.

(1) Madhya Pradesh

In Madhya Pradesh, a GIS-based ICT system has been well developed and utilised by the Forest Department. According to the Information Technology (IT) unit of the Department, it has started developing the ICT system in 2007 to manage forest-related information in an effective and integrated manner.

Table 7-1 demonstrates the GIS-based information systems developed by the Madhya Pradesh Forest Department. These systems help forest officers identify the current situations of forest lands and manage forest resources effectively. Forest officers can access the detailed information through the internet. In addition, much of the information is open to the public through the Department's website[88].

[87] Some state forest departments such as the Tamil Nadu and the Rajasthan Forest Departments pointed out that the GIS-based ICT infrastructure needs to be developed. However, this chapter deals with ICT as an independent subject from the infrastructure development.

[88] http://www.mpforest.org/index.html

Table 7-1 GIS-based information systems of Madhya Pradesh Forest Department

Fire Alert Messaging System (FAMS)	The system uses the Fire Information Resource Management System (FIRMS) developed and maintained by the University of Maryland and NASA[1]. Based on the processed remote sensing data of FIRMS, active fire locations are identified. Fire alert is then sent to concerned frontline officers as well as Divisional Forest Officers and Conservator of Forest through short message service (SMS) and email. They can see the fire locations on Google Maps on their computers. Responsible frontline officers are directed to provide online feedback about the location and measures taken. Furthermore, the dataset of fire locations also contribute to the identification of fire sensitive zones, and effective and efficient planning of fire control operations.
Forest Offence Management System	The system uses GIS-based technologies to register forest offences such as illicit felling, illicit transportation, poaching, encroaching, and illicit grazing. When frontline officers detected such offence, related information is to be uploaded to the website. The number of registered cases, status of cases filed, and other related information during particular period is readily available on the database.
Forest Dwellers Survey System	The system aims to clarify the status of forest dwellers with geographical location of their land holdings. This is required for the implementation of the Forest Rights Act 2006, and the system was developed responding to the request of the Madhya Pradesh Schedule Tribes and Schedule Caste Welfare Department. The GPS-based information including the boundary of areas where the forest rights are recognised, the certificate of the forest rights, and right holders' photographs are available on Google Map.
Integrated Forestry Works and Financial Management System	The system is used for the monitoring of the budget allocations and actual expenditure. Detail information of forest works, including tree planting and the construction of forest-related facilities, are uploaded on the website. The geographical location is readily identified on Google Map. Accounting information of respective works including voucher, receipt, cashbooks, and cheques are also uploaded and readily available online.
Wildlife Management System (WMS)	The system aims to monitor and analyze the wildlife movements, habitat status, population, and their relations with other animal populations and vegetations. Frontline forest officers bring PDA with GPS function for patrolling, and the system records their track log automatically. When they find wildlife or evidences of wildlife such as footprints and dung, they upload relevant information including the image of the animals or their evidences. When inputting the data, the PDAs automatically record the locations, dates and times. The information is readily available on Google Map. Such data will contribute to better wildlife habitat management.
Forest Planning and Geo-Mapping System	The system demonstrates the forest planning tools and maps. Working plan, various maps including forest stock maps, remote sensing map, and biodiversity characterization maps are also available online. Using these data and information, the Forest Department will plan the forest operations.

Note 1: The operation of FIRMS was transferred to the FAO in May 2011. FAO is currently operating Global Fire Information Management System.

Source: Website of Madhya Pradesh Forest Department, http://www.mpforest.org/index.html, retrieved on 26 June 2011; and Interview with IT unit of Madhya Pradesh Forest Department

a) Distribution of PDA to frontline officers

According to the IT unit of the Madhya Pradesh Forest Department, all Beat Guards[89] assigned to protected areas were given personal digital assistance (PDA) devices with GPS. The devices are being used for watching, reporting, and recording the forest conditions and events like forest fire and poaching. In addition to the Guards of protected areas, the Department plans to distribute PDA devices to the other Beat Guards. In 2011, tender for purchasing 5,000 PDAs were already completed and the PDAs are to be distributed to Beat Guards. Training sessions on the concept of GIS and how to use PDA are also provided by the Forest Department to the forest guard level.

With the device, Beat Guards can effectively monitor forest fires, encroaching, poaching, and other events. For instance, when Beat Guards receive fire alerts through FAMS listed in Table 7-1, they can effectively identify the location of fire, conduct on-site investigations, and report the actual situations

[89] In Madhya Pradesh, the lowest officer is called 'Beat Guard.'

and measures by using PDA devices.

The IT unit of the Forest Department also suggested that PDA devices are helpful to monitor how, when and where Forest Guards work. The track record can be traced through GPS system, and this enables the Department to manage their staff effectively.

b) Development of ICT systems

The ICT system in Madhya Pradesh is featured with the fact that the applications for their systems have been developed by the Forest Department itself. The IT unit of the Department estimates its total investments as approximately INR 100 million. This means that they could develop their system at relatively low cost. The investments were made for purchasing computers, servers, GIS software, PDA devices, and other necessary hardware and software to develop the whole system. However, the development of applications and training for forest officers were conducted by the Department itself.

According to the IT unit of the Department, the systems have been developed based on the existing ICT technologies, including Google Earth, Google Map, and SMS system. By combining the readily available and low-cost ICT services, the Forest Department could develop the effective management system without massive investments, although personnel costs were also required for the forest staff in charge of the development of the systems.

(2) Tamil Nadu

The Tamil Nadu Forest Department has a well-developed GIS-based forest management system. The development of a GIS-based database was a component of the Tamil Nadu Afforestation Project Phase I and II assisted by JBIC (now JICA). The Projects also supported the capacity development of forest department staff related to GIS. According to the ex-post evaluation report of the Phase I Project[90] dated in 2008, the introduction of GIS-based database was undertaken as planned, and monitoring on changes in tree canopy density and other forest resources were initiated in some parts of the state.

The Geomatics Centre, which is responsible for GIS-related information system, was established under the JBIC-funded project in 1997. The Geomatics Centre is mandated to develop a GIS and remote sensing-based database, develop a forest resource inventory, and provide necessary data and information to make decisions on forest management. More specifically, the major activities of the centre include creation of digital database of forest resource; collection, compilation, storage, dissemination of spatial data; assessment of latest forest cover; and support of forest mapping. The staff members of the Geomatics Centre have been trained to acquire professional expertise for data collection, data processing, GIS-based information creation, and analysis and interpretation on the dataset. According to the Centre, staff members who acquired GIS-related expertise will stay in the Centre for a relatively long time.

The GIS-based information systems operated in Tamil Nadu are outlined below.

- **Generation of forest maps and other thematic maps**: The Geomatics Centre creates forest cover and forest class maps, forest type maps; maps for monitoring on vegetation changes; tribal enclave maps; maps for wildlife monitoring; and maps for forest fire monitoring.
- **Forest offence monitoring**: When forest offences are detected by Beat Guards[91], the Guards report the site information with the photographs to the Range and Division Offices. Such information will be incorporated into the forest offence database. If several offences are

[90] Ex-post evaluation report on Tamil Nadu Afforestation Project, http://www.jica.go.jp/english/operations/evaluation/oda_loan/post/2008/index.html, retrieved on 30 June 2011

[91] In Tamil Nadu, the lowest frontline forest officer is called 'Beat Guard.'

repeatedly detected in the same area, such area will be considered vulnerable to forest offences, and more attention is to be given by the frontline officers.

- **Fire monitoring system**: The system will detect forest fire using the data and information provided by the FIRMS. Beat Guards in charge of the fire sites will visit and check the situations, and will report to the Range Office.

With respect to the filed-level ICT application, PDA devices with GPS are being distributed to the level of Range Forest Officers according to the Geomatics Centre. When the distribution to the Range Forest Officers is completed, the distribution of the devices to the lower officers will be taken into consideration. The Centre is currently providing training for trainers who will be the resource persons to train how to use the distributed PDA devices. A candidate trainer per one division is selected and trained every year.

7.3 Current status of and issues in capacity development for forest officers

Capacity development of forest officers are undertaken at various levels. At the central level, training and education institutes such as the Indira Gandhi National Forest Academy (IGNFA) are established for the training of the Indian Forest Service (IFS) officers. The Central Academy for State Forest Service and the Eastern Forest Rangers College are also established under the supervision of the Directorate of Forest Education for the training of the State Forest Service (SFS) officers and Forest Range Officers (FRO). There are also forest rangers colleges operated by state governments. For instance, the Tamil Nadu Forest Academy at Coimbatore is managed by the Tamil Nadu Government.

7.3.1 Current status of capacity development for forest officers

(1) Training for IFS officers

The Indira Gandhi National Forest Academy (IGNFA) provides various training courses mainly for the Indian Forest Service (IFS) officers. The IFS Officers are expected to have many opportunities to develop their capacities: 1) 20 months probationers' course at the IGNFA and 2 months at the Lal Bahadur Shastri National Academy of Administration; and 2) Mid career training programme at 7 to 9 years, 16 to 18 years, and 26 to 28 years, as described in Section 2.3.3.

In terms of the training opportunities, the IFS officers seem to have enough opportunities for training. The probationers' course and in-service training courses are provided as per their career path. This will help the IFS officers acquire necessary skills and capacities in timely manner.

The themes of the training for the IFS officers cover broad issues. In addition to the basic themes like forest planning and management, silviculture, ecological science, wildlife management, engineering science, and human resources management, recently focused areas like GIS and remote sensing, climate change, and economic and social aspects are well covered.

(2) Training for SFS officers

With respect to the training for the State Forest Service (SFS) officers and the Forest Range Officers (FRO), the Directorate of Forest Education is mandated to organise training courses through the SFS Academies and the Forest Rangers College, as described in Section 2.3.3. According to the Director of the Directorate, the Directorate organises short-term general refresher courses and theme-based workshops and seminars for the SFS officers and FROs, in which approximately 350 to 400 in-service officers participate annually from all states and the Union Territories. However, the coverage of the SFS officers and FROs to be trained appears to be low, taking into account their numbers, i.e., 4,500

SFS officers and 10,000 FROs[92].

JICA-supported technical assistance project

For the capacity development of SFS officers, JICA is currently supporting a technical cooperation project titled 'Project for Capacity Building of State Forest Training Institutions and SFS Colleges.'[93] The Project duration is from March 2009 to March 2014. The executing agency is the Directorate of Forest Education, the MOEF. It aims at improving the training at the national level under the Directorate of Forest Education at the SFS Academies. Through the Project, the capacity of SFS officers, who are expected to be the trainers for the training for the frontline forest officers, are strengthened, and ultimately the quality of training for the frontline officers is expected to be improved. Main activities include 1) to examine the existing training course at the SFS Academy, Dehradun; 2) to identify the needs and challenges of state-level training; 3) to revise the design, subjects, curriculum and materials of training. The establishment of monitoring and feedback system to identify the effectiveness of training is also assisted.

The Project was originally linked to the ODA Loan Project titled 'Capacity Development for Forest Management and Personnel Training.' This loan project is to provide funds for the improvement of training environment for the frontline forest officers by rehabilitating the state training institutions, and for the capacity development of frontline forest officers. The technical cooperation project is to assist the ODA loan project in 1) preparing syllabus, and materials for master training and for model teaching note for frontline officer training; 2) implementing master training at the SFS Academy, Dehradun, and 3) monitoring of training of trainers conducted by master trainers. However, since the start of the ODA loan project has delayed, the expected synergy effects were not sufficiently exerted[94].

(3) Training for frontline forest officers

The training for frontline officers such as Deputy Rangers, Foresters, and Forest Guards are mainly state governments' responsibility. State forest departments with which the survey team interviewed suggested that needs for capacity development for the frontline officers are not sufficiently met. For instance, the Principal Chief Conservator of Forest of the Uttarakhand Forest Department stated that, although the state government has some budget for the capacity development of the frontline forest officers, there is a gap between the needs on the ground and the training opportunities actually provided. He identified the capacity development of the frontline officers as one of the critical challenges for the Department. The Tamil Nadu Forest Department is also aware of the need for the development of frontline officers' capacities.

At the central level, the Directorate of Forest Education provides training for the frontline forest officers as supplementary ones to the training provided by state forest departments. According to the Directorate, approximately 3,500 to 4,000 frontline officers are trained per annum. However, the coverage seems low and insufficient because the number of the frontline officers is approximately 115,000[95].

[92] Paper provided to the survey team by the Director of the Directorate of Forest Education on 20 April 2011, titled 'Note on the Refresher Courses for In-Service State Forest Service (SFS) Officers, Forest Range Officers (FROs) and Forest Frontline Staff'

[93] The outline of the project is presented at JICA website, http://www.jica.go.jp/india/english/activities/activity21.html, retrieved on 25 June 2011.

[94] Interview with JICA long-term expert

[95] Paper provided to the survey team by the Director of the Directorate of Forest Education on 20 April 2011, titled 'Note on the Refresher Courses for In-Service State Forest Service (SFS) Officers, Forest Range Officers (FROs) and Forest Frontline Staff'

7.3.2 Issues in capacity development for forest officers

(1) Resource allocations for training at various levels

As described in the previous subsections, the IFS officers have been receiving good training as regards both quality and quantity. The SFS officers also have certain training opportunities through training programmes provided by the Directorate of Forest Education at the central level, and state training institutes at the state level. On the other hand, the frontline officers such as Forester and Forest Guards in general have limited opportunities to take training, although the situation varies from state to state. Increasing the training opportunities for the frontline forest officers and the allocation of more financial and human resources are, therefore, one of the crucial challenges.

(2) Evaluation indicators for training programmes and feedback system

Setting appropriate indicators to monitor and evaluate the training programmes is also critical. In this regard, the development of outcome-based indicators should be prioritised. For instance, the Rajasthan Forest Department states that indicators like the number of training sessions and trainees are not sufficient to measure the effectiveness of the training, although such indicators are useful to monitor the progress. Indicators to measure the achievements need to be properly developed. Activities to check such indicators, including follow-up test or self-assessment, may need to be incorporated as part of training programmes.

The JICA Long-term Expert for the technical cooperation project mentioned above also pointed out the importance of developing effective indicators and establishing effective feedback system. The SFS Academy had already developed feedback system on the quality of programmes, including the feedback on the contents, trainers, and training facilities. However, such feedback system cannot identify to what extent the programme contribute to the enhancement of the trainees' capacity. From this point of view, under the ongoing JICA technical cooperation project, the system for self-assessment on the trainees' capacity was introduced to see the effectiveness of the training programme, and to ensure fruitful achievements.

CHAPTER 8 JICA's cooperation strategy in forestry and biodiversity sector

8.1 Rationale for JICA's cooperation in forestry and biodiversity conservation sector

(1) Achievement of JICA's assistance and considerations of JICA's future cooperation strategy

a) Achievement of JICA's assistance and emerging needs for further cooperation

JICA has assisted India's forest management and biodiversity conservation for many years, with particular emphasis on Joint Forest Management (JFM) and biodiversity conservation. The major objectives of the assistance have been increase in and conservation of forest cover, and poverty reduction through enhancement of livelihood of forest-dependent communities. The Survey conducted case studies in Rajasthan and Tamil Nadu to assess the performance of JFM programmes assisted by JICA. The result of the case studies indicates that the assistance has achieved these objectives, contributing to the improvement of their livelihood and increase in forest cover, although it have shown the diversified levels of achievements reflecting internal and external factors surrounding the implementation of JFM. The summary of the achievements identified in the case studies is as follows:

- Improvement of natural regeneration of the forest and increase in forest cover and survival rates of planted trees with soil moisture works and reduced biotic interference
- Increase in ground water table and water availability in the wells
- Securing and management of proper access to NTFP by JFMC members
- Decrease of forest dependency due to alternative livelihood and energy sources such as LPG
- Enhancement and improvement of JFMC members' livelihood through IGAs
- Increase in agriculture productivity and diversification of agricultural crops that led to increasing farm income
- Participation of socially disadvantaged groups of the people in the village in the decision-making process of the JFM related activities that contributed to building social capital among the members and strengthening social coherence
- Enhancement of capacity of JFMC and SHG members in organisation and financial management, and improvement of access to financial services

In addition to the above achievement, case studies also identified the important factors necessary to be considered in future JICA's assistance to JFM. They are: 1) the recent MOEF's policy promotes the decentralisation of forest governance, putting more focus on the role of Gram Sabha and other local institutions; 2) in some areas, people's dependency on forests is decreasing due to the government's livelihood support programmes including National Rural Employment Guarantee Scheme (NREGS); and 3) there are areas where forest rights are recognised under the Forest Rights Act 2006. Because of these factors, the concept and implementation mechanism of JFM need to be reviewed and redefined.

Biodiversity conservation is a relatively new area for JICA's assistance. Review of the past and ongoing JICA-supported projects identifies challenges including needs for capacity development of forest officers, and coordination between project management unit and wildlife wing of forest department. In terms of area wide issues, community-conservation conflicts, human-wildlife conflicts, undervaluing community conservation, necessity of capacity development for wildlife management, need of application oriented research, inadequate inter-sectoral coordination, and contradictions in certain laws and regulations need to be addressed.

Although the farm forestry and wood-based industries has not been a major priority area for JICA's cooperation, it is important to consider the current situation and issues of the area due to its potential contribution to increase in forest cover, creation of employment opportunities, and meeting demand of

wood-based raw materials. The Forest (Conservation) Act 1980, the National Forest Policy 1988, and the Supreme Court Order dated 12 December 1996 have limited the supply of wood-based raw materials from recorded forest areas; on the other hand, there have been increasing demand for the materials due to India's economic development. This situation led to the supply shortage, and farm forestry has responded to the situation by increasing its production base. The past experience also indicates that farm forestry can be failed without demand from wood-based industries. In light of the above, the Survey examined the current status and issues in the promotion of farm forestry and wood-based industries. Major issues identified include 1) increased demand for timber and raw materials due to the economic growth; 2) discouraging laws and policies related to farm forestry; 3) productivity and technology issues with respect to wood-based industries; and 4) challenges in inter-departmental coordination mechanism.

b) Consideration of JICA's future cooperation strategy

In order to assist the GOI in addressing the above issues appropriately, JICA needs to explore a variety of assistance options in addition to its current cooperation approach to the forestry and biodiversity sector in India. This will be particularly required for JFM, and farm forestry and wood-based industry.

To align with the MOEF's recent policy on forest governance decentralisation, it is effective to incorporate the Gram Sabha and other local institutions into the decision-making process of JFM. In line with the government's decentralisation policy, JICA should pursue collaboration with the local institutions and support to their capacity development in relation to the forest sector. The inclusion of the Gram Sabha in the project implementation mechanism may be helpful to solve or prevent potential conflicts that may be caused by the individual claims under the Forest Rights Act 2006. This is one of the future strategies of JICA's cooperation. Under such assistance strategy, the individual needs, such as those for capacity development of forest officers, enhancement of roles of NGOs, inter-departmental cooperation, and effective monitoring, should be addressed.

To address the issues concerning farm forestry and wood-based industries, it is worth considering the promotion of farm forestry and the development of wood-based industries for JICA's future cooperation. Such support to industrial development is the new approach of JICA to forest sector development in India. To consider cooperation to the area, JICA's assistance experience in the other sectors may be helpful. For instance, JICA has experience in supporting the 'Industrial Pollution Control Project' in West Bengal in which a two-step loan was provided to promote capital investment in pollution prevention measures. Based on such experiences, it may be effective for JICA to pursue various assistance options including a two-step loan. Furthermore, to support the enhancement of farm forestry and wood-based industries efficiently, an inter-sectoral coordination mechanism among departments in charge of, for example, industrial and commercial affairs, agriculture, and horticulture should be established. JICA is able to support the establishment of such inter-sectoral coordination mechanism to promote wood-based industries.

With respect to biodiversity conservation, JICA should continue to support several activities including ecodevelopment, habitat improvement, human-wildlife conflict management, establishment of Community Reserves, ecotourism development, and others. Capacity development of forest officers in wildlife management and application-oriented wildlife research are also identified as priority areas for the assistance. For the implementation of ecodevelopment, an implementation mechanism similar to JFM described above will need to be set up.

For the other thematic areas like climate change and crosscutting issues, no specific cooperation strategies need to be recommended at present. This is because, in terms of climate change measures, there are unclear situations such as ongoing international negotiations and GOI's position on the negotiations. With regard to the crosscutting issues including the application of information and communication technology, capacity development of forest officers, and infrastructure development

are usually addressed as supplementary components of individual project Thus, it is unnecessary to set a specific cooperation strategy for the crosscutting issues.

(2) Relevance of JICA's cooperation

a) Japan's ODA policies

Japan's ODA is provided in accordance with its Official Development Assistance Charter (ODA Charter), first formulated in 1992 and updated in 2003. The Charter puts high priority on addressing global challenges including climate change and other environmental issues. To realize the ODA Charter, the Medium-Term Policy on Official Development Assistance (Medium-Term ODA Policy), formulated in February 2005, identifies priority areas, approach, and actions. The Medium-Term ODA Policy highlights three priority areas of the environmental issues: 1) climate change mitigation and adaptation; 2) pollution control; and 3) conservation of natural environment. In the context of the conservation of natural environment, the management of protected areas, the conservation and management of forest, the prevention of desertification, and natural resources management are focused.

The current Country Assistance Programme for India, which was formulated in 2006, states that Japan's ODA to India will have the priority areas on 1) promotion of economic growth; 2) improvement of poverty and environment issues; and 3) expansion and enhancement of human resources development and exchange. In the context of the second priority area, the Programme recognises that the improvement of rural population income and rural employment is essential for poverty reduction. Assistance for forestry and biodiversity conservation is also clearly mentioned. It is centred on increasing the quality and quantity of forests. The Programme gives due attention to the fact that the poor and socially vulnerable groups are dependent of forest resources, and therefore emphasises a comprehensive approach to both forest conservation and community development.

JICA's country assistance programme to India, formulated in 2009, identifies four priority areas: 1) support to sustainable economic growth through infrastructure development; 2) support to economic growth with increasing employment; 3) support to poverty reduction; and 4) support the environmental conservation and climate change measures. In the context of poverty reduction, increasing employment opportunities in rural areas through small- and medium-scale enterprises development in rural areas is one of the focused areas. Under the fourth area, featured are JFM at villages with high poverty ratio, capacity development of forest officers and local stakeholders, tree planting outside forest areas, and protected area management in collaboration with rural population. In addition, the programme defines two crucial cross-cutting issues: 1) climate change; and 2) capacity development of local government and other stakeholders. With respect to climate change, carbon sequestration through tree planting is considered one of the expected cooperation areas. In the context of the capacity development, the programme declares that JICA will proactively support the capacity development of local administrative institutions as well as NGOs and other stakeholders.

