Asia Pacifc Forestry Sector Outlook Study-II

Country Report

Ministry of Environment & Forests
Government of India

PREFACE

Rapid socio-economic changes in the Asia-Pacific region are having profound impacts on all sectors including forestry. Societal transformations are changing people's perceptions of forests, while growing and often conflicting demands for forest-derived goods and services have increased the complexity of forest management. Globalization and increasing accessibility to global markets for many, but marginalization and increased asymmetry for others, has presented significantly different opportunities and challenges. Concerns over climate change, escalating energy prices and deepening water deficits have moved forestry into the spotlight of global and national development. Added to these are long-standing challenges, such as poverty and deprivation, which are still to be resolved. Forestry has thus entered the 21st century with a plethora of old and new issues and more to emerge in the future. During 21st session of APFC, it was decided to conduct Asia Pacific Forestry Sector Outlook (APFSOS) Study-II for providing scenario of forestry sector in 2020 to combat the challenges through appropriate policy interventions at global as well as national level. FAO is conducting this study and has requested member countries to submit their country report. FAO is also conducting studies on various thematic elements of forestry sector. FAO will prepare final report on the basis of country reports and outcome of the studies on thematic elements.

Indian forestry revolves around social and environmental elements of the Sustainable Forest Management. The demand of wood and wood products continues to be incresed in future. The present need is met mainly from agroforestry sector and balance demand through import. The forests of the country are catering the need of 16% human and 18% of the cattle population of the globe. India is also maintaining around 20%of the forest area under protected area network for providing ecological security of the country.
The nation has empowered the community with the occupation and habitation rights to the forest dependant communities along with responsibility of conservation of forests. There is wide gap between "have" and "have not "in the country. The strengthening in the capacity of rural poor for improving their income is crucial for checking the degradation of forests.

The forestry sector is impacted by other sectors such as Energy, Agriculture, Education, and Water Resource, Industry, Infrastructure Development, Biofuels, Change in demographic structure and high economic growth. All Policies of the Government of India has to move around prime objective of the National Forest Policy and mandate of achieving 33% Forest and Tree cover in the country.

The country report has been prepared after wide consultation with multistakeholders. The main future projection made in this report is 3-4 time increse in the demand of wood and wood products by 2020. It would facilitate the Government of India and State Governments to make policy interventions for combating future challenges in the forestry sector.

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List of Abbreviations

AAC	Annual Allowable Cut
APFC	Asia-Pacific Forestry Commission
BHS	Biodiversity Heritage Sites
BMC	Biodiversity Management Committees
BOD	Biochemical Oxygen Demand
BSI	Botanical Survey of India
CAMPA	Compensatory Afforestation Management Authority
CBD	Convention on Biological Diversity
CBF	Central Board of Forestry
CCA	Community Conserved Areas
CDM	Clean Development Mechanism
CITES	Convention on International Trade on Endangered species
CPCB	Central Pollution Control Board
CSD	Commission on Sustainable Development
CSFER	Centre for Social Forestry and Eco-rehabilitation
CSIR	Council of Scientific & Industrial Research
CSO	Central Statistical Organisation
CSS	Centrally Sponsored Schemes
cu. m	Cubic Metre/s
CZA	Central Zoo Authority
DBT	Department of Biotechnology
DFE	Directorate of Forest Education
DLR	Department of Land Resources
DNA	Designated National Authority
DRDA	District Rural Development Authority
DSS	Decision Support System
DST	Department of Science & Technology
DWD	Department of Wasteland Development
EAC	Expert Appraisal Committees
EAP	Externally-Aided Project
EIA	Environmental Impact Assessment
ENVIS	Environmental Information System
FAO	Food and Agriculture Organization
FCA	Forest Conservation Act
FDA	Forest Development Agencies
FLIS	Forestland Information System
FRI	Forest Research Institute
FSI	Forest Survey of India
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas

GIS	Geographic Information System
GLOBE	Global Learning and Observations to Benefit the Environment
GLORIA	Global Observation Research Initiative in Alpine Environments
GMEF	Global Ministerial Environment Forum
GMO	Genetically Modified Organisms
GOI	Government of India
GPA	Global Action Plan
GPS	Global Positioning System
IBIS	Indian Biodiversity Information System
ICAR	Indian Council of Agricultural Research
ICFRE	Indian Council of Forestry Research and Education
ICI	Indigenous Community Institutions
IFAD	International Fund for Agricultural Development
IFS	Indian Forest Service
IGNFA	Indira Gandhi National Forest Academy
IGNOU	Indira Gandhi National Open University
IIFM	Indian Institute of Forest Management
INR	Indian Rupee
IPCC	Inter-governmental Panel on Climate Change
IPIRTI	Indian Plywood Industries Research and Training Institute
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature & Natural Resources
IVRI	Indian Veterinary Research Institute
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
LMO	Living Modified Organisms
MAI	Mean Annual Increment
LPG	Liquefied Petroleum Gas
MDF	Medium Density Fibre
MFP	Minor Forest Produce
m cu. m	million cubic metres
m ha	million hectares
MLD	Million Litres per Day
MNES	Ministry of Non-Conventional Energy Sources
MNRE	Ministry of New and Renewable Energy
MOA	Ministry of Agriculture
MoEF	Ministry of Environment and Forests
MOU	Memorandum of Understanding
NAEB	National Afforestation and Eco-development Board
NAEEB	National Afforestation, Eco-restoration and Eco-development Board
NAP	National Afforestation Programme
NAQP	National Air Quality Planning
NCEPC	National Committee on Environmental Planning and Coordination
NCT	National Capital Territory

NEAC	National Environment Awareness Campaign
NEPED	Nagaland Environmental Protection and Economic Development Project
NFAP	National Forestry Action Plan
NGO	Non-Governmental Organisation
NPV	Net Present Value
NRAP	National River Action Plan
NRC	National Referral Centre
NRCP	National River Conservation Plan
NREGA	National Rural Employment Guarantee Act
NREGP	National Rural Employment Guarantee Programme
NREP	National Rural Employment Programme
NTCA	National Tiger Conservation Authority
NTFP	Non-Timber Forest Produce
NWDB	National Wasteland Development Board
NZP	National Zoological Park
O&M	Operation & Maintenance
ODS	Ozone Depleting Substances
PA	Protected Areas
PESA	Panchayat (Extension to Scheduled Areas) Act, 1996
PIC	Prior Informed Consent
PM	Particulate Matter
PCPI	Pollution Control and Prevention in Industrial Areas
POP	Persistent Organic Pollutants
PPVFR	Protection of Plant Varieties & Farmers' Rights
PRI	Panchayat Raj Institutions
RD	Rural Development
RLEGP	Rural Landless Employment Guarantee Programme
RRA	Regional Resource Agencies
RTI	Right to Information
RWE	Round Wood Equivalent
SFM	Sustainable Forest Management
SFR	State of Forests Report
SHGs	Self-Help Groups
SME	Small and Medium Scale Enterprises
TFRA	Scheduled Tribes and other Forest Dwellers (Recognition of Forest Rights) Act
TOF	Trees Outside Forests
TSDF	Transport, Storage and Disposal Facilities
UGC	University Grants Commission
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment & Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

VF	Village Forest
VFC	Village Forest Committee
VSI	Village and Small Industries
WII	Wildlife Institute of India
WP	Writ Petition
WPA	Wildlife Protection Act
ZSI	Zoological Survey of India

Asia-Pacific Forestry Sector Outlook Study II
India Outlook Study 2020

Chapter 1: Introduction

1.1 Background

The Twenty-first Session of Asia-Pacific Forestry Commission (APFC) held at Dehradun, India in 2006, resolved to undertake the Outlook Study for the next decade 2020 as a sequel to Asia-Pacific Forestry Outlook 2010. Member countries agreed to prepare their respective country reports for developing an abridged outlook study for Asia-Pacific Region. The present report is the outcome of the work in pursuit of the decision taken.

1.2 Objectives

The forestry outlook study 2020 aims at an introspection on the prevailing forestry situation in the country and makes a critical analysis of the trends of development in various socio-economic sectors (agriculture, energy, etc) till 2020 and their influence on the forestry sector in its management, institutional and policy development aspects. The analysis is expected to result in building up scenarios based on the trends and options for the forestry to respond to the likely developments.

In pursuing the above mentioned objectives the study seeks to

Identify emerging socio-economic changes which can have impact on forests and forestry in the coming time. These may include elements of economic growth, demographic changes, socio-economic and socio-political developments impacting the forestry sector in India.

Analyze probable scenarios for forestry developments to 2020 in context of the impact of the identified socio-economic changes and potential of the forestry development to cope up with the impacts.

Assess the role of forestry sector to address the Millennium Development Goals (MDGs) by providing sustained source of livelihood through interface with forest-dependent communities for forest management.

Provide complete thematic coverage of the forestry sector with the exception of wildlife which is referred to in terms of protected areas habitat.

Identify priorities and strategies to address the emerging opportunities and challenges on account of the changing scenarios within and outside the sector.

Assess the type and quantum of investment for policy reorientation and institutional development to affect the identified strategies while maintaining the sustainable status of forest resources

The study besides projecting the picture of Indian forestry sector in the regional and global context is also likely to provide inputs for national policy reorientation, institutional development and for bilateral and multilateral technical and financial collaborations.

1.3 Key Elements

The key elements of this study include reports on the present status and future prospects of the following items;

State of the biodiversity and related aspects of forests such as productivity, carbon sink status, social interface, environmental services like watershed, protected areas, conservation, etc.

Interdependence of people and forests and various socio-economic and cultural issues related to the forest resources.

Production, consumption and trade of industrial wood products, wood energy and non-timber forest products including ecotourism as well as water and their future trends .

Economic development and its impact on environment and other natural resources (land, water, forests, etc) in terms of their future demand on natural resources.

Global change scenario and the role of forests in the mitigation and adaptation in the context of genetic resources and utility of the changing biodiversity profiles.

Implications of policy alternatives determining the future course of forestry development in India.

1.4 Methodology

The Ministry of Environment and Forests (MoEF), Government. of India, constituted a National Level Steering Committee under the chairmanship of Director General of Forests; and a Drafting Committee with Director, Forest Research Institute(FRI), Dehradun, as its chairman for the purpose. The composition of these Committees is given as Annexes A1 and A2 respectively

The National Steering Committee held its first full Meeting on18 May 2007 and final Meeting on 19 December 2007 and two Meetings in between on 20 September 2007. The Drafting Committee held a number of full and core Meetings : on 4 April 2007 (Dehradun), 9 May 2007(Delhi), 4-5 July 2007 (Dehradun), 3-4 August 2007 (Bhopal), 13-14 November 2007and 14-16 December 2007 and held in-depth discussions about the structure and content of the Report. The Minutes of the first meeting of Drafting Committee and of the Steering Committee, in which the methodology and content of the report was decided are given as Annexes B1 and B2 respectively.

The National Steering Committee provided the basic framework for identifying the drivers of change within the economic environment and for analyzing the synergy between environment and development issues. Linkages with poverty alleviation were identified as main emphasis of future forestry development in India. It was decided that the growing importance of non- timber forest products for its poverty reduction paradigm is also to be placed in proper perspective. The recent developments in research and technology and interlinkages between regional economic imbalances and national development leading to many social problems such as extremism have also to be considered in analyzing future forestry development.

Inputs from a number of external resource persons have been used in the report. While the1998 Forest Policy continues to be the guiding principle for sustainable forestry development in India, the following other relevant reports and documents have been appropriately consulted for preparation of this Report;

1 National Forestry Action Plan 1999
2 Documents related to international conventions
3 Millennium Development Goals (2000)
4 National Forest Commission Report (2006)
5 Acts and policies
6 Sustainable forest management in India report of the Mission 2006(ITTO)
7 International Instruments on Sustainable Development of all type of forests.
8 State Forests Report (2005)

1.5 The Structure of the Report

The Country Report -India is structured in the following seven chapters;

Chapter 1 : Introduction
Chapter 2: Current state of forests and forestry in India
Chapter 3: The drivers of change
Chapter 4: Probable scenarios and their implications
Chapter 5: Visualizing 2020
Chapter 6: Creating a better future
Chapter 7: Conclusion

Annexures

Chapter 2: Current State of Forests and Forestry in India

2.1 The Forest Resources

Forestland in Indian context is a tract of land that is legally proclaimed to be forest under the forest laws (mainly Indian Forest Acts 1865, 1927). The Supreme Court of India clarified that this includes the forest as understood in the dictionary sense also besides any area recorded as forest in the Government record irrespective of its ownership (WP No. 202/1995 dated 12.12.96). India has a notified forest area of 77.47 million hectares (m ha), comprising 39.99 m ha of Reserved, 23.84 m ha of Protected and 13.64 m ha of Unclassed (unclassified) Forests. The Reserved Forest is an area notified under the Indian Forest Act or a State Forest Act enjoying a higher degree of protection (human activities are prohibited unless expressly permitted), Protected Forests are also notified under the Forest Acts but the restrictions are less stringent (human activities are permitted unless expressly prohibited). Unclassed Forests are the category of forests which have not been included in reserved or protected forest categories. The tenurial status of such forests varies widely.

2.2 Trends in Forest Resources

Forestry as a land use category is the second largest land use category after agriculture in India. The land use categories other than forestry also encompass some of the forestry activities as important constituents of the respective management domains. In general, the following three categories of the land use classifications contain forest use as a constituent:

1. Forest estate within public (government), community and private domain. While main category of forestland use is within public domain, private and community ownership status of many forests exists and is recognized under the law.

2. Common property resources other than the legally recorded community forests also serve the forest definition and provide the goods and services which are normally ascribed to forests. The social forestry resources created and developed during the last three decades of the 20th century are under this category and are constitutionally devolved to the local self governments (panchayats) for management as common property resources.

3. Agroforestry constituent of agriculture is perhaps the most important part of the land use which, though accounted in agriculture sector, is largely in the sown area category, but caters to the forest products category, providing the valuable quantum of wood-based raw material to industry and recognized as a part of the strategy for development of forests and forest industry in the country.

It is the first category of which the most dominant component, i. e. government forests are maintained as forest estates and managed by the government. The land use category described as forests in the records include basically the forest estate, and the common property resources maintained as forests irrespective of being within public, community or private (rarely) domain (Table 2.0) This land use category, indicated in the government statistics has been more or less constant over the last six decades. The trend is shown in Table 2.1 and Figure 1.

Table 2.1: Land Use in India*

Land use	Area in million hectares	Percentage
Total geographic area	328.73	
Reporting area for land utilization	306.05	100.0
Forests	69.02	22.6
Not available for cultivation	42.41	13.9
Permanent pasture and grazing land	11.04	3.6
Land under miscellaneous tree crops and groves	3.62	1.2
Culturable wasteland	13.48	4.5
Fallow land and other than current fallows	10.11	3.3
Current fallows	14.80	4.8
Net area sown	141.23	46.1

*(*Source : Agriculture StatiticsAt A Glance 2003, Ministry of Agriculture)*

The existing land use pattern suggests that there is a good possibility to achieve the goal of bringing one-third of the area under forest and tree cover through greening culturable wasteland, current fallows and other fallow land in the coming years. Also there is scope for compatible development of agricultural production through increasing irrigated areas which at present are much less than the rainfed areas (Table 2.2) without extending agriculture in new areas.

Figure 1: Major Land Use Classification

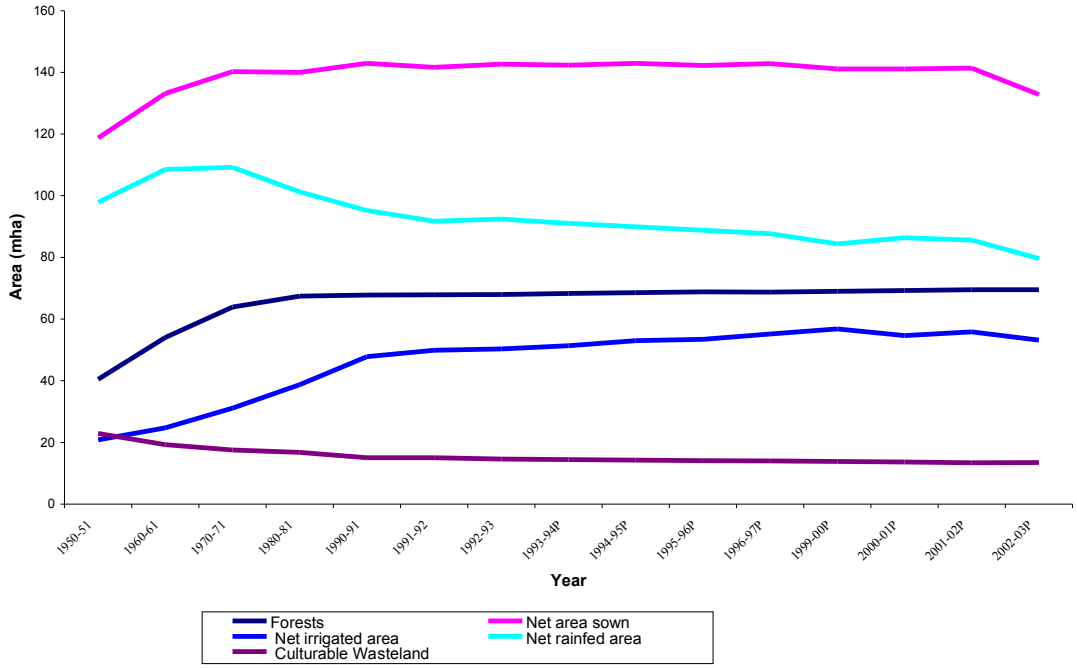

Table 2.2 Major land use categories*

(Area in m ha)

Year	Forests	Net area sown	Net irrigated area	Net rainfed area	Culturable wasteland
1950-51	40.48	118.75	20.85	97.90	22.94
1960-61	54.05	133.20	24.66	108.54	19.21
1970-71	63.91	140.27	31.10	109.17	17.50
1980-81	67.47	140.00	38.72	101.28	16.74
1990-91	67.80	143.00	47.78	95.22	15.00
1991-92	67.87	141.63	49.87	91.76	14.99
1992-93	67.98	142.72	50.30	92.42	14.57
1993-94P	68.31	142.34	51.34	91.00	14.41
1994-95P	68.60	142.96	53.00	89.96	14.26
1995-96P	68.82	142.20	53.40	88.80	14.10
1996-97P	68.75	142.82	55.14	87.68	13.94
1999-00P	68.97	141.10	56.76	84.34	13.80
2000-01P	69.22	141.08	54.68	86.40	13.64
2001-02P	69.49	141.38	55.85	85.53	13.35
2002-03P	69.47	132.80	53.13	79.67	13.48

**(Source: Compendium of Environmental Statistics, 2006)*

2.3 State of Forest Resources

Forests include the areas under the forestry land use category and some areas recorded as forests while not under tree cover, like rocky, desert, mountain ranges, etc. The recorded forests inclusive of these categories extend over 76.962 m. ha, 23.41% of the geographical area of the country. The forest cover in the country is 67.70 m. ha. which is 20.60% of the geographical area of the country*.

The forests of the country have been grouped into 5 major categories and 16 types according to biophysical criteria. The distribution of these groups indicates 38.20% subtropical dry deciduous, 30.30% tropical moist deciduous, 6.7% subtropical thorn and 5.8% tropical wet evergreen forests. Other categories include subtropical pine (5%), tropical semi-evergreen forests (2.5%) and other smaller categories. Temperate and alpine areas cover about 10% of the forest areas in the Himalayan region. The forest area estimate based on types is given in Table 2.3

Table 2.3: Forest area estimate for major forest types*

Forest type**	Area (Sq. km)	% of total	Occurrence in States/UTs
Tropical wet evergreen forest	45000	5.8	Arunachal Pradesh, Assam, Karnataka, Kerala, Mizoram, Manipur, Nagaland, Tamil Nadu, Sikkim, Andaman & Nicobar Islands, Goa
Tropical semi-evergreen forest	19000	2.5	Assam, Karnataka, Kerala, Maharashtra, Nagaland, Orissa, Tamil Nadu, Sikkim, Andaman & Nicobar Islands, Goa
Tropical moist deciduous forest	23300	30.3	Andhra Pradesh, Bihar, Gujarat, Assam, Karnataka, Kerala, Maharashtra, Nagaland, Mizoram, Tripura, Meghalaya, Uttar Pradesh, West Bengal, Orissa, Tamil Nadu, Sikkim, Andaman & Nicobar Islands, Goa
Littoral and swamp forest	7000	0.9	Andhra Pradesh, Gujarat, Maharashtra, Orissa, Tamil Nadu, West Bengal, Andaman & Nicobar Islands
Tropical dry deciduous forest	29400	38.2	Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Jammu & Kashmir, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh
Tropical thorn forest	52000	6.7	Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya

			Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh
Tropical dry evergreen forest	3000	0.3	Himachal Pradesh, Jammu & Kashmir, Andhra Pradesh, Tamil Nadu
Subtropical broad leaved hill forest	3000	0.4	Assam, Meghalaya
Subtropical pine forest	37000	5.0	Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttar Pradesh, Haryana, Punjab
Subtropical dry evergreen forests	2000	0.2	Himachal Pradesh, Jammu & Kashmir
Montane wet temperate forests	16000	2.0	Arunachal Pradesh, Karnataka, Manipur, Nagaland, Sikkim, Tamil Nadu
Himalayan moist temperate forests	26000	3.4	Himachal Pradesh, Jammu & Kashmir, Uttarakhand
Himalayan dry temperate forests	2000	0.2	Himachal Pradesh, Jammu & Kashmir
Sub-alpine, moist alpine scrub forests and alpine forests	33000	4.3	Jammu & Kashmir, Himachal Pradesh and Uttarakhand

**Forest Survey of India* 1995

*** As per Seth and Champion Classification of Forest Type of India*

Largest extents bear tropical dry deciduous and tropical most deciduous types. These have been most important in terms of yield of forest products. Accordingly these habitats have been converted into commercial plantations also for industrial raw material.