As described above, forest conservation is clearly defined as one of the key assistance areas of Japanese ODA policies as well as its assistance policies for India. Thus, providing assistance to India in the forest and biodiversity management is in general relevant to Japanese ODA policies. More specifically, assistance in tree planting outside forests and wood-based industry development is relevant since it will contribute to both forest cover increase as well as rural employment enhancement. Participatory forest management through JFM, which aims to conserve forest resources and improve livelihoods of forest dependent communities, is also consistent with Japan's ODA policies. Similarly assistance in biodiversity management will increase quality and quantity of natural environment, and therefore is considered relevant.

b) Development policy of India

The key development policy in India is the Eleventh Five Year Plan 2007-2012. The Plan sets a national target of increasing forest and tree cover by five percentage points, as described in Section 2.3.1. It also indicates initiatives to be implemented in forestry and biodiversity conservation, focusing on the integration of forest and tree cover increase with rural livelihood improvement, increasing productivity of forests, promotion of agroforestry and marketing, and preservation of wildlife and forest biodiversity. The Mid-Term Appraisal of the Eleventh Five Year Plan 2007-2012 basically supports the policy direction of the Plan in terms of forestry and biodiversity. The Appraisal highlights the necessity to shift the policy focus from 'quantity' to 'quality,' and emphasises the enhancement of forest density, the regeneration of degraded forests, and the restoration of ecosystem.

In conclusion, JICA's assistance in forestry and biodiversity management, including farm forestry and wood-based industries, participatory forest management, and biodiversity management, is consistent with the development policy of India.

(3) Japanese knowhow and experiences that may be applied to JICA's future cooperation

Japan has planned and implemented a variety of initiatives in promoting commercial forestry and wood-based industries, supporting private forestry, and conserving natural forests. Through such initiatives, the Government of Japan has accumulated experience of working with the private sector and knowhow with respect to forest conservation and forestry. Among them, in relation to JICA's future strategy in India, it may be worth referring to Japan's experience in the promotion of wood-based industries because, in India, initiatives to promote wood-based industries have not been well designed and implemented so far. Such initiatives by the Forestry Agency of Japan include the following (FA, 2011).

1) Development of a stable supply system of raw material through the coordination and consolidation of forestry practices, the promotion of mechanized forestry, and human resource development
2) Development of a processing and distribution system of wood products
3) Capacity development in terms of marketing and distribution of wood products

In relation to the first initiative, the Forestry Agency of Japan promotes the 'proposal-based coordination and consolidation of forestry practices.' Under the initiative, private forestry contractors propose consolidated forestry practices to forest owners in order to enable more organised forestry practices on a larger scale. The Agency also introduced 'forest management and environment conservation direct payment system.' This aims to support private forest owners and contractors who intend to implement consolidated forestry practices on a large scale. These initiatives are expected to contribute to effective and stable forestry management, and eventually to the improvement of productivity in forestry. Such schemes may be worth referring to in formulating a project to promote farm forestry in India. Farmers engaging in farm forestry in India are diverse and relatively scattered, and thus organisation of such farmers is expected to enhance effectiveness and productivity. This is one of the assistance options to pursue for the enhancement of farm forestry.

The second initiative is related to the development of a wood-based industry. The Forestry Agency of Japan implements the 'New Wood Production Project' which aims to promote stable supply of wood products at lower costs. Under the scheme, the construction of large-scale plywood mills, for example, is facilitated. This intends to enhance the productivity and efficiency of wood processing industries, and to establish an effective distribution mechanism. Such measures addressing constraints faced by downstream wood processing industries may be a good reference for JICA's future cooperation projects in India. This is because, in India, government interventions to promote wood-based industries have not been well designed and undertaken so far.

Human resource development is also critical in terms of fostering experts in the field of marketing and distribution of wood products. Wood-based industries are relatively less developed in India due to the challenges identified in Chapter 3. Experts who can effectively analyse the market trends of raw materials and wood-based products are expected to help the central and state governments plan and implement effective and practical initiatives.

Although India's natural and socioeconomic conditions as well as policy and legal systems are different from Japan, initiatives described above may be useful in planning a project for farm forestry and wood-based industries.

8.2 Cooperation needs and cooperation strategies of priority areas

8.2.1 Joint Forest Management

(1) Capacity Development

a) Forest Department

For the implementation of JFM programme, the State Forest Development Agency (SFDA), which is a registered society at the state/union territory level, acts as federation of the Forest Development Agencies (FDAs). The Chairperson of the SFDA is the Principle Chief Conservator of Forests (PCCF). The Chairpersons of the FDAs are the Conservators of Forests (CFs) with the Divisional Forest Officers (DFOs) as the Member Secretaries. At the district level, the key Forest Department officer for JFM related activities is the DFO assisted by the Range Officers. At the village level, the foresters or the forest guards are responsible for all village level activities related to JFM and any general village development taken up under JFM. In view of the recent policy direction of the MOEF, the capacity development issues highlighted below are required at all levels of the Forest Department[96].

- The enhancement of knowledge on the legal aspects used for determining the composition of the JFMC/EDC (essentially forest protection community groups) which are currently functioning under Forest Department management and their reconstitution under the Gram Sabha
- In the context of new policy directives, a reassessment is needed of the Forest Working Plans with special reference to reserved and protected forest areas
- Capacity development of planning, implementation, and monitoring and evaluation knowhow in the area of forest management and socioeconomic development works in coordination with other departments and the Gram Panchayat
- Revision and future clarification regarding the benefit sharing norms from final felling and NTFP between the Forest Department and the Gram Sabha/JFMC (and/or the Gram Panchayat)
- Facilitation skills for forest rangers, foresters, and forest guards for planning, implementation, and monitoring and evaluation to promote local people's participation, and to devolve their roles and responsibilities into the Executive Committee of the JFMC and EDC
- Capacity development for using modern technology such as GPS and MIS in determining ground facts, maintaining records, planning timelines, and for mapping areas and monitoring

[Only for the areas under the Forest Rights Act 2006 and/or PESA]

- Enhancement of knowledge on the role of the Gram Sabha and Gram Panchayat in forming the Forest Rights Committees, clarifying their development needs, and understanding of their new functions in forest management
- Capacity development for coordinating with the Ministry of Tribal Affairs for the implementation of the PESA and the Forest Rights Act 2006 as well as other social development programmes under

[96] In consideration for the diversified levels of capacity requirements of the forest officers by state, training needs assessment should be conducted at the designing stage.

the Tribal Sub Plans
- Enhancement of knowledge and clarity on the legal aspects of the functioning of the (proposed) forest protection committees under the Gram Panchayat, and their relationship to the existing JFMCs

b) Gram Sabha/JFMC members and the JFMC Executive Committee

The important roles played by JFMCs in forest conservation, regeneration, and management have been recognised under the decentralised governance envisaged by the 73rd amendment to the Constitution, the PESA, and the Forest Rights Act 2006. The Gram Sabha (mostly JFMC members)[97] has been given a central position in planning and managing forests. JFMCs which have established and functioned under the Forest Department over the last 20 years will have to be reoriented to become 'an organ of the Gram Sabha.' Increased awareness, and training and capacity building in different areas will be essential at the community level. The details are described below.

- Capacity development in micro planning and the formation and management of village development plans to be more inclusive and operated in an equitable manner
- Negotiation and facilitation skills, development of benefits sharing modalities of NTFP and/or MFP production, and the use of funds for social development works in coordination with the Gram Panchayat
- Technical capacity development in silviculture operations with support from the Forest Department[98]
- Capacity development of organisation management to be more inclusive and equitable (i.e., keeping minutes of discussions, democratic decision making, planning, and monitoring and evaluations), and of financial management to be more transparent and accountable (i.e., income generation, fund allocation, reporting financial statuses, and strengthening linkages with other government agencies and financial institutions)
- Capacity development of forest related enterprises and marketing

[Only for the areas under the Forest Rights Act 2006 and/or the PESA]
- Enhancement of knowledge on the legal aspects of the rights and responsibilities of the tribal and other village units under the Forest Rights Act 2006 and the PESA, and on the process for filing, assessing and accepting or rejecting claims.

c) Gram Panchayat

The Gram Panchayats are responsible for a wide range of village development works providing infrastructure and social development schemes launched by different government departments. Capacity development is also required for local government officers so that the village level micro planning exercises can be well coordinated and that maximum benefits can be derived from existing schemes. Most States, however, still need to start actions that will enable a much larger role to be given to Panchayati Raj Institutions, especially for forest management. In the new policy direction, both the Gram Sabha and Gram Panchayat will require capacity development as illustrated below before they can make informed decisions and take up management activities in a sustainable, inclusive, and equitable manner. However, the detailed activities for the capacity development need to be considered as per the individual conditions of target states, since how the Gram Panchayat will be

[97] There are some instances where all villagers are not the members of JFMC, and the Gram Sabha is conducted at the panchayat level and not the village level.
[98] The Forest Department maintains the integrity of technical decisions for silviculture operations in JFM areas following the Working Plans of reserved and protected areas of the Forest Department. This implies a limited role for the community in forestry operation. This issue still needs further debate and field verification for the judging capacities of the JFMCs to provide technical inputs to silviculture operations.

involved in JFM-related activities will depend on the policies of state forest departments.

- Capacity development of the Gram Sabha/Gram Panchayat in micro planning for development activities (including forestry conservation and coordination with other village planning exercises) and approval for decisions related to the use of development funds by JFMC
- Enhancement of knowledge on legal aspects of the functioning of (proposed) forest protection committees and their relationship to existing JFMCs
- Enhancement of knowledge concerning the role of the Gram Sabha and Gram Panchayat in forest management, and supervision of the JFMC functions as the Standing Committee for social forestry, farm forestry and minor forest produce listed in Schedule 11 of the Constitution
- Assessment of the composition of the JFMC Executive Committee and a reformulation of the old groups or the establishment of new JFMCs under the supervision of the Gram Sabha

[Only for the areas under the Forest Rights Act 2006 and/or PESA]
- Enhancement of knowledge on the legal aspects of the formation of the Forest Protection Committee and the Gram Sabha's responsibilities in determining claims under the Forest Rights Act 2006
- Enhancement of knowledge and clarity on the legal aspects related to the functioning of the (proposed) forest protection committees under the Gram Panchayat and their relationship to the existing JFMCs.

(2) Enhancement of community participation

The village community needs to be adequately informed about the role of different stakeholders (the Forest Department and the Gram Panchayat) in the management of forest resources, and about community and individual rights and responsibilities for forest protection and management. Capacity development as identified above will enable the Gram Sabha effectively reformulate the JFMCs if and as required. The Gram Panchayat will participate in micro planning exercises so that forestry management is coordinated with other aspects of village development planning such as for roads, wells, and community development. It will also enable the community to improve participation in decision making for social development works. Introducing social audits will improve transparency and accountability.

To enhance community participation, more attention needs to be given to benefit sharing mechanisms and increase in participation of female and the youth in decision making. In general, however, where the majority of members in the Gram Sabha are the same as JFMC members[99] and the elected Gram Panchayat members are the same persons who are also elected to the JFMC Executive Committee members, decision-making is equitable and inclusive. The unit responsible for decision-making and for access to the sharing of community resources should therefore be at the individual hamlet level. This will ensure that all members of the Gram Sabha are covered. The JFM rules for functioning and benefit sharing norms should be decided at this level.

A recent letter (Oct. 2010) from the Minister of the MOEF has requested State Governments put the required legislation in place to enable the Gram Sabha to take over the management functions of existing, reformulated, or new JFMCs, and to give approval for the use of the development funds of the JFMC. Enhanced community participation is therefore envisaged under the recent Central Government of India's policy directives. Thus, future JICA support to forestry projects may needs to consider an inclusive approach for enhancing the participation of Gram Sabha members at the smallest hamlet levels. In particular, Forest Rights Act 2006, PESA, and the recent letter from the MOEF have

[99] All adults of the village/hamlet level Gram Sabha are eligible to be members of the JFMC on payment of INR 1 or 2 as membership fees, thus enabling them to make use of the benefits garnered from the sharing of proceeds from the NTFP and timber from the JFM areas.

increased the role of the Gram Sabha and Gram Panchayats. Taking into account the above decentralization trend, the following measures may be worth considering:

- Providing the Gram Sabha with the authority to approve micro plans and the use of JFMC funds prior to the final approval by the state forest departments
- The need to formulate JFMCs as is required so as to reach the smallest hamlet levels within the revenue generating villages and clarify the roles and responsibilities of forest protection and management
- The need for capacity development within the village level JFM community groups, and the need to provide guidelines for effective and inclusive participation and legal status to JFM groups

(3) Effective and efficient monitoring

a) Establishing baseline databases and monitoring indicators

At present, even though the JFMC are consulted, all management decisions related to forest management and JFMC functioning including fund flows are made by the Forest Department. The information generated is not yet being used effectively for updating micro plans and management methods. Although much information and disaggregated data exists in the village micro plans, documentation of the production and benefits sharing figures for NTFP and timber are absent and needs to be collated. Such information can be used to scientifically document the implementation processes, planning targets, and impacts. Effective and efficient monitoring indicators related to changes in the socioeconomic environment need to be established through a MIS.

b) Establishing a MIS

A JICA-supported State forestry project could help establish a MIS for the JFMC/Gram Sabha and the Forest Department to monitor progress of their activities efficiently. A computerised MIS will help to establish baseline information and update the information meant for midterm corrections to micro plans, as well as aid in monitoring overall progress and impacts. This will also help in day to day management activities including the following: in tracking violations of rules, and the fines imposed; the quantity of NTFP produced; and fluctuations in market prices. This will also help in the selection of beneficiaries to receive benefits from government schemes (JFM related watershed works) and earn wages or get services (health checkups and school education).

The computer centres already established by the Forest Department in many states (such as Madhya Pradesh) can be developed as the nodal points for MIS. Innovative processes such as the distribution of simple laptops at the Block or village level for maintaining and monitoring records can be discussed. A large part of rural India is covered under the mobile telephone network and coverage is rapidly growing. Mobile Internet connectivity can be tapped for regular transmissions of village data to the block, district and state levels. This will multiply the accountability and transparency of operations undertaken under JFM[100].

(4) Collaboration with NGOs

There are a wide-ranging NGOs found in rural areas of India. In general, NGOs with high financial and technical capacity can contribute to bringing about outcomes through JFM programme. In addition, it is effective to execute JFM related activities, if NGOs have adequate knowledge and practical experiences in JFM programme. At the same time, the acceptance of NGOs by villagers is a key factor

[100] In Madhya Pradesh, the use of GPS has been introduced for assessing individual and community claims under the Forest Rights Act 2006. The use of GPS/satellite imagery and other computerized data management systems should be encouraged to accurately document and verify changes under JFM in the field.

to success of JFM programme. In this sense, NGOs that have well trained local staff who can communicate with villagers in local language or dialect and are associated with culture and society in target areas, are more acceptable for JFM targeted communities.

As outlined in the State JFM resolutions, NGOs are encouraged to participate in JFM related activities, and many NGOs have provided villages/communities/JFMC/SHG with input to mobilise, organise, strengthen, and access other sources of support for village development, for example, through the Gram Panchayat, Central and State Government schemes, donor agencies, and the private sector. However, the way in which the Forest Department works with NGOs largely depends on the policy of the Forest Department and the availability and capability of NGOs in the project sites, as illustrated in the case study. It is important to distinguish the different types of NGOs and their capabilities. In this context, in future JICA support to JFM, the selection criteria and clear terms of references should be pre-determined to adequately identify the NGOs on the basis of their necessity to the projects and the availability of NGOs within the locality. NGOs can provide support by doing the following:

- Mobilising the community and raising awareness for JFM related activities among community groups, and re/formulating JFMCs for forest management and community development under the Gram Sabha
- Assisting in the clarification of responsibilities for forest management between the Forest Department and JFMCs, and transferring identified responsibilities from the Forest Department to JFMC
- Facilitating micro-planning including forest management and other community development projects
- Coordinating with other line departments and donors who can provide village development services and infrastructure in collaboration with JFMC
- Providing JFMCs with marketing skills and marketing support to ensure the economic and financial viability and the sustainability of the micro enterprises established
- Coordinating with the private sector so that the JFMC/SHGs can start specific IGA
- Re/formulating SHGs, establishing procedures and systems for SHG operations, and linking to regional microfinance institutions/banks, and starting IGAs, especially marketing linkages
- Assisting NTFP collector groups with the managing of their collection activities, transport, storage and sale of NTFP to private buyers/traders, if any
- Assisting with the establishment of a participatory monitoring and evaluation system for JFMCs and the Gram Sabha, and the Gram Panchayat

[Only for the areas under the Forest Rights Act 2006 and/or the PESA]
- Supporting the production of publicity and awareness materials on the Forest Rights Act 2006, the PESA, and the Gram Panchayat norms of JFM
- Developing training materials for the capacity development of different stakeholders, and conducting the project at different levels in collaboration with the Tribal Department

(5) Support to IGAs under JFM

As mentioned above, the survey team adopted the case study method that does not statistically represent the JICA assisted projects as a whole. With this methodological limitation the results from the case studies in Tamil Nadu and Rajasthan infer the following conclusions. Under JFM attempts to start SHG and introduce IGA have had mixed results with very few SHGs functioning in a sustainable manner with financial and technical strengths[101]. Successful IGA started under the JFM programme which are still on-going are linked to forestry-related activities with considerable technical and financial support from the Forest Department or NGOs that have been working in the village with their

[101] However, SHGs for microfinance are working better than the ones for enterprises.

own funds. Most IGAs without continuous support from the Forest Department or NGOs have failed due to inadequate production and technical capacities, and poor business and marketing strategies[102].

The capacity development for properly functioning SHGs and starting of IGAs will therefore be important considerations in future JICA support. With the use of local resources and market linkages, the project has to promote only those IGAs which are financially viable and sustainable. As mentioned in the case studies, the forest related IGAs are likely successful due to increased people's commitment of forest protection and reduced production cost. Further, the cost effectiveness of new enterprises should be assessed and business plan with a viable market strategy should be formulated with assistance from NGOs or the private sector such as business service providers and business enterprises. As mentioned, NGOs or the private sector can assist the areas in: 1) capacity development of marketing, skills in production, quality control and packaging; 2) marketing support; and 3) capacity development of organisation and financial management. The project can finally approve the fund provision based on the business plan. In consideration for transaction cost involved and lack of market, hiring expensive NGOs and private companies from outside to assist IGA might not be cost effective, in case that there is no private specialised NGOs or entities from the private sector specializing in marketing available in the locality.

In response to the urgent needs of JFMC members right after the introduction of JFM, more attention is given to the increase in availability of NTFPs, and to wage employment for forestry and general public works through EPA and the NREGS. If the local people's dependency on forests is substantial, there will be a large economical return from NTFPs and agricultural production by increased water availability. A high level of forest dependency in the forest fringe villages is a key indicator which can help determine the level of success the project attains. In addition, with the considerable amount of government funded programmes targeting the poor, linking with other departments, especially agricultural related agencies[103], might be more cost effective and sustainable as a means for increasing agricultural products and income[104]. Furthermore, the JICA project might explore the prospects of providing JFMCs and SHGs with microfinance, or it may consider facilitating this through NGOs with other financial institutions. As illustrated in the case studies, the JFMC/SHG members afforded to purchase milk cows by replacing goats. This has had the joint effect of reducing the pressure on forests while increasing income from the sale of milk. In summary, the IGAs do not necessarily have to be undertaken through new SHG formulation driven by the project with a short term intervention. In addition, IGAs can be done through the existing development programmes and public service utilising local resources. This will lead to ensuring the sustainability of IGAs through JFM.

(6) Securing sustainability of various JFM related activities

While many instances and case studies show inequity in the decision making and benefit sharing process under JFM, it should be noted that the village communities have benefited from JFM related activities, especially in instances where the people's dependency on forests is great. By and large, JFMC members are satisfied with the JFM related activities which has led to increasing forest cover, improving living conditions, and increasing income in some areas. This results in meeting an objective

[102] In Tamil Nadu, among 64 SHG in the surveyed villages, 52 SHGs are active in the sense that they are engaged in running microfinance or conducting a regular meeting. Out of 52 active SHGs, 20 SHGs are doing IGAs. However, only two SHG are doing IGA as a group with their own market, while the rest are sub-contracting with NGOs on an individual basis. The NGOs provide the SHGs with raw materials for final products such as candles, coconut mat weaving, incense stick, and give them a meagre profit often below a minimum labour wage determined by law. Without their own market, it can be viewed that the sustainability of those SHGs depends on NGO's assistance. In case of Rajasthan, 25 out of 28 SHGs in the surveyed villages are active in the sense that they are engaged in running microfinance or conducting a regular meeting. Only four out of 25 SHGs are engaged in IGAs that have been assisted by the Forest Department or NGOs.

[103] In JFM target areas, most villagers are engaged in agriculture and the main source of income is agriculture.

[104] The construction of water harvesting structures through EPA which are used for supporting agriculture, has had a great impact in increasing the availability of water which has led to an increase in agricultural production and income was observed in the case studies.

of project, namely, poverty reduction to a large extent. Benefits from the sale of NTFP and timber have been realized and the appropriate share distributed among the members. So far this arrangement has been managed by the Forest Department in a sustainable manner[105], but the function will soon have to be taken up by the JFMC in its revised role as an organ of the Gram Sabha.

The main components to assess the sustainability of JFM related activities as implemented over the last two decades can be linked to forest management, institutional management systems, and the EPA/IGAs.

Some indicators of sustainability in forest management are:

- Increased or maintained forest cover and availability of NTFP and MFP
- Provisions in micro plans for forest management that have short, medium and long term approved and established harvesting and regeneration norms for NTFP/timber, and a clear role for JFMCs
- Allocation of a portion of the benefits shared from any final felling and sales of NTFP which are then given to JFMC members to be reinvested in forest protection and regeneration

Institutional and social-economic indicators for sustainability can be considered through:

- Increased and widespread knowledge on JFM, and the benefits of participation in forest protection and village development activities undertaken under the project
- Capacity development at all levels for the main stakeholders designed to improve technical, organisational, and financial management as mentioned above
- The acquirement of legal status for JFMCs as organs of the Gram Sabha under the relevant Acts relating to panchayat raj institutions, and their functioning as Standing Committees of Gram Panchayat
- An increase in family income as a result of increased NTFP collection and access to wages under JFM and other village development works through SHG/IGA started
- Agreement in JFMC regarding the distribution and sharing of benefits from NTFP and timber produce, and the decision making process conducted in an inclusive and equitable manner
- An increase in the financial capacity of JFMCs to generate income from the collection of membership fees and entry fees to forests, commissions from forest related IGA, benefit sharing of final felling with the Forest Department, and enforcement of fines from illegal activities in the forests
- An enhanced financial capacity to allocate funds for community development, and an enhanced coordination capacity with other departments to bring other development schemes in to improve village infrastructure, and to provide villager access to health, education, and agriculture knowhow
- Increased financial capacity of JFMCs to provide JFMC/SHG members with microfinance, and increased coordination capacity to assure that they are able to access to microfinance from banks
- Specific activities such as the distribution of LPG and blankets (for those areas where it becomes cold at certain times) and a reduction in the dependency on forest resources for meeting subsistence needs[106]

[105] In almost all States, benefits are shared among JJMC members after deduction of FD costs for harvesting from the final amount available from sale proceeds.

[106] Results from Tamil Nadu show a reduction in the collection of firewood in villages where use of LPG has become common. However, the maintenance cost and distribution network for cylinders should be considered in order for their distribution to be used more sustainably

(7) Considerations

In recent years, the legal and economic environment surrounding JFM has dramatically changed. The Forest Rights Act 2006 has influenced rural society considerably in India where the some JFMC members obtained individual rights and usufruct on forests and natural resources. As illustrated in the case study, this has resulted in conflicts among JFMC members or between the JFMC members and their neighbours over the commonly managed forests. It also has resulted in depriving JFMC members of incentives for protecting the forests. Thus, the impact of the Forest Rights Act 2006 on the ground should be assessed to verify the feasibility of the project at the project formulation stage. In addition, other government programmes such as the NREGS, and employment opportunities have become disincentives for the villagers to participate or to sustain JFM related activities in areas where economic growth has been rapid. Thus, those external factors should be thoroughly verified in relation to JFM related projects.

It is fair to say that JFM related projects in India have covered most potential villages, although the status and achievement of implementation differ by state. For future project formulation related to JFM, the achievement of JFM in target state/areas, especially the availability and location of potential villages, should be carefully reviewed. In states such as Tamil Nadu and Madhya Pradesh, most potential villages for JFM have already been covered by foreign and central government funded projects. In those states, the implementation of a JFM-related project might not be cost effective due to scattered target areas and low forest dependency. Further, from the viewpoint of ensuring equity of aid resources, it is reasonable to prioritise areas that are not covered by JFM related projects. In consideration of the above factors[107], a detailed survey should be conducted to verify the present status and achievement of JFM related projects by state and determine target states for projects with a new JFM concept aligned to the current decentralization policy and devolution of power to the Gram Sabha.

(8) Conclusion

The case studies conducted in Tamil Nadu and Rajasthan States indicate that over the last two decades, JFM has been fairly successful because it has contributed to increasing or maintaining forest cover and reducing poverty. Needs for JFM particularly in the areas where JFM have not been implemented are still identified, and Forest Departments intend to continue JFM. However, conventional JFM that was conceptualised and standardised in the early 1990s will not be fully applicable in the next decade due to the changes in policy directions of the GOI and the evolving economic environment in India. India has engaged in the process of decentralisation in the hopes of being a countervailing force which can enable people to acquire control over decisions that influence their lives. On the other hand, India's Five Year Plans do address the issue that that proper implementation of development programmes has been hampered by the fact that benefits from these have largely been appropriated by the local elite. Strengthening the Gram Sabha therefore is viewed as another step in promoting decentralisation, and it is expected that it will serve as an empowering and proximate forum for local democracy. In this context, the MOEF has recently taken the initiative in bringing the spirit of decentralisation in JFM, putting the Gram Sabha[108] in the centre to ensure there is an inclusive and democratic process for development, including forest management and other social development programmes. In order to ensure sustainability of JFM-related activities and aid effectiveness, it may be inevitable to align JFM into the existing legal and institutional framework, coordinating with the Gram Sabha/ Gram Panchayat and other line department. Along with these directions, JICA also may consider to modify the strategy as addressed above. However, it should be noted that how the Gram Sabha and Gram Panchayat will

[107] As a new JFM project will be implemented through a new implementation framework, existing successful JFMCs can also be included to verify the effectiveness of the new form of JFM and modify the model to expand to other areas.

[108] However, each state has its own Act which stipulates the vested authority and function of the Gram Sabha. For project formulation, the Act in each respective state should be reviewed to situate the Gram Sabha in the most appropriate way for the project.

involve JFM-related activities will depend on the state governments' policies as well as actual situations of these local-level institutions[109]. Thus, in formulating JICA's future assistance projects, it is necessary to confirm the stance of state forest departments and the actual situations on the ground.

8.2.2 Farm forestry and wood-based industries

This section discusses cooperation needs for farm forestry outside of recorded forest area and wood-based industries particularly those of sawmill and wooden board industries. Currently in India, enhancement of farm forestry and wood-based industries is urgently needed to address the continuing forest degradation and increasing demand-supply gap of raw materials. As discussed in Chapter 3, the short supply of raw materials indicate lost opportunities for farmers to obtain profits, expand tree cover in their farmland, and increase employment opportunities. Thus, the need to mobilize additional public resources and production capacity of the private sector must be considered to realise such opportunities. To provide economic incentives for farmers and the corporate private sector for enhancing farm forestry and wood-based industries, the following cooperation needs and strategies need to be considered with respect to the issues identified in Chapter 3.

Farm forestry and wood-based industries are tightly linked through the demand and supply of raw materials. Thus, measures to address issues in the promotion of the forestry and industries are inseparable, and the government must consider concurrent support to farm forestry and wood-based industries in the target area to develop wood-based markets. To address the issues identified in Chapter 3, it is necessary to take a coordinated approach not only by the forest department but also by other concerned authorities such as the department of industry and commerce.

(1) Laws and policies

Discouraging laws and policies with respect to farm forestry

Although discouraging national and state laws and policies exist, the national and state governments have tried to establish a facilitative legal environment to encourage farm forestry. To encourage the governments to set a more effective regulatory framework to promote conservation of public forests and private participation in farm forestry, it is necessary to carry out a detailed assessment of impacts of the current application of laws and regulations. This evidence-based regulatory framework improvement is essential for the governments to gain confidence from the private sector in regulating wood-based raw materials and products markets. JICA should support the following activity:

- Detailed assessment and research of impacts derived from the current application of laws and regulations

Research and analysis of raw material and wood-based products market and licensing

The Supreme Court Order requires state governments to assess the capacity of all tree sources to supply woods so that newly established or expanded industries are appropriately and smoothly permitted. This assessment is essential to grant new licences and permission for expansion of sawmills, and for the department of industries and commerce to consider provision of business support to wood-based industries. Currently such detailed wood supply capacity assessment has never been carried out by state government, and no licences are allowed to be issued by forest department. Since this detrimental situation can only be solved by completion of a wood balance and market study, JICA's support to the following study will significantly contribute to development of farm forestry and wood-based industries.

[109] MOEF, in the meeting with the survey team, clarified that the Gram Sabha will be the central partner for implementing JFM at the village level, and JFMC is the extension of the Gram Sabha. On the other hand, no role is envisaged for the Gram Panchayat, since the Gram Panchayat is a political body. If the Gram Panchayat is involved for some practical reasons, it is state forest departments who decide the modalities of the involvement of the Gram Panchayat.

- Implementation of a wood balance and market study
- Establishment of market information management and dissemination systems

Establishment of coordination mechanism for promotion of wood-based industries
Forest Department must work with other department such as Department of Industry and Commerce to provide integrated services to farm forestry and wood-based industries. Although this integrated approach would incur a significant amount of transaction costs of both departments. JICA's support to the following should result in a sufficiently large economic impact.

- Establishment of a coordination mechanism among Forest Department and other relevant public authorities

(2) Functions of market

The past experiences of farm forestry showed that the development of a wood-based raw material market is crucial for the expansion and sustainability of both farm forestry and wood-based industries. In the market, supply from farm forestry and demand from wood-based industry need to much, and the development of a wood-based raw material market required a concurrent effort to nurture the forestry and industries. The support strategies presented in this subsection is meant to establish efficient competitive and fair markets for both the demand and supply sides.

Price fluctuations with respect to farm forestry outputs
There are always risks of price fluctuation in commercial farming. Farmers usually take them into account in their production decisions. It is their responsibility to plan for anticipated risks and absorb risks realized. Thus, the governments' extension activity to strengthen farmers' risk management capacity is an important element of farm forestry promotion. Risk management methods to be extended to the farmers are, for example, diversification of production by applying wider tree spacing which allows inter-cropping of annual crops, concurrent production of pulpwood production with short rotation period and timber production with longer rotation period and application of buy back schemes. In addition to the commercial tree farming, the commercial production of non-timber forest products (NTFPs) should also be tested and promoted since the market risk to farm forestry farmers can be mitigated by the diversification of farm forestry produce. JICA's support to the following is expected as experienced and well-tested extension knowhow is a key to success:

- Capacity development of extension workers and extension methodology development

Government's intervention to farm forestry produce market
Currently, farmers are the only players in farm forestry, and competition among themselves is their only concern. Imported raw materials may pose competition to farm forestry, but farmers have not voiced any concern on them. However, future policy changes may introduce not only imported raw materials, but also private firms, and forest departments or forest corporations as farmers' competitors. For example, once private companies are allowed to run a large plantation, the plantation will threaten the business of farm forestry farmers as their operations are comparatively smaller. To mitigate such detrimental impact, the regulator (i.e. government) can provide guidance on the competitive market in the form of policies and regulations. To make these policies and regulations truly effective, the government must have thorough understanding of how markets work, and new policies and regulations have to be tested by, for example, a well-controlled social experiment prior to their introduction. Thus JICA's support for the following is expected.

- Implementation of social experiments and action research in support of the improvement of policies, regulations, and extension strategies. Examples are monitoring and analysis of farm forestry's reactions with respect to change in tariff rates of selected wood-based raw materials,

and monitoring and analysis of market reactions with respect to production of higher quality raw materials by farm forestry with improved planting materials.

Insufficient supply of raw material and market failure

In Andhra Pradesh, it is reported that due to short supply of raw materials and labour, and technical and management issues, only 50% of the current capacity of sawmill and wooden board industries is utilised. On the other hand, inherent overcapacity of the industry is also reported. As indicated by these examples, information regarding wood-based industries is anecdotal and inconsistent. To address issues of wood-based industries in a comprehensive manner, the wood balance and market study must be conducted as the initial step. To render focussed remedies, it is necessary to understand, for example, whether this low capacity utilisation is a result of insufficient raw material supply or technical problems, or some other factors.

Market failure which constraints the development of wood-based industries may be present. In Andhra Pradesh farm forestry has developed through establishment of the pulpwood market dominated by the four large paper mills. This oligopolistic market structure presumably results in insufficient supply to wood-based industries. At the same time efficiency of interstate raw material market is questionable due to different states' regulations concerning trade and transportation of wood-based raw materials. In order to address issues of insufficient information and market failure, detailed studies and social experiments must be implemented to assess impact and effectiveness of public interventions. JICA is expected to support the following:

- Collection and analysis of raw material and wood-based products market, and implementation of social experiments and applied research to understand short supply of raw materials, and develop government intervention schemes.
- Collection and analysis of market failure of raw materials and wood-based products market, and implementation of social experiments and applied research to develop government intervention schemes.

(3) Technical development and extension

Technical development on and extension of farm forestry

The examples of ITC's Farm Forestry Programme and Social Forestry Programme are expected to be applicable to the diversification of the farm forestry produce market. A programme similar to the Farm Forestry Programme is to be established to promote Type 1, 2, and 3 farm forestry to relatively well-off farmers. Another programme similar to the Social Forestry Programme is to be established to promote Type 1 and 3 farm forestry to marginal and small farmers, and scheduled tribes and castes. To apply these farm forestry programmes, the most important required capacity of the officials of the forest department, the department of industry and commerce, and other relevant authorities is an ability to identify high potential areas for farm forestry along with potential for development of wood-based industries and subsequent development of a raw material market.

In the case of Andhra Pradesh, the Forest Department has recently begun identification and improvement of farm forestry tree species for timber production suitable to meet demand from wood-based industries. These tree improvement undertakings including technical development and application, field tests, and economic analysis to diversify farm forestry tree crops, must be implemented and accelerated by Forest Departments under JICA supported projects.

Based on the discussion above, JICA should support the following:

- Testing, establishing, and scaling up of a commercially oriented farm forestry programme targeting relatively well-off farmers
- Testing, establishing, and scaling up of a farm forestry programme with appropriate subsidies

targeting marginal and small farmers, and scheduled tribes and castes
- Provision of technical services for enhancement of farm forestry
- Identification of plus trees, development and improvement of clonal seedlings and pest control techniques, and economic and business analysis of farm forestry
- Provision of high quality seedlings at a cost recovery bases or free of charge by the forest department
- Development and extension of drip irrigation techniques for farm forestry in semi-arid areas

Awareness raising and capacity development of farm forestry, and formation of farm forestry associations

Since many farmers still do not know or are not convinced of advantages of firm forestry, it is necessary to raise their awareness through extension activities. It is also important that interested farmers correctly understand risks and other shortcomings associated with farm forestry. As field observations confirmed that capacities of marginal farmers and schedule tribes and castes are low, their farm forestry management capacity should be improved by intensive extension activities in the initial stage of implementation of JICA supported project. In addition, formation of a farm forestry association allows farmers to access technical and market information. To support the governments' policy, it is necessary to facilitate formation of farm forestry associations. Therefore, JICA is recommended to support the following activities:

- Extension activities for promotion of the farm forestry programmes
- Capacity development of marginal farmers, scheduled tribes and castes
- Facilitation of access to market and financial services
- Facilitation to form farm forestry associations

Technical development on and extension of wood-based industries

Because a number of business, factory, labour, and safety management issues, and productivity, technology, quality control issues hamper improvement of performance of wood-based industries, JICA should provide assistance to the following technical development and improvement, and extension activities:

- Development and improvement of business, factory, labour, and safety management, and productivity, technology, quality control measures
- Extension of business, factory, labour, and safety management skills
- Extension of productivity, technology, and quality control measures
- Facilitation of access to market and financial services
- Provision of financial services

(4) Capacity development of forestry officials

To help develop farm forestry and wood-based industries, it is necessary for forest department officials to thoroughly understand the market of wood-based raw materials and products. Since the forest department officials have neither understandings of the market nor enough experience of extension activities to the private sector, JICA should support the capacity development activities on the following matters:

- Laws and regulations necessary to support farm forestry and wood-based industries
- Methods and procedure of business development support services
- Identification of management and technical consultant, machinery suppliers, financing institutions, standard certification organization, etc. for business development support services
- Technical knowhow of farm forestry and wood-based industries
- Institutional development of the forest department

8.2.3 Biodiversity management

Biodiversity conservation and its sustainable use is an overarching priority for India as described in the earlier sections. Biodiversity management refers to protected area and wildlife programmes in the context of JICA forestry projects. As mentioned in the review of the biodiversity components of some of the ongoing JICA forestry projects in the country, these project activities have already created an impact in improving protected area management and enhancing the livelihood of the forest-dependent communities. JICA's support for biodiversity-related programmes should be continued and enhanced, especially in the light of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets[110] set by the tenth meeting of the Conference of Parties to the Convention on Biological Diversity. Following the perceived failure (SCBD, 2010) of the Biodiversity Target 2010, the Aichi Targets have the mission to 'halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services … and contributing to poverty eradication.' All Indian states are committed to biodiversity conservation and are at various stages of improving their capacity to do so. Biodiversity conservation is one of the priority areas that JICA should support the central and state governments' efforts.

JICA's future support for biodiversity management may be in the areas of 1) ecodevelopment, 2) habitat improvement, 3) human-wildlife conflicts management, 4) expansion of Community Reserves, 5) ecotourism development, 6) capacity building, and 7) application-oriented wildlife research.

(1) Ecodevelopment

Ecodevelopment, implemented through Ecodevelopment Committees (EDCs), would be central to poverty alleviation among the forest-dependent communities living within and around protected areas and thus being able to form a partnership with them for the better management of the protected areas. Ecodevelopment is an important means to address at least some of the community-conservation conflicts arising out of the restrictions on resource use imposed by the declaration of protected areas[111].

In the absence of statutory backing for EDCs, which is the case in most states, EDCs may be set up under the Gram Sabha as its local level institution for ecodevelopment as asked by the letter, dated 29 October 2010, of the Minister of Environment and Forests to the state chief ministers on JFM. Further, the Forest Rights Act 2006 empowers the right holders and Gram Sabha to manage and protect wildlife and forests (Sections 5 of the Act) and the Rules under the Act empowers the Gram Sabha to create committees for this purpose (Section 4 (1) (e) of the Rules).

Against this background, and in line with India's decentralization policy, it may be effective to consider the alignment of ecodevelopment into the current legal and institutional framework of local governance. EDCs could be reoriented to become an organ of Gram Sabha to further strengthen participatory management and sustainability of EDC activities. In this regard, state forest departments' policies on the involvement of the Gram Sabha in ecodevelopment need to be confirmed. Furthermore, increased awareness and training and capacity development of forest fringe communities as well as officers of forest department are key to realise the effectiveness of the activities of EDC under Gram Sabha.

Enabling provisions: JICA should continue to support ecodevelopment under new legal and institutional framework of local governance. JICA should encourage the state partners to clarify the legal position on ecodevelopment in the context of the decentralisation and devolution of power regarding forest and biodiversity conservation. Experience shows that ecodevelopment activities thin

[110] CoP/CBD document: UNEP/CBD/COP/10/27
[111] See Section 5.4.1.

out once the funding is over and hence JICA should encourage provisions for ensuring the sustainability of ecodevelopment to be built into the project design.

Implementation approach: A micro plan, developed by the EDCs with the assistance of forest department and approved by state forest departments, forms the basis of ecodevelopment in each EDC. In the future the micro plan could be approved by the Gram Sabha, or where no statutory Gram Sabha exists, the micro plan will be approved by the general body of the EDCs, prior to the final approval by the forest departments. To implement EDC effectively, an adequate and timely training of forest department staff and EDC members is essential. Provision for a revolving fund that will continue beyond the loan project period should be incorporated.

Monitoring indicators: Such numbers as those of micro plans approved, training programmes conducted, activities undertaken, and IGAs established, against the set target will serve as useful indicators for monitoring.

(2) Habitat improvement

Habitat improvement activities help to improve the ecosystem health and restore and enhance biodiversity, and JICA should continue to support such activities. The type of activities may vary from state to state and between protected areas. However, the common needs include soil and moisture conservation works, grassland management, and eradication of invasive alien species. These are activities, if not undertaken, could lead to, for example, soil erosion and gully formation and consequent habitat degradation over a long period of time, flash floods downstream and at the same time groundwater level drop in the park area, and dominance by invasive species. Central government funding for habitat improvement activities tend to go to the well-known protected areas. Therefore the under-funded sites should receive more funding. Besides, activities that have a recurring cost implication may be required to ensure the means to continue upon completion of the loan project.

Implementation approach: Habitat improvement activities should be planned based on the needs in each protected area. The priorities set by the management plan of the respective protected area should be given due consideration. The planning of the interventions shall be done by the forest department and implementation carried out through the EDCs.

Monitoring indicators: The indicators can be set based on the types of activities to be undertaken under each project. For example, the number of soil and conservation structures made and the area (in hectares) of weed removal can be used as indicators.

(3) Human-wildlife conflict management

As described in Section 5.4.2, human-wildlife conflicts are a serious issue affecting most forest areas of the country. The central government and state governments are trying to address this issue and it is appropriate that JICA supplement these efforts through cooperation; some of JICA's ongoing forestry projects already take this into account.

The nature and impact of issues vary with the species involved and between locations. Examples of preventive and mitigation measures are mentioned in Section 5.4.2. Since this issue is not restricted to protected areas and surroundings, areas beyond protected areas may also be considered. However, in the long term, the potential for such conflicts can be removed only by improving the wildlife habitat condition and by bringing about changes in the agricultural and livelihood patterns of the vulnerable communities.

Implementation approach: The forest department may prepare the plan for the prevention and mitigation of human-wildlife conflicts, in consultation with EDCs/JFMCs and other stakeholders like

agriculture and revenue authorities. The activities could be implemented through the EDCs (JFMCs outside protected area zones) with the oversight of the forest department, except specialized activities (e.g., tranquilising animals) that should be handled by the forest department directly. Training of EDC/JFMC members and forest staff, as well as awareness building among the local public are also important. JICA support will not be given for the direct payment of compensations.

Monitoring indicators: The number of interventions planned, procurement of equipment where appropriate, and number of training programmes conducted would serve as indicators.

(4) Expansion of Community Reserves

India is committed to expanding the protected area coverage, as set out in the National Wildlife Action Plan. The priority is given for establishing Community Reserves as provided by Section 36C of the Wildlife Protection Act as this category of protected areas provides opportunities for resource use, conservation, and full community involvement in the management of the area through a management committee nominated by the local village panchayat(s). Issues related to Community Reserves are described in Sections 2.3.2, 5.1.1, and 5.4.1. Community Reserves may be established in areas traditionally used by local communities, with their voluntary consent. The only areas exempted from being notified as Community Reserves are areas coming under a Sanctuary or National Park. JICA may support the establishment and management of new Community Reserves.

Implementation approach: An information dossier on the issues related to the establishment and management of Community Reserves may be prepared as part of the JICA preparatory study for the reference of the forest department staff. This is critical since it is widely seen that inadequate information and orientation is a reason for the slow progress in the establishment of Community Reserves (only four reserves so far). Criteria for site selection within the state may also be developed as part of the preparatory study. The state forest department, in consultation with the concerned village panchayats and local communities, will be responsible for the notification of the Community Reserve and for the formation of the management committee. Support may be provided to the forest department for surveys to identify sites, capacity building of the management committee and for the preparation of the statutory management plan. EDCs may serve as implementation groups, under the oversight of the management committee, for the activities designed in the management plan. Technical support for the implementation of the activities in management plan is to be provided by the forest department.

Monitoring indicators: Possible indicators are: number of Community Reserves established; number of management plans approved; number of training sessions conducted for forest department staff and management committee; and number of area-wise activities of the management plan implemented.

(5) Ecotourism development

It may be worthwhile to consider supporting ecotourism, i.e., low-cost, low-impact nature tourism managed by EDCs. The draft Guidelines for Ecotourism in and around Protected Areas seek to promote ecotourism to support the livelihood of the local communities and to enhance awareness of biodiversity. JICA's support for ecotourism may be centred around protected areas and may be given for activities such as planning, design, establishment of ecolodges (low investment residential structure) and associated facilities (including nature trails), and training (including tour guidance).

Implementation approach: The forest department will identify the sites in consultation with the local communities, form EDC(s) and build the communities' capacity. JICA's assistance may be provided for site survey, planning and design, construction of facilities, and training. NGOs may be involved for training and helping to build marketing linkages. The ownership and financial relationships regarding the facility have to be made clear at the beginning. An option is to have the forest department own the

facility, the EDCs manage it, and the two share the net profit. The forest department should also develop contingency arrangements in the event of a net loss.

Monitoring indicators: Possible monitoring indicators include the following: number of sites selected; number of EDCs formed for this purpose; number of training programmes conducted, number of facilities constructed; and types of marketing arrangements made.

(6) Capacity development in wildlife management

As described in Section 5.4.5, India needs capacity enhancement in wildlife management and JICA's cooperation in this respect would be crucial. For the long-term sustainable management of the country's biodiversity, it would be effective to train the forest department personnel to enable them to address the existing and emerging biodiversity issues, particularly the issues of social conflicts, and have them acquire modern wildlife management techniques. Training would be required for all levels of staff. For the training to reach many lower-raking staff members, their trainers would also be trained. Management of community issues, including the practice of ecodevelopment, should be given priority. Modern wildlife management equipment should also be provided.

Implementation approach: Capacity development may be done in two mutually complementary ways: 1) national level and 2) state level. The national level initiative may train a target proportion of senior officials and lower-level staff members of the state forest departments. Pedagogy and curriculum reform of forest training institutions in a few states to incorporate wildlife components may also be done. Modern wildlife management equipment may also be provided. MOEF may designate a national agency for the implementation of the project. Since MOEF personnel are often overstretched, consideration may be given for adequate staff support to MOEF for project coordination.

The state level capacity development programme could be part of JICA-assisted forthcoming forestry projects in states. Training on wildlife may be provided to both senior and lower-level officials, curriculum and pedagogy reform of state-level training institutions may be undertaken, and modern wildlife management equipment and infrastructure development (essential buildings) may be provided.