From the point of view of forest utilization value, the important forest regions include central southern region with predominantly teak forests, eastern region with *Shorea robusta* (sal) dominated forests and the western Himalayan region with coniferous species like pine, cedar, spruce and fir. The northern plains and foothills of Indian Himalayan region support Shorea, Dalbergia, Terminalias Gmelina, Albizzias, etc while northwestern arid areas bear Prosopis and Anogeissus dominated vegetation, interspersed with grassy rangelands. North eastern region is rich in tropical and subtropical moist forests having much diversity of hardwood and softwood species. Similar composition of forests in the Western Ghats and in Andaman & Nicobar Islands has been an important source of wood and wood products. Other specific ecologically important regions include sandalwood habitats in southern dry belt, red sanders in Andhra Pradesh, shola forests in Nilgiris, mangroves in Sundarbans in West Bengal, rain forests in Andaman & Nicobar Islands and Himalayan alpines.

2.4 Forest and Tree Cover

Forest Survey of India (FSI) has been undertaking assessment of forest cover in the country since 1981 on a two-year cycle. For the purpose of assessment of tree cover, the country has been divided into 14 physiographic zones by FSI. The assessment of tree cover includes digital processing of

satellite imageries for blocks of more than 1 ha (called 'forest cover') and a stastistically designed inventory-based assessment of the notional tree cover outside forests (TOF), accounting for the trees in patches less than 1 ha. Accordingly, the 2005 assessment reported a total tree cover of 23.41% including a forest cover of 20.60% and the rest TOF.

The total cover consists of 5.45 m. ha. (1.66%) in very dense, 33.26 m. ha. (10.12%) in moderately dense and 28.98 m. ha. (8.82%) in open canopy category. In addition to this, nearly 10 m. ha. area has been assessed (notionally based on ground sampling for the patches not captured by remote sensing) as under tree cover outside the forests, totaling up to 76.92 m. ha. or 23.39% of the land area of the country..

Table 2.4: Forest cover assessment by Forest Survey of India from 1987 to 2005

Year of State Forest Report	Data period	Forest/tree cover (sq. km)	% of geographical area**	Dense forest (per cent)
1987	1981-83	640,819	19.49	59.06
1989	1985-87	638,804	19.43	60.27
1991	1987-89	639,364	19.45	60.31
1993	1989-91	639,386	19.45	60.30
1995	1991-93	638,879	19.43	60.27
1997	1993-95	633,397	19.27	57.98
1999	1996-98	637,293	19.39	59.21
2001				
Forest	2000	675,538	20.55	61.70
Tree cover@	2000	81,472	02.48	
Total		757,010	23.03	
2003				
Forest	2002	677,816	20.62	57.33***
Tree cover	2002	99,896	4.04	
Total		777,712	23.68	
2005				
Forest	2003	677,088	20.60	57.19
Tree cover	2003	81,663	2.79	
Total		768,751	23.39	

*** Geographical area (32,87,263 sq km); @ Assessment attempted for the first time.*
**** Assessed with higher resolution and two density categories (moderate and very dense)*

2.5 Growing Stock

The growing stock (wood biomass indicating growing capital) of Indian forests/trees is estimated at 6,218.282 million cubic metres [4,602.038 million cubic metres in forest and 1,616,244 million cubic metres outside] i.e. 59.79 cubic metre/ hectare (SFR 2005) with only 0.7 cubic metre/hectare/year productivity against world average of 2.1 cubic metre/hectare/year. This is mainly due to non-recycling of biomass in forest soil, forest fire, grazing, over-exploitation, etc.

The mean annual increment (MAI) of India's forests is assessed to be less than 0.5 cu m /hectare / year as against the world average of about 2.0 cu m / ha / year. The two most important tropical hardwoods species, viz. teak and sal in tropical moist deciduous and dry deciduous forests have very dense and moderately dense forest areas and cover about 60% of the forests. In such areas, the MAI is much higher than the average. An assessment of increment in the natural forests of India was made by FSI in 1995 which indicated an annual allowable cut (AAC) of over 87 million cubic metres. The net annual increment of growing stock from all sources (public and private) was assessed to be 127 million cubic metres in 1994 and the actual production was estimated to be 294 million cubic metres (FAO, 1997).

Table 2.5: Forest increment in the natural forests of India (1995)*

S. no.	State	Increment '000 cubic metres
1)	Arunachal Pradesh	15243
2)	Madhya Pradesh (including Chhattisgarh)	14122
3)	Jammu & Kashmir	6402
4)	Assam	6061
5)	Andhra Pradesh	5929
6)	Uttar Pradesh (including Uttarakhand)	5818
7)	Karnataka	5574
8)	Maharashtra	5008
9)	Orissa	4432
10)	Meghalaya	2150
11)	Kerala	1983
12)	Nagaland	1903
13)	Manipur	1889
14)	Bihar (including Jharkhand)	1715
15)	Himachal Pradesh	1603
16)	Andaman & Nicobar Islands	1494
17)	Gujarat	1459
18)	Tamil Nadu	1394
19)	Mizoram	1332
20)	Sikkim	767
21)	West Bengal	433
22)	Tripura	316
23)	Rajasthan	292
24)	Goa, Daman & Diu	231
25)	Haryana	27
26)	Punjab	23
27)	Dadra & Nagar Haveli	22
	Total	*87622*

*Source: Forest Survey of India (1995). *Extent, composition, density, growing stock and annual increment of India's forests*.

The MAI for planted species in agroforestry / farm forestry is much higher than in the natural forests. The main species planted in farm forestry are poplars in north India and eucalyptus in all parts of India. The MAI varies between 10 cu m to 60 cu m per ha per year. A case study of ITC Bhadrachalam is given in the box 2.01.

Box. 2.01

Growth and income from farm forestry in Andhra Pradesh

International Tobacco Company (ITC) which has a paper and pulp mill in Andhra Pradesh (Bhadrachalam, district Khamam) has promoted a partnership with farmers to grow clonal eucalyptus plantations in farmer's field. Results have shown that the MAI of clonal plantation of eucalyptus species range between 20 and 58 cubic metres per ha / year and the farmers are able to earn a net profit of INR.50,000 to 150,000 per ha, depending on site quality and management inputs, in the first cutting, 3 years after planting. Profits increase in the subsequent cuttings, since the cost involved in maintaining a coppice crop is lower. Further, since the tree farms are raised under a system of agroforestry, additional income will be earned from the harvest of the agricultural crop.

The forest research unit of the company carries out trials on genetic improvement of the planting stock and silvicultural/ agroforestry practices (e.g. spacing of planting rows, type of inter-crop) to be adopted. The company supplies clonal seedlings for planting to the farmers along with continuing extension services. Further, the company guarantees to buy the pulpwood produced by the farmers at a fixed floor price which is revised periodically.

Currently the tree farms within economic distance from the mill are able to supply only about 40% of the pulpwood required by the mill. It is estimated that the company will be able to source its entire pulpwood requirement from the clonal tree farms in the selected districts of Andhra Pradesh.

The MAI of clonal eucalyptus plantations being raised by Tamil Nadu Forest Development Corporation has been giving a mean annual increment of 20-60 cu m per ha per year. Improved technology of plant propagation in fast growing species provides promising potential for agroforestry.

2.6 State of Forest Management

During the early years of the scientific management, forests of the country were managed primarily for wood production under the Working Plans prescribing specific management systems based on the growth rates, regeneration, increment patterns and extent of variability of crops. Appropriate

silvicultural systems were taken into account for harvesting, regeneration and growth regulation. Development imperatives after independence resulted in large scale diversion of forests for agriculture and other developmental activities. The post -independence development strategies necessitated expansion of resource base for industrial development in the country. In the early 1960s, imperatives of industrial development prompted their governments to boost investment towards large-scale industrial plantations for ensuring supply to wood-based industry. Approximately 5.4 million ha (30% of 18 m ha plantations till 1990*), of the forest area has been under commercial plantations, diverting natural forests into fast growing pulp, matchwood, plywood and other economically important hardwood species. The diversion of the forests was restricted in 1980.However, plantation activity continued as afforestation and enrichment efforts for degraded forests in India. At present, the classical forest management systems, at places, have been changed to planting with harvesting followed by replanting. Harvesting in natural forests is largely limited to salvaging of dead/fallen material.

* *NFAP*

2.7 Joint Forest Management

Consequent to heavy human sustenance pressure on forests coupled with some innovative experiments in society's involvement in forest management, models for participatory forest management have been evolving in India since 1980s. This has been followed by acceptance of the principles of community participation in management of natural resources and biodiversity. Accordingly, at present about 22.02 m ha (India's Forests. GOI. 2007) of largely natural degraded forests are being managed and rehabilitated under the Participatory/Joint Forest Management (JFM) regimes. Being more social than scientific system, these regimes are rarely supported by an inventory and an assessment of basic parameters for understanding the dynamics of forests.

JFM is one of the thrust areas of the forestry programme with a lot of expectations. The JFM programme has been envisaged as an effective tool for halting further degradation of forests. Communities in about 170,000 forest fringe villages are at present involved in the JFM programme. By February 2007, there were 99,868 JFMCs covering about 125,000 villages on forest fringes. Forest areas amounting to more than 21.4 m ha are covered by the JFM programme.

2.8 Diversion of Forestland for Non-forestry Purposes

During the initial years of post independence period, forests were considered as surplus lands and large areas were diverted for various development purposes including agriculture. On the recommendations of National Commission on Agriculture in 1976, increasing productivity and concept of social forestry came up as major objectives. The National Forest Policy 1988 brought about a major change in the definition of the term 'use' related government forests meaning 'economic use subordinated to ecological use'.

In 1996, through a landmark judgement on diversion of forests by the Apex Court, all matters related to diversion of forests, irrespective of ownership, came within the purview of the government and for any land use change from forests category, prior concurrence of the central government was made mandatory. Further, the stipulated mandatory provision of compensatory afforestation and payment of net present value has made the diversion process more stringent. The trend of diversion

of forestlands since 1980 has come down considerably indicating that large scale reduction of forests is not anticipated in the near future.

2.9 Conservation Status of Forests

Indian forests have been under severe pressure for meeting growing demands for alternative land uses, fuel, fodder, grazing, timber, pulpwood and non-wood forest products from ever growing human and livestock population and industrial development and infrastructure needs. Some important facts about our forests in this context are provided below.

- Per capita forest area is only 0.064 ha against world average of 0.64 ha. (FAO) i.e. only 1 /10th of the world average.

- The growing stock (wood biomass indicating growing capital) of Indian forests/trees is estimated at 6414 million cubic meters [4782 in forest and 1632 outside] i.e. 61.72 cubic metres per ha. (SFR-2005) with only 0.7 cubic metres/hectare/year productivity against world average of 2.1cum/hectare/year. This is mainly due to non-recycling of biomass in forest soil, forest fire, grazing, over-exploitation, etc.

- Due to rapid industrial development along with an increase in human population from 390 million (1950) to 1 billion in 2001 and domestic animals from 350 million to 520 million, the demand–supply gap for construction and industrial timber, fodder and non-wood forest products is rapidly increasing leading to over-harvesting and degradation of ecosystem.

- Vast stretches of forest are still diverted for a variety of developmental and infrastructural projects.
- In spite of the recognition of the significance of fulfilling the needs of local communities in the Forest Policy, there are inadequate institutional arrangements to involve them positively in forest conservation and management. As much as 78% of the forest area is subjected to heavy grazing and other unregulated uses adversely effecting productivity and regeneration. Similarly, nearly 10 m ha of forest area is under shifting cultivation, once a sustainable rotational agroforestry system that has run into difficulties with population increase and penetration of market forces.

- Land use changes including diversion of community areas for fuel, fodder, etc for non- primary production purposes have redirected nearly all non- farm needs towards forests.

2.10 Forestry and Livelihood

Forests and forest produce have been recognized as multipurpose resources with potential of providing livelihood to a substantial part of the population. Constitutional provisions empower the local self governments with rights over the non-wood forest produce. The strategy for forest management focuses on empowerment of community institutions in management and deriving livelihood from forests. The Government of India has promulgated a law recognising the right of forest dwellers in the forestlands wherein the ownership rights will be documented and the right of communities are recognized for common use of forests for their livelihood practices conforming to the principles of sustainability of forests. These provisions are considered to be enhancing the stake

of the forest dwellers and fringe populations in the development of forests. The effect of this new law will be clear after a few years.

Similarly, with the realization that the existing forest areas alone cannot cater to all the livelihood needs of the country, sizeable areas of non-forest lands used earlier by rural communities for their daily needs as common property resources need to be revived and regenerated. The Constitution of India puts responsibility of social forestry on local self governments. The revival and management of such village common lands are being considered as a promising way for sustainable management of natural resources. Assuming that about 20% of the present forest and tree cover of the country, i.e. 14 m ha is covered under this category; it can be extended to bring an extent of about 20 m ha under forestland use by 2020.

2.11 Expansion of Plantation Programme

Since 1980's, the Government of India has promoted plantations under different agroforestry and social forestry plantation schemes as well as investment for industrial plantations. The plantation area in India is 32.57 m ha, which accounts for 17 % of the global forest plantation and is the second largest in the world after China. It also has the largest share in the global plantation of teak (44%). The most prominent plantation species are eucalyptus, poplars, acacias, silver oak and rubber wood. It is estimated that 1.5 million cubic metres of rubber wood is available in India and by 2020 the annual output of rubber wood will reach 14 million cubic metres of usable logs. Several projects are in progress in different research institutes of the country to overcome the processing problem of the species and to develop a cheap technology suitable for India.

2.12 Policy and Legal Framework

The formal Forest Policy and legal framework for protection, conservation and management of forests exists since 1894 and 1865 respectively. Early forest policies tended to consider timber production as the primary function of the forest. In today's context, a multiplicity of interests compete for forest outputs and correspondingly forest policies have become increasingly complex. The Forest Policy 1952 recognized the protective role of forests and discarded the notion that forestry has no intrinsic right to land. It stipulated that the country should aim at having at least one third of its total land area under forests. Wildlife conservation became prominent in 1972 with the promulgation of the Wildlife (Protection) Act. The legal regime for protection of forests is mainly limited to Indian Forest Act 1927. Most of the states in the country have promulgated separate legislations to meet specificities of the respective states. The Constitution of India assigns fundamental duties to the citizen of the country and directs States for conservation and protection of forest, wildlife and environment. The country shifted forest from the state list to the concurrent list in the Constitution of India due to emerging ecological needs in mid-seventies. India has shown the political commitment for the conservation of forests with initiative to enact the Forest (Conservation) Act 1980. It is regulatory Act and keeps balance between development and conservation. It was a milestone step in the direction of forest conservation in the country. India had taken a revolutionary shift in the approach of forest management from regulatory to participatory with the promulgation of National Forest Policy 1988. This Forest Policy came four years before the Earth Summit which embodies all elements of Sustainable Forest Management and India's forests are treated as social and environmental resources. The ecological security became the prime

objective and focus was given for providing livelihood to the forest dependent communities. India has initiated the implementation of this policy in a big way to involve local communities in the conservation, protection and management of forests through joint forest management institutions in 1990 and expanded this programme to more than 22 million hectares of forests with the involvement of approximately 21 million people. India has shown sensitivity towards recognition of tenurial rights of the tribals on forestland with the issuance of guidelines to the state governments in 1990. The Environment Protection Act was enacted in 1986 for improving the environment of the country. India has shown remarkable progress during last 15 years for enhancing contribution of forests towards poverty alleviation through empowering people with the ownership of NTFP. India has provided legal regime to biodiversity conservation with the promulgation of national level legislation i.e. The Biological Diversity Act 2002. Another milestone has been achieved in 2006 by the nation with the enactment of a national level legislation for assigning habitation and occupation rights on forests along with responsibility of conservation of biological resource and maintenance of ecological balance to community. The fine tuning of Indian Forest Act 1927, State Forest Acts and Wildlife Protection Act is needed in future.

Forests in India are treated primarily as social and environmental resource, only secondarily as commercial resource. The country largely depends upon the forest for its requirement of wood and wood products from private lands. We are making relevant policy interventions to provide enabling environment for private sector to grow more trees. The policy and legal regime have been reviewed by an independent body, i.e. the National Forest Commission which submitted its report in 2006. The view of the National Forest Commission is to continue with the National Forest Policy 1988.The forestry sector is impacted directly by the policies of other sectors such as agriculture, rural development, *panchayti raj*, education, energy, and water resources and indirectly by the policies of petroleum, chemical and fertilizers, and industry and commerce. India needs separate grazing policy to manage 18% cattle of the globe and also to facilitate natural regeneration in the forests.

India is looking for certain policy interventions to motivate people for growing more trees in future and also thinking to establish a mechanism to involve private sector for investing financial resources on degraded forests. Our mandate is to achieve 33% forest and tree cover in the country and also to contribute towards achieving global objectives for sustainable development of all types of forests. The policy and legal regime in the forestry sector will keep focus on poverty alleviation through forestry, increasing productivity, enabling environment for private sector to grow more trees, ecological security of the nation, empowerment of communities along with their capacity building and biodiversity conservation in 2020.

The Forest Policy of 1952 was among the notable initiatives taken by the Government in post-independent India. It enunciated a target of maintaining one third of total land area under forests. In 1976, The National Commission on Agriculture fully acknowledged the role to be played by forestry in the development of the country and recommended large scale plantations on degraded forest areas and social forestry in community and private lands to reduce the growing gap in timber and firewood requirements. It also suggested formation of Forest Corporations to raise plantations in degraded forestlands. This led to the initiation of large scale social forestry projects from 1980 onwards with international assistance and as part of rural development programme since the 7th Five Year Plan.

The National Forest Policy 1988 acknowledges the primacy of the requirements of local communities, and advocates sustainable management approach with maintenance of environmental stability, restoration of ecological balance, and soil and water conservation as the prime objectives of forest management. The conservation of natural heritage and genetic resources is highlighted with indicator targets of maintaining the forest/tree cover (33% of landmass and 66% in hills). The social concerns are addressed through increasing productivity of forests to meet the local needs first, and creating massive people's movement for afforestation to reduce pressure on existing forests. Industries have been specifically advised to network with farmers for production of industrial raw material instead of depending on subsidized supply from government forests. Economic benefits of forests have been subordinated to principal aim of environmental stability.

The National Afforestation and Eco-development Board (NAEB) has the mandate to regenerate degraded forests in the country with the active involvement of the people and the stakeholders. The National Wasteland Development Board (NWDB) focuses on improving land capabilities.

The subject 'Forest' is in the concurrent list of the Indian Constitution since 1976. The Forest (Conservation) Act 1980 (amended in 1988, 2003) empowers the central Government (Ministry of Environment and Forests) to guide the states in the matters related to diversion of forestland for non-forestry purposes, conversion of natural forests into plantations and even priorities of forest management in line with the National Forest Policy.

The forest laws in India provide for declaration of forests under government management in categories like reserve and protected forests. Other categories include community, local common and private forests, aggregating into unclassed forests. The legal categories of lands indicate the intensity of regulation on the use of these lands as forests. Forests have traditionally been the habitats of tribal communities with a variety of lifestyles ranging from nomads, hunters, wild food gatherers to the agrarians. The traditional lifestyles of tribes and their recorded rights have been respected and embedded in the forest management practices as well as in subsequent policies. A law has been enacted in 2006 recognizing the rights of occupation of forests by tribes and forest dwellers and empowering them for management of forests used by them as common property resources. It is estimated that about 20% of the government controlled and managed forestland will come under the occupational titles recognized under this law. The recognition of right of common use conforms to the policy prescription of participatory forest management and also accepted principles of biodiversity conservation as well as community involvement in conservation.

Within the ambit of the national policy and legislation, the states can promulgate legal instruments and undertake suitable measures to facilitate smooth functioning of the sector. A number of state laws have been passed to regulate forest resource use, including timber and non-timber forest products (NTFPs).

Box 2.02

The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

This is an Act to recognize and vest the forest rights and occupation in forestland in forest

dwelling Scheduled Tribes and other traditional forest dwellers to provide for a frame work for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forestland.

Whereas the recognized rights of the forests dwelling Scheduled Tribes and other traditional forest dwellers include the responsibilities and authority for sustainable use, conservation of biodiversity and maintenance of ecological balance and thereby strengthening the conservation regime of the forests while ensuring livelihood and food security of the forest dwelling Scheduled Tribes and other traditional forest dwellers.

And whereas the forest rights on ancestral lands and their habitat were not adequately recognized in the consolidation of State forest during the colonial period as well as in independent India resulting in historical injustice to the forest dwelling Scheduled Tribes and other traditional forest dwellers who are integral to the very survival and sustainability of the forest ecosystem.

And whereas it has become necessary to address the long standing insecurity of tenurial and occupational rights of forest dwelling Scheduled Tribes and other traditional forest dwellers including those who were forced to relocate their dwelling due to State development interventions.

2.13 Biodiversity Conservation

The important milestones in independent India on wildlife conservation include provision in National Forest Policy 1952 for setting up of sanctuaries and national parks for preservation of wildlife, enactment of the Wild Life (Protection) Act 1972, launching of Project Tiger in 1973, Project Elephant in 1992 and the Biological Diversity Act 2002. The National Forest Policy 1988 has the conservation as its basic objectives: "Conserving the natural heritage of the country by preserving the remaining natural forest with vast variety of flora & fauna, which represents the remarkable biological diversity and genetic resources of the country".

Forest and Wildlife are inseparable. We have set apart around 4.8 per cent of the geographical area of the country for the exclusive conservation its biodiversity in the form of Protected Areas. Currently the 659 Protected Areas of the country include 100 National Parks, 514 Sanctuaries, 41 Conservation Reserves and 4 Community Reserves. We all are also aware that Tiger conservation has become a symbol of the status of wildlife conservation in the country and also represent the conservation of whole ecosystem. However, Tiger Reserves and Protected Areas are faced with multifarious challenges these days. Habitat fragmentation, conflicting land uses, presence of heavily used infrastructure and biotic interference are some of them. The All India Tiger Estimation figures using the refined methodology is in public domain. The assessment, for the first time depicts the status of tiger habitat, co-predators and prey across tiger landscapes. The status of tiger has not shown a significant change in the core tiger habitats of Tiger Reserves and Protected Areas, their status in other forest areas is not satisfactory. The approximate figure of tigers in the country is 1411 and may vary between 1165 and 1657. {Wild Life Institute of India (2008)]. This calls for mainstreaming tiger concerns in the landscape around core areas.