Monitoring indicators: Possible monitoring indicators include the following: number of training courses conducted; number of curriculum and pedagogy reforms undertaken, equipment items procured; and number of buildings constructed, where appropriate.

(7) Application-oriented wildlife research

Wildlife research that has a direct bearing on management must be promoted as identified in Section 5.4.6. When management decisions are made based on scientific input, management interventions become far more effective. Wildlife research assumes a small part in many ongoing JICA-assisted forestry projects. This needs to be sustained, and enhanced where appropriate, in future projects.

Implementation approach: Wildlife research may be commissioned by the forest department, as part of a state-level forestry project, to recognized institutions or universities. Preference may be given to those institutions that will work with local research institutions so that local capacity for research is also enhanced. The research agenda should be set based on the priorities identified by the forest department.

Monitoring indicators: The number of field investigations undertaken and the number of reports produced will serve as indicators. The number of publications in well recognised journals could also be the indicator.

8.2.4 Climate change measures

The assistance in the forest sector to address climate change, such as those through Afforestation and Reforestation Clean Development Mechanism (AR-CDM) and reducing emissions from deforestation and forest degradation (REDD) plus or REDD+, should be demand driven. Willingness of the Central Government and state forest departments should be carefully confirmed first; otherwise cooperation projects will not produce fruitful outputs. For instance, although some state forest departments with which the survey team interviewed showed certain interests in REDD+ related projects, they also had some reservations for such projects. In fact, the Tamil Nadu Forest Department expressed concerns about how they could implement a pilot project for REDD+, though REDD+ seemed an interesting theme for them in the future. This is because the international negotiation on REDD+ is still ongoing, and the scheme to be developed is still unclear. Similarly without a national strategy for REDD+, it may be hard for state forest departments to commit REDD+ projects. In addition, climate change-related negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) are based on the political decisions of the Central Governments. Thus receiving climate change-related assistance also involves political decisions to some extent. In formulating a climate change-related project, development partners including JICA also need to confirm the government policies and the government's stance on the international negotiations, and then willingness of the Central Government and state forest departments.

(1) REDD+

In the context of JICA's future cooperation, pilot projects to prepare a possible international framework of REDD+ would be prioritized. In fact, a number of countries, such as Indonesia, Cambodia, Vietnam, the Philippines and others, have already initiated a pilot project in collaboration with bilateral and multilateral development partners (ADB, 2010). The components of such projects may include but not limited to 1) formulation of a national REDD+ strategy; 2) development of methodology for determining reference level; and 3) establishment of measurable, reportable, and verifiable (MRV) monitoring system.

The international negotiations related to REDD+ are basically supportive of addressing the nationwide deforestation and degradation issues to avoid or reduce the risk of leakage of greenhouse gas (GHG) emissions. This means that a national programme is more likely to be applicable than a site-specific project-based approach. Taking into account such trend, the MOEF considered that a national or sub-national level pilot programme covering multiple states to prepare for REDD+ may be feasible. However, the Ministry has not come up with a concrete project concept so far.

It should also be kept in mind that the GOI puts emphasis on ensuring local communities' benefits from a REDD+ scheme. A future pilot programme should, therefore, ensure that any financial incentives from the scheme flow fully and adequately to the local communities involved. It may be necessary to help establish guidelines for financial flow from the central to state governments and then the lower levels may be assisted.

In addition to the compliance scheme to be determined under the UNFCCC in the near future, the voluntary REDD+ schemes such as those approved by the Verified Carbon Standard (VCS) and the American Carbon Registry may be also taken into account, depending on the interests of the GOI or state forest departments.

(2) AR-CDM

The state forest departments with which the survey team interviewed showed certain interests in formulating AR-CDM projects. The component for AR-CDM may be incorporated into a future JICA-supported project involving afforestation and reforestation. However, as discussed in Chapter 6,

to support AR-CDM projects, certain points must be confirmed prior to project formulation as described below.

Eligibility conditions
Project participants need to prove the eligibility for an AR-CDM project by demonstrating that the planned project site was not a forest area as per the following categories of the criteria. When initiating the project formulation, such eligibility criteria shall be cleared. Detailed eligibility criteria and requirements for project participants are described in Chapter 6.

- For reforestation activities, the project site was not a forest as of 31 December 1989.
- For afforestation activities, the project site has not been a forest at least for 50 years.

Non-permanence
Project participants, in particular state forest departments, need to be well aware of the non-permanence of the Certified Emission Reduction (CER), which may reduce financial incentives.

Willingness of the state forest department
The willingness of a state forest department is considered critical. In the process of the formulation of an AR-CDM project, the strong commitments of the state forest department is required since the department will need to invest the time and effort to develop necessary documents like the Project Design Documents for the registration of an AR-CDM project with UNFCCC.

Technical capacity
The technical capacity to develop an appropriate methodology and formulate a project design document needs to be examined. Although state forest departments are in general considered to have certain capacity to develop and implement an AR-CDM project, technical assistance to the departments also needs to be taken into account.

8.2.5 Other cross-cutting issues

(1) ICT application to forest management

Information and Communication Technology (ICT) is powerful tool for the management of large geographical areas of forests. In particular, GIS-based database and information systems are effective. In fact, all state forest departments with which the survey team interviewed demonstrated interests in developing the GIS-based information systems.

The Madhya Pradesh State Forest Department as well as the Tamil Nadu State Forest Department has developed advanced GIS-based forest management systems. Both states have various GIS-based systems, but there is a contrast in the ways in which they are developing the systems. The Madhya Pradesh Forest Department has developed the ICT systems by their initiatives whereas the Tamil Nadu Forest Department utilised the external funded projects. Both approaches can be taken depending on the situations of the state government, in particular the status of budget allocation.

Regardless of the approaches to be employed, it is necessary for the state forest departments to pursue an effective and efficient way of ICT application. According to the IT unit of the Madhya Pradesh Forest Department, the Department developed their systems at a relatively low cost by combining the existing low-cost ICT services. Such strategy is necessary and appropriate for JICA's future cooperation projects. Instead of heavy investments in ICT-related hardware and software, the utilisation of the existing ICT services at a lower cost is preferable. In this regard, the system that the Madhya Pradesh Forest Department developed can be a good model for the other states.

(2) Capacity development for forest officers

a) Resource allocations for training at various levels

The Central Government is responsible for the capacity development for the IFS officers, SFS officers, Forest Range Officers (FROs), whereas the state government takes care of the frontline forest officers such as Deputy FROs, Foresters, and Forest Guards. The training opportunities for the IFS and SFS officers seem sufficient to some extent. However, as described in Section 7.3, the frontline forest officers have limited opportunities to take training. Thus, training for frontline officers is necessary.

Since the number of frontline officers is large, it may be hard for the state forest department to provide training for them on a regular basis, given the limited financial, human, and infrastructure resources. In the context of JICA's cooperation projects, the project-specific training needs to be taken into account, depending on the objectives and activities of the projects. For instance, forest offence management, JFM, human-wildlife conflicts, and protected area management can be the main theme of the training courses. Recently focused issues like biodiversity management, GIS application, and climate change may be selected depending on the project components.

b) Evaluation indicators for training programmes and feedback system

Setting appropriate indicators to monitor and evaluate the training programmes is critical to get proper feedback for the programmes and to ensure the quality. In the context of JICA's future cooperation projects, the development of outcome-based indicators should be pursued in project formulation. Activities to check such indicators, including follow-up test or self-assessment, may need to be incorporated as part of training components.

In addition, to ensure productive and effective training, feedback from trainees should be properly collected and needs to be reflected in future programmes. As introduced under the ongoing JICA's technical cooperation project[112], feedback systems to assess the improvement of trainees' capacity are useful to evaluate the effectiveness of the training programmes. For JICA's future cooperation projects, such indicators also need to be incorporated as appropriate.

(3) Infrastructure development

The need for the forest-related physical infrastructure development is site-specific, and varies greatly from project site to site. Necessary types, designs, and scales of infrastructure will also greatly vary from site to site, depending on the natural and socioeconomic conditions as well as the status of infrastructure development. Thus, the plan for infrastructure development needs to be developed as the supplementary components of JICA's future cooperation projects.

8.3 Priority areas and candidate states for JICA's assistance in forestry and biodiversity sector

The Survey identified five priority areas for JICA's future cooperation: 1) Joint Forest Management; 2) farm forestry and wood-based industries; 3) biodiversity conservation; 4) climate change measures; and 5) other crosscutting issues. Out of them, this section will prioritise candidate states for the first three thematic areas. This prioritisation exercise aims to help JICA draw overall pictures for future assistance needs, but does not mean that JICA will focus only on the selected states.

For the climate change measure and other crosscutting issues, on the other hand, the survey team does not select candidate states. In terms of climate change, AR-CDM and REDD+ are the potential areas

[112] The Project titled 'Capacity Development for Forest Management and Personnel Training'

for assistance. However, as discussed in Section 8.2.4, cooperation needs for AR-CDM are not identified nationwide due to the inherent technical difficulties. Similarly, for REDD+, a national or sub-national level pilot programme seems more appropriate for future assistance. The survey team, therefore, believes that ranking exercise of candidate states is not appropriate for climate change measures.

With respect to the crosscutting issues, including ICT application and capacity development, components related to them are, in general, complementary ones that are associated with the main components such as JFM, biodiversity conservation, and farm forestry. Therefore, a prioritisation exercise regarding the crosscutting issues is considered inappropriate.

Accordingly, the following subsections briefly describe the criteria and result of prioritisation of candidate states in the areas of JFM, farm forestry and wood-based industries, and biodiversity conservation. However, it should be noted that the availability of state-wise data is limited. Criteria employed here, therefore, are selected based on the limited statistical data, and thus may not represent the actual situations of respective states. In addition, the socioeconomic and natural conditions vary greatly from site to site even within a state. Thus the detailed situations of each state cannot be captured by this exercise. Hence, it should be kept in mind that the ranking results in this section may not reflect the real needs on the ground, although this will be useful to have the overall picture of respective states.

(1) Joint Forest Management

JFM aims at the conservation of forests as well as the enhancement of rural livelihood. It has contributed to poverty reduction especially in rural communities, and increase in forest and tree cover. Since JFM has been implemented over two decades, many potential areas for JFM have been already covered in some states[113]. It is also necessary to consider the recently emerging factors such as the Forest Rights Act 2006. Taking account of the above factors that need to be noted in the formulation of JICA's future projects, the following criteria for selecting candidate states for JICA's future cooperation for JFM projects are selected: 1) rural poverty ratio; 2) change in forest cover; 3) change in ratio of open forest; 4) potential areas to expand JFM; and 5) number of individual claims under the Forest Rights Act 2006 received, accepted, or rejected. States that already received a Japanese ODA loan are excluded.

Rural poverty ratio
The criterion of poverty ratio is crucial, since one of the important objectives of participatory forest and biodiversity management is poverty alleviation. States with a high rural poverty ratio is given high priority.

Change in forest cover
To see the extent of forest degradation, change in forest cover from 2005 to 2007 is taken into consideration. States with higher reduction in forest cover during this period are prioritised.

Change in ratio of open forest
Change in the ratio of open forest can be an indicator of the degree of forest degradation, although climatic and geological conditions are also critical factors to determine change in the area of open forest. The difference between the ratio of open forest to the total forest area in 2005 and that in 2007 is calculated in each state. If the ratio of open forest is increasing over the time, forest degradation is

[113] Two examples are shown in the following. According to the APCCF of the Tamil Nadu Forest Department, out of 3,072 forest fringe villages in the state, most of the potential villages have been already covered by JFM programmes, and thus, a new JICA funded project would not focus on setting up JFMCs unlike previous JICA funded projects. Similarly, according to the CF of the Madhya Pradesh Forest Department, almost all potential villages of JFM (about 15, 000 in the state) out of about 22,000 forest fringe villages that are located within five km from the forests have been already covered by JFM programmes.

considered ongoing. States with larger increase in the ratio are prioritised.

Potential areas to expand JFM
Area under forest land and potential area available for JFM are considered. As mentioned above, JFM has been applied over the last two decades. In some states, most potential areas have been already covered under JFM, and in such states it is hard to launch a new JFM-related projects. Thus, States with more potential area for JFM should be more prioritised. To see the potential areas, percentages of JFM-covered area against recorded area are used as the proxy. States with the smaller percentages are more prioritised.

Number of individual claims under the Forest Rights Act 2006 received, accepted, or rejected
The number of individual claims under the Forest Rights Act 2006 received, accepted, or rejected are also considered to avoid potential conflict areas under the Act. Since the conflict over resource use rights given to a particular member of forest fringe communities reduces their incentive to conduct collective management of common resources, states with higher numbers of claims are given lower priority for the JFM implementation.

Table 8-1 shows the scoring arrangement of each criterion. The integer number from 1 to 5 will be given as per the scoring categories. First, states are divided into five groups based on sorting of their figures. Then the integer number of 1 to 5 is allocated to each group. Five (5) is allocated to the highest-priority states, and 1 is for the lowest-priority ones.

Table 8-1 Score table for each criterion: JFM

No	Criteria	Scoring scheme	
1	Rural poverty ratio	• 40% or more: 5 • 31 to 40%: 4 • 21 to 30%: 3	• 10 to 20%: 2 • 9.9% or less: 1 • NA: 2
2	Change in forest cover	• -1.00% or less: 5 • -0.10 to -0.99%: 4 • -0.01 to -0.09%: 3	• 0 to 0.99%: 2 • 1.00 or more: 1
3	Change in ratio of open forest	• 1.00 point or more: 5 • 0.40 to 0.99 point: 4 • 0.11 to 0.39 point: 3	• 0 to 0.10 point: 2 • -0.01 or less: 1
4	Potential areas to expand JFM	Share of area under JFM in recorded forest area • 9.9% or less: 5 • 10 to 20%: 4 • 21 to 30%: 3	• 31 to 40%: 2 • 40% or more: 1
5	Number of individual claims under the FRA received, accepted, or rejected	No. of titles distributed under FRA per km^2 of recorded forest • 0.00: 5 • 0.01 to 1.00: 4 • 1.01 to 2.00: 3	• 2.01 to 3.00: 2 • 4.00 or more: 1

[Legend] FRA: Forest Rights Act 2006
Source: Survey team

Table 8-2 Summary of ranking for JFM

Ranking	States	Score
1	Nagaland	23
2	Arunachal Pradesh	20
2	Mizoram	20
4	Assam	19
4	Manipur	19
4	Meghalaya	19

Source: Survey team

All the 28 states have been ranked by applying the above criteria and this is presented in Annex 10. Six priority states emerging from this priority setting exercise and their ranking is provided in Table 8-2.

As shown in Table 8-2, all the selected states are north eastern states. This is because, in the north eastern states, the number of claims under the Forest Rights Act 2006 tends to be small as discussed in Section 4.4. As a result, these states were given higher scores in the fifth criterion, and eventually they came in higher ranks. This is caused by the constraint in the availability of state-wise statistical data.

Based on the above considerations, the ranking exercise excluding the north eastern states is also conducted (Table 8-3). As a result, Bihar and Goa, followed by Jammu and Kashmir, and Uttarakhand, were given higher priority.

Table 8-3 Summary of ranking for JFM without north eastern states

Ranking	States	Score
1	Bihar	16
1	Goa	16
3	Jammu and Kashmir	15
3	Uttarakhand	15
5	Madhya Pradesh*	14
6	Jharkhand	13

* It should be noted that the Madhya Pradesh State Government currently has the policy not to accept any loans from the external financial sources.
Source: Survey team

(2) Farm forestry and wood-based industries

Since farm forestry and production by the wood-based industries are commercial activities susceptible to policy, regulatory, infrastructure, and market environments, development potentials of farm forestry and the industries are not evenly recognised among all the Indian states. For example, it should be augured that states with readily developed or developing farm forestry and the industries have higher probability of success. Based on the similar discussions, a set of quantitative criteria have been developed to prioritise the states. The selected criteria are: 1) popularity of farm forestry, 2) percentage of tree cover area to geographical area of state, 3) number of plywood units, and 4) percentage of agricultural labour to cultivator. States that already received a Japanese ODA loan are excluded.

Popularity of farm forestry
Saigal et al. (2002) reported six areas consisting of eight states where farm forestry is popular (see Figure 3-4). In these areas, farm forestry produce market has been already established and potential for further development of the market is assumed to be high indicating a high probability of success of project with a relatively low cost of public service delivery. As the forest departments' experiences of supporting commercial and market based farm forestry and wood-based industries are limited, it is recommended for the departments to begin such project with a high probability of success.

Percentage of tree cover area to geographical area of state
Area of tree cover is the potential area from where wood can be supplied. This is a proxy of potential wood supply area or area where farm forestry can be expanded. States with larger percentages are given higher scores.

Number of plywood units
The number of plywood units is a proxy of wood processing capacity. This is a proxy of the scale of expected consumption that wood-based industries are able to process. In addition, larger number of plywood units indicates higher possibility of processing capacity expansion. Therefore, states with a

larger number of units are given higher scores.

Percentage of agricultural labour to cultivator
Ratio of agricultural labour to cultivator is a proxy of potential agricultural labour benefited from the expansion of farm forestry and labour intensive wood-based industries. Simulation presented in Chapter 3 indicates labour shifts from the agriculture sector to wood-based industries (Annex 5). States with higher percentages of agricultural labour to cultivator are given higher scores.

Table 8-4 shows the scoring scheme of each criterion. The integer number from 1 to 5 will be given as per the scoring categories except the criteria "popularity of farm forestry." In the criteria the states where farm forestry is popular are given a score of 5, and other states are given a score of 1. For other criterion states are divided into five groups based on sorting of their figures. Then the integer number of 1 to 5 is allocated to each group. Five (5) is allocated to the highest-priority states, and 1 is for the lowest-priority ones.

Table 8-4 Score table for each criterion: farm forestry and wood-based industries

No	Criteria	Scoring scheme	
1	Popularity of farm forestry	• Popular: 5 • Not popular: 1	
2	Percentage of tree cover are to geographical area of state	• 3.2% to 7.8%: 5 • 2.9% to 3.2%: 4 • 2.3% to 2.9%: 3	• 1.2% to 2.3%: 2 • 0.2% to 1.2%: 1
3	Number of plywood units	• 30 to 80: 5 • 13 to 30: 4 • 4 to 13: 3	• 1 to 4: 2 • 0: 1
4	Percentage of agricultural labour to cultivator	• 50% to 70%: 5 • 42% to 50%: 4 • 28% to 42%: 3	• 12% to 28%: 2 • 4% to 12%: 1

Source: Survey team

All the 28 states have been ranked by applying the above criteria. The ranking is presented in Annex 11. Five priority states emerging from this priority setting and their rankings are provided in Table 8-5. As shown in the table, states that already received a Japanese ODA loan are excluded, leaving Bihar, Andhra Pradesh, and Maharashtra, Goa, and Jharkhand States as candidate states for development of project concerning farm forestry and wood-based industries.

Table 8-5 Summary of ranking for farm forestry and wood-based industries

Ranking	State	Total score
3	Bihar	18
5	Andhra Pradesh	17
11	Maharashtra	13
12	Goa	12
13	Jharkhand	11

Source: Survey team

(3) Biodiversity conservation

Biodiversity management, with a focus on poverty alleviation, is a national as well as a global priority. Although the composition and abundance of biodiversity vary among states, the dependence of communities on biodiversity remains a common denominator as well as their impoverishment. Most states are potentially in need of funds and the patterns of biodiversity management issues are not markedly different. A set of quantitative criteria has been developed to prioritise the states, namely, 1) biodiversity significance, 2) rural poverty ratio, 3) change in forest cover, and 4) change in ratio of

open forest. States that already received a Japanese ODA loan are excluded.

Biodiversity significance
Since JICA's cooperation in biodiversity management will focus on protected area issues, biodiversity significance is estimated by the total number of protected areas as well as the percentage of area of protected area upon the total geographic area of the state. States with a higher score for percentage of protected area coverage per geographical area, and total number of protected areas will be given priority.

Rural poverty ratio
Ecodevelopment as a means to reduce poverty among the forest dependent communities in and around protected areas will be central to biodiversity management intervention. Thus rural poverty ratio is considered a criterion. States with a higher rural poverty ratio is accorded higher priority.

Change in forest cover
The change in forest cover during 2005-2007 is taken as a criterion to estimate the state of forest degradation. States whose forest cover has decreased during this period deserves support to arrest and reverse the trend and are hence prioritized.

Change in ratio of open forest
Although open forests are in many cases natural climax forests, a change in the area of open forests could largely be a result of forest degradation. Change in the ratio of open forest to the total forest can be an indicator of the degree of forest degradation. The difference between the ratio of open forest to the total forest area in 2005 and that in 2007 is calculated for each state. The greater the increase in open forest ratio, the level of ongoing forest degradation will be larger, and thus states with a large increase are prioritized.

Table 8-6 shows the scoring scheme for each of the criteria. The integer number from 1 to 5 will be given as per the scoring categories. First, states are divided into five groups based on sorting of their figures. Then the integer number of 1 to 5 is allocated to each group. Five (5) is allocated to the highest-priority states, and 1 is for the lowest-priority ones.

Table 8-6 Score table for each criterion: biodiversity conservation

No	Criteria	Scoring scheme	
1	Biodiversity significance	No. of protected areas • 31 or more: 5 • 26 to 30: 4 • 19 to 25: 3 • 10 to 18: 2 • 9 or less: 1	% of protected areas • >20.1: 5 • 10.1 to 20.0: 4 • 5.1 to 10.0: 3 • 3.1 to 5.0: 2 • 0.01 to 3.0: 1
2	Rural poverty ratio	• 40% or more: 5 • 31 to 40%: 4 • 21 to 30%: 3	• 10 to 20%: 2 • 9.9% or less: 1 • NA: 2
3	Change in forest cover	• -1.00% or less: 5 • -0.10 to -0.99%: 4 • -0.01 to -0.09%: 3	• 0 to 0.99%: 2 • 1.00 or more: 1
4	Change in ratio of open forest	• 1.00 point or more: 5 • 0.40 to 0.99 point: 4 • 0.11 to 0.39 point: 3	• 0 to 0.10 point: 2 • -0.01 or less: 1

Source: Survey team

All the 28 states have been ranked by applying the above criteria and this is presented in Annex 12. Five priority states emerging from this priority setting exercise and their ranking is provided in Table 8-7.

Table 8-7 Summary of ranking for biodiversity conservation

Ranking	Name of state	Score
1	Arunachal Pradesh	16
1	Assam	16
1	Madhya Pradesh	16
4	Maharashtra	15
4	Nagaland	15

Source: Survey team

In addition to Maharashtra and Nagaland, Gujarat and Tripura have also scored 15 but these two states have ongoing JICA-assisted forestry projects with a significant biodiversity component and hence not included among the priority states.

8.4 Development of project concept notes in selected thematic areas

To examine the feasibility of the priority areas, the survey team developed a project concept note that provides a basis for JICA's future cooperation project. The note describes the overall conceptual framework of JICA's future project, and may be used as a discussion material in the process of project formulation or a checklist for the project proposal.

8.4.1 Thematic areas for development of project concept note

Out of the five priority areas for JICA's future cooperation identified in Section 8.3, two thematic areas are selected for the development of project concept notes. One is farm forestry and wood-based industries. The other is related to participatory forest and biodiversity conservation, involving JFM and ecodevelopment.

(1) Farm forestry and wood-based industries

As discussed in Section 8.3, it may be appropriate for JICA's future cooperation to put more focus on farm forestry and wood-based industries. The rationales for the promotion of farm forestry and the industry are 1) to meet growing demands for raw materials for wood-based industries due to the rapid economic growth; 2) to increase forest or tree cover to achieve the targets set by the National Forest Policy 1988 and the Eleventh Five Year Plan; and 3) to increase employment opportunities.

To meet the demands for raw materials from wood-based industries, the supply of timber and wood materials needs to be enhanced through facilitating farm forestry as well as promoting wood-based industries particularly those of sawmill and wooden board industries. The promotion of wood-based industries will help increase employment opportunities, especially for non-landed agricultural labour. It is therefore sound to enhance raw material production for wood-based industries by farm forestry.

With respect to increase in forest and tree cover, several national policies and plans set the numerical targets. The National Forest Policy 1988 sets the target that one third of total geographical area of the country shall be under forest and tree cover. The Eleventh Five Year Plan also sets the target of '5% increase of tree cover.' The Policy and the Plan state that such targets will be achieved through tree planting outside forest as well as tree planting in and conservation of the recorded forest areas. Therefore the promotion of farm forestry is considered in line with the national policy.

Considering the above, the survey team decided to develop a concept note for the enhancement of farm forestry and wood-based industries.

(2) Participatory forest and biodiversity conservation

The other thematic area where a concept note is developed is participatory forest management and biodiversity conservation in and around the recorded forest area and protected areas. Activities related to JFM Committees (JFMCs) and Ecodevelopment Committees (EDCs) will be the main component. JFM is considered a powerful instrument to provide forest dependent communities with opportunities to participate in forest management. This has contributed to forest conservation as well as local livelihood enhancement. Ecodevelopment has also contributed to both the livelihood of forest dependent communities and protected area management.

JICA has many experiences in supporting JFM-related forest projects, and certain needs for the support to JFM programmes still exist in the near future. However, in the long run, JFM project needs to respond to the recent emerging issues identified in Section 8.2.1. Such factors include 1) the recent MOEF's policy to promote the decentralisation of forest governance; 2) Forest Rights Act 2006, and 3) other external factors that may affect JFM such as NREGS. In the context of decentralisation of forest governance, in particular, the inclusion of JFMC under the local institutions such as the Gram Sabha may be effective, as stated in the letter sent by the MOEF to the Chief Ministers dated 29 October 2010. This policy direction is also confirmed in the Green India Mission.

JICA's future cooperation projects may need to take these issues into account, and may help the state governments respond to these new trends, although individual states' conditions including policies of state governments need to be considered. In particular, the incorporation of the Gram Sabha into the institutional arrangement of the future project could be the important issues to be considered. Thus, in the Survey, it is necessary to conceptualise how such local institutional arrangements are smoothly achieved. Participatory forest and biodiversity conservation is therefore selected as the theme of a project concept note.

8.4.2 Selection of candidate states to be surveyed for developing project concept notes

To select states to be surveyed for the development of a project concept note, the survey team developed selection criteria for the respective thematic areas. For the criteria, the survey team consulted with statistical data such as rural poverty ratio and change in forest cover as well as expert knowledge on farm forestry. In addition, the survey team considers that the states that have already received Japanese ODA loan in the forest sector should have lower priority. This is also an overall criterion for state selection. The major criteria for the selection of the candidate states are listed below.

Overall criterion

- Whether the state has already received Japanese ODA loan in the forest sector

Criteria for enhancement of farm forestry and wood-based industries

- Potential of farm forestry area with fast-growing commercial species
- Existence and potential of raw material market for wood-based industries
- Ratio of non-landed agricultural labour to landed cultivator

Criteria for participatory forest and biodiversity conservation

- Rural poverty ratio
- Change in forest cover
- Change in ratio of open forest
- Number of protected areas as proxy of richness of biodiversity

Based on the criteria above, the survey team selected Andhra Pradesh for developing a project concept note for the enhancement of farm forestry and wood-based industries, and Madhya Pradesh

for participatory forest and biodiversity management.

8.4.3 Project concept notes for the selected thematic areas

Based on the short visits to Andhra Pradesh and Madhya Pradesh, project concept notes for the two thematic areas were developed. The concept notes are attached to Annex 13 and Annex 14, and their characteristics and outlines are presented below.

(1) Enhancement of farm forestry and wood-based industries

The survey team visited Andhra Pradesh State to develop a concept note for the project to enhance farm forestry and wood-based industries particularly those of sawmill and wooden board industries. The team discussed with the Andhra Pradesh Forest Department, and visited farm forestry sites and a private paper company. The team revealed that farm forestry and wood-based industries are tightly linked through the demand and supply of raw materials, and felt that the state government needs to consider concurrent support to farm forestry and wood-based industries in selected target area to enhance farm forestry produce market. Since the project focuses on support to private sector activities, external factors such as market conditions, business environment, and capacity of existing and potential farm forestry farmers and industrialists of wood-based industries should be examined carefully in selecting areas to be covered by the project. To implement proposed components, a coordinated approach by the Forest Department and other concerned departments such as department of industries and commerce is required. The summary of the concept note is presented below, and the project details are described in Annex 13.

Project title: Enhancement of farm forestry and wood-based industries project

State: State of Andhra Pradesh

Project duration: 10 years

Project needs and rationale: India's increasing demand for forestry products provides an opportunity for farmers and wood-based industries to increase their economic returns. Government support to enhance farm forestry and wood-based industries, particularly small-scale enterprises, should result in increase in supply of raw materials and forest and tree cover and generation of employment in the industries. However, farm forestry and the industries face policy, regulatory, and market barriers, technical and financial constraints, and rapidly changing markets of raw materials and wood-based products. Government support and services to the farm forestry and wood-based industries to reduce their risks associated with the barriers and constraints and enhance their adaptation to changing market environment are necessary. Such support will contribute to the achievement of increase in forest cover, meeting growing demand for raw materials, and generation of employment opportunities.

The objectives of the project:

1) Promote farm forestry outside of recorded forest area to meet the growing demand for raw materials for wood-based industries and to improve and expand forest and tree cover; and
2) Attain sustainable development of the wood-based industries which generates employment opportunities.

Project sites: to be determined in Andhra Pradesh State

Project components:

1) Establishment of an enabling policy and legal environment
2) Extension and facilitation service delivery
3) Technical development

4) Monitoring and analysis of the markets of farm forestry produce and wood-based products
5) Capacity development of the Forest Department
6) Establishment of financial service mechanism

(2) Participatory forest and biodiversity management

The survey team visited Madhya Pradesh State to develop a concept note of the project for the thematic area of participatory forest and biodiversity management. However, during the discussion with the Madhya Pradesh Forest Department, it was revealed that the Madhya Pradesh State Government will not accept any loans from the external financial sources. This is the overall policy of the state government, and the Forest Department will follow it. Under these circumstances, the survey team decided that, instead of developing the project concept focusing on Madhya Pradesh, it is more appropriate to develop a project concept for future participatory forestry project that can be used as a model concept. Although some information obtained during the stay in Madhya Pradesh as well as some from Tamil Nadu and Rajasthan were used, the concept note itself is not for the future project in Madhya Pradesh. Instead, the note was developed to demonstrate general concept that may be applicable to the other states, though some modification will be necessary as per the natural and socioeconomic conditions of the state. The summary of the concept note are presented below, and the project details are enclosed in Annex 14.

Project title: Project for Sustainable Forest and Biodiversity Management

State: to be determined in consultation with the Government of India and state governments

Project duration: 8-10 years

Project needs and rationale: JFM and ecodevelopment have contributed to forest conservation as well as local livelihood enhancement, and certain needs for the support to JFM-related activities still exist. However, there are emerging factors and changing socioeconomic environment that projects for JFM and ecodevelopment need to respond. The issues to address include the following: 1) the MOEF's recent policy to promote the decentralisation of forest governance; 2) Forest Rights Act 2006 that may affect project implementation; and 3) external factors that may reduce communities' dependency on forest resources such as NREGS and other government livelihood-support programmes. Taking into account the recent trends described above, it may be effective to formulate and implement a project for participatory forest and biodiversity management with the involvement of the Gram Sabha. However, when considering how the Gram Sabha and other local institutions are involved in JFM, it is necessary to examine the policies of state forest departments and other relevant conditions of each state.

The objectives of the project:
1) Manage forest and protected areas sustainably as well as enhance local livelihood through JFM and ecodevelopment.
2) Develop a practical model to incorporate local institutions such as Gram Sabha in the decision making process of JFMC and EDC.

Project sites: to be determined in consultation with the state forest department

Project components:
1) Alignment of the current policies related to JFM and ecodevelopment
2) Developing the selection criteria for villages
3) Planting trees in degraded forests and barren areas
4) Protection of protected areas through ecodevelopment activities
5) Sustainable management of NTFPs
6) Socioeconomic development including income generating activities and establishment of

village development funds
7) Capacity development of local institutions and Forest Department
8) Development of forest and wildlife management infrastructures
9) Supply of materials and equipments for forest and wildlife management

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Annexes

Annex 1 State-wise forest cover and recorded forest area since 1987 assessment

State/ Union Teritory	Method / Reported year / Data period / Resolution	Forest cover (km^2)											Recorded forest area (km^2)			Geographical area (km^2)
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2009	87'/09'	Reported in 1987	Reported in 2009	87'/09' change	2007
		1981-83 80m	1985-87 30m	1987-89 30m	1989-91 30m	1991-93 36.25m	1993-95 36.25m	1996-98 23.5m	2000 23.5m	2002 23.5m	2004 23.5m	2006 23.5m	change				
		a	b	c	d	e	f	g	h	i	j	k	l=k-a	m	n	o=m-n	p
State	Andhra Pradesh	49,573	47,290	47,290	47,256	47,112	43,290	44,229	44,637	44,412	45,231	45,102	-4,471	63,771	63,814	43	275,069
	Arunachal Pradesh	64,132	69,002	68,757	68,661	68,621	68,602	68,847	68,045	67,692	67,472	67,353	3,221	51,540	51,540	0	83,743
	Assam	25,160	24,832	24,751	24,508	24,061	23,824	23,688	27,714	27,735	27,758	27,692	2,532	30,708	26,832	-3,876	78,438
	Bihar	28,482	26,668	26,668	26,587	26,561	4,832	4,830	5,720	5,573	6,807	6,804	1,972 *1	29,230	6,473	n.a.	94,163
	Jharkhand	n.a.	n.a.	n.a.	n.a.	n.a.	21,692	21,644	22,637	22,569	22,722	22,894	1,202 *2	n.a.	23,605	n.a.	79,714
	Delhi	15	22	22	22	26	26	88	111	174	177	177	162	42	85	43	1,483
	Goa	1,240	1,255	1,255	1,250	1,250	1,252	1,251	2,095	2,164	2,156	2,151	911	1,053	1,224	171	3,702
	Gujarat	11,991	11,921	11,907	12,044	12,320	12,578	12,965	15,152	14,814	14,604	14,620	2,629	18,777	18,927	150	196,022
	Haryana	513	513	513	513	603	604	964	1,754	1,576	1,604	1,594	1,081	1,685	1,559	-126	44,212
	Himachal Pradesh	12,480	12,480	12,480	12,502	12,501	12,521	13,082	14,360	14,359	14,666	14,668	2,188	21,325	37,033	15,708	55,673
	Jammu & Kashmir	20,905	20,449	20,449	20,449	20,433	20,440	20,441	21,237	21,273	22,689	22,686	1,781	20,892	20,230	-662	222,236
	Karnataka	32,268	32,104	32,199	32,343	32,382	32,403	32,467	36,991	35,246	36,200	36,190	3,922	38,644	38,284	-360	191,791
	Kerala	10,292	10,292	10,292	10,336	10,336	10,334	10,323	15,560	15,595	17,284	17,324	7,032	11,222	11,265	43	38,863
	Madhya Pradesh	130,099	135,541	135,541	135,396	135,164	74,760	75,137	77,265	76,145	77,739	77,700	2,940 *3	155,414	94,689	n.a.	308,245
	Chhattisgarh	n.a.	n.a.	n.a.	n.a.	n.a.	56,435	56,693	56,448	55,992	55,929	55,870	-565 *4	n.a.	59,772	n.a.	135,191
	Maharashtra	45,616	44,044	44,044	43,859	43,843	46,143	46,672	47,482	47,514	50,661	50,650	5,034	64,055	61,939	-2,116	307,713
	Manipur	17,475	17,685	17,685	17,621	17,558	17,418	17,384	16,926	17,259	16,952	17,280	-195	15,155	17,418	2,263	22,327
	Meghalaya	16,466	15,645	15,875	15,769	15,714	15,657	15,633	15,584	16,925	17,205	17,321	855	8,514	9,496	982	22,429
	Mizoram	19,084	18,170	18,853	18,697	18,576	18,775	18,338	17,494	18,583	18,600	19,240	156	15,935	16,717	782	21,081
	Nagaland	14,394	14,399	14,321	14,348	14,291	14,221	14,164	13,345	14,015	13,665	13,464	-930	8,625	9,222	597	16,579
	Orissa	53,253	47,227	47,205	47,145	47,107	46,941	47,033	48,838	48,353	48,755	48,855	-4,398	59,555	58,136	-1,419	155,707
	Punjab	943	1,338	1,343	1,343	1,342	1,387	1,412	2,432	1,545	1,660	1,664	721	2,803	3,058	255	50,362
	Rajasthan	12,758	12,884	12,889	13,099	13,280	13,353	13,871	16,367	15,821	16,012	16,036	3,278	31,151	32,639	1,488	342,239
	Sikkim	2,756	3,041	3,041	3,119	3,127	3,129	3,118	3,193	3,262	3,357	3,357	601	2,650	5,841	3,191	7,096
	Tamil Nadu	17,472	16,992	16,992	17,005	17,045	17,064	17,078	21,482	23,003	23,314	23,338	5,866	22,319	22,877	558	130,058
	Tripura	5,953	5,535	5,535	5,538	5,538	5,546	5,745	7,065	8,123	8,173	8,073	2,120	6,280	6,294	14	10,486
	Uttar Pradesh	31,226	33,627	33,609	33,961	33,986	10,751	10,756	13,746	14,127	14,346	14,341	3,590 *5	51,269	16,583	n.a.	240,928
	Uttarakhand	n.a.	n.a.	n.a.	n.a.	n.a.	23,243	23,260	23,938	24,460	24,493	24,495	1,252 *6	n.a.	34,651	n.a.	53,483
	West Bengal	8,432	8,015	8,015	8,186	8,276	8,349	8,362	10,693	12,389	12,970	12,994	4,562	11,879	11,879	0	88,752
Union	A & N Islands	7,601	7,622	7,622	7,624	7,615	7,613	7,606	6,930	6,807	6,663	6,662	-939	7,144	7,171	27	8,249
Teritory	Chandigarh	2	5	5	5	7	7	7	9	15	17	17	15	6	34	28	114
	Dadra & N. Haveli	238	206	206	206	204	204	202	219	221	216	211	-27	203	204	1	491
	Daman & Diu	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6	8	6	6	0 *7	n.a.	8	n.a.	112
	Lakshdweep	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	27	25	26	26	-1 *8	n.a.	0	n.a.	32
	Pondicherry	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	36	42	42	44	8 *9	n.a.	13	n.a.	480
Total		640,819	638,804	639,364	639,386	638,879	633,397	637,293	675,538	677,816	690,171	690,899	48,105	751,846	769,512	17,785	3,287,263

Note: 1) and 2) Bihar State was divided into Bihar and Jharkhand States in 2000, and the changes in forest cover during the 1993-95 and 2006 data periods are calculated assuming that the states were in existence in the 1993-95 data period. 3) and 4) Madhya Pradesh State was divided into Madhya Pradesh and Chhattisgarh States in 2000, and changes in forest cover during the 1993-95 and 2006 data periods are calculated assuming that the states were in existence in the 1993-05 data period. 5) and 6) Uttar Pradesh State was divided into Uttar Pradesh and Uttarakhand States in 2000, and changes in forest cover during the 1993-05 and 2006 data periods are calculated assuming that the states were in existence in the 1993-95 data period. 7), 8), and 9) Changes in forest cover during the 2000 and 2006 data periods.

Annex 2 Year- and state-wise forest cover and recorded forest area (% to the state's geographical area)

State/ Union Teritory	Method	Forest cover											Recorded forest area			Geographical area
	Reported year	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2009	Reported	Reported	87'/09'	2007
	Data period	1981-83	1985-87	1987-89	1989-91	1991-93	1993-95	1996-98	2000	2002	2004	2006	in 1987	in 2009	change	
	Resolution	80m	30m	30m	30m	36.25m	36.25m	23.5m	23.5m	23.5m	23.5m	23.5m				
		a	b	c	d	e	f	g	h	i	j	k	m	n	o=n-m	p
State	Andhra Pradesh	18.0%	17.2%	17.2%	17.2%	17.1%	15.7%	16.1%	16.2%	16.1%	16.4%	16.4%	23.2%	23.2%	0.0%	100.0%
	Arunachal Pradesh	76.6%	82.4%	82.1%	82.0%	81.9%	81.9%	82.2%	81.3%	80.8%	80.6%	80.4%	61.5%	61.5%	0.0%	100.0%
	Assam	32.1%	31.7%	31.6%	31.2%	30.7%	30.4%	30.2%	35.3%	35.4%	35.4%	35.3%	39.1%	34.2%	-4.9%	100.0%
	Bihar	30.2%	28.3%	28.3%	28.2%	28.2%	5.1%	5.1%	6.1%	5.9%	7.2%	7.2%	31.0%	6.9%	n.a.	100.0%
	Jharkhand	n.a.	n.a.	n.a.	n.a.	n.a.	27.2%	27.2%	28.4%	28.3%	28.5%	28.7%	n.a.	29.6%	n.a.	100.0%
	Delhi	1.0%	1.5%	1.5%	1.5%	1.8%	1.8%	5.9%	7.5%	11.7%	11.9%	11.9%	2.8%	5.7%	2.9%	100.0%
	Goa	33.5%	33.9%	33.9%	33.8%	33.8%	33.8%	33.8%	56.6%	58.5%	58.2%	58.1%	28.4%	33.1%	4.6%	100.0%
	Gujarat	6.1%	6.1%	6.1%	6.1%	6.3%	6.4%	6.6%	7.7%	7.6%	7.5%	7.5%	9.6%	9.7%	0.1%	100.0%
	Haryana	1.2%	1.2%	1.2%	1.2%	1.4%	1.4%	2.2%	4.0%	3.6%	3.6%	3.6%	3.8%	3.5%	-0.3%	100.0%
	Himachal Pradesh	22.4%	22.4%	22.4%	22.5%	22.5%	22.5%	23.5%	25.8%	25.8%	26.3%	26.3%	38.3%	66.5%	28.2%	100.0%
	Jammu & Kashmir	9.4%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.6%	9.6%	10.2%	10.2%	9.4%	9.1%	-0.3%	100.0%
	Karnataka	16.8%	16.7%	16.8%	16.9%	16.9%	16.9%	16.9%	19.3%	18.4%	18.9%	18.9%	20.1%	20.0%	-0.2%	100.0%
	Kerala	26.5%	26.5%	26.5%	26.6%	26.6%	26.6%	26.6%	40.0%	40.1%	44.5%	44.6%	28.9%	29.0%	0.1%	100.0%
	Madhya Pradesh	42.2%	44.0%	44.0%	43.9%	43.8%	24.3%	24.4%	25.1%	24.7%	25.2%	25.2%	50.4%	30.7%	n.a.	100.0%
	Chhattisgarh	n.a.	n.a.	n.a.	n.a.	n.a.	41.7%	41.9%	41.8%	41.4%	41.4%	41.3%	n.a.	44.2%	n.a.	100.0%
	Maharashtra	14.8%	14.3%	14.3%	14.3%	14.2%	15.0%	15.2%	15.4%	15.4%	16.5%	16.5%	20.8%	20.1%	-0.7%	100.0%
	Manipur	78.3%	79.2%	79.2%	78.9%	78.6%	78.0%	77.9%	75.8%	77.3%	75.9%	77.4%	67.9%	78.0%	10.1%	100.0%
	Meghalaya	73.4%	69.8%	70.8%	70.3%	70.1%	69.8%	69.7%	69.5%	75.5%	76.7%	77.2%	38.0%	42.3%	4.4%	100.0%
	Mizoram	90.5%	86.2%	89.4%	88.7%	88.1%	89.1%	87.0%	83.0%	88.2%	88.2%	91.3%	75.6%	79.3%	3.7%	100.0%
	Nagaland	86.8%	86.9%	86.4%	86.5%	86.2%	85.8%	85.4%	80.5%	84.5%	82.4%	81.2%	52.0%	55.6%	3.6%	100.0%
	Orissa	34.2%	30.3%	30.3%	30.3%	30.3%	30.1%	30.2%	31.4%	31.1%	31.3%	31.4%	38.2%	37.3%	-0.9%	100.0%
	Punjab	1.9%	2.7%	2.7%	2.7%	2.7%	2.8%	2.8%	4.8%	3.1%	3.3%	3.3%	5.6%	6.1%	0.5%	100.0%
	Rajasthan	3.7%	3.8%	3.8%	3.8%	3.9%	3.9%	4.1%	4.8%	4.6%	4.7%	4.7%	9.1%	9.5%	0.4%	100.0%
	Sikkim	38.8%	42.9%	42.9%	44.0%	44.1%	44.1%	43.9%	45.0%	46.0%	47.3%	47.3%	37.3%	82.3%	45.0%	100.0%
	Tamil Nadu	13.4%	13.1%	13.1%	13.1%	13.1%	13.1%	13.1%	16.5%	17.7%	17.9%	17.9%	17.2%	17.6%	0.4%	100.0%
	Tripura	56.8%	52.8%	52.8%	52.8%	52.8%	52.9%	54.8%	67.4%	77.5%	77.9%	77.0%	59.9%	60.0%	0.1%	100.0%
	Uttar Pradesh	13.0%	14.0%	13.9%	14.1%	14.1%	4.5%	4.5%	5.7%	5.9%	6.0%	6.0%	21.3%	6.9%	n.a.	100.0%
	Uttarakhand	n.a.	n.a.	n.a.	n.a.	n.a.	43.5%	43.5%	44.8%	45.7%	45.8%	45.8%	n.a.	64.8%	n.a.	100.0%
	West Bengal	9.5%	9.0%	9.0%	9.2%	9.3%	9.4%	9.4%	12.0%	14.0%	14.6%	14.6%	13.4%	13.4%	0.0%	100.0%
Union	A & N Islands	92.1%	92.4%	92.4%	92.4%	92.3%	92.3%	92.2%	84.0%	82.5%	80.8%	80.8%	86.6%	86.9%	0.3%	100.0%
Teritory	Chandigarh	1.8%	4.4%	4.4%	4.4%	6.1%	6.1%	6.1%	7.9%	13.2%	14.9%	14.9%	5.3%	29.8%	24.6%	100.0%
	Dadra & N. Haveli	48.5%	42.0%	42.0%	42.0%	41.5%	41.5%	41.1%	44.6%	45.0%	44.0%	43.0%	41.3%	41.5%	0.2%	100.0%
	Daman & Diu	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.4%	7.1%	5.4%	5.4%	n.a.	7.1%	n.a.	100.0%
	Lakshdweep	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	84.4%	78.1%	81.3%	81.3%	n.a.	0.0%	n.a.	100.0%
	Pondicherry	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.5%	8.8%	8.8%	9.2%	n.a.	2.7%	n.a.	100.0%
Total		19.5%	19.4%	19.4%	19.5%	19.4%	19.3%	19.4%	20.6%	20.6%	21.0%	21.0%	22.9%	23.4%	0.5%	100.0%

*1 *2 *3 *4 *5 *6 *7 *8 *9

Note: 1) and 2) Bihar State was divided into Bihar and Jharkhand States in 2000, and the changes in forest cover during the 1993-95 and 2006 data periods are calculated assuming that the states were in existence in the 1993-95 data period. 3) and 4) Madhya Pradesh State was divided into Madhya Pradesh and Chhattisgarh States in 2000, and changes in forest cover during the 1993-95 and 2006 data periods are calculated assuming that the states were in existence in the 1993-05 data period. 5) and 6) Uttar Pradesh State was divided into Uttar Pradesh and Uttarakhand States in 2000, and changes in forest cover during the 1993-05 and 2006 data periods are calculated assuming that the states were in existence in the 1993-95 data period. 7), 8), and 9) Changes in forest cover during the 2000 and 2006 data periods.