The Wildlife (Protection) Act 1972 provides basis for conservation forestry with constitution of a series of National Parks and Wildlife Sanctuaries. These areas, mostly the game reserves of the erstwhile rulers and subsequently the catchments of the dams and reservoirs, have become showcases of the Indian Biodiversity. A network of 659 such protected areas is spread over the country, covering about 16 million ha of forests. These conservation areas cover all the legal categories of forests and are managed for conservation of biodiversity with generally flagship animal species as the focus.

The National Board for Wildlife, chaired by the Prime Minister of India, is the apex body to consider the wildlife and biodiversity conservation issues at the national level. Establishment of the Directorate of Wild Life Preservation, ban on Indian ivory and India's membership of CITES indicate national initiatives towards protection of wildlife. On Research and Development front, setting up of Wild Life Institute of India, Central Zoo Authority and now Tiger Conservation Authority and National Wild Life Crime Control Bureau show the increasing national resolve to support the responsibility of states for conservation.

The participatory approach has also been attempted in wildlife management. India Eco-development Project was implemented during 1995-2005 under GEF sponsorship. The main focus of the programme was village eco-development through sustainable development of village resources and involvement of local people in conservation of protected areas. The results have been encouraging at some sites and participation and benefit-sharing are now a recognized aspect of PA management. However, the adoption of this approach as an integral part of PA management is yet to be realized.

2.14Wood and Wood Products

2.14.1 Viability of Forest Management for Wood Production

Plantation activities undertaken (32.6 million ha) after independence is impressive. Forest plantations being a major investment activity, the low level of productivity however, is a cause of concern. About 50% of the plantations raised since 1980 are in agroforestry system with varying intensities of management. The National Forest Policy 1988 has envisaged that forest industries should meet their raw material requirement from wood grown in collaboration with farmers and local community. In accordance with the stipulation in NFP1988, subsidies on supply of raw material from government forests to forest-based industries will gradually cease. Several industrial enterprises (particularly the pulp and paper companies) have been working with farmers to encourage farm forestry activities with their active technical and financial assistance. The following approaches are commonly pursued.

Supply of free or subsidized quality planting stock with or without buy back guarantee

Facility of bank loan assistance and providing planting stock, technical extension and buy back guarantee

Leasing or share cropping scheme under which the company raises and maintains plantations on farmer's lands based on appropriate arrangements

Intensive research and development and commercial sale of clonal planting stock to farmers by companies with or without buy back guarantee.

These initiatives generally popularized the concept of tree farming and have contributed to the cultivation of commercial trees on private lands. This has also provided to the farmers an alternative/ complementary source of land use for improving their farm income particularly in the event of crop failure.

2.14.2 Current level of Production of Wood and Wood Products

India, an ITTO producer member country, is one of the major consumers of wood in the Asia Pacific region although she domestically produces several tropical hardwood species. The indigenous production was sufficient to meet most of the domestic timber demand till 1980s. However, with the enactment of the Forest Conservation Act 1980 and subsequently the formulation of the National Forest Policy 1988 there has been more emphasis on conservation than timber production.

Production from natural forests showed a declining trend also due to continuing forest degradation. Sampling in some of the reserved forests (RF) revealed that 82% had dense forests while the forests were degraded in the remaining18% area and had open crop where production was minimal (SFR, 2003). In protected forests (PF) the percentage of open forest was more than 60% which meant that harvesting in these areas could not be feasible. Some good forest areas were also included in wildlife areas further affecting the productivity. The conditions of plantations after 1980 have also not brought the best of results mainly due to lack of proper protection, cleaning and thinning at the desired stage. Thus, the production from plantations was not commensurate with the area under plantation.

In order to arrest deforestation and environmental deterioration most of the state forest departments have completely or partially banned logging in natural forests over the past 20 to 25 years. Madhya Pradesh is a case in point where 16 districts / forest divisions completely banned logging with the view that these areas would ultimately recoup.

2.14.3 Wood Production

At present, logging operations in natural forests have been minimised and the resulting wood scarcity as a consequence has provided an impetus for development of farm forestry, homestead forestry and agroforestry particularly in north and south India. Currently, about 50% of the wood supply in the country comes from non-forest sources, that is, outside government forests. The rest of the industrial wood consumption is accounted for partly by imports and supply from public forests, mainly plantations.

India's round wood production in 2006 was estimated to be about 240 million cubic metres, of which 75% is the estimated share of fuelwood and 15-20 million cubic metres industrial round wood, including poles and small lumber for rural households (NFC Report 2006, p261). Supply from natural forests (including temperate hardwood and softwood species) is about 12 million cubic metres (about half of it from tropical forest areas). The estimated share of industrial round wood for

industry coming from farm forestry and other trees outside forests is 31 million cubic metres. Official imports of timber accounted for just over 3 million cubic metres in 2006, mostly in the form of logs. Hence, there is a gap between consumption and supply of timber of about 25 million cubic metres (conservatively estimated). It is assumed that a considerable part of this gap is being filled from unregistered sources, such as from home gardens and small timber logs and poles. Recycling and use of modern technologies for structural use of small wood and waste wood are also important contributors. There are varying estimates of production as well as consumption of forest products, particularly timber and processed wood.

In wood production, the concept of annual allowable cut (AAC) has often been given low consideration. India's AAC, based on the net annual increment of growing stock from all sources (public and private) was only 127 million cubic metres in 1994, but actual production was estimated to be 294 million cubic metres. According to FAO (1997), estimated removals were about 50% above net increment. Over-cutting is, however, more serious than these figures imply, considering that nearly 40% of the net annual increment in the region is in young forest plantations and that the proportion of total production from plantations is comparatively low. The failure to use less commercially desirable species and sizes, led to damage to residual trees, inadequate protection and maintenance. The state forest departments (SFDs) admit seizure of 10-20% of the illegally harvested timber. However, even the routine seizure of illegal logs in the country is guestimated to be about 200,000 cubic metres. This figure needs to be multiplied by a factor of 10 to get a reasonable account of unrecorded removal.

The Government of India as a major policy initiative has permitted import of wood under the Open General License since 1996 with a view to easing out the wood shortage and also to reduce pressure on natural forests

The data on wood production, import and export in ITTO producer member countries of the Asia Pacific region between 1990-2000 is given in Table 2.6

Table 2.6: Wood statistics of ITTO producer member countries in the Asia-Pacific region 1990-2000

1.	Round wood production (000 cubic metres)			
	a)	1990	-	273,687
	b)	2000	-	319,498
2.	Industrial round wood production (000 cubic metres)			
	a)	1990	-	24,406
	b)	2000	-	22,188
3.	Processed products 2000			
	a)	Sawn wood	-	7,900
	b)	Panel products	-	421
	c)	Wood pulp	-	1,590
4.	Export 2000			

	a)	Round wood	-	-
	b)	Sawn wood	-	06
	c)	Panel products	-	14
	d)	Wood pulp	-	16
5. Import 2000				
	a)	Round wood	-	2,100
	b)	Sawn wood	-	09
	c)	Panel products	-	86
	d)	Wood pulp	-	166

Most of the production estimates of timber products (round wood logs, sawn wood, veneer and plywood) is generally based on *FAO Year Book of Forest Products 2003* and *ITTO Annual Review and Assessment of World Timber Situation, 2004/05*. Some of the data pertaining to 2001-05 are given in Tables 2.7, 2.8 and 2.9.

Table 2.7: Production of timber products ('000 cubic metres)

Item / year	2001	2002	2003	2004	2005
Round wood/logs	13500	13500	13500	13500	13500
Sawn wood	6800	6000	6000	6000	6000
Veneer	55	235	246	258	258
Plywood	1300	1600	1760	1936	1936

Table 2.8: Consumption of timber products ('000 cubic metres)

Item / year	2001	2002	2003	2004*	2005*
Round wood/logs	15914	15051	16293	16535	16535
Sawn wood	6806	6007	6010	5984	5984
Veneer	56	238	249	257	257
Plywood	1253	1551	1704	1911	1911

Table 2.9: Import of Timber Products ('000 cubic metres)

Item / year	2001	2002	2003	2004	2005
Round wood/logs	2421	1561	2798	3036	3036
Sawn wood	7	7	10	11	11
Veneer	2	4	4	6	6
Plywood	17	10	4	9	9

Source: *FAO Year Book 2003, ITTO Annual Review and Assessment of World Timber Situation, 2004/05.*

Based on the figures given in Tables 2.9 - 2.11, an estimate for 2005-06 is provided in Table 2.10 (Bhat, 2004).

Table 2.10: Estimated production, consumption and trade of timber products, 2005-06

Items	Volume (million cubic metres)				Value (million US$)	
	Production	Consumption	Imports	Exports	Imports	Exports
Round wood/logs	52.041	56.690	4.689	0.0040	937.8	0.80
Sawn wood	32.961	33.180	0.221	0.0020	55.0	0.70.
Veneer	2.340	2.380	0.068	0.0280	7.5	6.22
Plywood	0.499	0.500	0.003	0.0019	1.8	5.20

The requirement of wood and wood products are bound to witness unprecedented upward trend due to various economic and policy initiatives recently taken in India. In education sector the allocation has been hiked from 2% to 6% of GDP. For this purpose there is going to be a major demand for paper and pulp. The gap between present availability and future demand cannot be met entirely from import. Some new large units will be required to be established apart from enhancing the installed capacity of the existing mills. Since the raw material is not likely from natural forests Agroforestry and farm forestry sources are bound to get greater emphasis. The development of farm sector will have the advantage of recent agricultural policy which emphasizes on intensification of agriculture so as to ensure annual growth presently hovering at about 2% to 4%. This would mean more inputs in the form of irrigation, watershed management, improved variety of seeds, organic farming, etc. Agroforestry and farm forestry to supplement the income of the farmers have been identified as main strategy for achieving the growth in agriculture. The prospective paper and pulp mills and other forest-based industries can develop partnership with farmers to grow timber species as being presently practiced by ITC n Andhra Pradesh.

All panels other than plywood hardly account for 10% of the total production and the remaining 90% comprise the plywood and block board. There are about 62 large and medium size plywood mills and over 2,500 SSI units which mostly operate based on the plantation wood like poplar and eucalyptus grown by the farmers under agroforestry system. Technological advances allow more efficient use of raw material for better quality of products. Development of panels of bamboo composites from the mats of woven bamboo slivers is a significant development. The medium density fibreboard (MDF) has a variety of end uses and can replace tropical hardwood timbers for most of the uses. Despite the technological advances relating to efficient use of wood, reduction of wastages, diversity of raw materials and recycling, the gap between demand and supply is widening. Projected demand for panel wood by 2020 as given in table 5.4 of " Forests and Wildlife Statistics, INDIA 2004" is reproduced below.

Table 2.11 – Projected demand of panel wood

(in million cubic metres)

Plywood	Veneer	Particle Board	MDF Board	Total
29.20	0.70	0.35	0.28	30.53

The development of infrastructure and housing will also require substantial wood and wood products. According to the housing policy for 11th Five Year Plan (2007-12) there is a backlog of over 22 million housing units. Similarly 26 million housing units are additionally to be constructed during this plan period. It is not possible to achieve this target in next 5 years as a result of which at

least 50% spill over will go to 12th Plan and beyond. Presuming that each housing unit will require on average 2 cubic metre timber for construction and furniture (presuming that door and windows will be partly timber and partly steel or aluminum). This would mean about 50 million cubic metres additional timber in next 5 years or so. Since natural forests and existing plantations are not going to meet any additional demand the bulk of the supply will have to come from non-forest sources. This may trigger the private participation in sustainable forestry.

Wood and wood products for meeting energy requirement are going to be stable in view of the fact that urban poor are gradually switching to non-wood sources (LPG, kerosene and solar appliances). A number of programmes on women's health in rural areas are in vogue. Many other programmes may come up in view of greater emphasis on their health problem connected with smoke-related problems of burning fuels. Improved smokeless stoves, solar appliances and even LPG in areas closure to urban areas may reduce the pressure on forests for fuelwood. There is a continuous rural migration to urban cities. As such, the rural population is not likely to grow un-proportionately. Moreover, rural population has a number of other alternatives for cooking food. In coming years, with the construction of express highways and other roads, the road side restaurants (*dhabas)* are also likely to start using LPG and their dependence on fuelwood may decline. With the aforementioned developments the current level of consumption of wood as fuel will more or less stabilize or marginally reduce in the coming decade.

2.15Forest Industries

Despite great economic linkages, flexibility (for capital, technology, etc) and diversity of forest resources, forest-based timber processing industries are generally handicapped due to inefficient operations, legal restrictions, low output, non-availability of skilled labour and resultant inertia.

In terms of wood (and increasingly bamboo) utilisation in India, there are some 23,000 sawmills of varying capacities (mostly small and unsophisticated technically). Of these, 950 units are manufacturing wood-based panel products and veneer sheets; 380 units producing pulp, paper and paperboards; 5 units safety matches (with an unknown number of cottage scale units); plus a large number of units involved in downstream processing and recovery and further processing of residues. Seventy to 90% of the plants are in small-scale sector. Most of the production units are short of investment capital, hire un-organized and legally unprotected labour, use outdated machinery and are characterized by poor management and technical skills. In sawmills, for example, only 3% of products generated by them meet Indian grading standards. Processing technologies in small scale sector are generally inefficient and cause a high amount of wastage.

The information on wood-based industries and secondary forest-based industries as gathered by Central Statistical Organization (CSO, Kolkata, 2002) is given in Tables 2.12 and 2.13.

Table 2.12: Wood-based units at a glance

Description/Year	2000-2001	2001-2002
Number of factories	3227	3161
Factories in operation	2823	2821
Fixed capital (in million INR)	830,940	84,823
Total output (in million INR)	2,234,060	34,337

Materials consumed (in million INR)	1,445,000	2,006,550
Net value added (in million INR)	297,900	351,400
Income (in million INR)	194,490	237,410
Profit (in million INR)	26,590	26,910

Source: C.S.O Kolkata, 2002.

Table 2.13: Secondary forest industries in India

Sub-sector	No. of production units	Capacity share of small scale plants (% of production)
Pulp and paper, paper board	406	66
Wood-based panel	506	80-90
Saw mills	23,000	82
Matches	12,000	82
Doors wood working plants	98	95

Source: C.S.O Kolkata, 2002

2.15.1 Timber Trade

India is a net importer of forest products. In 2001, the largest share of forest product import was for logs, followed by paper and paperboards and recovered paper. The total recorded value of imports of primary forest-based products in 2001 was US$ 942 million, compared to US$ 94 million for exports of those products. On a value base, the import of logs made up about 42% of the total forest products import bill, while the officially recorded volume was only about 2.1 million cubic metres in 2004. Ninety-five per cent of all wood imports to India are logs, mainly from tropical countries. Main supply countries for tropical logs are Myanmar, Indonesia, Malaysia and several African and South American countries. Log imports are supported by a favourable tariff regime of 5%, compared with 25% for imported sawn wood,

2.15.2 Fuelwood Production and Trade

Fuelwood accounts for about 50% of the total fuel consumption in rural India (FSI, 2002). It is the mainstay of India's rural population for cooking food and for other household and non-agricultural works such as rural crafts. The annual consumption can be taken to be ranging between 250-300 million. cubic metres. Of this, only about 17 million cubic metres. of fuelwood is recorded to come from India's forest, leaving a staggering gap of more than 90% of the total consumption. Part of the gap is absorbed by production from forest and trees outside the forests but much of it is collected in an unorganized way from the forests. This is an important factor impacting the growing stock and ecological imbalances.

Based on per capita fuelwood consumption, Forest Survey of India, Dehradun has estimated the annual consumption of fuelwood in rural areas in the vicinity of forests and non-forest areas at 78 million tons and 74 million tons respectively. The average per capita consumption was 424 kg and 144 kg respectively.

The fuelwood collection ("head loading") from forests is traditionally uncontrolled and unmonitored. About 75% of all forest production is said to be fuelwood, mostly collected from natural forests. Although most of the 225 million cubic metres of fuelwood is consumed domestically by the forest-dependent poor including tribals. The sale of fuelwood is also a major source of income. About 30 million cubic metres of fuelwood is used for industrial purposes, including as charcoal.

2.16 Trees Outside Forests (TOF)

Social forestry was initiated in 1980s to assist rural communities and landless people to meet their livelihood needs for fodder, fuelwood, small timber, fruits, and minor forest produce through community planned and managed nurseries and tree plantations in common lands and non-forest public lands. Social forestry was recognized as a component of 'community development' programmes. However, the focus on this aspect withered with increasing global attention on biodiversity conservation within forests. The revival of social forestry with stronger linkage with the communities for better livelihood opportunities is being considered in view of the recognition of linkage of life support with conservation.

Forest Survey of India has made a comprehensive assessment of TOF in rural and urban areas of Punjab using remote sensing techniques followed by field inventory. Trees outside forests (TOF) provide a viable diversification option and help in making farm management practices competitive, which is desirable in the present era of globalization. TOF also help in achieving ecological security by improving soil and water conservation.

2.17 Non-Timber Forest Products

Non-timber forest products (NTFPs) in India play an important role in the social and traditional life of millions of forest dependent population, particularly the tribal and landless people, women and other rural poor. Today, it contributes over 75% of total forest export revenue in India. Nearly 400 million people living in and around forests in India depend on NTFPs for sustenance and supplemental income. NTFPs contribute significantly to the income of about 30% of rural people. More than 80% of forest dwellers depend on NTFPs for basic necessities. The collection of NTFPs comprises the main source of wage labour for 17% of landless labourers, and 39% more are involved in NTFPs collection as subsidiary occupation.

Traditionally, the collection of NTFPs has been a low intensity activity and generally sustainable. However, as their economic potential has improved, the intensity of collection has increased and better infrastructure for trade and processing has developed. For example, a large number of pharmaceutical enterprises have come up to meet the market demand for medicines. They pose a threat to a large number of medicinal plants through demand-based overexploitation. This has raised the concern about the sustainability of NTFPs resource and the equitable distribution of the benefits derived from them. For addressing these concerns and improving the resource base outside forests by promoting cultivation of medicinal plants and germ plasm, the National Medicinal Plants Board was established in 2002. The Board is also expected to develop standards because of the fact that a number of plants are used in traditional Ayurvedic medicines and are in the export trade especially to the Middle East and Europe.

In most cases, trading of the nationalized NTFP is controlled through autonomous state- supported institutions such as State Forest Development Corporations and federations of cooperatives and tribal societies.

The production and trade in NTFPs has received attention in successive forest policy statements. The Constitution provides for ownership of NTFPs to gram sabhas/ panchayats (village assemblies) in states having sizable tribal population.

States in India have different systems for management and trade of NTFP collection. The State Minor Forest Produce (Trade and Development) Co-operative Federation Ltd in Madhya Pradesh organises collection of minor forest products through cooperatives and organises good trade practices for optimising the wages and benefits, eventually ploughing back the benefits to the communities and ensuring that the resources are sustainably managed.

The role of forestry in rural livelihood is indicated by a few studies like Vedeld *et al*. (2004), who observed that forest products contribute between 20-40% of total income of households in forest areas. Other estimates in Indian conditions indicate a range between 10-54% (Bhattacharya and Hayat, 2004 ; Prasad, 2006). There are varying estimates (100 million to 500 million persons) of dependence of communities on NTFP for cash income and self consumption (Prasad and Bhatnagar, 1990; Shiva 1993; Saxena, 1999 ; Bhattacharya and Hayat, 2004).

For the successful implementation of joint forest management, flow of benefits through production of NTFPs offers the best incentives to the participating communities on sustained basis. In order to sustain the interest of the participating communities in forest conservation, sustainable NTFP management therefore assumes key role. However, the current NTFP management practices need reforms in order to make them ecologically and socially sustainable.

Among the non-wood forest products (NWFPs), tendu leaves (leaves of *Diospyros melanoxylon)* used as wrapper for making *bidies* (country cigarettes) is the most important. The item contributes for INR…million in terms of value of raw material and INR … in terms of products. The enterprise supports about 10 million people in cottage industry of rolling the final product.

The other important NTFPs include seeds of sal (*Shorea robusta)*, Indian gooseberry, amla (*Emblica officinalis)*, myrobelan fruits of *Terminalia bellirica* Roxb (baheda) and *T.chebula* (Harra); kernels and seeds of *Buchanania lanzans*; roots like *Asparagus racemosus,* (satavar) and *Chlorophytum borivilliana*; gums of *Boswellia serrata* and *Sterculia urens*; flowers and seeds of *Madhuca longifolia*, Taxus, *Agalochha sp*., *Celastrus paniculata, Andrographis paniculata, Helicteres isora*. These are only some of the most prominent NTFPs having volume in trade. In addition, there are a number of other NTFPs specific to a particular ecosystem found and traded. It is estimated that the value of NTFPs in India is in the range of US$ 60-100 billion.

(a) Growth trend: With the growing preference for use of natural products the market demand for different NWFPs is growing as is evident in Table. 2.14

Table. 2.14: Growing demand in trade

S.N.	Species	Demand (in tons)		Annual growth rate (%)
		2001-02	2004-05	
1)	Amla (*Emblica officinalis Gaertn)*	22,729.5	41,782.9	22.5
2)	Ashok (*Saraca asoka (Roxb.)De Wilde*)	7,051.3	10,724.2	15.0
3)	Ashwagandha (*Withania somanifera (Linn) Dunal*)	7,028.7	9,127.5	9.1
4)	Atis (*Aconitum heterophyllum Wall. ex Royle)*	270.1	448.4	18.4
5)	Bael (*Aegle marmelos (Linn) Corr)*	5,381.2	7,084.5	9.6
6)	Bhumi amlaki *(Phyllanthus amorus Schum &Thonn)*	2,212.6	2,985.3	10.5
7)	Brahmi (*Bacopa monniteri (L) Pennel*)	3,822.5	6,621.8	20.1
8)	Chandan (*Santalum album Linn*)	635.2	1,073.1	19.1
9)	Chirata (*Swertia chirata Buch-Ham*	965.2	1,284.7	10.0
10)	Daru haridra (*Berberis aristata DC)*	1,187.3	1,829.4	15.5
11)	Giloe (*Tinospora cordifolia Miers*)	2,258.3	2,932.6	9.1
12)	Gudmar (*Gymnenia sylvestre R Br)*	N.A.	N.A.	N.A.
13)	Guggal (*Commiphora wightii (Am.) Bhandari)*	1,505.0	2,548.9	19.2
14)	Isabgol (*Plantago avata Forsk*)	N.A.	N.A.	N.A.
15)	Jatamansi (*Nardostachys jatamansi DC*)	674.9	866.8	8.7
16)	Kalihari (*Gloriosa superba Linn*)	65.4	100.5	15.4
17)	Kalmegh (*Andrographis paniculata Wall ex Nees)*	2,005.0	2,197.3	3.1
18)	Kesar (*Crocus sativus Linn*)	N.A.	N.A.	N.A.
19)	Kokum (*Garcinic indica Chois*)	N.A.	N.A.	N.A.
20)	Kuth (*Saussurea costus C B Clarke (S.lappa*)	1,414.1	1,826.3	8.9
21)	Kutki (*Picrorhiza kurroa Benth ex Royle*)	220.3	317.0	12.9
22)	Makoy (*Solanum nigrum Linn*)	2,077.9	2,192.2	1.8
23)	Mulethi (*Glycyrrhi glabra Linn*)	873.4	1,359.8	15.9

S.N.	Species	Demand (in tons)		Annual growth rate (%)
		2001-02	2004-05	
1)	Amla (*Emblica officinalis Gaertn)*	22,729.5	41,782.9	22.5
24)	Patharchur *(Coleus barbatus Benth/ C vettiveroides Jacob*)	37.8	60.8	17.2
25)	Pippali *(Piper longum Linn*)	3,992.5	6,280.4	16.3
26)	Safed Musali (*Chlorophylum borivillianumum Sant*)	N.A.	N.A.	N.A.
27)	Sarpgandha (*Rawollfia serpentinaBenth ex Kurz*)	423.6	588.7	11.6
28)	Senna (*Cassia Augustifolia Vahl)*	6,462.5	11,677.3	21.8
29)	Shatavari (*Asparagus racemosus Willd.)*	10,924.7	16,658.5	15.1
30)	Tulsi (*Ocimum sanctum Linn*)	3,296.8	5,402.9	17.9
31)	Vatsnabh (*Aconitum ferox Wall)*	322.3	3,426.8	30.0
32)	Viavidang (*Embelica ribes Burm f.)*	N.A.	N.A.	N.A.

Source*: National Medicinal Plant Board, New Delhi*

2.18 Service Functions of Forests

Forests are among the most prominent features of the Indian landscape, covering about 67.83 million hectares, spread over all bio-ecological regions. They are integral to environment, economy, culture and history of the country. In addition to widespread tangible benefits such as timber, fuelwood, pulpwood, fodder and fibre grasses, and non-wood forest produce, these forests also provide intangible services such as watershed benefits at local level; ecotourism, biodiversity conservation at national level and carbon sequestration at global level. The major services include:

Service of consumptive direct-use value, e.g., timber, fuelwood, fodder and fibre grasses, and wide range of non-timber products derived from plants and animals.

Services of option values, e.g., a natural habitat for biodiversity and a repository of genetic wealth.

Services of non-consumptive direct-use values, e.g., recreation and ecotourism.

Services of local indirect-use values, e.g., carbon sequestration.

2.18.1 Economic Valuation of Forests in Indian Context

A few attempts have been made in India recently to estimate economic value of intangible benefits of forests like ecotourism, recreation, water supply, watershed value, carbon and biodiversity. The following annual values indicate general observations on selected benefits on unit area basis.

Table 2.15: Annual values of selected benefits of forests in India

S. No.	Economic benefit	Nature of benefit	Value of annual flow of goods and services per hectare (INR.)	
			Minimum	Maximum
1	Timber	Tangible	2701	9,270
2	Non-timber forest products	Tangible	538	2,957
3	Ecological functions (watershed)	Intangible	624	200,000
4	Ecotourism	Intangible	676	20,444
5	Carbon store	Intangible	20,125	1,200,000

Source: Manoharan, 2000.

2.19 Forest Institutions

There are forestry-trained manpower at the union and state levels, having defined functions and responsibilities. While at the Government of India level, the role of the MoEF is mostly in the nature of providing policy, strategy and legislations, at the state level the state forest departments (SFDs) play the main role as custodians of the public forest resource, carrying out the normative, regulatory, silvicultural and protection functions. Often they also perform an enterprise function, by being involved in forest production, processing and trade. Most of the states in India have set up forest development corporations (FDCs), to be responsible for the production activities of the public forest estate. These corporations are meant to operate as autonomous business entities.

There are a number of specialized institutions directly linked to the MoEF. These include the network of institutions under the Indian Council of Forestry Research and Education (ICFRE) Dehradun; the Indian Institute of Forest Management, Bhopal (IIFM); Indira Gandhi National Forest Academy, Dehradun; Wild Life Institute of India, Dehradun; FRI University and Forest Survey of India, Dehradun. The major institutions carrying out forestry research in India (ICFRE, the Forest Research Institutes or Research Divisions of SFDs) are core-funded by the Government.

2.20 Funding of Forestry

Funding in forestry has been a problematic area in most of the developing countries, and India is no different. The main reason of low allocation to the sector is the fact that forestry has neither gained the importance, it deserves, nor does it attract the Political Commitment. Financial resources are limited in the country. There is competing demand from sectors such as Power, Transport, Health Care, Rural Development etc. Undervaluation of the contribution of forests to the GDP, which is presently estimated as 1.2%, is another reason of inadequate financial support which is evident from the following (Table, No : 2.16) which gives the allocation for forestry sector in successive plans

Table 2.16 : Outlay in Forestry Sector in Successive Plans*

Plan	**Period**	**Total Public Sector**	**Outlay for**	**% of Plan out**

		(Rs. In Crores)	forestry and wildlife (Rs. In Crores)	lay
First	1951-56	2069	7.64	0.37
Second	1956-61	4800	21.21	0.44
Third	1961-66	7500	45.85	0.61
Post-Third	1966-69	6687	41.93	0.63
Fourth	1969-74	15901	89.42	0.56
Fifth	1974-79	38853	208.84	0.53
Annual	1979-80	12550	68.33	0.54
Sixth	1980-85	97500	692.49	0.71
Seventh	1985-90	180000	1859.10	1.03
Post- Seventh	1990-92	139197	1413.00	1.01
Eighth	1992-97	434100	4081.87	0.94
Ninth	1997-02	859200	8189.09	0.95

* India. Planning Commission. Plan Documents.

As against the above allocation, Ministry of Environment & Forest and Forests Department of various States have been requesting Finance Ministry and Planning Commission for allocation of 3 % of Plan out lay to Forestry Sector. But this has not been agreed to so far. However in recent past, there have been two developments, which has resulted in increasing the investment in forestry sector to some extent. In one of the recommendations of 12th Finance Commission an Ad – Hoc one time grant of INR 10000 million has been sanctioned to forest rich states to implement the prescriptions of working plans. India has created an innovative funding mechanism to suppliment the efforts of the nation in the achievement of sustainable development of its forests. Sustainable forest management. A corpus of INR 70000 million has been created. It is expected that this amount will soon increase to INR 100000 million.

Forests are national resource of global concern. India is trying to generete finacial resources for implementing SFM in the country. Inspite of making such efforts for generating new and additional financial resources, India needs more financial resources to implement SFM and also to build the capacity of its human resource living in and around forests. India advocates to establish a Global Forest Fund for providing financial resources to the developing countries in the compliance of fourth shared global objective

2.21 Human Resource Development

India has more than one hundred years of forest service which is hierarchically structured from the level of uniformed forest guards and foresters with policing functions upwards to Indian Forest Service (IFS) officers recruited by the Union Public Service Commission. Foresters of all levels are well-trained in traditional technical forest-related subjects. The main training is imparted at the Indira Gandhi National Forest Academy (IGNFA) in Dehradun for IFS officers. Each state has

training schools for forestry and one state, Andhra Pradesh, has instituted a vocational training facility for village foresters that are not engaged in the forest service.

2.22 Role of Public and Private Sectors

2.22.1 Role of NGOs

The National Forest Policy 1988 envisaged definite but limited role for non-governmental organizations (NGOs) in assisting in the process of rural development. There are thousands of NGOs and NGO groupings in India which are working to support communities in organizing themselves to provide training, deliver extension services, identify income earning activities and to facilitate market access. SFDs often may include NGOs in the rural extension work, development of micro-plans and other activities in joint forest management schemes. NGOs can play an important monitoring and communication role between communities and forest services. Equity issues, conflict resolution and development-oriented investments at community level may be effectively managed by NGOs trusted by the forest-dependent communities .

2.22.2 Private Forestry Initiatives

The Government has been by far the most important player in the Indian forestry sector. While main forestry activities have remained under the Government domain, rural people have also been practising forestry in their farms, homesteads, and community land to meet their primary household requirements for fuel, poles, timber and medicinal plants. Several different combinations of agro-silvi-pastoral systems are practised by the rural people. With the advent of social forestry, a promotional drive was launched for tree planting in wastelands, institutional lands and non-forest public and private lands. A large number of tree farming and agroforestry enterprises have sprung up all over the country and they are performing an important role as suppliers of forest raw material as well as market products (fuelwood, poles, small timber, bamboo, etc)

A new development in this regard has been the involvement of large pulp and paper companies in supporting such small scale efforts though R&D support, technology extension for establishing clonal plantations and a buyback arrangement for the pulpwood produced. Currently the area of private tree planting (including agroforesry / farm forestry) covers an area of over 6 million hectares. In addition to these, there are also other non-forest sources of wood, namely rubber, coconut, cashew, and mango plantation. The non-forest sources together provide about 50% of total wood supply in the country and probably an equal or larger share of NTFPs.

A number of private companies, industrial houses, private individuals with large holdings, forest farmers, household with gardens, etc are now getting involved in raising forest plantations for producing timber, wood fuel, NTFPs, medicinal plants, etc.. Currently the area of private tree planting covers over 6 million hectares. In addition to these, there are also other non-forest sources of wood, namely rubber, coconut, cashew, mango, jatropha, several woody agricultural biomass, etc.

The private initiatives are not supported commensurately with relevant research, extension, technological packages, input delivery, market information and / or credit facilities. Being private initiatives, these forestry efforts tend to be efficient in terms of growth and yield. But the land

owners can also move on to better economic alternatives if and when such opportunities are available. In the interest of sustainable forestry, it is necessary to encourage the small operators to keep up their interest and to ensure that their needs are adequately understood and addressed.

A number of private companies are now getting involved in raising forest plantations for producing wood raw material. There are some 40 plantation companies in operation. It is early to evaluate their performances. While the Government has dominated the Indian forestry scene for the last 150 years , there is a growing realization now that the private sector should be encouraged to play a greater role than it has hitherto played. It has been widely accepted that there is an urgent need to simplify procedures to allow the private sector to contribute more effectively (Saigal, et. al 2002). The timber transit rules and regulations have been relaxed by some states as a means to encourage private tree planting.

2.23 Research and Development

Research on multifaceted forestry discipline is an important requirement for sustainable forest management. Apart from the apex research body ICFRE having mandate for research in all fields, there are a number of other public institutions engaged on different thematic research areas (IIFM - for application of business management principles to forestry, Wild Life Institute of India - for management research on protected areas. Besides, the state forest departments have also established several state forest research institutions and forestry research setups that carry out R&D on local forestry issues. Further, there are several universities and institutions engaged in research on biology and socio-economic studies relating to forestry.

ICFRE with its network of 8 institutions form the backbone of forestry research in India. The ICFRE institutes are spread across all the physiographic zones of the country focussing on the researches relevant for the forestry issues of the respective zones. The Council not only undertakes research through its institutes, but also has the mandate to encourage and guide forestry education and research in other educational and research institutions in the country. Problem solving task orientation, participation of clients in research planning, demonstration of research results, dissemination and sharing of research information, networking of research institutions, establishment of technology centres to highlight the do how aspect of research are *inter alia* the areas requiring special attention.

2.24Overall State of Forests: Dynamics of Change in Forest Conditions

Forest resources are affected by a complex web of policies and conditions. A varied set of policies have significant direct and indirect impacts on changes in the level of forest resources. Over the last ten years, policy and decision making have been increasingly moving toward integrated and holistic assessment of economic, social and environmental issues. As such, the multiple aspects and potential benefits of forest resources are being directly considered by a rather large number of inter-governmental processes. The importance of forests as tools to generate economic, social and environmental products and services are highlighted in a number of instruments .The UN Millennium Declaration and the Johannesburg Plan of Implementation (JPOI), agreed during the World Summit on Sustainable Development (WSSD), explicitly recognize the link between sustainable forest management and development. Both were concerned on the rapid rate of

deforestation, especially in tropical countries and called for new commitment by both governments and stakeholders for finding ways to address this complex problem. There are a number of international and regional instruments and processes that address the issue of deforestation from different perspectives.

The discussion clearly indicates that with fast economic development forestry is being redefined. People's participation in the form of India's flagship programme of JFM has visible impact on forest restoration. As per the SFR (2001 and 2003) there is marginal increase in forest cover. Forest diversion appears to be halting. There is greater emphasis on poverty alleviation through forestry programmes. NTFPs have come to centre stage providing year round employment and supplementing income of forest-dependent population. Private participation in forestry is also gradually gaining momentum. It is hoped that with SFDs easing out certain legal and policy disincentives this participation may further grow up meeting bulk of India's requirements of forest goods and services. Forestry statistics has to be organized for gathering reliable and up-to-date statistics on all aspects of forestry.

Chapter 3 : Drivers of Change

3.1 Demographic Change

India's population of 1.12 billion (July 2007 estimate), approximately one sixth of the world's population, is projected to touch 1.33 billion by 2020. The national demographic growth rate is estimated at 1.38% per annum, the population density is 336 inhabitants per square kilometer, seven times of the world average. Seven hundred and forty million people (68%) live in rural areas, (growth rate 1.43% per annum). Six hundred million people are dependent on agriculture for their livelihoods, of which 200 million are to some degree forest-dependent whereas 90 million are in scheduled list of tribes under the Indian Constitution and are particularly forest-dependent. Thirty-one per cent of the population is less than 14 years of age while another 64% is between 14 and 64.

The population of farmers is aging rapidly, and the next generation is more focused on opportunities for urban employment. Eighty-eight per cent of the 89.4 million Indian farmers have land holdings in the range of 0.1-2.0ha.

The geographic location of India makes her suitable for human habitation with near optimum living environmental conditions. Therefore, even with a low per capita energy intensity and carbon emission levels, a high density of population is living comfortably. However, with increasing population, per capita availability of natural resources decreases, resulting in increase in cost of living in terms of energy requirement and proportionate use of resources, Based on the above demographic profile (Table 3.1) the energy consumption particularly the use of firewood has also been assessed by TERI (2006) which is reproduced in Table 3.1

Table 3.1: Percentage distribution of households in various income groups using sources other than firewood for heating water

Income group	Firewood	Other sources
Rural low	100	0
Rural middle	70	30
Rural high	60	40
Urban low	60	40
Urban middle	20	80
Urban high	0	100

Source : National Energy Map for India: Technology Vision 2030

The dependency ratio of population on forests shows a declining trend (Fig 3.1). The most likely scenario is also presented in Fig.3.1. However, as the size of population depending on forests increases with faster growth of population, the demand of products and services from forests keeps increasing, albeit at a slower rate than the population.

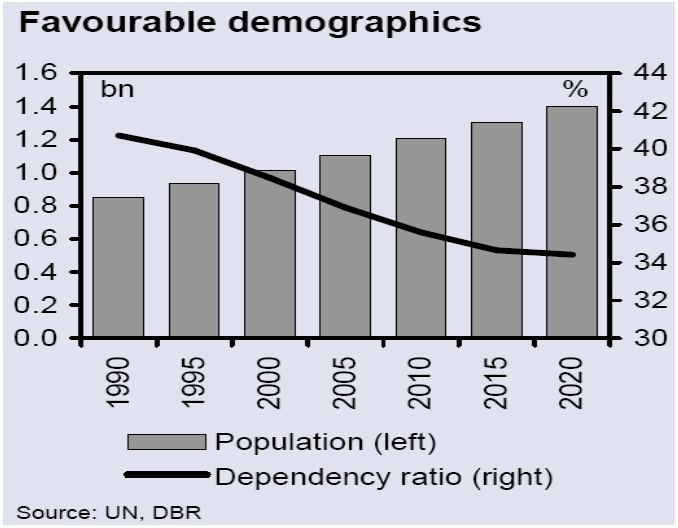

Fig.3.1. Demographics depicting dependence on forest products use

3.1.1 Factors influencing the State of Forests

With the changing demographic situation, the corresponding changes in the various aspects of economic, social, cultural aspects of society also cause changes in the need and utility perceptions o f the natural resources including forests. The influences of the changes include those which govern t he extent of forests, and also those which determine the profile in terms of management concerns rel ated to production, quality, utility and services , etc expected from forests.

3.2 Primary Production

Agriculture remains the primary occupation of majority of population in rural India and foremost focus of rural economic growth. An extent of 141 million hectares (over 42%) of the total geographic area is under agriculture. While our Agriculture Policy does not prescribe increase in the extent under agriculture, diversions from agriculture in favour of urbanization is taking place slowly. In the vicinity of larger urban areas, irrigated agricultural lands are being converted. As the government is committed to increasing the agricultural growth from the present less than 2% to about 4% it is likely that the farmers income will get supplemented by additional avenues of income particularly from dairy, horticulture, vegetable, etc. This is due to expanding road network in hitherto uncovered rural areas. Increasing area under irrigation being a priority of agriculture sector, inclusion of more rainfed areas under irrigation is expected to offset the loss of irrigated farmlands. The corresponding fall in net area is also being offset by increasing use of wastelands, technological advances and increasing investment in suitable production systems in rainfed areas.

With increasing focus on the development of rainfed areas, diversification of agricultural practices, economic sense prevailing over traditional practices is also becoming increasingly visible. In the circumstances, prospects of perennial tree-based crops including agroforestry have significant future. It is complemented by the increasing government efforts and several initiatives by the private sector for networking with farmers on production systems on pulpwood, plywood, biofuels, bamboo, etc. Thus, while not only agricultural developments may not put pressure on forestry in terms of area, it

can also reduce pressure from forests for products and the area supporting perennial tree-based systems could only add to the green cover.

3.3 Infrastructure and Industrial Growth

Infrastructure development is the main focus for sustaining the economic growth rates projected for the coming years. India has committed herself to develop state-of-the-art infrastructure for facilitating growth and improving quality of life. Communication, transport, housing, energy, healthcare and knowledge infrastructure are the priorities. Land is the foremost requirement for these. The safeguards adopted in India in terms of making environmental impact assessments mandatory for development projects and also for decision making on diversion of forests at highest level ensure objective considerations of balanced growth. The rate of diversion of forests for development has been restricted to inevitability in the recent years.

The present target of industrial growth is 10% while that of manufacturing sector is 12%. The concepts of special economic zones and special economic regions are also expected to have strong influence on the socio-economic profile of the people in their catchments, leading to changes in consumption patterns and way of living. Dependence on forests in the areas with forests in the vicinity is also expected to be influenced accordingly. The industrial development is expected to take small and medium enterprise sector in special focus in the coming years. Agro- and rural industry segment depends upon the farm and non-farm production of raw material, large proportion of which comes from forest products. The rural social forestry becomes very important in organizing sustained supply of wood and non-wood products for craft, artisanal and value addition segments of rural industries.

3.4 Urbanization

As per 2001 census, 285 million people (27.8%) live in 5,161 towns. Out of this 285 million urban people, 37% lives in 35 metropolitan cities today, as against 19% in 1951. The projection of urban population by 2020-21 indicates a corresponding size of 433 million. Cities harbouring over 100,000 population account for 68.9% of the urban population and about 23% of the population is estimated to be slum dwellers. The estimated requirement of housing in urban areas in 2002 was about 22.44 million dwelling units. This is estimated to be around 24.71 million by 2007 and 26.3 million by 2012. The requirement projections and housing plans are basically for economically weaker sections and low income groups and any housing development in this section essentially finds wood and wood products affordable for housing. Therefore, the trend can be taken as an indicator of the growth in the requirement of structural material and accessories in the housing sector.

The growing use of industrial material with technologies for efficient use of wood and wood composites together is resulting in increasing use of smaller and low quality wood also for structural purposes, thus bringing the wood-based structural material within affordable prices. Similarly, the increasing use of plantation wood from short-rotation species is also improving the returns from agroforestry practices. For example, growing of poplars, acacias, casuarinas and eucalyptus in north and south India is making agricultural practices more remunerative. The development of rural road network and other rural infrastructure is likely to further improve the economic viability of

agriculture and other land-based activities as the farmers will have better access to urban markets. The trend indicates positive influence on agroforestry development in the coming years.

3.5 Economic Changes

With a per capita GDP of US$3,4032 (2007 estimate which registered 14% increase over 2005), India is a middle-income country. There are major and increasing differences between the rich and the poor, the north and the south, and the urban and rural areas of the country. It is estimated that there are between 300 and 500 million Indians who are heavily affected by poverty (living with less than US$ 1 per day), many of them are living in forest-fringe areas. The most poverty-prone states are in the northeast and central India.

The urban-based economy has grown rapidly through investment in industries and services which are increasingly liberalized from government control. Currently the economy has been growing at about 9% per annum. The projections for the coming years are 9%+. This high rate of economic growth, however, is not commensurate with employment figures. During 2004-05, almost 58% of the population was unemployed. The impetus on agriculture is considered helpful in reducing rural unemployment. Skill development for value addition and manufacturing in small and medium sectors are also recognized as equally important in this respect.

High economic growth, physical infrastructure and industrial sectors have also put pressure on the environmental resources. Increasing education and awareness of the civil society has also brought the environmental sustainability agenda in forefront. The imperatives of conservation of environment in general and forests, biodiversity and ecosystem services in particular have been recognized as essential components of sustainable development.

3.6 Climate Change

With the recognition of climate change as a consequence of anthropogenic carbon emissions in the environment as inevitability, efforts are on in all the possible ways to either mitigate the impact by reducing the emissions or working on adaptation to the changing situations. As the predictions of the impact of climate change are still full of uncertainties, concepts on possible strategies for adaptations are said to be far from clear and the cost of adaptations are also indicated to be much more than mitigation. Further, in the wake of uncertainties, mitigation or reduction of green house gases from the atmosphere is the only option available. The united global efforts in this context, which include UN Framework Convention on Climate Change (UNFCCC) and related protocols, focus on arrangements on limiting the carbon emissions to the lowest levels possible. Carbon sequestration is a very important option available in this context.