Annex 3 Biogeographic zones of India

Biogeographic Zones	Biogeographic provinces	% of Geographical area of India
1. Trans Himalaya	Himalaya - Ladakh Mountains	3.3
	Himalaya -Tibetan Plateau	2.2
	Trans - Himalaya Sikkim	<0.1
2. The Himalayas	Himalaya - North West Himalaya	2.1
	Himalaya - West Himalaya	1.6
	Himalaya - Central Himalaya	0.2
	Himalaya - East Himalaya	2.5
3. The Indian Desert	Desert – Thar	5.4
	Desert – Katchchh	1.1
4. The Semi Arid	Semi - Arid - Punjab Plains	3.7
	Semi - Arid - Gujarat Rajputana	12.9
5. The Western Ghats	Western Ghats - Malabar Plains	2.0
	Western Ghats -Western Ghats Mountains	2.0
6. The Deccan Peninsula	Deccan Peninsular - Central Highlands	7.3
	Deccan Peninsular - Chotta Nagpur	5.4
	Deccan Peninsular - Eastern Highlands	6.3
	Deccan Peninsular - Central Plateau	12.5
	Deccan Peninsular - Deccan South	10.4
7. The Gangetic Plains	Gangetic Plain - Upper Gangetic Plains	6.3
	Gangetic Plain - Lower Gangetic Plains	4.5
8. The Coasts	Coasts - West Coast	0.6
	Coasts - East Coast	1.9
	Coasts – Lakshdweep	<0.1
9. Northeast India	North - East - Brahamputra Valley	2.0
	North - East – North East Hills	3.2
10. Islands	Islands – Andamans	0.2
	Islands – Nicobars	0.1

Source: MOEF (2009)

Annex 4 Community conserved areas

Community conserved areas (CCAs) are areas traditionally protected by local communities through exercises of customary norms and social sanctions for the conservation and sustainable use of the forest resources and for social and religious needs. In some cases as in Uttarakhand and Orissa these sites and the community rights are legally protected. Examples of CCAs are explained below:

In case of Van Panchayats (Forest Councils) in Uttarakhand, the land belongs to the Revenue Department but is managed by Van Panchayats, and usufructs claimed by the local community under the Indian Forest Act 1927 in a unique agreement that was made with the British colonial regime in 1931 (Pathak and Bhatt 2003). Apart from the Van Panchayats, there are also other systems and institutions in this region that include traditional *Lath Panchayats* (protection of forests by rotation), Yuvak Dals (Youth Groups), Mahila Mangal Dals (Women's Groups), and Dekh Rekh Samitis (groups for village maintenance and upkeep, and sometimes forest management).

Orissa has a large number of village forest committees that manage about half of the forest area of the state. These committees have a reasonable level of autonomy in protecting as well in sustainable resource use since the land is under the jurisdiction of the revenue department. Mendha-Lekha's Gram Sabha's (a village council, not the statutory village council but a voluntary registered society) sustainable management of its village forest is a well-known case. This community of the *Gond* tribe in Gadchiroli district of Maharashtra successfully protects its approximately 1,500ha forests without intervention by the forest department (Pathak and Taraporevala, 2008).

New institutions are also established under different circumstances in other parts of the country. In Periyar Tiger Reserve in Kerala, what started as a successful ecotourism initiative through the ecodevelopment programme has now grown into a complete community initiative. In 2004, a public trust called the Periyar Foundation was established primarily to ensure the sustainability of these initiatives. Being an autonomous organization, the Foundation has the operational flexibility of a NGO while getting the support from the Government (Bhatt and Liyakhat, 2008). In the Alwar district of Rajasthan, people from the villages located in the catchment of the river Arvari have been conserving the catchment for more than a decade. This has resulted in the seasonal river becoming perennial. The villagers have now formed an 'Arvari Sansad' (Arvari Parliament) for the management of the catchment (Pathak, 2009).

According to Pathak, et al. (2004) some other examples are:

- 1,800 hectares of forest have been protected by *Gond* tribal community in the Mendha (Lekha) village in Maharashtra. The village has also achieved self-governance and has secured income for all community members through the year. It is also one of the first villages to claim rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006.
- The local community of Jardhargaon village in Uttarkhand have regenerated and protected 600-700 hectares of forests. Villagers also use a traditional system of grassland and water management. The area is also known for the revival of hundreds of varieties of indigenous crops by farmers who continue to grow them through organic farming.
- The people of KokkareBellur village, Karnataka, Veerapattu and Nellapatu in Andhra Pradesh, Kunthankulam in Tamil Nadu and hundreds of other villages in India protect bird species such as the painted stork (*Mycteria leucocephala*) and the threatened spot-billed pelican (*Pelecanus philippensis*).
- Buddhist communities in the Sangti Valley of Arunachal Pradesh provide protection to the endangered Black-necked crane (*Grus nigricollis*).
- Forests protected and managed by villages have been in vogue in Orissa since 1936. This practice is continued in several hundred villages without any official support.
- 600-ha village forest in the catchment of Loktak Lake in Manipur has been regenerated by the youth of Ronmei tribe from TokpaKabui village of Chandrapur district in Manipur. This community of traditional hunters has now imposed a complete ban on the hunting of the threatened Brow-antlered deer (*Rucervus eldi*).

Annex 5 Estimation on profit from eucalyptus plantation for paper mills and sawmills

Case 1: Eucalyptus for papermills, 4-year rotation

	Unit	Rate (INR)	Qty	1st cycle						2nd cycle						3rd cycle					
				1	2	3	4	Total		1	2	3	4	Total		1	2	3	4	5	6
Cost / ha																					
Ploughing	ha	2,400	1	2,400	2,400	2,400	2,400	**9,600**		2,400	2,400	2,400	2,400	**9,600**		2,400	2,400	2,400	2,400	2,400	2,400
Alignment & staking	ls	150	1	150				**150**						**0**							
Pitting & planting	plant	1.5	2,222	3,333				**3,333**						**0**							
Weeding & soil working	ha	1,111	2	2,222	2,222			**4,444**						**0**							
Fertilizer, green manure	ha	2,250	1	2,250	2,250	2,250	2,250	**9,000**		2,250	2,250	2,250	2,250	**9,000**		2,250	2,250	2,250	2,250	2,250	2,250
Antitermite treatment	ha	800	2	1,600				**1,600**						**0**							
Fencing	ls	2,000	1	2,000	200	200	200	**2,600**		200	200	200	200	**800**		200	200	200	200	200	200
Contingency of the above (5%)				697	353	242	242	**1,534**		242	242	242	242	**968**		242	242	242	242	242	242
Cost of plants (incl transport)		6.5	2,222	14,443				**14,443**						**0**							
Insurance			1.25	363	92	63	63	**581**		63	63	63	63	**252**		63	63	63	63	63	63
Total cost				29,458	7,517	5,155	5,155	**47,285**		5,155	5,155	5,155	5,155	**20,620**		5,155	5,155	5,155	5,155	5,155	5,155
Benefit / ha																					
Tree (eucalyptus)	Ton	2,000	90				180,000	**180,000**					180,000	**180,000**					180,000	**180,000**	
Intercrop (net profit)				15,000				**15,000**						**0**							
Total benefit				15,000			180,000	**195,000**					180,000	**180,000**					180,000	**180,000**	
Net profit								**147,715**						**159,380**							**159,380**
Net profit / year (each cycle)								**36,928**						**39,845**							**39,845**
Net profit / year (throughout three cycles)																					**38,873**

cf. Annual net profit of chilli or cotton is INR 37,073 to 44,488/ha or INR 15,000 to 18,000/acre.
Source: Survey team

Case 2: Eucalyptus for sawmills, 6-year rotation

	Unit	Rate (INR)	Qty	1st cycle							2nd cycle							3rd cycle					
				1	2	3	4	5	6	Total	1	2	3	4	5	6	Total	1	2	3	4	5	6	Total
Cost / ha																								
Ploughing	ha	2,400	1	2,400	2,400	2,400	2,400	2,400	2,400	**14,400**	2,400	2,400	2,400	2,400	2,400	2,400	**14,400**	2,400	2,400	2,400	2,400	2,400	2,400	**14,400**
Alignment & staking	ls	150	1	150						**150**							**0**							**0**
Pitting & planting	plant	1.5	2,222	3,333						**3,333**							**0**							**0**
Weeding & soil working	ha	1,111	2	2,222	2,222					**4,444**							**0**							**0**
Fertilizer, green manure	ha	2,250	1	2,250	2,250	2,250	2,250	2,250	2,250	**13,500**	2,250	2,250	2,250	2,250	2,250	2,250	**13,500**	2,250	2,250	2,250	2,250	2,250	2,250	**13,500**
Antitermite treatment	ha	800	2	1,600						**1,600**							**0**							**0**
Fencing	ls	2,000	1	2,000	200	200	200	200	200	**3,000**	200	200	200	200	200	200	**1,200**	200	200	200	200	200	200	**1,200**
Contingency of the above (5%)				697	353	242	242	242	242	**2,018**	242	242	242	242	242	242	**1,452**	242	242	242	242	242	242	**1,452**
Cost of plants (incl transport)		6.5	2,222	14,443						**14,443**							**0**							**0**
Insurance			1.25	363	92	63	63	63	63	**707**	63	63	63	63	63	63	**378**	63	63	63	63	63	63	**378**
Total cost				29,458	7,517	5,155	5,155	5,155	5,155	**57,595**	5,155	5,155	5,155	5,155	5,155	5,155	**30,930**	5,155	5,155	5,155	5,155	5,155	5,155	**30,930**
Benefit / ha																								
Tree (eucalyptus)	Ton	2,700	120						324,000	**324,000**						324,000	**324,000**						324,000	**324,000**
Intercrop (net profit)				15,000						**15,000**							**0**							**0**
Total benefit				15,000					324,000	**339,000**						324,000	**324,000**						324,000	**324,000**
Net profit										**281,405**							**293,070**							**293,070**
Net profit / year (each cycle)										**70,351**							**73,267**							**73,267**
Net profit / year (throughout three cycles)																								**72,295**

cf. Annual net profit of chilli or cotton is INR 37,073 to 44,488/ha or INR 15,000 to 18,000/acre.
Source: Survey team

Annex 6 The Supreme Court order related to wood-based industries

The most important court case for the forestry sector in recent years is the ongoing case of T.N. Godavarman Thirumulpad vs. Union of India under which, starting in December 1996, the Supreme Court of India has issued directions to oversee the enforcement of forest laws across the nation.

Some of the important directions of the court affecting wood-based industries are as follows:

1) The felling of all trees in all forest is to remain suspended except in accordance with a working plan approved by the Central Government.
2) Licences given to all wood-based industries (in the North East) shall stand suspended.
3) A complete ban on the movement of cut trees and timber from any seven north-eastern states of the country either by rail, road or water ways. The Indian railways and state governments were directed to take all measures necessary to ensure strict compliance of these directions. Railways were asked to shift immediately to concrete sleepers instead of using wooden sleepers. Defence establishments were also asked to find alternatives to various wood-based products.
4) In March 1997, the court ordered the closure of all unlicensed sawmills and wood processing plants, and forbade states from licensing new operations.

More recently, the Supreme Court has banned felling of trees and collection of NTFPs from the forests of the Andamans, especially for use by industries on the mainland. Some of the relevant points of the order are as follows:

5) No felling of trees for whatsoever reasons or justification should be carried out to supply to, or to meet the raw material requirement of, plywood, veneer, block board, match stick or any other such wood-based units except to local small-scale units (including saw mills) solely for meeting the local requirement for sawn timber and other wood-based products.
6) There should be a complete ban on the establishment of any new wood-based unit for the next 10 years.
7) All existing wood-based units (saw mills) should be relocated within industrial estates or, where industrial estates are not feasible, in locations contiguous to forest offices or otherwise convenient for the Forest Department to monitor. This relocation should be completed within one year, after which the non-complying saw mills should be closed down. These saw mills should also be required to obtain a licence from the Forest Department within three months and to maintain such records as may be prescribed by the Forest Department. Their licence may be renewed every year at the discretion of the Forest Department, after the department has satisfied itself that a) the unit was not involved in the use of any illegal timber; b) the prescribed records were properly maintained; c) all provisions of the act, rules and the terms and conditions stipulated by the Forest Department from time to time have been complied with. Necessary rules, guidelines etc., for the purpose, should be prescribed by the Forest department within three months.
8) No subsidy of any type, including transport subsidy, should be given to any wood-based unit.
9) Existing medium and large scale wood-based industries (including plywood, veneer, and match industries) can be allowed to function provided they import their entire requirement of wood and other forest based raw materials from the mainland or from abroad. No subsidies should be allowed to them.
10) No timber, either as logs or as sawn timber or plywood/ veneer, or in any other form, should be transported out of the islands through any means whatsoever. This should not, however, inhibit the transportation, as personal baggage, of a reasonable quantity of wooden handicrafts by tourists or of personal articles by those permanently leaving the islands. Also, where a wood-based industry, as specified in the point above, imports its entire wood and forest based raw material requirement, then it should be permitted to export its finished product.

Source: Saigal and Bose (2003)

Annex 7 Biosphere reserves in India

No.	Name	Year of notification	Area (km^2)	State
1	Achanakamar - Amarkantak	2005	3,835.51	Madhya Pradesh and Chhattishgarh
2	Agasthyamalai	2001	1,828	Kerala
3	Dehang-Dibang	1998	5,111.50	Arunachal Pradesh
4	Dibru-Saikhowa	1997	765	Assam
5	Great Nicobar	1989	885	Andaman And Nicobar Islands
6	Gulf of Mannar *	1989	10,500	Tamil Nadu
7	Kachchh	2008	12,454	Gujarat
8	Khangchendzonga	2000	2,619.92	Sikkim
9	Manas	1989	2,837	Assam
10	Nanda Devi *	1988	5,860.69	Uttarakhand
11	Nilgiri *	1986	5,520	Tamil Nadu, Kerala and Karnataka
12	Nokrek *	1988	820	Meghalaya
13	Pachmarhi *	1999	4,926	Madhya Pradesh
14	Simlipal *	1994	4,374	Orissa
15	Sunderbans *	1989	9,630	West Bengal
16	Seshachalam	2010	755.997	Andhra Pradesh
17	Cold Desert	2009	7,770	Himachal Pradesh

Note: * Listed in the international network.
Source: MOEF (2011a)

Annex 8 Ramsar wetland sites in India

No.	Site Name	State	Year of Declaration	Area (km^2)
1	Asthamudi Lake	Kerala	2002	1,860
2	Bhitarkanika Mangroves	Orissa	2002	525
3	Bhoj Wetlands	Madhya Pradesh	2002	31
4	Chandertal Wetland	Himachal Pradesh	2005	38.56
5	Chilka Lake	Orissa	1981	1,140
6	DeeporBeel	Assam	2002	4.14
7	East Calcutta Wetlands	West Bengal	2002	378
8	Harike Lake	Punjab	1990	86
9	Hokera Wetland	Jammu and Kashmir	2005	13.75
10	Kanjli Lake	Punjab	2002	14.84
11	Keoladeo Ghana national park	Rajasthan	1981	28.73
12	Kolleru Lake	Andhra Pradesh	2002	673
13	Loktak Lake	Manipur	1990	945
14	Point Calimere	Tamil Nadu	2002	17.26
15	Pong Dam Lake	Himachal Pradesh	2002	307.29
16	Renuka Wetland	Himachal Pradesh	2005	not available
17	Ropar Lake	Punjab	2002	41.36
18	Rudrasagar Lake	Tripura	2005	2.40
19	Sambhar Lake	Rajasthan	1990	736
20	Sasthamkotta Lake	Kerala	2002	11.3
21	Surinsar-Mansar Lakes	Jammu and Kashmir	2005	3.50
22	Tsomoriri Lake	Jammu and Kashmir	2002	120
23	VembanadKol Wetland	Kerala	2002	4,583
24	Upper Ganga River (Brijghat to Narora Stretch)	Uttar Pradesh	2005	265.90
25	Wular Lake	Jammu & Kashmir	1990	173

Source: National Wildlife Database (http://oldwww.wii.gov.in/nwdc)

Annex 9 Elephant reserves of India

No.	Elephant Reserve	Date of notification	State	Total area (km²)	Protected area in ER (km²)	Elephant population in 2005
1	Mayurjharna ER	24 Oct 2002	West Bengal	414		96
2	Singhbhum ER	26 Sep 2001	Jharkhand	4,530	193	371
3	Mayurbhanj ER	29 Sep 2001	Orissa	3,214	1,309	465
4	Mahanadi ER*****	20 Jul 2002	Orissa	1,038	964	464
5	Sambalpur ER*****	27 Mar 2002	Orissa	427	427	284
6	Baitami ER[#]		Orissa	1,755		108
7	South Orissa ER[#]		Orissa	4,216	750	138
8	Lemru ER[#]		Chhattishgarh	450		-
9	Badalkhol-Tamorpingla ER		Chhattishgarh	1,048.3	1,154.93	-
10	Kameng ER	19 Jun 2002	Arunachal	1,892	748	
11	Sonitpur ER*****	6 Mar 2003	Assam	1,420	420	612
12	Dihing-Patkai ER	17 Apr 2003	Assam	937	345	295
13	South Arunachal ER	29 Feb 2008	Arunachal	1,957.5	378.13	129
14	Kaziranga-KarbiAnglong ER	17 Apr 2003	Assam	3,270	1,073	1,940
15	Dhansiri-Lungding ER	19 Apr 2003	Assam	2,740		275
16	Intanki ER	28 Feb 2005	Nagaland	202	202	30
17	Chirang-Ripu ER	7 Mar 2003	Assam	2,600	526	658
18	Eastern Dooars ER	28 Aug 2002	West Bengal	978	484	300-350
19	Garo Hills ER	31 Oct 2001	Meghalaya	3,500	402	1,047
20	Khasi-hills ER		Meghalaya	1,331		383
21	Mysore ER	25 Nov 2002	Karnataka	6,724	3,103	4,452
22	Wayanad ER	2 Apr 2002	Kerala	1,200	394	636
23	Nilgiri ER	19 Sep 2003	Tamil Nadu	4,663	716	2,862
24	Rayala ER	9 Dec 2003	Andhra	766	525	12
25	Nilambur ER	2 Apr 2002	Kerala	1,419	90	281
26	Coimbatore ER	19 Sep 2003	Tamil Nadu	566	482	329
27	Anamalai ER	19 Sep 2003	Tamil Nadu	1,457	300	179
28	Anamudi ER	2 Apr 2002	Kerala	3,728	780	1,726
29	Periyar ER	2 Apr 2002	Kerala	3,742	1,058	1,100
30	Srivilliputhur ER	19 Sep 2003	Tamil Nadu	1,249	568	638
31	Shivalik ER	28 Oct 2002	Uttarakhand	5,405	1340	1,510
32	Uttar Pradesh ER	9 Sep 2009	U.P.	744		NA
	Total			65,270.8	18,732.03	21,200+

[Legend] ER: elephant reserve

Note: [#] Approved by the Government of India (GOI), but not yet notified by the State Government.