Forests can be used as a source or sink of carbon dioxide, which is the most prevalent green house gas (GHG). The role as sinks is presently the most important, in immobilizing large quantities of carbon in the form of biomass for long periods. The release of carbon in deforestation, forest fires, decomposition of litter, withdrawal for human use, etc is also an equally important source of GHG. Thus, the role of forests in climate change is determined by their state of profile and management. The impact of climate change on forests is also expected to be in line with the changes in climatic conditions, to be manifested in species composition, profile, productivity, resilience and biodiversity.

In India, with around 70 million tribal and 200 million non-tribal rural people depending on forest resources for their subsistence needs, climate change would have an impact on their livelihoods.

Forests, whether natural or planted, play a key role in the removal of accumulated carbon dioxide in atmosphere, and sequester it in vegetation, soil and wood products (Sharma *et al*., 2003). Carbon stock is an important indicator of the state of forests in the context of climate change. There are varying estimates of carbon stock in biomass and mineral soils in India. A comprehensive study conducted by Haripriya (2003) takes into account the carbon stored in both above and below ground biomass as well as in the soil. The study estimated the total carbon stock in biomass and mineral soils to be 2, 934 MT C and 5, 109 MT C respectively for the year 1994 and 1995. The average biomass carbon of the forest ecosystem in India for the year 1994 was reported to be 46 T C/hectare, of which 76 % is in above ground biomass and the rest in fine and coarse root biomass. The average mineral soil carbon was found to be 80 T C/hectares.

The forest cover and the growing stock of India has shown a gradual upward trend over the years. However, growing stock per unit area of Indian forests is substantially lower (and hence the carbon in biomass) when compared to other South Asian countries and the global average. The post-Kyoto Protocol negotiations are sure to have carbon sequestration as an important factor of mitigation strategies and Indian forests will have a key role in it. The imperatives of increasing productivity and utilization of forest products for applications which keep the carbon captured for longer period.

Based on the annual average afforestation of 1.16 million hectares as the default rate of afforestation, the mitigation potential of forestry has been analysed by Ravindranath *et al* (2006). The studies indicate that in the period of 20 years (2005-2025) mitigation potential of short-rotation forestry options for carbon stock may vary from 63 TC/hectare in case of hot arid region to 101 TC/ hectare in northern and eastern plains. In the case of long rotation forestry, the potential varied from 58 TC/hectare in the case of Eastern Ghats, Western Ghats and coastal plains to 118 TC/hectare in northern and eastern plains. The mitigation potential of natural regeneration option varied from 71 TC/hectare to 89 TC/hectare.

3.7 Political and Institutional Environment

The forestry institution in India is well organized but needs to gear up to deal with emerging demands and challenges. Meeting expectations of the stakeholders would require significant changes in the roles and responsibilities as well as structure of the forest administration. The increasing decentralization of the democratic processes, community empowerment, participation in decision making, increasing inter-sectoral linkages, economic aspects governing the decision making require urgent development of skills of interpreting the conservation and ecosystem services in economic terms and support to conservation on the basis of economic imperatives.

The use of modern technologies and concepts in natural resource management planning and implementation needs suitable and compatible changes in governance and documentation systems. The auditing system could include environmental audit as an integral part of the social audit. A long-term strategy will be needed to deal with the challenges of improving governance, accountability and transparency in all spheres of central and local governments, the corporate sector and community levels.

3.8 Impacts on Forests

3.8.1 Change in Forestland Resources

The growing concern for environment and sustainable development and India's commitments to the global environmental concerns have been increasingly influencing the greening movement in the country and bringing more areas under plantations. The steadily enhancing green cover along with reduction in cultivable wastelands indicates the effective policy and programmatic interventions towards optimisation of land use. It is expected that the cultivable waste and degraded lands will decrease substantially in favour of the green cover.

The pace of economic growth including infrastructure and industrial growth is sure to influence the demand for forest products and it is certain that the business-as-usual scenario is unable to keep pace with the demands. An analysis of demands of wood, which is a major indicator of forest products, is given below.

3.9 Growth Pattern in Demand for Wood

The total industrial demand of wood, in terms of round wood equivalent (RWE) is expected to go up from 58 million cubic metres in the year 2000 to 153 million cubic metres in the year 2020,

Table 3.2 reveals that the average annual rate of growth of demand of timber in RWE from 2000 to 2005 will be 5.52%, which will increase till 2014 and then the rate of growth of demand shows decreasing trend between 2015 and 2020 .

Table 3.2: Growth pattern of future demand of wood

Year	Demand (million cubic metres)	Percentage increase (average per annum)
2000	58.00	-
2005	74.00	5.52
2010	95.00	5.68
2015	123.00	5.89
2020	153.00	4.88

This slight decline in the growth rate in the later decade will be due to plateau in infrastructure growth and focus on maintenance.

The growth rate reaches a plateau by 2015 and then declines to maintain the status. The use of wood may not decrease as the wood proves to be the best environment-friendly material for structural purposes and sought after in energy saving in the sense of renewable option.

Alternatives/substitutes from metals, synthetic composites, etc would be on a downward trend because they involve energy and carbon intensive processing, apart from being non-renewable.

3.9.1 Demand of Wood from short and long rotation Tree Species

Future demands of wood may be projected in terms of wood from short- and long-rotation tree species. The forest-based industries use wood not only from absolutely short-rotation (SR) or long-rotation (LR) species, but also in varying mix depending upon availability. Based on this assumption, the projected demand of wood from short- and long-rotation species have been projected separately in Tables 3.3 and 3.4 respectively.

Table 3.3: Projected demand of RWE from SR species

(million cubic metres)

S. N.	Industry	2000	2005	2010	2015	2020
1.	Paper and paperboard (100%)	4.48	8.96	15.50	26.64	35.84
2.	Newsprint (100%)	1.78	2.56	3.42	4.63	6.22
3.	Rayon grade pulp (100%)	2.50	2.80	3.10	3.40	3.80
4.	Construction industry (20%)	3.18	3.88	4.42	5.26	5.70
5.	Packaging (50%)	2.31	2.77	3.20	3.78	4.50
6.	Agricultural implements (50%)	1.06	1.17	1.25	1.25	1.25
7.	Sports goods (50%)	0.18	0.29	0.49	0.84	1.37
8.	Plywood (50%)	5.50	7.0	8.98	11.45	14.60
9.	Veneer (50%)	0.14	0.17	0.22	0.27	0.35
10.	Matchbox (100%)	2.30	2.60	3.00	3.40	4.00
11.	Mining (50%)	1.60	1.75	2.00	2.25	2.50
12.	Miscellaneous industry (50%)	2.85	3.35	4.70	5.60	7.58
Total		27.87	37.30	50.18	68.76	87.70

Table 3.4: Projected demand of RWE from LR species

(in million cubic metres)

S. N.	Industry	2000	2005	2010	2015	2020
1.	Construction industry (80%)	12.72	15.52	17.68	21.04	22.80
2.	Packaging (5%)	2.31	2.77	3.20	3.78	4.50
3.	Furniture (100%)	2.52	3.36	4.62	5.9	7.53
4.	Automobile (100%)	0.19	0.28	0.41	0.60	0.87
5.	Agricultural implements (50%)	1.06	1.17	1.25	1.25	1.25
6.	Railways sleepers (100%)	0.03	0.03	0.22	0.02	0.02
7.	Sports goods (50%)	0.18	0.29	0.49	0.84	1.37
8.	Handicraft (100%)	0.45	0.54	0.65	0.78	0.95
9.	Plywood (50%)	5.50	7.00	8.98	11.45	14.60
10.	Veneer (50%)	0.14	0.17	0.22	0.27	0.35

11.	Particleboard (100%)	0.14	0.18	0.22	0.28	0.35
12.	MDF board (100%)	0.14	0.17	0.21	0.24	0.28
13.	Mining (50%)	1.60	1.75	2.00	2.25	2.50
14.	Catamaran (100%)	0.03	0.05	0.07	0.11	0.16
15.	Miscellaneous industry (50%)	2.85	3.35	4.70	5.60	7.58
Total		29.85	36.63	44.92	54.40	65.10

The summary of demand projection for industrial wood from SR and LR species is shown in Table 3.5.

Table 3.5: Summary demand projection of industrial wood from SR & LR species
(in million cubic metres)

Source of wood/year	2000	2005	2010	2015	2020
Wood from SR species	27.87	37.30	50.18	68.76	87.70
Wood from LR Species	29.85	36.62	44.92	54.40	65.10
Total (% growth)	57.72	73.92 (5.52)	95.10 (5.68)	123.16 (5.89)	152.80 (4.88)

The demand of wood from LR species is almost equal to that from SR species up to 2005 . But by 2020, the demand of wood from SR species will be 33% more than that from LR species. It clearly shows that in future, industries will require more wood from the SR species i.e. from farmlands and other non-forestlands. Though some of the SR species like bamboo comes from forests and similarly some hardwood species like *shisham* comes from private land also, but most of the SR species are grown in private lands and LR species in forests.

3.9.2 Plywood and Panel Industry

The panel industries identified to be using wood are plywood, veneer, particleboard, MDF board, etc. The demand projections for these products are summarized in the Table 3.6, and Fig.3.2 .

Table 3.6: Projected demand for panel wood
(million cubic metres)

Year	Plywood	Veneer	Particleboard	MDF board	Total
1998	10.10	0.25	0.13	0.13	10.61
1999	10.50	0.26	0.13	0.14	11.03
2000	11.00	0.27	0.14	0.14	11.55
2005	14.00	0.34	0.18	0.17	14.69
2010	17.96	0.43	0.22	0.21	18.82

2015	22.90	0.54	0.28	0.24	23.96
2020	29.20	0.70	0.35	0.28	30.53

Source : Table 5 .4 of "*Forest and Wildlife Statistics, India 2004*"

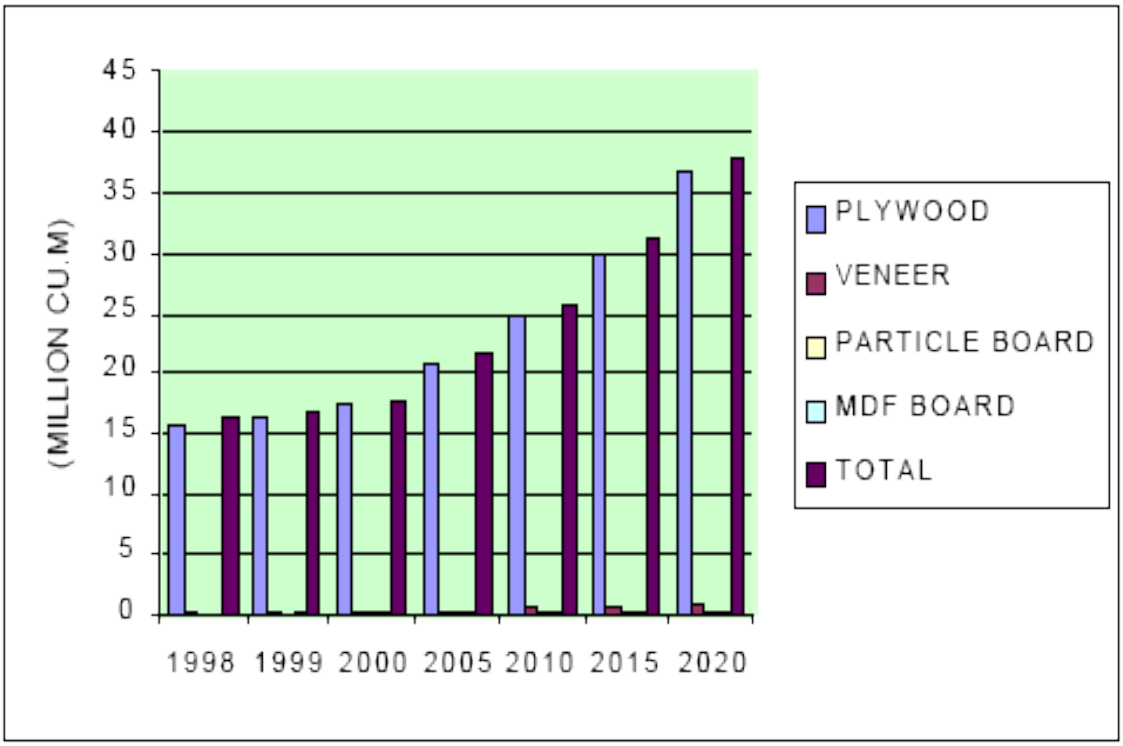

Figure: 3.2 Projected demand for panel wood

3.9.3 Paper and Pulp Industry

The pulp and paper industry is considered as one of the high consumers of forest-based raw materials. However, on average the industry in India uses only 3.5 % of the total wood from forests. Nearly 90% of the wood from forest is being used as fuel (Fig.3.3).

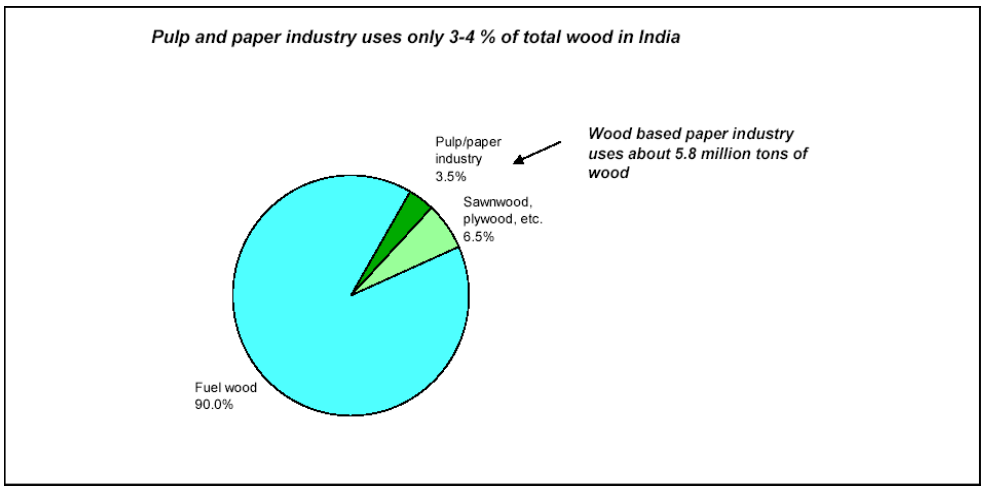

Figure: 3.3 Wood consumption in India

The industries consuming pulpwood are primarily paper and paperboard, newsprint and rayon grade pulp. The demand projection for pulpwood-based industries are given in Table 3.7.

Table 3.7: Projected demand of RWE for pulpwood - based industries
[million cubic metres]

Year	Paper and paperboard	News-print	Rayon grade pulp	Total
2000	4.48	1.78	2.50	8.76
2005	8.96	2.56	2.80	14.32
2010	15.40	3.42	3.10	21.92

2015	26.64	4.63	3.40	34.67
2020	35.84	6.22	3.80	45.86

The pulp and paper industry is the most important cellulose fibre-based industry in India with a turnover exceeding INR.100 million. There are more than 380 mills with installed capacity of nearly 5 million tons. Historically, the industry has grown @ 5% per annum, but during the 1990s, the growth rate has been faster around 8%. Most of the mills are very small compared to international standards; 315 (83%) of the mills have less than 10,000 tons per annum capacity. Only four mills have installed capacity over 100,000 ton per year. The per capita consumption of paper in India is very low - around 5 kg compared to world average of around 50 kg and 40 kg for Asia Pacific Region .

Each ton of paper production requires approximately 4 tons of freshly harvested pulpwood. The present forest resources are inadequate even to meet fibre demand of existing pulp mills. There is tremendous scope for the farm forestry sector to increase production and bridge the growing gap between demand and availability of pulpwood. For example, 14.4 million tons of additional pulpwood will be required annually to bridge the projected gap of 3.6 million tons of paper by 2010-2011. The demand of wood in paper industry is likely to increase to 13.2 million tons by the year 2020. Fig.3.4 shows the demand of wood in Indian paper industry.

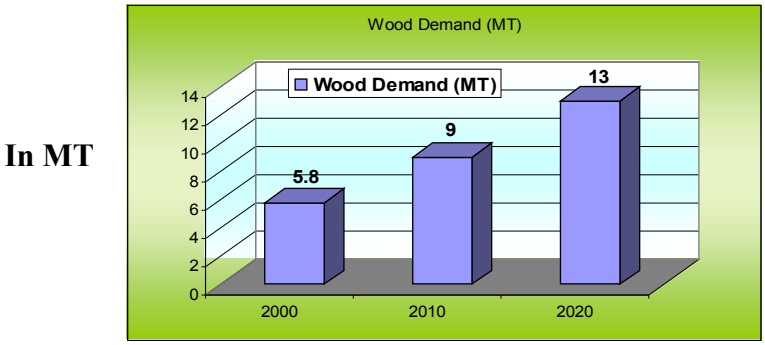

Figure: 3.4
Demand of wood for Indian paper industry

3.9.4 Plantation and Wood Production

Several initiatives have been taken by the Indian industry for meeting the demand of raw material, The attempts have mostly started after 1988 NFP prescriptions advocating industry farmer interface. By 2005, nearly 343, 000 hectares of farm forestry plantations have been promoted by the paper industries over a period of 16 years who are the members of Indian Paper Manufacturers Association (IPMA). It is estimated that this land mass can produce approximately 20 million tons of wood at 60 tons/hectare yield [Table 3.8].

Table 3.8: Company-wise data on plantations promoted under farm forestry.

S.N.	Company	Plantations (hectares)	Estimated wood generation

			(lac MT)*
1	ITC	42000	25.20
2	BILT	40000	21.00
3	JK	46000	27.60
4	APPM	29000	17.40
5	SPM	15000	09.00
6	TNPL	2000	01.20
7	SPB	200	00.12
8	Orient	27000	16.20
9	Century	17000	10.20
10	Star	35220	21.13
11	MPM	35000	21.00
12	HNL	30000	18.00
13	WCPM	25000	15.00
	Total	343420	203.05

*= @ 60 MT/hectare yield. Lac – 100,000

The current level of promotion of planting by the industry is 65,000 hectares. To meet the additional annual requirement of 3 million tons of pulpwood, an additional planting of 50,000 hectares is required at the prevailing productivity range. Therefore, every year nearly 115,000 hectares of plantation is to be carried out by the industry to meet the pulpwood demand on continuous and sustainable basis. With increasing focus on R & D and genetic improvement initiated largely by the private sector, a twofold increase in the productivity can be projected as feasible.

Table 3.9: Farm forestry plantations in last 5 years promoted by industry

Year	Area planted (hectares)	Yield/hectare (MT)	Estimated wood generation (million MT) in the year
2001-02	16,000	60	2006-07 = 0.960
2002-03	25,000	60	2007-08 = 1.500
2003-04	36,000	60	2008-09 = 2.160
2004-05	45,000	60	2009-10 = 2.700
2005-06	65,000	60	2010-11 = 3.900

Apart from the industry's effort, farmers on their own are also raising plantations, be it clonal or seed root, which is adding to the general availability of wood to the industry. Therefore, the industry today is getting almost 5.0 to 6.0 million tons of wood annually through farm forestry. With improvement of markets apart from technologies for increasing productivity, this sector is expected to expand many folds in coming years.

3.9.5 Meeting the Demand for Raw Material by Wood-based Industry

Efforts have been made to work out the strategies for production of wood required by wood-based industries for meeting the raw material requirements.

The total area of tree plantation in the year 1999-2000 [1, 7], under different schemes was 31.2 million hectares. This includes part of degraded forests also, but then there is no separate data on plantation on forest and non-forest lands. The majority of plantation was in non-forest lands. Out of 31.2 million hectares, 10.26 million hectares were planted by way of seedling distribution among farmers and the rest 20.94 million was block plantation. The Forest Department and Forest Corporation have been planting 70% of the fast growing short- rotation species and 30% long-rotation species. Out of which the estimated survival rate as per FAO study is around 62% and assessment by NAEB through field survey also comes to an average of 60%.

Assuming the rotation period of plantation timber is 7 to 10 years and that of teak 20 years, the economics of growing plantation timber is compared with that of teak in Table 3.10

Table 3.10: Economics of growing poplar, eucalyptus, teak and kadamba sp.

Species	Poplar	Eucalyptus	Kadam*	Teak
Rotation years	7	10	8	20
No. of trees/hectare	500	1,250	320	475
Expenditure/hectare in INR	82,292	113,215	43,776	209,715
Benefit (in INR)	272,533	266,220	68,124	419,961
B:C ratio	3.31	2.33	1.6	2.0
IRR %	68	32	31	30

***** *Anthocephalus kadamba*

The requirement of land (both degraded and agroforestry land) for the plywood industry is worked out and projected in Table 3.11. From the Table it is clear that the total land requirement for the plywood industry in 2005 is 0.91 million hectares, in 2010 – 1.8 million hectares, in 2015 – 2.29 million hectares and in the year 2020 it is 2.63 million hectares. This is assuming that 70% of plantation timber and 30% long-rotation timber are used for the manufacture of plywood. Further, assuming the cost of plantation for long-rotation hardwood timbers as INR.40,000 per hectare and for short-rotation plantation timber as INR.25,000 per hectare, the cost involved to carry out plantation in both degraded and agroforestry land works out to approximately INR.33,000 million in 2005, INR.63,000 million in 2010, INR.68,000 million in 2015 and INR.79,000 million in 2020. It is five times the budget available at present. It may not be possible by the Government alone, hence corporate sectors, and the bulk consumers of wood have to come forward to invest for this cause to get their requirements. It is suggested that the wood-based industries can fulfill this huge task in two ways. Firstly, they have to make available funds and participate in the management of degraded forests along with the Government as formulated by MoEF, Government of India and secondly they have to establish relationship with farmers and individuals by providing them quality planting materials. Unless this task is taken on war footing the requirement of raw material by the wood-based industries will not to be fulfilled.