***** Proposal for extension approved by GOI, but not yet notified by the State.

Source: ETF (2010)

Annex 10 Scoring table for Joint Forest Management

No	State	Japan-ese ODA loan project	Rural Poverty Ratio		Change in forest cover 2005-2007		Change in open forest 2005-2007		Share of area under JFM to recorded forest area (Mar 2006)		Number of titles distributed under FRA per km^2 of recorded forest (Feb. 2011)		Total score	Rank-ing
			(%)	Score	(%)	Score	(%)	Score	%	Score	No.	Score		
1	Andhra Pradesh		10.53	2	-0.29	4	-0.06	1	40.22	1	2.63	2	10	28
2	Arunachal Pradesh		43.68	5	-0.18	4	-0.02	1	0.42	5	0.00	5	20	2
3	Assam		39.64	4	-0.24	4	0.24	3	3.73	5	1.11	3	19	4
4	Bihar		50.74	5	-0.04	3	0.07	2	59.49	1	0.00	5	16	10
5	Chhattisgarh		NA	2	-0.11	4	0.13	3	54.81	1	3.60	1	11	27
6	Goa		1.64	1	-0.23	4	-0.03	1	8.17	5	0.00	5	16	10
7	Gujarat	xx	12.56	2	0.11	2	0.52	4	14.41	4	1.36	3	15	15
8	Haryana	x	7.98	1	-0.62	4	1.30	5	38.49	2	0.00	5	17	8
9	Himachal Pradesh	x	8.83	1	0.01	2	0.03	2	11.47	4	0.00	5	14	19
10	Jammu and Kashmir		3.93	1	-0.01	3	-0.01	1	1.98	5	0.00	5	15	15
11	Jharkhand		NA	2	0.76	2	0.40	4	92.78	1	0.26	4	13	21
12	Karnataka	xx	17.21	2	-0.03	3	0.01	2	7.93	5	0.17	4	16	10
13	Kerala	x	8.90	1	0.23	2	0.11	3	15.38	4	1.39	3	13	21
14	Madhya Pradesh		49.08	5	-0.05	3	0.01	2	62.80	1	1.22	3	14	19
15	Maharashtra		22.45	3	-0.02	3	0.03	2	43.35	1	1.69	3	12	25
16	Manipur		35.88	4	1.93	1	0.90	4	3.46	5	0.00	5	19	4
17	Meghalaya		42.65	5	0.67	2	0.10	2	0.78	5	0.00	5	19	4
18	Mizoram		31.11	4	3.44	1	1.86	5	5.86	5	0.00	5	20	2
19	Nagaland		31.77	4	-1.47	5	0.65	4	2.77	5	0.00	5	23	1
20	Orissa	x	46.04	5	0.21	2	0.18	3	15.14	4	4.38	1	15	15
21	Punjab	xx	6.36	1	0.24	2	0.41	4	64.90	1	0.00	5	13	21
22	Rajasthan	xxxx	12.72	2	0.15	2	0.07	2	23.59	3	0.92	4	13	21
23	Sikkim	x	41.67	5	0.00	2	0.00	1	15.15	4	0.00	5	17	8
24	Tamil Nadu	xx	23.09	3	0.10	2	-0.06	1	2.55	5	0.00	5	16	10
25	Tripura	x	47.28	5	-1.22	5	-0.15	1	17.85	4	18.88	1	16	10
26	Uttar Pradesh	x	31.32	4	-0.03	3	0.03	2	5.66	5	0.61	4	18	7
27	Uttarakhand		NA	2	0.01	2	0.03	2	15.73	4	0.00	5	15	15
28	West Bengal		31.20	4	0.19	2	0.16	3	52.61	1	2.34	2	12	25

Annex 11 Scoring table for farm forestry and wood-based industries

State		Number of projects supported by Japanese ODA loan (exclusion criteria)	Popularity of farm forestry (Saigal et al., 2002)		% of tree cover area to geographical area of state		Number of plywood units (1997)		% of agricultural labour to cultivator		Total score	Ranking
No.	Name		value	score	value	score	value	score	value	score		
1	Andhra Pradesh		x	5	2.6%	3	15	4	63.8%	5	17	5
2	Arunachal Pradesh			1	0.7%	1	17	4	6.3%	1	7	22
3	Assam			1	2.0%	2	45	5	25.3%	2	10	15
4	Bihar		x	5	2.6%	3	48	5	62.1%	5	18	3
5	Chhattisgarh			1	3.0%	4	0	1	41.8%	3	9	16
6	Goa			1	7.7%	5	4	3	41.5%	3	12	12
7	Gujarat	xx		1	4.3%	5	14	4	47.1%	4	14	9
8	Haryana	x	x	5	3.2%	4	12	3	29.8%	3	15	8
9	Himachal Pradesh	x		1	1.1%	1	3	2	4.6%	1	5	25
10	Jammu and Kashmir			1	3.0%	4	3	2	13.4%	2	9	16
11	Jharkhand			1	3.8%	5	0	1	42.3%	4	11	13
12	Karnataka	xx	x	5	3.0%	4	52	5	47.5%	4	18	3
13	Kerala	x	x	5	7.2%	5	52	5	69.1%	5	20	1
14	Madhya Pradesh			1	2.2%	2	10	3	40.1%	3	9	16
15	Maharashtra			1	3.1%	4	19	4	47.8%	4	13	11
16	Manipur			1	0.9%	1	1	2	23.0%	2	6	24
17	Meghalaya			1	2.4%	3	1	2	26.9%	2	8	21
18	Mizoram			1	0.8%	1	0	1	9.5%	1	4	26
19	Nagaland			1	1.8%	2	4	3	5.3%	1	7	22
20	Orissa	x		1	2.8%	3	3	2	54.1%	5	11	13
21	Punjab	xx	x	5	3.4%	5	12	3	41.9%	3	16	7
22	Rajasthan	xxxx		1	2.4%	3	8	3	16.1%	2	9	16
23	Sikkim	x		1	0.3%	1	0	1	11.5%	1	4	26
24	Tamil Nadu	xxx	x	5	3.8%	5	14	4	62.8%	5	19	2
25	Tripura	x		1	1.6%	2	3	2	46.8%	4	9	16
26	Uttar Pradesh	x	x	5	3.1%	4	48	5	37.7%	3	17	5
27	Uttarakhand			1	1.2%	2	0	1	14.2%	2	6	24
28	West Bengal	x (pipeline)		1	2.8%	3	73	5	56.6%	5	14	9

Annex 12 Scoring table for biodiversity conservation

No	State	Japanese ODA Loan Project	Protected Areas				Rural Poverty Rartio (%)		Change in forest cover 2005-2007		Change in open forest 2005-2007		Total score	Rank-ing
			No. of PAs	Score	% of PA area/total area	Score	(%)	Score	(%)	Score	percentage point	Score		
1	Andhra Pradesh		27	4	4.73	2	10.53	2	-0.29	4	-0.06	1	13	14
2	Arunachal Pradesh		13	2	11.68	4	43.68	5	-0.18	4	-0.02	1	16	1
3	Assam		23	3	4.98	2	39.64	4	-0.24	4	0.24	3	16	1
4	Bihar		13	2	3.38	2	50.74	5	-0.04	3	0.07	2	14	8
5	Chhattisgarh		14	2	4.79	2	NA	2	-0.11	4	0.13	3	13	14
6	Goa		7	1	20.39	5	1.64	1	-0.23	4	-0.03	1	12	17
7	Gujarat	xx	27	4	8.72	3	12.56	2	0.11	2	0.52	4	15	4
8	Haryana	x	10	1	0.64	1	7.98	1	-0.62	4	1.30	5	12	17
9	Himachal Prad	x	35	5	17.99	4	8.83	1	0.01	2	0.03	2	14	8
10	Jammu and Kashmir		19	2	6.38	3	3.93	1	-0.01	3	-0.01	1	10	26
11	Jharkhand		12	2	2.74	1	NA	2	0.76	2	0.40	4	11	22
12	Karnataka	xx	26	3	3.38	2	17.21	2	-0.03	3	0.01	2	12	17
13	Kerala	x	21	3	6.13	3	8.90	1	0.23	2	0.11	3	12	17
14	Madhya Pradesh		34	4	3.51	2	49.08	5	-0.05	3	0.01	2	16	1
15	Maharashtra		41	5	5.01	2	22.45	3	-0.02	3	0.03	2	15	4
16	Manipur		2	1	1.01	1	35.88	4	1.93	1	0.90	4	11	22
17	Meghalaya		5	1	1.35	1	42.65	5	0.67	2	0.10	2	11	22
18	Mizoram		10	1	5.89	3	31.11	4	3.44	1	1.86	5	14	8
19	Nagaland		4	1	1.34	1	31.77	4	-1.47	5	0.65	4	15	4
20	Orissa	x	20	3	0.65	1	46.04	5	0.21	2	0.18	3	14	8
21	Punjab	xx	12	2	0.64	1	6.36	1	0.24	2	0.41	4	10	26
22	Rajasthan	xxxx	30	4	2.73	1	12.72	2	0.15	2	0.07	2	11	22
23	Sikkim	x	8	1	30.77	5	41.67	5	0.00	2	0.00	1	14	8
24	Tamil Nadu	xxx	26	3	2.94	1	23.09	3	0.10	2	-0.06	1	10	26
25	Tripura	x	6	1	5.76	3	47.28	5	-1.22	5	-0.15	1	15	4
26	Uttar Pradesh	x	24	3	2.37	1	31.32	4	-0.03	3	0.03	2	13	14
27	Uttarakhand		12	2	13.71	4	NA	2	0.01	2	0.03	2	12	17
28	West Bengal	x (pipeline)	20	3	3.26	2	31.20	4	0.19	2	0.16	3	14	8

Annex 13 Concept note: Enhancement of farm forestry and wood-based industries project in Andhra Pradesh

1. Project title

Enhancement of farm forestry and wood-based industries project in Andhra Pradesh

2. State

State of Andhra Pradesh

3. Background (project needs and rationale)

(1) Status of farm forestry and wood-based industries in the state

Status of forest

- Forest cover: 45,102 km^2 (16.40% of the State's geographical area)
- Tree cover: 7,191 km^2 (2.61% of the State's geographical area)
- Loss of forest cover: 119 km^2 from 2004 to 2006

Status of farm forestry and wood-based industries

- Rural poverty ratio in rural areas: 10.53%
- Farmers practice Type 1 (plantation in marginal agricultural land), Type 2 (plantation in fertile agricultural land), and Type 3 (plantation in boundaries of agricultural fields) farm forestry
- Estimated number of farmers involved in farm forestry: 136,000 farmers[114]
- Estimated area and volume of farm forestry: 167,000 ha and 10 million tonnes, respectively mainly for pulpwood production
- Annual production of pulpwood by farm forestry consumed by the four paper mills: 1.91 million tonnes
- Types and numbers of wood-based industrial entities: 4,175 sawmills, 123 wooden board (plywood, board, and veneer) factories and 22 paper mills within which only four large paper mills reportedly consume wood for paper production
- Market arrangements of farm forestry and wood-based industries: the farm forestry market is oligopolistic, where the sawmill and wooden board industries do not obtain raw material from the market. Some of sawmill and wooden board industries use mango tree and miscellaneous domestic and imported timber for their production.

(2) Nature of farm forestry

Based on the field observations, three types of farm forestry are identified. The characteristics of the three types of farm forestry are summarized below:

Type 1 farm forestry

Type 1 farm forestry is done in marginal agricultural land. Although per ha productivity of this farm forestry is relatively low, the opportunity cost of farmers opting to practice the farm forestry is low, and the farm forestry is insensitive to market and economic conditions. High quality eucalyptus clones made it possible to cultivate trees with a reasonable cost in marginal agricultural land that had been too unproductive to grow agricultural crops. Since the farmers would gain an additional profit

[114] It is estimated from the data presented in Table 3-8 that three paper mills help plant 167,000 ha of farm forestry, and under ITC, which is one of the three paper mills, 65,000 farmers have established 80,000 ha of farm forestry. This implies that the total number of farmers involved in farm forestry can be estimated by calculating as follows: 167,000 ha/80,000 ha*65,000 farmers.

from the land with a low opportunity cost of alternative land uses such as grazing, the farmers prefer farm forestry. Their perceived production risks are partially hedged by free distribution of clonal seedlings, and technical and facilitative services provided by public services. Provision of market, financial, and technical information to farmers by NGOs has facilitated farmers' decision-making to opt for farm forestry.

Type 2 farm forestry

Type 2 farm forestry is done in fertile agricultural land. This type of farm forestry shows high per ha productively, but its opportunity cost is also high, and it is sensitive to market and economic conditions. If a tree crop is just an option for farmers' farming portfolio, then the inclusion of the crop in the portfolio is dependent on labour, factor, and produce market conditions, and risks associated with the crop. This means that type 2 farm forestry is sensitive to market conditions, and alternative crops may be chosen after harvest of farm forestry produce as a result of farmer's optimal production decision-making.

Type 3 farm forestry

Type 3 farm forestry is done in boundaries of productive agricultural land where no other uses are expected. Farmers seem not to expect high per ha productivity, and the opportunity cost of the farm forestry must be low due to lack of expectation of alternative use of boundary land. This low opportunity cost of tree plantation on boundary land infers that type 3 farm forestry is market insensitive. Farmers are likely to perceive that farm forestry in the boundary land and agriculture in their farm land are different production exercises, and are not interchangeable.

Table 1 summarizes the characteristics of three types of farm forestry.

Table 1: Characteristics of three types of farm forestry

Characteristic item	Type 1	Type 2	Type 3
Land	Marginal agricultural land	Productive agricultural land	Boundary land between productive (or marginal) agricultural land
Opportunity cost of land use	low	high	low
Productivity of farm forestry per ha and per year	medium	high	low
Farmer's crop choice set	tree crops	tree and agricultural crops	tree crops
Sensitivity to market conditions	low	high	low
Probability of farm forestry altered to other crops	low	relatively high	low
Management time horizon	medium (less than 10 years)	short (less than 5 years)	long (longer than 10 years)
Farmer's awareness of farm forestry produce market	aware (purchase by ITC)	strongly aware (purchase by ITC)	aware
Prevailing economic condition	Labour scarcity (increasing wage rate)	Labour scarcity (increasing wage rate) Mechanization	Labour scarcity (increasing wage rate) Urbanization Mechanization

Source: Survey team

(3) Needs for enhancement of farm forestry and wood-based industries

India's increasing demand for forestry products provides an opportunity for farmers and wood-based industries to increase their economic returns. Government support to enhance farm forestry and wood-based industries, particularly those of sawmill and wooden board industries, should result in an

increase in raw material supply and tree cover through expansion of farm forestry and generation of employment for skilled and unskilled workers in the industries. However, farm forestry and the industries face policy, regulatory, and market barriers, technical and financial constraints, low productivity and production efficiency, and rapidly changing markets of raw materials and wood-based products. Therefore, the government's facilitative support and services to farm forestry and the industries are important to reduce their risks associated with the barriers and constraints, and to enhance their adaptation to the changing market environment.

(4) Policy and regulatory environment and emerging market

Encouraging and constraining policies

The provisions of the Forest (Conservation) Act 1980 and the National Forest Policy 1988 have effectively ended the role of the private sector in the recorded forest area. However, the Policy recognises a major role for the private sector in forestry outside of the recorded forest area. Although various national and state level restrictions act as disincentives for private sector investment in forestry, removal of restrictions on felling and transport of farm forestry species, and reduction in sale and purchase tax on wood sold have been achieved in Andhra Pradesh. A total of 821 items, including sawn timber, are reserved for the small-scale industry sector. Special treatments are provided, such as priority sector lending, concessional crediting, and preferential purchase arrangements.

Although the above encouraging policy and regulatory environment have supported the development of farm forestry and wood-based industries, there are still a number of discouraging factors. The market liberalization policy in 1991 made import of forest raw materials easier, and the domestic wood-based industries have had to face competition from foreign companies. There are still a number of national and state wide restrictions with respect to felling and transporting trees on private land. A Supreme Court Order in 2002 has made it very difficult for state forest departments to grant licences to sawmills for their establishment or expansion of units. In Andhra Pradesh, wood-based industries are excluded from obtaining marketing support, entrepreneurship, and skill development programmes, and credit support from the Department of Industries and Commerce of the State. This situation is detrimental to the development of wood-based industries to improve economic and technical efficiency of their operations.

Contribution of the private sector to the establishment of pulpwood

In Andhra Pradesh, the private sector has played a major role for the development of farm forestry. For example, ITC Limited launched the promotion of farm forestry in 1982, and succeeded in promoting farm forestry. Currently ITC is able to obtain 1.2 million tonnes of greenwood harvested annually from 115,000 ha of farm forestry area. The company's efforts to develop clonal planting materials have achieved remarkable results. The company has also implemented Farm and Social Forestry Programmes to promote farm forestry where a total of 65,000 farmers are participating in the programme to supply the pulpwood market.

Diversification of farm forestry produce market

Since farm forestry in Andhra Pradesh is concentrated on pulpwood production for only a few large paper mills, some concerns have arisen about the oligopolistic nature of the farm forestry produce market, along with other concerns about high dependence of farm forestry on the operation of the paper mills. Therefore, diversification of the market through promotion of demand from wood-based industries, particularly demands from sawmill and wooden board industries, needs to be considered.

(5) JICA's cooperation in farm forestry and wood-based industries

Development of both the farm forestry and wood-based industries, particularly those of sawmill and wooden board industries, should be supported by a JICA assisted project to enhance and diversify markets of farm forestry produce. Stability and growth of such markets should result in expansion of

farm forestry and forest and tree cover, along with an increase in employment opportunities.

Taking into account the above, the survey team proposes to formulate a prototype of a project aiming at enhancement of farm forestry and wood-based industries in Andhra Pradesh

4. Objectives

The objectives of the project are as follows:

1) Promote farm forestry outside the recorded forest area to meet growing demand for raw materials for wood-based industries and to improve and expand forest and tree cover
2) Attain sustainable development of the wood-based industries, which generate employment opportunities

Ultimately, the Project is expected to contribute to both environmental conservation and sustainable socioeconomic development at the project site.

5. Project components

(1) Project areas

To be determined in consultation with the Forest Department of Andhra Pradesh. The project areas selected for the project must show high potential of development of farm forestry and wood-based industries, and raw material and forest products market. Selection criteria are, for example, a number of farm forestry farmers, value of wood-based raw material production, number units of wood-based industries, value of wood-based products, prices and availabilities of factor imputes, condition of labour and capital markets, status of infrastructure development, and perceived constraints by farmers and industrialists,

(2) Project components

Farm forestry and wood-based industries are tightly linked through the demand and supply chain of raw materials. Thus measures to address issues in the promotion of farm forestry and wood-based industries are inseparable. This means that the government needs to consider concurrent support to farm forestry and wood-based industries in the target area to develop and enhance the farm forestry produce market. Since the project is focusing on enhancement of private sector activities, external factors such as market conditions, business environment, and capacity of existing and potential farm forestry farmers and industrialists of wood-based industries should be examined carefully in selecting areas to be covered by the project. In terms of selecting participating industrialists priority should be given to sawmill and wooden board industries whose needs for productivity, technical, and quality improvement are significant. Implementing the proposed components will require a coordinated approach by the forest department and other concerned departments.

Keeping in mind these market- and business-oriented characteristics of farm forestry and wood-based industries, the following six (6) project components are proposed: a) establishment of enabling policy and legal environment, b) extension and facilitation service delivery, c) technical research, d) monitoring and analysis of the markets of farm forestry produce and wood-based products, e) capacity development of the Forest Department, and f) establishment of financial support mechanism. In order to achieve project objectives b) extension and facilitation services delivery to the farmers and industrialists is the most crucial component. This is the interactive interface between the Forest Department and private sector entities, and quality of the services is evaluated in terms of success or failure of their businesses. Because business and investment risks are all bone by the farmers and

industrialists who are basically risk adverse entities, only credible and trusted public services can be accepted and adopted. The diversification of farm forestry produce by introduction of commercial production of non-timber forest products (NTFPs) should also mitigate the market risk to farm forestry farmers, and thus the production should be tested and promoted in addition to the commercial tree farming.

Other components will be implemented to support the delivery of quality extension services. Enabling policy and legal environment and capacity development of the Forest Department sets basic service delivery environment which determine effectiveness of the services. Demand driven technical research provides credible contents of services including provision of superior planting materials, subsidies for production and business management improvement, and technical knowhow. Monitoring and analysis of the markets will secure forest department's clear understanding of supply and demand situation, and certain level of prediction which helps extension services to facilitate matching of demand and supply of raw materials. To ease financial constraints faced by industrialists, a prudently operated financial service mechanism will be established.

a) Establishment of enabling policy and legal environment

In order to encourage the government to consider an effective policy and regulatory environment in promotion of private participation in farm forestry and wood-based industries, a detailed assessment of impacts derived from the current policy and legal environment will be implemented. For farm forestry and wood-based industries, evidence-based assessment and studies will be implemented:

- Detailed assessment and research of impacts on farm forestry derived from the current application of laws and regulations
- Implementation of wood balance and market study to address issues identified by Supreme Court orders

b) Extension and facilitation service delivery

Extension and facilitation service delivery is the key component of the project. This component includes four subcomponents, namely, identification of project areas and participants, social forestry subcomponent, farm forestry subcomponent, and wood-based industries subcomponent.

b-1) Identification of project areas and participants

To implement social and farm forestry subcomponents, and wood-based industries subcomponent successfully, an important capacity required of officials of the forest department and other relevant authorities is their ability to identify high potential areas for farm forestry and wood-based industries. The project will set the criteria for the selection of project areas. Detailed analytical work will be carried out prior to the selection of project areas for the promotion of farm forestry and wood-based industries. The following criteria are proposed for consideration.

- Current status of farm forestry and wood-based industries
- Current status of infrastructure development, labour and factor markets, and demand and supply gap
- Current capacity of farm forestry and the industries, and their constraints and opportunities
- Identification of economic and social issues constraining the development of farm forestry and wood-based industries
- Cost and benefit analysis, and impact analysis
- Identification of high potential farm forestry farmers and industrialists of wood-based industries

b-2) Social forestry subcomponent

This subcomponent is similar to ITC's Social Forestry Programmes where subsidies in a form of low priced or free clonal or high quality seedlings are provided in addition to free legal and administrative, and extension and technical services. Target clients are landed and marginal farmers mainly consisting of Scheduled Tribes and Castes. In this subcomponent Type 1 farm forestry (farm forestry in marginal agricultural land) and Type 3 farm forestry (farm forestry in boundaries of agricultural land) will be promoted to enhance utilization of low productivity agricultural land. Formation of a farm forestry association allows farmers, for example, to access technical and market information, to lobby government, and to conduct collective negotiations with wood-based industries regarding prices of raw materials. Simple infrastructure can be identified for construction on communal land thorough consultation with farm forestry farmers. Under this subcomponent the following services will be provided:

- Legal and administrative services for enabling marginal farmers to access extension and technical services, subsidies, and market information
- Provision of subsidised clonal and high quality seedlings
- Provision of extension and technical services either directly or through associations and NGOs
- Provision of market information
- Facilitation for organisation of farm forestry associations
- Construction of simple infrastructure such as small irrigation structures, village roads, and community centres
- Capacity development of participating farmers

b-3) Farm forestry subcomponent

This subcomponent is similar to ITC's Farm Forestry Programmes where free legal and administrative, and extension and technical services are provided. Target clients are landed farmers willing to involve farm forestry on a commercial basis. In this subcomponent Type 2 (farm forestry in fertile agricultural land) and Type 3 (farm forestry in boundaries of agricultural land) will be promoted to enhance farmers' production practices. Under this subcomponent the following services will be provided:

- Legal and administrative services for enabling farmers to access extension and technical services, and market information
- Provision of clonal and high quality seedlings at commercial rate
- Provision of extension and technical services either directly or through associations
- Provision of market information
- Facilitation for organisation of farm forestry associations
- Capacity development of participating farmers

b-4) Wood-based industries subcomponent.

This subcomponent is designed to support productivity improvement of wood-based industries. Particularly those of sawmill and wooden board industries. For selecting participating industrialists to the project, priority should be given to sawmill and wooden board industries because their needs for productivity, technical, and quality improvement are significant. In addition, the industries' financial capacity, and business, factory, safety, environment, and labour management capability are still weak, and need improvement to boost industry's efficiency and profitability. Under this subcomponent the following services will be provided:

- Legal and administrative services for enabling industrialists of wood-based industries to access extension and technical services, capacity development programmes. commercial or subsidised loans, subsidies, and market information
- Provision of subsidised equipment and machineries on a pilot or experimental basis
- Provision of extension, technical, factory management, and business development services

either directly or through associations
- Provision of market information
- Capacity development of participating industrialists

c) Technical development

c-1) Farm forestry

Application oriented technical development such as identification and improvement of farm forestry tree species for timber production suitable to meet demand from wood-based industries will be implemented. Under this component, the following research items are identified:

- Economic and technical analysis of Type 1, Type 2 and Type 3 farm forestry
- Identification and development of clonal seedlings, pest control, and economic analysis
- Development of drip-irrigation techniques for farm forestry in semi-arid areas
- Other technical development activities

c-2) Wood-based industries

Because there are a number of technical, labour, and safety issues that are constraining improvement of the performance of wood-based industries, the following research activities will be implemented under this subcomponent:

- Research on technology development
- Development of factory management, safety, and quality control methodologies
- Factory experiment on developed technologies and improved production procedures

d) Monitoring and analysis of the markets of farm forestry produce and wood-based products

Because the development of the wood-based raw material and products markets is a crucial factor for the expansion and sustainability of farm forestry and wood-based industries, results of close monitoring and analysis of the market will be employed to render and adjust services to be delivered by the project. The following monitoring and analysis will be done to promote an efficient, competitive, and fair market for both the demand and supply sides.