Table 3.11: Land requirements for growing plantation timber/hardwood species for the plywood industry

Year	Yield of plantation timber/ hectare/year	Yield of long rotation hard- wood timber/ hectare/year	Projected demand of round wood equivalent of plantation timber in million cubic metres	Projected demand of round wood equivalent of hardwood timber in million cubic metres	Total land requirement in million hectares for growing timber for the plywood industry	Area already available under plantation or production in public/ private domain
2005	20 cubic metres	10 cubic metres	9.80	4.20	0.91	
2010	"	"	12.57	5.39	1.80	
2015	"	"	16.03	6.87	2.29	
2020	"	"	20.44	8.76	2.63	

The shortages of industrial raw material and the increase in its price have forced the industries to look for alternative avenues. The import of timber from other countries is on the rise. The industries have also started obtaining a part of their raw material requirement from farmers. It is hoped that in a decade or so, the linkage between forest-based industries and farmers for short-rotation tree species, will develop to such an extent that dependence of panel industries on timber grown in natural forests will be reduced considerably. However, for meeting the growing needs of saw milling and the plywood industry degraded forests will have to be regenerated and planted with long-rotation tree species like teak (*Tectona grandis*), *gurjan (Dipterocarpus turbinatus)*, makai (*Shorea assamica*), *dhup* (*Canarium spp.), Vateria indica*, *pali* (*Palaquium ellipticum*), and *poon* (*Calophyllum inophyllum*) .

Table 3.12: Timber import trend [in '000 cubic metres]
(value in million rupees)

Particulars	2002-03	2003-04	2004-05	2005-06
Logs	16,033.9	30,681.4	37,371.0	36,817.4
Sawn wood	341.8	566.07	608.2	924.0
Plywood	168.8	193.1	233.6	365.1
Veneer	159.9	165.5	226.1	492.4
Particle board, etc.	346.4	608.7	767.3	1,178.6
MDF/Hardboard	487.6	600.5	813.2	1,237.8
Wooden furniture	322.5	563.2	787.4	1,368.6
Grand total INR.	17,860.9	33,378.4	40,806.8	42,383.9

Source: Directorate General of Commerce, Intelligence and Statistics, Kolkata.

3.9.6 Trees outside Forests (TOF)

Trees growing outside forests (TOF) is the single most important and cost effective strategy for achieving the goal of 33% forest / tree cover envisaged in the National Forest Policy 1988. It also helps in achieving the important additional goal of poverty alleviation.

Trees growing outside forests provide a viable diversification option and help in making farm management practices competitive, which is much desirable in the present era of globalization. TOF help in achieving ecological security by improving soil and water conservation, and have immense potential for socio-economic and cultural development. Therefore, TOF plantation programmes should be fine-tuned to be more responsive to the social, cultural and economic needs of the stakeholders.

We should take into account both economic and ecological aspects of TOF. The key lessons such as people's empowerment, assessment of rural need at village level, involvement of local institutions, civil society, and self help groups need to be incorporated in all future programmes of planting trees on non-forest lands.

A strong extension network with a responsive research support system is the key issue for the success of such type of forestry projects. The Forest Department should have strong extension setup, on the lines of Agricultural Department, to provide timely guidance to the community in making right choice of species for planting outside forests, tending of plantations to maturity, their value additions and most importantly marketing of the produce at remunerative prices. For increasing tree cover outside the forest area, there is an urgent need to develop synergy among various departments and extension research agencies working in the field.

There should be a nodal apex body / committee comprising representatives of concerned ministries / departments i.e. forest, agriculture, rural development, commerce and industry, etc at the Central level to take the mission of agroforestry to its logical conclusions of ensuring financial prosperity and ecological security to the practicing communities. The Forest Department should be the nodal department for this exercise.

3.10 Trends and Changes for Reflecting True Economic Value of Forests

Despite making considerable contribution to India's economic and ecological systems, the forests of the country do not get befitting attention in the national income (GNP) of the country and the current value of forest reflected in the System of National Accounts (SNA) represents less than 10% of the real value (0.7% of GDP in 2005-06). It is mainly due to lack of availability of methodology for valuation and estimation of true contribution of forest services to the economic system.

The basis for estimating economic value of a resource or an environmental amenity is its probable effect on human welfare. There is lack of understanding of the true role of forests in the well-being of the people. Forestlands have become degraded on account of overuse and mismanagement, the investment in the sector has not kept pace with the removals and the few resources available to the forestry sector are often put to non-productive uses. Whereas the investment in the manmade capital and financial capital is on the rise, the forestry sector due to lack of appreciation of its true and total

value has always been less appreciated and thus has received less budgetary allocation and investment. Low investment in the sector is the resultant of low annual growth of the sector as compared to other sectors of the economy.

3.11 Inter-Sectoral Linkages and Economic Growth

The rising demand for and pressure on land as well as forest boundaries make inter-sectoral planning and implementation essential. Besides the local pressure exerted by demographic increase in the agrarian rural population, there is increasing competition for land for mining, infrastructure, housing, tourist facilities, hydropower generation and water supply. The non- availability of sufficient central or state level codes for integrated land use planning, and clear guidance on priorities for selection between incompatible land uses, it is likely that states will prefer the higher financial yields apparently available in the short term from non-forest use. This provides another good reason for using total economic value (TEV) in land use planning and coordination, where TEV includes forest services as well as forest goods.

Three examples indicate why inter-sectoral planning need higher priority:

a. The Central Government plans to electrify all rural areas by 2009. What effect that electrification is expected to have on fuelwood consumption, which is currently estimated to comprise 85% of woody forest harvest by volume, will require in-depth analysis. The most imminent scenario that emerges is that because of the lack of uninterrupted supply of electricity, it may not be possible to use electricity for cooking by replacing wood fuel. The electricity in rural areas may be used for lighting and irrigation purposes. With the intensification of agriculture and use of agroforestry, there may be abundant supply of fuelwood at the doorstep of farmers thus easing the pressure on natural forests.

b. Natural regeneration in large areas of notified forests is damaged continually by free-grazing village-owned cattle. Stall-feeding milch cows with high-yielding fodder produced in agroforestry schemes can be seen in some demonstration areas. There remains the problem of large number of steers (male cattle) roaming free and with only limited demand for animal traction (pulling carts and ploughs and other agricultural tilling implements). The cultural sentiment is strongly against slaughter of excess steers. The need of understanding of financial losses in foregone forest growth because of cattle browsing and trampling, and optimum options for managing the cattle population will demand better coordination with the livestock department on provision of dry-season forage. The reduction in scrub cattle and improved supply of cultivated fodder may improve the milk production and may further supplement the farmers' income on the one hand and reduce the pressure on forests for grazing on the other.

c. In education, a quantum jump in investment is envisaged from 2 % to 6% of GDP. India is also developing into a global hub for quality printing at competitive cost. The major paper and pulp mills in India have planned expansion of over 63% in coming years. Currently, the paper mills have been using up to 30% recycled fibre, 31% agro-based raw material and 39% wood. According to CII study (2006), the projected use of raw material by 2010 is going to be 30% recycled fibre and 28% agro-based material. The wood requirement, as raw

material, is pitched at 42% against 84% prevalent in 1970s. However, this trend may come back with more emphasis on wood resources grown outside forests. A number of paper mills (e.g. ITC) have already demonstrated the usefulness of partnership with farmers. Another compelling reason for India to grow its own raw material is the likely competition from China and other neo economies who will be competing for raw material from Asia, Africa and Latin America. The New Zealand raw material may not be enough to meet the growing demands of paper mills in India and other countries

It is essential to monitor the development in closely linked sectors and assess the trend of forests growth and productivity.

3.12 Trends in the Overall Development

There are a number of indicators showing all round improvement and all these are likely to have positive influence on the forestry sector. One of the most important attributes would be governance indicators. For this purpose three major economies of Asia viz., Singapore, China and India have been compared for control of corruption, role of law, regulatory governance effectiveness, political stability, voice and accountability (Fig.3.6).

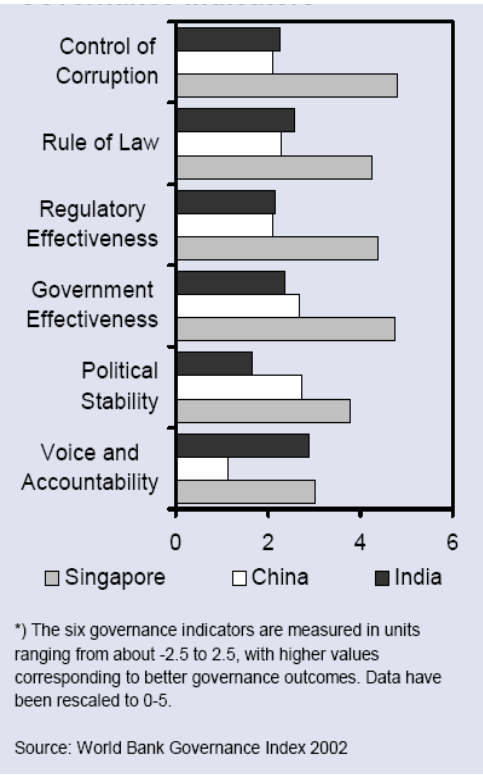

Fig.3.5 : Governance indicators

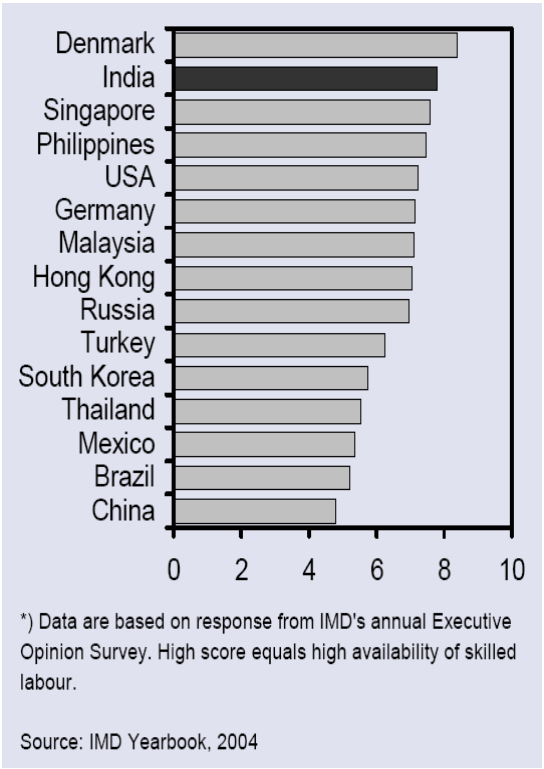

Fig.3.6: High availability of skilled labours

In respect of the last indicator (voice and accountability) India and Singapore are similar and ahead of China. In many other indicators, while India is either better off or equal to China but much behind Singapore. Looking to socio-economic and demographic mix it is not really surprising. Instead of comparing with Singapore it is better to compare with China as both are most populous

countries of the world. Further, in respect of high availability of skilled labour, India is only next to Denmark and ahead of many other developed and developing countries (Fig. 3.5).

Another measurable indicator is household consumption bundle calculated in 2002 and projected for 2020 which shows favourable economic scenario and corresponding spending on essential items. The reduced depredation of forests and uplifting of population above poverty line will have positive impact on forest health of India as is given in Fig.3.7.

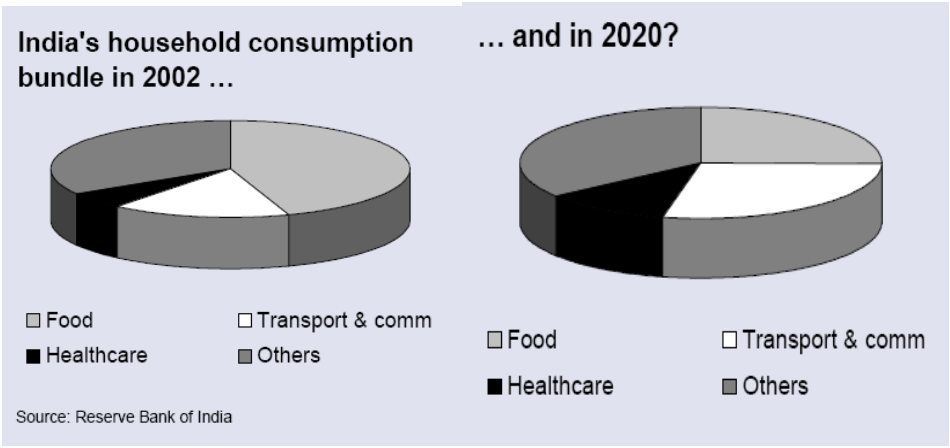

Fig. 3.7: Projected household consumption bundle in 2020
Adopted from Jennifer Asuncion-Mund. *India rising: A medium-term perspective* .Deutsche Bank Research May 19, 2005 India Special, Frankfurt

3.13 Future Energy Demand and its Implications on Forests

India's requirements of firewood at the close of the century have been variously estimated between 225 million cubic metres and 350 million cubic metres (Chakravarti, 1985). Taking conservative estimates of the requirements and optimistic estimates of per hectare fuelwood production, the country will require a minimum of 25 million hectares of land for intensive fuelwood cultivation. At the country level, it appears that there would be no difficulty in finding adequate land for fuelwood production, but in view of the ecological and socio-economic imbalances in the country, much investigative study will be required at the meso- and micro- levels to arrive at the local targets of production, land requirements and technology. In subsequent assessment (ITTO, 2003) the current level of fuelwood consumption has been assessed to be 280 million cubic metres which is projected to go up to 400 million cubic metres in 2020. This is quite reasonable to assume when FAO (1997) has projected fuelwood consumption of 262.782 million cubic metres in 1993 and 302.387 million cubic metres in 2010.

Fuelwood is likely to continue to be the most important fuel for cooking and heating particularly in rural areas in the vicinity of forests. However, the proportion of fuelwood from forest and non-forest sources is likely to remain at 50:50. Presuming the current trend of decadal population growth there is no likelihood of any perceptible change in the present amount of household fuelwood consumption. This optimism is based on the projected trend for use of LPG for heating water and cooking among rural middle (20%,) rural high (20%), urban low (10%) and urban

middle (60%) classes. Gradually LPG supply is reaching the slums and rural areas in the vicinity of medium and small towns as well.

Another cause for optimism is due to likely expansion of agro / farm forestry. Growing of eucalyptus, casuarina, poplars, sissoo, and some other local species have demonstrated their economic potentials to the farm income. Besides yielding wood for supply to forest-based industries these may also meet the demand of small timber and fuelwood. Surplus production of wood may also act as feed to the brick kilns and similar other rural industries. The changes in felling and transit rules which has so far throttled the growth of tree cultivation is becoming evident because of imminent growing pressure on forest-based industries to develop partnership with farmers and have committed supply of wood or resort to uncertain and expensive sustained import of raw material to keep the industries alive. There is visible eagerness on the part of SFDs and Government of India to create enabling environment for above developments.

3.13.1 Economics of Wood Energy Use

The present economic boom is gradually improving the economic conditions of urban poor. With convenient availability of alternative fuels as well as added advantages of convenience of use, the reduction of societal risk from smoke etc, and affordability with improved economic status, preferences for alternative fuels are increasing. These include LPG, kerosene and in some cases, even electricity. All these measures are likely to reduce the wood fuel consumption in urban areas. With increasing awareness, procurement of illegally collected forest products including fuelwood in commercial establishments like hotels and brick kilns etc is also falling. Environmental norms also discourage energy deficient systems in industry sector, resulting in fall in demand of firewood.

3.13.2 Technological Changes with Alternative Fuels (Biofuels)

Growing biofuel crops is becoming a visible cultivation activity in rural areas. While conventional crops like sugarcane has an additional utility for use as a blend in conventional fuels, oilseeds, especially non-edible ones have emerged as an option for cultivation in rainfed, low capability lands. The bio fuel can also be used for domestic purposes such as lighting and cooking. People are gradually switching over their preference for use of clean fuel and that may help in reducing the fuelwood consumption. These appliances and technologies have been in vogue for quite sometime but due to their primitive technologies and lack of maintenance they had hardly an impact on the energy consumption pattern. However, modern technological advances in the use of conventional fuels like gasifiers, better biogas systems, use of biodegradable waste for electricity generation, integration of electronics in propulsion technology etc will be an important aspect of energy budget in the coming years

3.14 Impact of Globalization

India like China is working towards sustained supply of forest raw material for industry. The pressure on forest resources may become intense in time to come as the forest harvesting in parts of Africa, Latin America and Southeast Asia cannot suffice the growing need . Some of the countries in Southeast Asia (e.g. Indonesia) have already adopted pro-conservation approach. Sooner than later, some of these countries may resort to self regulation and in the absence of commensurate

investment in forest plantations the resources may not last long. These developments are likely to make the importing countries like India and China to make further investment in production forestry. Private participation in forestry in India is being presently examined. In time to come it may become imminent. What is required is the change in certain rules like easing out the land ceiling act, felling and transit rules. Liberalization has already prompted governments to sanction special economic zones (SEZs). SAARC member countries have sustainable forestry development as an important subject. Some other regional groupings with other Asia-Pacific countries are also in existence. Right now it is not very clear about the trade in forest products amongst the members of these countries but in future it may develop. In addition, India has bilateral cooperation on SFM with China and other countries of the region. These types of bilateral cooperation may expand and develop into a formidable combination for development and generation of forest products.

With WTO requirements coming into play, many trade barriers (tariffs and non-tariffs) will go and liberalized import and export of forest products will be ensured. With economy growing , the common man will have easy access to material affordable to them.

3.15 Technological Changes within and outside Forest Sector

Information technology is gradually emerging as an important tool for assessment and decision making in planning and management of forest resources. Forest Survey of India, Dehradun is already using remote sensing technique in forest assessment on bi-annual basis. Presently, it is limited to assessing the changes in forest cover on snap shot basis. With the refinement of technology, the assessment is likely to provide more useful data for forest planning and management.

Tissue culture and clonal propagation are already being extensively applied by forest-based industries to produce quality planting material and it has revolutionized the plantation forestry. Improved technology has also found many applications in processing of secondary tropical species. Material hitherto used as fuelwood is now being converted to produce decorative furniture. Similarly, the paper pulp and hardboard technology are making use of all types of forest wood in producing durable material for house building and furniture. This is likely to replace the use of sawn planks and optimize the use of wood. Thus, the same production technology is likely to provide better economic returns to industry and help all class of consumers meeting their requirements.

The availability of improved technology for processing and value addition of non-timber forest products, can ensure remunerative returns to gatherers, besides providing opportunities of developing rural enterprises for value addition and trade. Forest certification as a modern management tool has the potential to provide the gatherers and rural entrepreneurs better access to international markets. The technology application can also boost the income of gatherers. Initially, the due benefit may not be adequately apportioned by the poor gatherers. However, the joining of self help groups with them and having access to microfinance and storage facilities, is likely to improve their condition.

3.16 Environmental Issues and their Impact on the Forest Sector

The adverse impact of climate change is becoming more and more visible. The consequences of climate change on the monsoon pattern and natural calamities; and its impact on crop production, receding glaciers, biodiversity, land degradation, desertification and soil erosion has become the subject of discussion. Carbon sequestration and storage forestry are being considered as viable and acceptable climate change mitigation strategies. This would require more international understanding so that it is accepted for global funding. Although it has started receiving global attention, there are still many elements of uncertainties and non-clarities which would require considerable time to address.

In future, India's forests will have to be managed holistically, taking into account tangible and intangible benefits and involving forest communities and other stakeholders who will participate directly as shareholders. There are four major forest ecosystem services for which there is a clear demand. Forest communities could be rewarded for conserving biodiversity, providing carbon sinks, protecting watersheds, and maintaining scenic beauty or recreational values. But the only way this can happen is, if these services have real values attached to them. Paying for ecological services from forests is a phenomenon gaining ground world over, and many countries are already on this road to conservation. However, this money needs to go back to the forest communities through a system of localized payments as incentive to conservation. Thus, a "beneficiary pays" principle may be critical to sustainable forest management, where the people who benefit from the services, pay incentives to local forest communities. Putting a true value to forests could transform the way sustainable forest management is achieved

3.17 Forestry Research

The role of forestry research as an important catalyst in poverty alleviation, providing the most desirable goods, enriching services to the society, ensuring environmental security of the country and contributing towards addressing global concerns has assumed much greater importance today than ever before. Today, there has been a growing concern about conservation and sustainability of resources and the rise in environmental problems, such as global warming, biodiversity loss, pollution of water, depletion of the ozone layer, desertification and carbon sequestration. In the National Forest Policy document, priority areas of research and development needing special attention have been identified for achieving the objectives of the Policy.

There is need, therefore, to lay befitting emphasis on latest scientific forestry research necessitating adequate strengthening of the existing research base as well as new priorities for action. Some of the important areas where research input is vital are: agroforestry, watershed management, coastal area management and protective afforestation, high yield plantations, technological factors that limit yields, wildlife conservation and management, multipurpose forest management, genetic resources conservation, and forestry interaction with other sectors. Forest research needs to be more strengthened to make it more compatible with national priorities . It should be a catalyst for rural livelihood support and more people focused.

3.18 Forestry Education

Forestry both as a scientific discipline as well as a profession is fast emerging as multidisciplinary vocation with multi-sectoral dimensions and applicability. The higher education, therefore, is to tune to the present day requirements. The Forest Research Institute, University, [deemed university of Forest Research Institute, Dehradun] in conjunction with other agricultural universities and institutions, is dedicated to develop forestry education, formulate curricula, and design courses for imparting education and promoting postgraduate research and professional excellence, keeping in view the manpower needs of the country. There is need, however, to further strengthen their efforts and provide adequate support. Specialized and orientation courses for developing better management skills of in-service personnel also need to be encouraged taking into account the latest development in forestry and related discipline. Forest departments in the country and the Government of India should further encourage universities and organizations to take up higher education and research proactively, particularly applied research.

Chapter 4
Probable Scenarios and their Implications

4.1 Rationale for Scenario Definition

Forestry development is an outcome of the current policies, institutional development, socio-economic imperatives and international commitments. Both (a) developments within the forestry and allied sectors and (b) the external drivers will govern the future forestry scenario. Patterns of economic growth, developmental priorities, demography, skill development, and employment and migration profiles are among the important external drivers. Over 30% of the population lives below poverty line, and the sector's role in alleviating rural poverty, particularly in forest fringe villages, is critical for constraining overexploitation of forest resources and mobilizing adequate social and political commitments for its development. Awareness and appreciation for forestry as critical land use and key element of sustainable development are the vital for the sector. Long-term perspectives and strategic planning are inevitable in an effective forest planning and management. Sustainable growth of the sector will ultimately depend on developing competitive advantages through increasing efficiency (improved technology and operation), responsive management, and equitable flow of goods and services through superior resource governance.

4.2 Elements used in defining Scenarios

Some of key elements used in visualizing future forest scenario include (a) large population with remarkable demographic structure of substantially large young age class and somewhat higher population growth in rural areas (b) trends of economic growth, investment in agriculture, watershed and rural development; and (c) rural employment potential in forestry and allied sectors. Increasing import of raw material for meeting the requirements of forest-based industries and various consumer wood products such as furniture is also a significant development. The emergence of local and sub-national issues resulting in strong provincial political parties are likely to affect the consensus-building process pertaining to forests and natural resources demanding long-term commitments and concerted efforts of various stakeholders.

4.2.1 Priorities of Forest Management

The looming environmental crisis made it necessary to emphasise the conservation of forest as expressed in the Forest (Conservation) Act 1980, the National Forest Policy 1988, and the National Environment Policy 2006. The production functions of the public forests have lower priority. Logging operations in natural forests are discouraged, and locally banned in several areas. Imports of logs and wood products are liberal. Wood scarcity has provided impetus for farm forestry, homestead forestry, agro-forestry and growing trees outside forests. There have been efforts to develop captive tree plantations by wood industry units. Several industrial units are also promoting the growth of tree farms. Currently private and farmlands have emerged as major source of wood supply. The public forests, mainly forest plantations, meet a small portion of the remaining demand. There is a need to provide adequate management support and protection to avert further deterioration. Adequate investment in technology, management, conservation and protection are relatively convenient to mobilize for growing trees outside forests, which are likely to become reliable source for the forest-based industries and meeting timber demands. The forest-based

industries have already demonstrated the benefits of partnership with farmers. This trend is likely to develop in the interest of both.

4.2.2 Forestry as a Global Issue

The principle of sustained yield management for managing timber production was the hallmark of scientific forest management. Contemporary understanding of ecological and environmental functions require us to move forward to more comprehensive sustainable forest management encompassing multiple use forestry to meet various ecological, economic and social demands of goods and services from the forests.

a) ITTO Objective 2000

India as a producer member country is committed to achieve ITTO objective 2000, which means all timber and non-timber forest products in the market would come from sustainably managed forests. However, average wood production has fallen from a level of 47 cubic metre per hectare in 1990 to 43 cubic metre per hectare in 2000. The aboveground biomass in forests has also gone down from 93 metric tones per hectare in 1990 to 73 metric tones per hectare in 2000.The compliance to the objective 2000 under growing demand-supply gap will be almost unattainable in near future. Increasing productivity of natural forests needs large investment as well as strengthening village-level institutions. Further, creating enabling environment for promoting agroforestry, farm forestry and growing trees outside forests to meet the growing demand of forest products is inevitable.

b) Climate Change Debate

Global warming may significantly affect agricultural production in India because of large dependence on the monsoon. Climate modeling suggests that some traditional cropping patterns in semi-arid areas may become infeasible. It might specifically threaten large proportion of biodiversity and cause increased pressure on forests (IPCC AR4 Climate Change Report 2007). On the other hand, robust agroforestry systems may replace many farm areas. While for short-term actions, mitigation initiatives will be the priority and forests will gain importance as carbon sinks for long term. Adaptation and reducing vulnerability of forest ecosystems will become a major management challenge in the near future.

c) Global Objectives on Forests (2007)

Global concern for sustainable forest management has led to the development of a global instrument where the following four global objectives have been agreed upon:

(i) Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.

(ii) Enhance forest-based economic, social and environmental benefits by improving the livelihood of forest-dependent people.

(iii) Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests.

(iv) Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all the sources for the implementation of sustainable forest management. The forest development strategies of India are in conformity with the global objectives and global efforts will only accentuate the pace of efforts.

d) Import of Forest Products

Increasing gap between demand and supply is boosting import of forest products. Industrial round wood consumption in 2005 was 27.8 million cubic metres and this is projected to increase to 38.1 million, 49.8 million and 63.1 million in 2010, 2015 and 2020 respectively (personal communication from Dr. CTS Nair). Against 58.0 million cubic metres in 2000 and 74.0 million cubic metres in 2005, Forest Survey of India projected the industrial round wood demand at 95.0 million cubic metres in 2010 and 123.0 million cubic metres in 2015 and 153.0 million cubic metres in 2020 (Pandey 2007). The import bill for forest products has gone up from US$ 722 million in 1990 to US$ 1,300 million in 2000 and then to US$ 3.1 billion in 2005. Adequate enabling environment, such as reasonable provisions regarding land ceiling, tree felling and transit of timber, and institutional restructuring for generating wood and other forest produce may arrest this trend.

4.2.3 Other closely linked Sectors

The beneficial impact of the current economic growth on the rural poor can only be seen through higher priority of public investment in the sustainable management of natural resources, which are the mainstay of rural livelihood. The development in agriculture sector supporting about 70% of India's population is the major priority for national and state governments, and investment in agriculture and allied sector should continue to grow. From current level of less than 2%, the targeted agriculture growth is at 4% per annum through intensification of agriculture in which agroforestry, farm forestry and other similar sources are going to play important roles. Forestry, despite its well-known ecological (environmental), economic (production) and socio-cultural dimensions has not received similar attention. Perhaps small individual stakes in forestry often lead to preference for non-forest land use such as subsistence agriculture, grazing, and fishery in spite of considerable damage to environment and long-term livelihood potentials. However, forestry development has great potential for creating rural employment through NTFPs and ecotourism as well as wood production. There is urgent need to boost up efforts for enhancing people's participation through JFM programme with adequate empowerment of local communities having decision-making control over their forests. Appropriate incentive regime must effectively compensate local communities' conservation efforts.

4.2.4 Energy

Growing prosperity of rural middle class and household income of urban poor has spread the use of LPG as a replacement of biomass energy. There is greater access to LPG and other forms of non-

conventional and conventional energy in large parts of rural areas. The time efficiency of LPG is also attractive considering rising employment opportunities generated by the rural and urban infrastructure development. However, newer demands of forest produce are also emerging.

4.3 External Drivers

4.3.1 Demographic Transition

India was having a large (61.6%) population between 15-64 years of age in 2005. This is projected to grow to 63.6% (2010), 65.2% (2015), and 66.3%(2020). Further, the birth rate (per 1000) is projected to decline from 26.5 (2000), 24.5 (2005), 23.0 (2010), 21.1 (2015), 19.4 (2020) to 18.1 (2025). This transition will have impact on economy, employability and use of energy and natural resources such as forests, land and water.

4.3.2 Economic Changes

The present GDP growth is hovering around 9%, and expected to remain high in the next decade. The emphasis on urban and rural infrastructure development is generating large employment opportunities even for unskilled land semi-skilled workers. Substantial poverty alleviation efforts has been introduced recently in the form of National Rural Employment Guarantee Act (NREGA) ensuring 100 days of employment to each needy household in rural areas.

4.3.3 Environmental Concerns

The climate change debate has large bearing on the land use options intensifying production and conservation pressure on land, water and forests. Perhaps, the climate change mitigation will bring in more investment in the forestry sector.

4.3.4 Changing Political and Institutional Environment

Although the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 has generated lots of concern for conservation of forests because of recognition granted for habitation and livelihood rights of forest dwellers, it also assigns responsibilities of forest conservation and assistance in sustainable forest management to the local communities

4.3.5 Technological Changes

Emerging scenarios in forestry have necessitated the need for specific research and development support. Various frontline areas requiring R&D inputs include farm/agroforestry; bio fuels; forest certification; participatory forest management; forest nano science and technology; quality planting material; eco-friendly products and livelihood support systems.

The pace of sustained forest management will be determined by the economic analysis of the ecological aspects of human environment, which has been in focus in the context of global climate change and proven unsustainability of the efforts of growth based on high input technology alone. The scenarios described here indicate the situation in 2020 based on the intensity of efforts needed for their attainment.

4.4 The Business-as-usual Scenario

Large expansion of trees outside natural forest areas will be feasible because of favourable market. If the business-as-usual scenario continues, the natural forests are going to be under tremendous pressure and this may cause damage to natural forests. The non-forestry use of forest areas under the rights recognized under the provisions of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 may go on unabated if the documentation of the recognized rights is not taken in a time bound manner. The recognition of occupational rights on forests will achieve the twin goals of sustainable development in forests and enhancing income of the people living in and around the forest areas. The forest of the country will be meeting socio-economic and ecological need of the country. The demand of wood and wood products will be met mainly through import and production under agro-forestry / firm forestry.

4.5 Probable Shifts and Alternative Scenarios

The promotion of agroforestry and farm forestry is likely to ease out the gap between demand and supply. It may not be economically feasible to the urban and rural poor to carry on the business of fuel head load because the alternative employment opportunities may be more remunerative and without much drudgery. This will help in improving the conditions of natural forests. The fuelwood and small timber would come more from trees outside forests than from natural forests. Efficiency in the utilization of biomass for energy purposes is a developing area with potential positive impact on the consumption of wood biomass.

Joint Forest Management is now a well-recognized strategy for sustainable forest management covering about one third of the forest areas. However, the JFM modalities at present need more consolidation by way of enabling environment for ensuring empowered participation in management to make them more effective in reciprocating for forest protection and sustainable development.

Promoting cultivation of medicinal and aromatic plants, is likely to have favourable impact on biodiversity of natural forests. The business model approach for processing, value addition and marketing of NTFPs is likely to reverse the degradation and ensure increased returns to gatherers. Emerging systems may lead higher gains for gatherers, sustainable management and greater availability of NTFPs.

4.6 The Most likely Situation

The future scenario is most likely to address the people's emotional attachment to land, heritage and culture. Village institutions (such as joint forest management committees, community forest management committees and the *gram sabha*) responsible for the resource management should be more empowered and directly engaged in the programme implementation. The overall production of forest goods mainly from trees outside forests should rise. However, the maintenance of ecological balance and biodiversity conservation may gradually be confined to much smaller pockets of protected areas and other government forests.

Based on the approaches with varying intensity of policy, management and programmatic interventions in future, a statement of measurable and monitorable criteria is presented below (Table 4.1) with indications in 2020 in the three probable scenarios.

Table 4.1 Measurable and monitorable criteria

S. N.	Criteria	Unit	Remarks		
			BAU	Best case	
	Extent under forests	Million hectares	77.47	70	Diversions offset by compensatory afforestation
	Diversion of forests	Growth rate (%)	5	1	Rate of diversion slows down with infrastructure development reaching plateau
	Forests under non-forest rights of forest dwellers	Percentage of total	30	20	The forest rights are documented and frozen in the shortest possible timeframe.
	Forestry use of forests	Percentage of total	75	80	Remaining forests under rights or infrastructure and non-culturable category
	Area under commercial plantations	Million hectares	5	5	Conversion of forests into plantations is not resumed
	Plantation productivity	Growth rate (%)	0	100	Vast scope for intensive management with technology and investment
	PA network	Percentage of total forest area	25	30	No scope for expansion due to community pressure and production imperatives, apart from principles of biodiversity conservation across all the forests.
	Forest under community participation	Percentage of total	30	50	Apart from JFM, forest rights laws also recognize community control..
	Tree cover in non-forest common areas	Million hectares	14	20	Presuming that about 20% of the existing green cover is in this category, planted under social forestry
	Agroforestry	Million hectares	10	30	Entire TOF is considered part of agroforestry
	Green cover	Percentage of geo.	30	35	Depends on agro- and social forestry

		Area			
	Forest productivity	T/ha/y	1.34	2	Figures from NFAP (1998)
	Rural livelihood	Share of forestry in household income	marginal	substantial	No quantifiable indicators at present
	NTFP production	Growth rate (%)	0	50	NTFP grows faster with better productivity and management
	Wood production (Forests)	Growth (%)	0	50	Production from the EAP inputs of 1995-2005 starts yielding by 2020.
	Wood production (outside forests)	Growth (%)	0	100	Mainly from agroforestry
	Import of wood	Percentage of consumption	15	5	Imports fall with increasing production

Chapter 5 : Visualizing 2020

5.1 Forest Cover

The forest and tree cover of 23.39% of the geographical area (2005) is likely to touch 25% by 2008 and 30% by 2012. The goal is to bring 33% area under forest and tree cover by 2020. Trees outside forests (TOFs) in the form of farm forestry, agroforestry, homestead forestry, etc would bridge part of the gap. TOFs have immense potential for socio-economic and cultural development. The current trend in forestry sector favouring promotion of agroforestry is likely to improve the tree based use of agriculture substantially. The programmes on the cultivation of bamboo, rationalization of regulatory regimes for forest produce to favour cultivation in rainfed areas, realization of environmental preference for use of wood products in structural purposes, and improvement in technologies boosting efficiency in wood utilization have been driving the use and markets for wood-based material. These factors are expected to result in the enhancement of the area under agroforestry from about 10 million hectares (about 5% of total agriculture area)at present to at least 20 million hectares in near future. Further, about one third of India's total forests (22 million hectares) has already been covered under JFM programme. It is likely that the major part of remaining two third of forest areas will also be brought under participatory mode of forest management.

India's economic growth is being propelled by massive infrastructure development which obviously will need land area in addition to other items/investment. The technology for efficient utilization of wood and wood composites has influenced remunerative agroforestry practices.

5.2 Area under Sustainable Forest Management

Rising import of wood and wood products in India should make India among influential players in the international market. This status can help India in promoting the agenda of sustainable resource management at global level and evolve collaborative programmes and activities across the globe.

The major objectives of Agenda 21 of the United Nations Conference on Environment and Development (UNCED) related to forestry are to achieve conservation and rational utilization of forests and tree-based resources, to increase their contribution to overall socio-economic development and environmental protection, and bring improvements in people's quality of life (UNCED, 1993). ITTO's objective (2003) supports the sustainable forest management. In India, about 75% of forests are covered by the forest working plans and management plans, which are scientific documents based on the principles of sustainable forest management implying harvesting well within regenerative capacity of the forests without jeopardizing the ecological services. The principles have so far served as an effective proxy for SFM optimising both tangible and intangible values of forests. Although about 75% of India's forests are covered under systematic forest planning, 53% forests are reported to be deficient in natural regeneration. The balance between removal and may be annual allowable cut (AAC) needs much closer scrutiny from the purpose of multipurpose measurement. The coverage of forest area under working plan is a good indicator for showing the progress towards SFM. India is committed to implementing monitorable measures for SFM.

5.3 Biodiversity and Wildlife Conservation

Various policies, statutes and action plans have been formulated by the Government of India for shaping up conservation of wildlife in our country in the coming decade. These policy imperatives will continue to guide the forestry in future.

The NFP has advocated maintaining genetic continuity among the protected areas (PA). This has been reinforced by the WCS as well as NWAP, which call for bringing 10% of the land area of the country under PA network applying scientific approach based on the principles of biogeography. The Wildlife Protection Act (WPA) has included two new categories of PAs, namely conservation and community reserves in its 2002 amendment. The declaration of which does not lead to drastic curtailment of rights, privileges and concession of local people. Hence, these categories are likely to play a key role in achieving the aim of 10% area under the PA network. With sustainable forest management governing the ecological functions of the forests, the objectives and even strategies of forest and wildlife management indicate convergence. Thus, the island approach of wildlife management may see a shift towards conservation with specific approaches for specific biomes. The recently passed Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 is likely to have a large influence on this process. It would let only the critical habitats within the national parks and sanctuaries be declared finally as notified as the respective PAs where the coexistence with local communities is not possible as they may be required to be maintained as inviolate areas. Thus, relocation of human settlement may be possible in the intentionally notified PAs only if it is absolutely necessary for long-term biodiversity conservation. The process of identification of such areas will be based on scientific and objective criteria as is the case of tiger reserves as per the recent 2006 amendment of the WPA. The management approach will need to take into account these realities and look towards 'inclusive protection/management' of habitats.

5.3.1 Conservation of Rare and Threatened Wildlife Species

The tiger task force and implementation of its recommendation would hopefully lead to the tiger population bouncing back in most of its habitats. The setting up of the National Tiger Conservation Authority through suitable amendment to WPA in 2006 was the first crucial step in this direction. The establishment of the Wildlife Crime Control Bureau will help curb the poaching and illegal trade of wildlife by organized intelligence gathering, strategic planning and execution of anti-poaching operations in the country. The identification of villages which need to be relocated out of critical tiger habitat is already underway for developing and implementing proper relocation plans.. Similar strategies are being formulated and actions being taken for the conservation of other threatened species as and when required.

Another very significant tangible benefit from these reserves is that of tourism. More and more PAs are now coming into the tourism circuits. The demand for nature tourism is growing much more than what is being met right now. The choice of areas needs to expand out of the PAs to other forest areas and the ecotourism resource from mega-faunal species to the nature in totality. The nature tourism approach is expected to see a change towards activities which are environment friendly, managed by local people and have a high component of conservation education. to make them truly 'ecotourism activities'.

By 2020 we may see an India with nearly 10% area under a network consisting of finally notified PAs, including scientifically identified inviolate spaces, landscape level plans and PA specific management plans developed with scientific approach for all these areas, all nature-based tourism as true 'ecotourism', illegal trade of wildlife and its derivatives under complete check, human settlements from critical wildlife habitats relocated to make them inviolate through appropriate resettlement packages. By 2020 we may see an India where every citizen respects the wildlife and its habitat for the various services they provide for the humanity and becomes aware of a moral responsibility for its conservation.

5.4 Wood and Wood Products

5.4.1 Production, Consumption and Trade of Forest Products

The trend of import of timber may continue so long the Asia-Pacific and the African countries find it politically desirable and economically feasible to export. However, in the long run, it may not be a sustainable source of supply. Increase in the productivity of forests and creating conducive environment for the growth of trees outside forests (TOF) under agro- and farm forestry, homestead gardens, etc are expected to be pursued with vigour and will prompt substantial growth in production sector.

In respect of wood energy for cooking food and heating, the trend indicates that more and more people among urban poor and middle class will gradually switch over to LPG and other efficient energy sources. The rural population in peri-urban areas and villages away from forests will also find fuelwood more expensive and inconvenient to use and therefore they would also gradually switch over to other sources (such as LPG and non-conventional energy); still domestic requirement in rural areas will continue to depend on nearby forests. The rural population today has several employment opportunities in development works as well as assured employment through schemes like National Rural Employment Guarantee Act. The fuelwood collection and head load extraction may not remain remunerative.

5.5 State of Forest Industries

India's forest-based secondary industry encompasses a wide range of small, medium and large scale firms that process wood into a variety of products for the domestic market. With the improvement of productivity, net supply of wood products may improve. However, the principles of SFM and fair trade practices including eco-labeling of wood products might limit the wood supply from natural forests. In the circumstances, wood from trees outside forests, mostly agroforestry will become the main source of raw material for industries. It is also likely that wood processing unit will modernize and improve their efficiency so as to meet the growing demand of house construction and furniture industry, infrastructure and other industrial requirements.

These developments are likely to support new processing technologies creating demand for small size, lower quality wood which could be produced at short rotation in the farms and common land.

The existing paper and pulp mills have proposed to undergo substantial expansion in their capacity. With substantial expansion of education and knowledge infrastructure, pulpwood demand will shoot up for paper, opening markets for farm forestry.

5.5.1 Country's Share in the Global Trade and Probable Changes in the Context of Alternative Scenarios

Looking at the magnitude of domestic demand, it is less likely that India will have any export-oriented development in a decade or so. The enhanced capacity and new technologies would at the most take care of internal demand. However, there may be specialized export items like antique furniture and wooden toys, wood carving and other small wooden products which would in terms of volume and value would not be substantial.

5.6 Future Forestry Institutions

There have been remarkable changes in the social values and stakeholder's expectations from the forests in the recent past. Various studies on institutional reform supported by the donors in different states highlight the inability of current work practices, structures, and culture to readily address the emerging complex issues of the sector and rapidly changing public demands (Om Consultants 2000). The new paradigms and new institutional arrangements that require to be adopted to guide the change will primarily depend on our understanding of the emerging trends of challenges and opportunities. These trends are sending signals for change; some of which might be even ahead of our knowledge and experience of the outcomes of the change.

The future of forestry institutions will be guided by the new vision, strategic direction, and measurable outcome that will be set for the sector. While maintenance of ecological balance remains the pre-eminent objective of the forest management, contributions of forests to the subsistence and livelihood needs of millions of rural poor especially the tribal communities is one of the primary considerations (MoEF 1988).

5.7.1. Reengineering of SFD

It is increasingly becoming challenging for the developmental agencies working in forested areas to get themselves tuned to the pace of fast changing socio-economic conditions and assertion of communities rights. Generating employment opportunities has always remained a major task in these areas and this would become more challenging with the degradation of natural resources and growing social unrest.

Traditionally, the management of forests has remained exclusively with the state forest departments. The trend suggests that forest management will have to be based on local circumstances. The challenge would be to strike a balance between local and national interests. Many stakeholders of the sector are more prone to take non-negotiable ideological positions which result in intractable conflicts among them. Power differentials among stakeholders also make it challenging for the SFDs to bring them on negotiation table for the settlement of conflicting issues. Another challenge would

be of significantly improving horizontal integration of the forest plans with the plans of other sectors and vertical integration with the plans of the higher levels of governance in a manner that ensures livelihood security and minimizes conflict between the economic development and environmental security.

Mobilizing adequate financial resources for the sustainable forest management (SFM) in developing countries continues to be one of the major challenges of the sector. India has been trying to bridge the budgetary gap by adopting various policy instruments. The private sector and the civil society organizations have shown keen interest in participating in the management of the sector. Such opportunities need to be considered keeping their interest complementary to those of the communities.

The recent polices on rural development and natural resource management of the Government of India and some states clearly indicate that the policy makers are promoting multi-level, multi-organizational and multi-sectoral interventions for sustainable natural resource management and livelihood security. There is widespread perception that the policy space for collaboration has expanded with the decentralization of governance. However, a befitting change in the situation on ground is not so visible. Three parallel approaches to local development are simultaneously being promoted by the Government i.e. Panchayati Raj, joint forest management and cooperatives. However, despite substantial overlap in the principles of these approaches, it has been difficult to integrate them at the local level (Helling et al, 2005).