- Monitoring and analysis of market prices and quantity trends of farm forestry produce
- Monitoring and analysis of market prices and quantity trends of wood-based products
- Capacity development of extension workers and extension methodology development related to the farm forestry produce and wood-based products markets
- Social experiments, action research, and analytical work on the functions of markets and responses to the introduction of new policies and regulations
- Establishment of market information management and dissemination systems

e) Capacity development of the Forest Department

Supporting the development and enhancement of farm forestry and wood-based industries requires through understanding of players in and behaviours of markets. Since the Forest Department does not have sufficient experience of extension activities to the private sector, the project will carry out the following capacity development activities:

- Laws and regulations, and policy instruments related to farm forestry and wood-based industries
- Methods and procedure of business development support services
- Identification of local resources for business development support services
- Technical knowhow of farm forestry and wood-based industries
- Institutional development of the Forest Department

- Establishment of coordination mechanism among the Forest Department and other relevant public authorities

f) Establishment of financial service mechanism

To introduce advanced technologies and machinery for productivity improvement and expansion of production lines a significant amount of capital investment is required. However, wood-based industries particularly sawmill and wooden board industries often face financial constraint preventing them from considering such investment. Therefore, under the project in collaboration with appropriate financial institutions, tow step loan scheme will be used to establish a prudently managed financial service mechanism to ease their financial and investment constraints.

(3) Project timeframe

Approximately 10 years. It should be noted that market development requires a concurrent interdisciplinary approach, and involves an inherent risk of failure. The project must focus on reduction of production and market risks of prenatal crop production, which requires at least five years. Since ITC's success took 20 years to achieve, the project should provide at least 10 years of consistent support to the participants for farm forestry and wood-based industries.

6. Implementation mechanism

The Andhra Pradesh Forest Department is expected to be the implementing agency responsible for overall management of the project. A two-layer institutional setup, i.e., the high level steering committee at the state level and the project management unit within the state forest department, will be proposed.

The implementation mechanism will be set up with the involvement of relevant stakeholders. The state Forestry Department will be the implementing agency, and other state departments, including the Department of Industry and Commerce, need to be involved, since the project aims at the enhancement the small-scale industries. Other departments, including the Departments of Finance, Planning, and Agriculture, may be included in the High Level Steering Committee.

(1) Responsible institutions and source of external financing

Responsible departments and a credit programme for project implementation by component and subcomponent are shown in Table 2. Forest Department will take overall responsibility of project implementation in collaboration with Department of Industry and other relevant departments, and directed credit programme for small and medium enterprises (SMEs). Budgets and fund flows from JICA loan, state government, and national programmes will be managed by developing a consolidated annual work plan and budget which is subject to approval of the High Power Steering Committee. Monitoring and evaluation of application of funds, and audit will be performed in due course. Forest department will take lead to coordinate these participating institutions in order to secure on time and well-coordinated public service delivery to farm forestry farmers, and wood-based industries. For direct credit programme for small and medium enterprise may be hosted by a private banks or public bank which will be financed by JICA by two-step loan scheme. External funds to be proved to Forest Department, and Department of Industry and other relevant department will be provided by project loan scheme.

Table 2: Responsible departments and credit programme

Component / Subcomponent	Responsible departments and credit programme		
	Forest Department	Department of Industry and other relevant department	Directed credit programme for small and medium enterprises (SMEs)
	(Source of external fund)	(Source of external fund)	(Source of external fund)
a) Establishment of enabling policy and legal environment	Responsible (JICA loan)	Responsible (JICA loan)	Responsible (JICA loan)
b) Extension and facilitation service delivery			
b-1) Identification of project areas and participants	Responsible (JICA loan)	Responsible (JICA loan)	
b-2) Social forestry subcomponent	Responsible (JICA loan)		
b-3) Farm forestry subcomponent	Responsible (JICA loan)		
b-4) Wood-based industries subcomponent.	Responsible (JICA loan)	Responsible (JICA loan)	Responsible (JICA loan)
c) Technical development			
c-1) Farm forestry	Responsible (JICA loan)		
c-2) Wood-based industries	Responsible (JICA loan)	Responsible (JICA loan)	
d) Monitoring and analysis of the markets of farm forestry produce and wood-based products	Responsible (JICA loan)	Responsible (JICA loan)	
e) Capacity development of the Forest Department	Responsible (JICA loan)		
f) Establishment of financial service mechanism			Responsible (JICA two-step loan)

Source: Survey team

(2) High Level Steering Committee

The High Level Steering Committee will be created within the state government as the decision-making body of the project. The composition of the Committee is proposed as indicated in Table 3.

Table 3: Composition of High Power Steering Committee (Tentative)

Position	Post and department
Chairperson	Chief Secretary, Andhra Pradesh State Government
Member	Head of Department, Agriculture and Co-operation
Member	Head of Department, Backward Classes Welfare
Member	Head of Department, Finance
Member	Head of Department, Industries and Commerce
Member	Head of Department, Labour, Employment, Training, and Factories
Member	Head of Department, Minorities Welfare
Member	Head of Department, Planning
Member	Representative from Directed credit programme for small and medium enterprises (SMEs)
Member Secretary	Principal Chief Conservator of Forests

(3) Project Management Unit

The Project Management Unit (PMU) is responsible for the administration and management of implementation of the project. PMU will be created within the Forest Department, and may be

established as an autonomous society under a state act related to registration of the society.

The PMU will have two tiers, the Governing Body and the Executive Body. The former will hold the higher decision-making authority within the PMU, whereas the latter will be responsible for the implementation of the project activities. Concerned Forestry Department staff will be assigned as members of these bodies.

7. Indicators for monitoring and evaluation

Below are the possible indicators related to the development of farm forestry and wood-based industries:

- Number of farmers who practice farm forestry
- Farm forestry area
- Number of wood-based industrial entities participated in the project
- Frequency of success and management failures
- Value added and volume of outputs from both farm forestry and wood-based industries
- Number of workers employed by farm forestry and wood-based industries
- Value added by farm forestry and wood-based industries
- Number of training programmes/activities conducted for farm forestry farmers and factory managers and workers of the wood-based industrial entities
- Number of state Forestry Department staff members trained under the project

8. Points to consider

The following points will be considered at the time of detailed project formulation.

- Employment generation in farm forestry and wood-based industries (skilled and unskilled labor; transformation of rural economy and labor market)
- Identification of target wood-based industrial entities
- Regulatory and supporting departments and agencies for farm forestry, wood-based industries, and wood and forest products markets
- Advantage and disadvantage of application of minimum price support policy
- Food security with respect to reduced agricultural areas (only Type 2 farm forestry reduces cultivation of agricultural nonfood cash crops such as tobacco, chili, and cotton based on farmers' perception of expected market conditions).
- Trade regime affecting farm forestry and wood-based industries
- NGO criticism on monoculture forestry
- Function and roles of the Ministry of Small-scale Industries and Agro and Rural Industries, and other cooperating authorities
- Policies and regulations related to farm forestry and wood-based industries
- Items reserved for production in small-scale industry only
- Standards of products and working conditions (wages, safety, unions, etc.)
- Handling of risky and volatile markets of wood and forest products
- Factors likely to determine the future development of farm forestry and wood-based industries in selected project areas

Annex 14 Concept note: Participatory forest and biodiversity management project

1. Project title

Project for Sustainable Forest and Biodiversity Management

2. State

To be determined in consultation with the Government of India and state governments

3. Background (project needs and rationale)

(1) Status of forest and biodiversity in the state

Status of forest and biodiversity in the state where the project will be implemented shall be described as the background. Main items to be referred are the following.
(Status of forest)

- Area of recorded forest areas, and ratio of such area to total geographical areas
- Change

(Status of biodiversity)

- Number and area of protected areas
- Number of villages/population in and around protected areas

(Socioeconomic status and other issues)

- Rural poverty ratio
- Past projects and programmes involving Joint Forest Management (JFM) and ecodevelopment
- Number of claims under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 or the Forest Rights Act 2006, and area of forest land where titles distributed, if any
- Description of Scheduled areas, if any

(2) Needs for JFM and ecodevelopment

JFM is considered a powerful instrument to provide forest dependent communities with opportunities to participate in forest management. This has contributed to forest conservation as well as local livelihood enhancement. Ecodevelopment has also contributed to both the livelihood of forest dependent communities and protected area management.

JICA has many experiences in supporting JFM-related forest projects. Although the JFM project/programme has started in the 1990s in many states and has already covered many fringe villages, certain needs for the support to JFM-related activities in the short term still exist. In fact, some state governments show an interest in JICA's cooperation in the field of JFM. In and around protected areas, the ecodevelopment programme will be implemented. It will support forest-dependent communities whose access to forest resources has been constrained, and enhance biodiversity.

(3)Emerging factors and changing socioeconomic environment

Projects involving JFM and ecodevelopment need to respond to the emerging issues and the changing socioeconomic environment in rural areas. The issues to address include the following: 1) the MOEF's recent policy to promote the decentralisation of forest governance; 2) Forest Rights Act 2006 that may

affect project implementation; and 3) external factors that may reduce communities' dependency on forest resources such as the National Rural Employment Guarantee Scheme (NREGS) and other government livelihood-support programmes.

Policy to promote decentralisation of forest governance

Decentralisation of forest governance requires the inclusion of JFMC under Gram Sabha, as stated in the letter sent by the MOEF to the Chief Ministers dated 29 October 2010. The letter requests that the relevant state laws and policies be amended appropriately to reflect the forest management-related functions of Gram Sabha. This policy direction is also confirmed in the Green India Mission. The Mission states that JFMC will function as a committee of Gram Sabha. Although EDCs are not explicitly mentioned in the policy, the same concept can be applied to EDCs since the activities of EDCs are involved in the local development. Project to promote JFM and ecodevelopment should be therefore in line with the above trends. It may be necessary to consider including Gram Sabha in the framework of JFM and ecodevelopment, depending on the state forest departments' policies and actual situations of these local-level institutions.

Forest Rights Act 2006

The Forest Rights Act 2006 came into force on 31 December 2007[115]. The Act recognises and vests traditional forest rights in forest dwelling Scheduled Tribes and other traditional forest dwellers. The rights include rights of individual and common occupation of forest land for habitation or self-cultivation, rights to graze and collect minor forest produce. The Forest Rights Act 2006, therefore, is set to affect the implementation of JFM and ecodevelopment. In protected areas where the use of forest resources is prohibited by the Wildlife (Protection) Act 1972 and other laws, and the Supreme Court Orders, the Act recognises the traditional rights to access forest resources by local communities, and therefore expands the opportunities for ecodevelopment. Under the Forest Rights Act 2006, it is Gram Sabha that initiates the process for recognising and vesting forest rights. Thus it may be effective for the project to incorporate Gram Sabha in its implementation mechanism. This is expected to contribute to the prevention or reconciliation of potential conflicts among community members where many claims for forest rights are filed.

External factors

External factors such as NREGS and other government development programmes that may reduce communities' dependency on forest resources need to be taken into consideration. For instance, NREGS, which provides rural people with the opportunities for wage employment on public works, may lower the incentives of JFMC or EDC members to participate in JFM or ecodevelopment activities. Thus, site selection for the project requires the survey on the socioeconomic situations including government development schemes.

(4) JICA's cooperation in forest and biodiversity management

It may be appropriate for JICA to consider including Gram Sabha or other local institutions in the implementation mechanism of JFM and ecodevelopment projects in close consultations with state forest departments, taking into account the recent emerging factors and changing socioeconomic environment. This is in line with the Government of India (GOI)'s policy of decentralisation of local forest governance. Such arrangement is also likely to enhance the welfare of rural populations, and contribute to the enhancement of conflict mitigation capacity of the local institutions. However, the modalities of involvement of local institutions such as the Gram Sabha in the project will depend on the state forest departments' policies and actual situations of the local institutions.

[115] The implementation status of the Forest Rights Act 2006 in the state may be referred as appropriate.

4. Objectives

The objectives of the project may be as follows.

1) Manage forest and protected areas sustainably as well as enhance local livelihood through JFM and ecodevelopment
2) Develop a practical model to incorporate local institutions such as Gram Sabha in the decision making process of JFMC and EDC

Ultimately, the project is expected to contribute to both environmental conservation and sustainable socio-economic development in the project site.

5. Project components

(1) Project site

To be determined in consultation with the state forest department

(2) Project components

Here are the main components of the project[116]: 1) Alignment of the current policy and legal trends related to JFM and ecodevelopment; 2) Developing the selection criteria for villages and the selection of villages; 3) Planting trees in degraded forests and barren areas; 4) Improvement of livelihood of the forest dependent communities in and around protected areas through ecodevelopment activities; 5) Sustainable management of Non-Timber Forest Products (NTFPs); 6) Socioeconomic development including income generating activities and establishment of village development funds; 7) Capacity development of local institutions and Forest Department; and 8) Development of forest and wildlife management infrastructures; and 9) Supply of materials and equipments for forest and wildlife management. The components will be selected based on the close consultations with state forest departments.

Out of these components, the capacity development of local institutions as well as the Forest Department is considered the most important. This is because the project may develop a model to incorporate local institutions in the decision making process of JFMC and EDC, and such mechanism is new to JICA-supported projects. In relation to the Forest Rights Act 2006, enhancement of the capacity of Gram Sabha should also be given priority since it is Gram Sabha that is responsible for the recognition of the forest rights.

The other important components are the selection of target villages. The implementation status of the Forest Rights Act 2006 should be taken into account to avoid conflicts among local residents. External factors that may affect local people's incentives to participate in JFM-related activities should also be taken into account in selecting villages to be covered by the project.

Accordingly, this concept note focuses on these critical components. The other components such as tree planting, socioeconomic development, and supply of materials and equipments will be detailed when the actual needs are identified according to the natural and socioeconomic conditions of each project site.

[116] The actual components of individual projects will be selected, taking into account the situations of the state where the project is formulated.

a) Alignment of the current policy and legal trends related to JFM and ecodevelopment

Enabling policy environment to implement the MOEF's recent policies will be set up at the initial stage of the project. The existing guidelines, regulations, and other policy instruments for JFM and ecodevelopment of the state will be reviewed in accordance with the MOEF's policies, and may be amended, if necessary, to align them.

The implementation mechanism will be set up with the involvement of relevant stakeholders. The state forest department will be the implementing agency, and other state departments, including the Department in charge of Panchayat Raj, the Department in charge of Scheduled Tribes and Castes, need to be involved depending on the project components. The departments of finance, planning, agriculture, and livestock also need to be included. Detailed institutional setup for the project is described in Section 6 of this concept note.

b) Developing the selection criteria for villages and the selection of villages

The project will develop the selection criteria for the selection of villages to be supported. The following points need to be covered by the selection criteria.

- Dependency on forest
- Implementation status of the Forest Rights Act 2006
- Implementation status of other government development programmes such as NREGS

For the criterion of forest dependency, primary data and information, such as use of cooking devices, number and type of livestock, use of forest products, may be required. The project may need to conduct brief surveys to collect such information.

In relation to the Forest Rights Act 2006, the number of claims filed under the Act, accepted ones, and rejected ones will be key criterion. Areas with many claims may be less prioritised to avoid potential conflicts.

In addition, the project may need to avoid areas where NREGS and other government programmes are functioning well, and a reasonable source of income is provided to local people in order to avoid the duplication of other public investments.

c) Capacity development of local institutions and Forest Department

The JFMCs and EDCs supported by the project may be set up or reconstituted under Gram Sabha. The Gram Panchayat may also be involved since the village level micro planning exercise should be well coordinated with other local development programmes. In line with the recent policy trends, the capacity of Gram Sabha members and Gram Panchayat officers may be enhanced in terms of forest governance. The following capacity development components may be implemented in the project[117].

Capacity development of Gram Sabha and/or JFMC/EDC members

- Capacity development in micro planning and formation/ management of village development plans to be more inclusive and equitable
- Development of negotiation and facilitation skills for benefit sharing of NTFP/MFP and use of funds for social development works in coordination with Gram Panchayats
- Development of technical capacity in silviculture operations with support of the Forest Department

[117] Section 8.2.1 describes more detailed activities for capacity development.

- Capacity development for organisation management including keeping minutes of discussion, democratic decision making, planning, monitoring and evaluation of activities, and financial management including income generation, fund allocation, reporting financial status, strengthening linkage with other government agencies and financial institutions

[For the areas under the Forest Rights Act 2006 and/or the PESA[118]]

- Enhancement of knowledge on legal aspects of forest rights and responsibilities of tribal and other villagers under the Forest Rights Act 2006 and the PESA, and the procedures for filing, assessing, and accepting or rejecting claims

Capacity development of Gram Panchayat

- Capacity development of Gram Sabha and Gram Panchayat in micro planning for development activities and approval for decisions related to use of development funds by JFMC
- Enhancement of knowledge on role of Gram Sabha and Gram Panchayat in forest management and supervision of JFMC
- Assessment of composition of the JFMC Executive Committee and reformulation of old groups or establishing new JFMCs under the supervision of Gram Sabha

[For the areas under the Forest Rights Act 2006 and/or PESA]

- Enhancement of knowledge on legal aspects of the Forest Rights Committee, and Gram Sabha's responsibilities in the process of determining rights under the Forest Rights Act 2006

Capacity development of Forest Department

- Enhancement of knowledge on legal aspects for determining composition of JFMC/EDC (essentially forest protection community groups) that may be reconstituted under Gram Sabha
- In context of new policy directives, reassessment of Forest Working Plans for silvicultural planning with special reference to reserved and protected forest areas
- Capacity development for management and coordination with other departments and Gram Panchayats in planning, managing, and monitoring and evaluation, especially in the areas of forest management and socio-economic development works
- For forest rangers, foresters, and forest guards, facilitation skills in planning, implementation, and monitoring and evaluation to promote people's participation and to devolve their roles and responsibilities to the Executive Committee of JFMC and EDC

[For the areas under the Forest Rights Act 2006 and/or PESA]

- Enhancement of knowledge on the roles of Gram Sabha and Gram Panchayat in forming the Forest Rights Committees, and promotion of understanding on their new roles in forest management
- Capacity development for coordination with the Ministry of Tribal Affairs for implementation of the PESA and the Forest Rights Act 2006 and as well as social development programmes under the Tribal Sub Plans
- Enhancement of knowledge on legal aspects of Forest Rights Committees under Gram Sabhas and their relationship with existing JFMCs

d) Other components to promote JFM and ecodevelopment

In addition to the key components described above, the following components may be considered depending on the natural and socioeconomic conditions and actual needs on the ground.

(JFM)

- Planting trees in degraded forests and barren areas
- Sustainable management of NTFPs
- Socioeconomic development including income generating activities and establishment of village

[118] Panchayats (Extension to the Scheduled Areas) Act, 1996

development funds

(Ecodevelopment)
- Planting trees in the ecodevelopment areas
- Income generating activities
- Mitigation of human-wildlife conflicts
- Ecotourism (low cost, low impact, and EDC managed ecotourism) where appropriate

(Development of forest management facilities)
- Development of forest and wildlife management infrastructures
- Supply of materials and equipment for forest and wildlife management

(3) Indicative Timeframe

Approximately 8 to 10 years. It should be noted that capacity development of Gram Sabha and Gram Panchayat may take longer. Thus, a long timeframe will be appropriate to ensure fruitful achievements.

6. Implementation mechanism

The state forest department is expected to be the implementing agency which is responsible for overall management of the project. The two-layer institutional setup will be proposed.

(1) High Level Steering Committee

The High Level Steering Committee will be created within the state government as the decision-making body of the project. The composition of the Committee is proposed as follows. Other line departments such as agriculture, livestock, horticulture, and tourism may join the Committee as appropriate.

Composition of High Power Steering Committee (Tentative)

Position	Post and department
Chairperson	Chief Secretary, state government
Member	Head of Department, finance
Member	Head of Department, forests and environment
Member	Head of Department, Panchayati Raj
Member	Head of Department, planning and development
Member	Head of Department, tribal welfare
Member Secretary	Principal Chief Conservator of Forest

(2) Project Management Unit

The Project Management Unit (PMU) is responsible for the administration and management for the implementation of the project. PMU will be created within the Forest Department, and may be established as an autonomous society under a state act related to the registration of the society.

The PMU will have two tiers: the Governing Body and the Executive Body. The former will hold the higher decision-making authority within the PMU, whereas the latter is responsible for the implementation of the project activities. Concerned forest department personnel will be assigned as members of these bodies.

7. Indicators for monitoring and evaluation

Below are the possible indicators related to the inclusion of Gram Sabhas in the project implementation mechanism, and capacity development for Gram Sabhas, Gram Panchayats, JFMCs, EDCs, and state

forest departments.

- Number of JFMCs and EDCs established under Gram Sabhas
- Number of micro plans approved by Gram Sabhas
- Number of training programmes/activities conducted for Gram Sabhas, Gram Panchayats, JFMCs, and EDCs
- Number of state forest department staff trained under the project

Other indicators may include the following.

- Number of trees planted
- Survival rate of planted trees
- Areas of tree planting (ha)
- Participation rate of general meeting of JFMC and EDC
- Income and expenditure of JFMC/EDC fund
- Number of microenterprises set up
- Number of forest offence cases (felling, grazing, encroaching, poaching, etc.)
- Population trend of key wildlife species
- Number of cases of human-wildlife conflicts

8. Points to consider

(1) Characteristics of the concept note

This concept note is developed to demonstrate the basic concept and possible key components of JICA's future cooperation projects to promote participatory forest and biodiversity management. However, since this is not targeting any particular projects in particular states, it is necessary to conduct a brief survey to gather basic information and data when this concept will be put in practice.

It should also be noted that it is state forest departments who will determine how the Gram Sabha and Gram Panchayat will be involved in JFM-related activities. Thus, the state forest governments' policies as well as actual situations of these local-level institutions need to be carefully examined in formulating the projects.

(2) Selection of the project site

Site selection is critical for the project to promote JFM-related activities. In particular, forest dependency is a critical factor for the project to succeed. In some villages, villagers' forest dependency may become lower due to the government livelihood support programmes such as NREGS. As such, villagers may lose incentives to participate in JFM-related activities. It is therefore critical to examine and confirm the socioeconomic conditions of candidate villages.

The other critical factor for site selection is the implementation status of the Forest Rights Act 2006. The Act may cause conflicts among JFM members or between JFM members and their neighbours over forest resources. The villages where many claims are filed may pose such a risk of internal conflicts. It is therefore necessary to survey the number of claims filed, accepted, or rejected in selecting candidate villages.

(3) Income generation activity

One of the main components in the past JFM projects is the income generation activities (IGAs) through Self Help Groups (SHG). The impacts of IGAs and their sustainability had mixed results, and most

IGAs have failed due to inadequate production and technical capacity, and marketing strategies, although NGOs were hired to support the SHGs. Successful IGAs, on the other hand, are linked to forestry-related activities with considerable technical and financial support from the state forest departments or NGOs.

The support to IGA under the JFM project is therefore focused on the forestry-related activities. Capacity development of SHGs to conduct IGAs should also be prioritised. Local resources need to be utilised, and market linkage should be taken into account. However, it should be noted that IGAs do not necessarily have to be undertaken through SHG formulation. IGAs can be done through the existing development programmes such as NREGS and the utilisation of local resources.