Meeting expectations of the stakeholders would require significant changes in the roles and responsibilities of the SFDs. They will have to forge different types of alliances and working partnership with the local bodies and other sectors. Each sector has unique advantage that can be used to overcome the constraints of the SFDs. This would require befitting change in the structure and systems of the SFDs. Building multi-level, multi-organizational, and multi- sectoral relationships for convergent actions require flexibility in the systems of the SFDs. The systems that require re-look include planning, budgeting and approval system; MIS and HRD. The auditing system could include environmental audit as an integral part of the social audit. A long-term strategy would be required to be made compatible with the improving governance, accountability and transparency in all spheres of the central and local governments, the corporate sector and community levels.

The introduction of innovative market instruments could help in bridging the budgetary gap of the forestry sector. 'Forest Fund' has been created in some countries to overcome this problem that refers to constellation of approaches through which a portion of the state revenue is set aside for forestry purposes. The percentage of forest fund in the overall budget of the forestry sector in some countries is fairly high. Nearly a third of the United States Forest Service's budget flows through special accounts and trust funds. The SFDs may be allowed to retain the revenue. India should also advocate on behalf of the developing countries for increasing international assistance for the sector.

There is need for improved interactions between people and public servants.

The rising price of forest produce, growing interests in medicinal and nutritional values of non-timber forest produce and emerging trade scenario under the WTO regime are also creating

significant investment opportunities for private organisations. The debate on private participation has remained polarized on account of the appropriate role for the industry and control over the public forestland. New approaches need to be defined to create win-win situation while addressing the concerns and apprehensions of stakeholders.

5.7.2 Effective Management of Human Capital

The country's competitive advantage in a global economy and its ability to reduce poverty, to a large extent, will depend on the quality of research and education as the development of the sector in the knowledge economy will be contingent upon creation of new usable knowledge and availability of professionally qualified manpower. The continuing education will increasingly become more important with the declining 'shelf life' of knowledge and skills. The appearance of new providers of tertiary education in a "borderless education" environment will provide greater opportunity for collaboration with the international centres of excellence. The transformation in the modes of delivery and organizational patterns in tertiary education as a result of the information and communication revolution will go a long way in providing quality education at affordable price. The rise of market forces in tertiary education and the emergence of a global market for advanced human capital will provide new opportunity to the Indian universities.

Institutional Response

The problems of the sector are gradually becoming more complex and challenging. The solution to these problems lies in the faster adoption of new technologies, products and processes. Attracting and maintaining competent and motivated human capital will require better manpower planning, a recruitment strategy for filling critical skill gaps and proper alignment with the programmes, orientation and training of employees, promoting specialization among senior employees supported by continuing education, developing the competencies of potential leaders, and strategies to create working environment conducive to creativity. The ICFRE should also synthesize research and aggressively push for its application by providing extension support. This will require changes in the appraisal system of the scientists. Priority should also be given to stimulate investment in forest science and technology. Involvement of the private sector and commercialization of the new technologies would require effective management of intellectual property.

5.7.3 Information and Knowledge Management

The pace of innovation has intensified markedly forcing rapid manmade changes. The phenomenon like climate change is cautioning the decision makers to consider environmental implications of the developmental initiatives. There is a growing realization that interdependence could be better understood by looking at the larger picture that requires capacity to analyze large volumes of data drawn from different sectors. The falling prices of computer hardware, the declining costs of data transmission and expanding communication technology will allow updating, retrieval and analysis of large volumes of data collected from even remote villages. It will also be affordable to regularly update the spatial data with the development in remote sensing technology.

Institutional response

The forest information needs to be integrated with the social, economic and environmental data. A central agency should be identified for the purpose of integration of data from various states and sectors such that it could provide synthesized and distilled information to guide policy and decision. The MoEF should identify and adequately resource such agency. The SFDs should continue expanding electronic government services to its customers. This would facilitate speedy planning, online monitoring, and enhancing citizen's online transactions.

A central agency may be assigned task of developing knowledge index such that the gap between India and other countries that are using relatively new technologies could be measured and strategies are developed to bridge this gap. Knowledge management system needs to be developed to add value to information through synthesis and analysis.

5.8 Policy and Legal Framework

The forest and wildlife is in the concurrent list of the Constitution of India which has the provision for conservation of forest and wildlife under article 48A and 51A(g). The main responsibility of the central Government is policy and planning and implementation of activities related to forest and wildlife is with state governments. The National Forest Policy 1988 formulated four years before Earth Summit embodies all elements of sustainable forest management. The National Forest Commission reviewed the existing Forest Policy and recommended no change. The policies of other sectors such as National Environment Policy 2006, National Agriculture Policy, National Farmers Policy 2007, Tribal Policy, National Land Use Policy, and National Policy on Biofuels will have the impact on National Forest Policy. The National Forest Policy revolves around environmental and social aspects mainly. India has strong legal regime to implement its forest policy. The protection of forest and wildlife is mainly through Indian Forest Act 1927, Forest Acts of various states, Wildlife (Protection) Act, 1972 and Biological Diversity Act, 2002. India has enacted the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 to address the social aspect of the forest policy. The Forest (Conservation) Act 1980 is maintaining a balance between conservation and development, and will also be effective in future for the conservation of forests in the country. The new legal regime in the form of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 will enhance the contribution of forests towards poverty alleviation of the people living in and around forests. The role of community will be more crucial in sustainable development of forests in future. The country has to rationalize regulatory and policy constraints for trees grown on private land to motivate the private sector to grow more trees which would facilitate us in achieving one third land area of the country under forest or tree. A new grazing policy is needed to check degradation of forests, particularly due to interstate movement of livestock and overgrazing beyond carrying capacity. India, as a member state of the United Nations, has agreed to contribute towards achieving the shared global objectives on sustainable development of all types of forests through a non-legally binding international instrument. The country has policy and legal framework to implement concept of sustainable forest management and in process to develop mechanism of forest certification.

5.9 Long-term Shift in increased Use of Forests for their Service Functions

The climate change will affect agricultural production and most probably increase the pressure on forests. Climate change adaptation and reducing vulnerability of forest eco- system will become a major challenge in the management of rural landscape in the near future. Climate modeling suggests that some traditional cropping patterns in semi-arid areas may become infeasible because of increasing drought and unreliable rainfall and may be replaced by robust agroforestry systems. This would see the expansion of trees outside forests which will offset the loss of crop productivity. Soil and water conservation will also require greater emphasis for which forests and grasslands will have greater focus due to their known effectiveness.

5.10 Energy Uses and their likely Scenario

More than 55% of India's households belong to the low income group and cannot spend much money on energy. As the price of commercial energy is high the consumer will keep using traditional fuels and thus there is no reason to expect any dramatic energy switch in rural India. However, growing emphasis on biofuel such as bio mass-based gasifires and bio-diesel from *Jatropha, Pongamia* and other tree-based oils is expected to change the usage pattern of biomass for energy for domestic consumption. Further technological improvement may bring efficiency and cost reduction.

More and more people in urban peripheries are now switching over to non-wood-based energy sources. In urban areas during the last 20 years, there has been a substantial switch in the energy consumption. The use of traditional fuels has halved in relative terms and been replaced by commercial energy sources.

With the expansion of farm / agroforestry and other forms of tree growing, abundant supply of fuelwood is expected in the close vicinity of villages. With the receding forests and self restrictions imposed on by JFMC members on unsustainable removal, the rural middle class population is expected to switch over to LPG and electricity in the coming decades. The new energy policy focusing on the development of biofuel resources may provide an economic energy option available to rural and urban poor. As employment opportunities for rural and urban poor are growing due to fast infrastructure development there may be disincentives to rural poor to continue fuel head load removal as an economic option.

5.11 Future of Non-timber Forest Products

The annual value of direct contribution of NTFPs in India is estimated to be about US$27 billion, compared to about US$17 billion for wood products. NTFPs account for around 70% of forest-based export earnings (US$500 million). NTFPs provide 55% of total employment in the primary forest sector, with considerable multiplier effects in downstream processing and trade of some products.

The Government of India has empowered the communities with the ownership of NTFP for the purpose of collection, trade, value addition and marketing through a national level legislation. It is a milestone for enhancing contribution of forests towards poverty alleviation of 350-400 million people living in and around forests. Some of the states such as Madhya Pradesh and Chhattisgarh have adopted strategies for enhancing income of the forest-dependent communities through NTFP

management and its value addition, trade, marketing and certification facility for quality control of the value-added NTFP. The Government of India is now focusing on forest certification as well as certification facility to forest-dependent communities for quality control of value-added NTFP to explore better market.

The big challenge before the Government of India is to build capacity of the community with respect to sustainable harvesting of NTFP, value addition, trade and marketing. More efforts are needed for inventorization of NTFP and techniques for its cultivation and regeneration. India is having national level legislation for ensuring benefits arising out of traditional forest-related knowledge (TFRK). More efforts are needed to document TFRK. The Government of India is looking positively to overcome these challenges for enhancing income of the forest-dependent communities.

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The management including harvesting and trade of NTFP is at present handled by state agencies in the case of large volume products and the rest is generally available to communities. In some states, well-organized collection and trade systems ensure realization of optimum value from markets, which is passed on to the communities for collective and individual use, while setting apart a portion for regeneration of NTFP also. The new Forest Rights Act empowers the forest-dependent community institutions to undertake sustainable management. This will imply that the management planning for NTFP will be integrated with community institutions. In the event of conflict between SFDs and *gram sabha* at present there is no conflict resolution mechanism. However, in due course of time if the matter become serious the Government of India or Supreme Court of India may issue guidelines.

At present there is little R&D on aspects of sustainable harvesting limits. This is to be addressed by researchers who, based on the inventorying and viable population research, could prescribe the harvesting time and quantity. Forest certification may also become a tool to provide price advantage to gatherers as well as ensure sustainable management. Forest certification regimes with principles of sustainable forest management are expected to be internalized in community-based forest management.

5.12 Urban Forestry

Rapid urbanization will mean an increased emphasis on urban and recreational forestry. This would include avenues, green belts, parks, gardens and recreational forestry. Urban forestry will play a vital role in the Urban Renewal programmes of the government.

The management of urban forests will be coordinated with the management of the cities. They will be required to maintain the natural forests like water and nutrient cycle, support to flora and fauna and also provide recreational benefits to the population.

Mixed plantations will need to be revised along roads and avenues, thus helping to establish green belts and also add to the aesthetic value. Trees will be supplement with herbs and shrubs.

Urban camp sites would come up in large metros to provide camping sites; recreational benefits and act as green belts.

Town planners are already making urban forestry as an integral part of their plans. This trend will grow and spread to the smaller towns and cities. Massive research and development support will be needed for urban forestry.

5.13 Forest and Water

The looming environmental crisis was one of the main reasons for the Government of India to lay more emphasis on the environmental protection and conservation roles of forest in the 1988 Policy. Measures need to be continued with much vigour particularly to protect the upland watersheds outside the tropical belt, through forest conservation and afforestation, against increased erosion under degraded forests, sedimentation of water reservoirs, silting of irrigation canals, and flooding through too rapid run-off. Willingness to pay for environmental services particularly for the quality and amount of water downstream is an important programme being tested in some locations in India. The upstream communities are being gradually oriented to practice organic farming and assist in watershed management. The downstream people benefiting from these interventions upstream have shown willingness to pay and compensate for the efforts of upstream communities. Apart from the Government, international and national NGOs are gradually getting involved in promoting these initiatives. It is hoped that in the next 5-10 years this mode of improving water supply will gradually spread to more are more areas particularly where urban water supply is based on this kind of situations.

5.14 Forests as Carbon Sequesters

Forestry development becomes also crucial due to the fact that the existing natural forest stands have already fixed a huge amount of carbon from the atmosphere. However, due to alarmingly increasing green house gas (GHG) content in the atmosphere, it is urgently required to trap this carbon increment on a long-term basis and on a massive scale. Considering the fact that the level of GHGs are rising very fast the growth of carbon trapping should be equal to this pace or better even, greater. India has a potential of 175 million tons of carbon to be sequestrated annually through land use, land use change and forestry (LULUCF). The market instruments created under Kyoto Protocol require cumbersome methodologies compared to the present potential of carbon credits. In India, considering the population and economic pressure, it is not possible to set apart land area for carbon sinks. The existing forests and areas outside forests need to be managed optimally for maintaining optimum size of carbon sinks. The post-Kyoto commitment period deliberations are expected to provide workable mechanisms for accounting performance of countries in mitigation. India will be in a better negotiating position if its forests are in a better shape.

5.15 Social Functions of Forests

Local rights, admitted by SFDs during the settlement procedures for forest reservation, govern the use of forest resources by rural and tribal communities living in and near the forests. The plight of

most of these communities is one of great hardship and the situation demands the settling of tenure issues and rationalization of the system of people's participation in forestry. These claims were registered and rights were adjudicated mostly at a time when India's rural population was much smaller than it is today. There should be a thorough review of the ways in which rights are considered and now used, in relation to present and predicted livelihood options. Such a review should be accompanied by a study of trends in rural demography, and the implications of government policies now operating and under consideration.

The tribal communities way of life is woven around harmony with forests, and preservation of nature. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 is enacted for recognition of their traditional right of living in the forests.

5.16 Forest and Employment Generation

By the end of 2006, there was an estimated 22 million hectares covered by JFM programme and out of 173, 000 villages about 40% villages have been associated with the programme. This population has been depending upon employment and income from forests for about 150 days in a year. In terms of economic gain through wage labour, forestry operations (forest protection, nursery, plantation, tending operations, harvesting, post-harvesting and NTFP gathering) provide substantial cash income to the rural poor. In addition to NTFP for sale, certain quantity is also consumed locally to supplement the food and nutrition. The value of herbs used for local health care has not been estimated but is very large. This trend of employment from forests may grow providing better livelihood opportunity. Markets for natural products in modern lifestyles and value-added NTFP, crafts and products are increasing, providing more opportunities for generating gainful employment.

5.17 An Overview of the Future of the Country's Forests and Forestry in 2020

5.17.1 Strengths

India is implementing sustained yield-based forest management practices for the last 140 years and has adopted the principle of sustainable forest management (SFM) since the inception of National Forest Policy 1988 which embodies all elements of SFM. India has strong legal, policy and institutional framework for implementing strategies for sustainable development of forests. There is a shift in the policy, legislation and institution for involvement of people in the sustainable forest management with benefit sharing. The empowerment of people with the enactment of national level legislation for recognizing their rights on forests will definitely impact the institutional and legal regime of the forestry sector. The role of existing institution i.e. Forest Department will be marginalized and will be replaced by community-based institution. The Government of India has to face the challenge of building capacity of community to keep balance between meeting their need for sustenance and livelihood and maintaining ecological security of the nation. The Constitution of India provides specific provisions for wildlife conservation. India is practising *in situ* conservation of wildlife through protected area network of more than 600 national parks, sanctuaries, biosphere reserves and community reserves. Special efforts are being made for in situ conservation of the tiger population. The tiger poaching is impacted by other neighbouring countries. India has to explore support at international forum to save the tiger. The role of tree grown on private land will be very crucial to meet the demand of wood and wood products in the country. The Government of India is

creating enabling environment for growing more trees on private land. The National Farmers Policy 2007 provides sufficient space for agroforestry and NTFP to enhance the income of farmers. The forest resources of India will be treated as social and environmental resource in 2020.

5.17.2 Challenges and Threats

India's forests are under heavy pressure of multifarious demands. The requirements of fuelwood, timber and other forest products are much more than that available sustainably from forests. The deficit in demands and availability of forest products, which is already extremely large, will further increase in future with the increase in population. The fodder situation is also not satisfactory and results in large scale overgrazing and extensive lopping in forest areas. The problems confronting the forestry sector in India are well known. A random listing of these problems is given below:

1. Loss of forests through diversion, encroachment and degradtion (including desertification and soil erosion).
2. Declining forest productivity through overuse beyond sustainable limits.
3. Inadequate investment in afforestation and forest protection, management and development-inability to fully implement full multiple use/protected area management.
4. Inadequate rural energy source and lack of viable alternative energy available to rural communities.
5. High cattle population with low productivity in rural areas and inadequate fodder production resulting in very high grazing pressure on forest areas.
6. Lack of capacity of the people living in and around forests to implement SFM.
7. Forest fire and shifting cultivation.
8. Inadequate regeneration and enrichment planting to restock/rehabilitate degraded forests.
9. Inadequate distribution of protected areas for full representation of biodiversity and ecosystems.
10. Ever-increasing biotic pressures on forests research and extension in bringing knowledge and technology to field.
11. Inadequate extension support to farmer for agro/farm forestry-lack of appropriate agroforestry production models and other extension service.
12. Over reliance on rules and procedures of forestry organisations rather than on productivity and efficiency.
13. Inadequate and non prioritised forest research and extension in bringing knowledge and technology to field.
14. Inefficient forest industry in terms of scale of operations, equipment, technology, management, shortage of raw material, protection, etc.
15. Inadequate infrastructure and institutional support for marketing and distribution of wood and non-wood forest products.
16. Insufficient database and information systems for resource utilisation and management planning.
17. Lack of effective national and state land use policy planning and relationalisation of priorities.
18. Breakdown of linkages between technical forestry issues and financial planning.
19. Forestry education not abreast with the latest developments in the forestry sector.
20. Lack of viable economic/social alternatives for rural poor and tribal people.
21. Vast potential of biodiversity and NWFPs found in forests of the country not reaped fully.

Chapter 6: Creating a Better Future

6.1 Responding to the Changing Societal Needs

India is one country in the Asia-Pacific Region which has undertaken a number of initiatives, adopted diverse strategies, policy and associated instruments to create an enabling environment for sustainable management of forest resources. However, a number of socio- economic challenges have come to the fore due to rapidly changing societal needs which directly and at times indirectly, impact the sustainable forestry development in India.

The population projection for India under the realistic scenario (2000-2025) shows that the population of the age 15-64 years will be 66.3% by 2020. The median age will be 27 years. This would mean growth of manufacturing sector to meet ever-increasing demands of population in respect of housing, furniture, paper use, ecotourism, quality water and environment. All these will require well-managed forests in rural landscape and green spaces in urban areas. The growth will also heat up the climate change debate and that would necessitate emphasis on clean development mechanism (CDM, including green environment wherever feasible). The recent National Rural Employment Guarantee Act, Bharat Nirman and the Backward Regions Grant Fund are aiming to improve the socio-economic condition of rural and urban poor by providing gainful employment to the people and at the same time catering to better living conditions through urban and rural infrastructure development. This is likely to improve the income and consequently the purchasing power of the people.

The concept of people's participation in forestry has gained momentum in India, and there have been a number of initiatives to ensure participation, as seen in different models of JFM. In view of the large dependence of communities on forestry as a source of sustainable livelihood there is a need of higher and well-organized participation. Local organizations such as cooperatives are still in building stage and are not strong enough in forestry. Strong cooperative movements across the country would lead to better societal involvement.

Shifting cultivation in the Northeast, which so far has affected an estimated 10 million hectares of forestland is likely to come down as it is gradually becoming more labour and other inputs intensive. Some of the abandoned shifting cultivation areas in one of the northeastern states, i.e. Tripura, has been brought under rubber and bamboo plantations. Other models have also been on small scale. A substantial number of shifting cultivators of earlier days have now been associated with the rubber plantations. The population living below poverty line (US$ 1 a day) are now getting INR 20,000 per month (US$ 500). It is expected that with the government, NGOs, and civil society's intervention the people will get organized and spend their newfound wealth into creation of assets. One of the impacts could be intensification of agriculture for land-owning population and alternative employment avenues for landless people. In agriculture, there may be diversification. Species suited for agro- and farm forestry, horticultural and medicinal use would gradually be planted in increased proportion by the land-owning population. Ultimately, the rural ecosystem may see a layered crop sequences giving income throughout the year.

The manufacturing sector related to forestry is likely to further develop in the form of capacity expansion of paper and pulp and other processed woods. With increasing private participation and as

an outcome of market forces it is likely that more investment-friendly legal tools would be devised. Already a number of initiatives have been taken at the Government level. SFDs will also be required to make certain changes. All these initiatives are likely to contribute to sustainable development of forest and tree resources.

6.2 Policy Changes within and outside the Forestry Sector

India has equipped herself with a number of policies and associated instruments. The objectives of forest policies (and legislation) are now more diversified and comprehensive. Moving from a perspective which focussed on wood as a sustainable resource, they now address a wide range of private and public goods and values, and acknowledge the equal importance of production as well as conservation. The policies on natural resources which are to reflect national aspirations with regard to their use and management are likely to involve various stakeholders with the government. They are considered to be more effective if conceived and implemented in conjunction with other public policies and in consultation with the stakeholders. Accordingly, there has been growing demand for adapting forest policies (and legislation) to new social and economic developments.

Policy goals envisage the role of a forest as multifunctional resources for its economic potential and for its importance to environment. In order to meet the challenges before the country to support higher levels of population and a better standard of living, the necessity for a rational Land Use Policy has been adopted five years back, and National Environment Policy in 2006.

The policy making scenario has also oriented fundamentally towards multilevel policy networks, privatization and increased democratic participation. The distinction between private enterprise and public administration is getting increasingly permeable. A major challenge of our forest policy is to develop consistent approaches and adaptive political and legal frameworks consistent with sustainable forest management (SFM). There is need to redefine the roles of private and public sectors, and to find equitable and effective balances between the benefits and responsibilities of stakeholders. This can also help promote stakeholder synergies and avoid or reduce suspicions and conflicts. International agencies, donors and NGOs are active in the forest policy arena in some of the tropical countries, to provide support in developing policies and laws that are transparent and responsive to people's needs. In the case of India the National Forest Policy 1988 embodies all the requirements in attaining the goals of SFM.

There are difficulties in some cases in law enforcement in the forestry sector not due to lack of policy and legal framework, but due to gaps in implementation, inadequate capability and insufficient funds and manpower. The involvement of private sector in forestry is currently under the active consideration of the Government of India. Once the modalities are finalized it may be possible to attract private investments for ensuring SFM.

6.2.1 According Priority to Inter-Sectoral Policies

Although conservation of natural resources, particularly forests and wildlife, has linkages with several key sectors of the society, it has not yet been befittingly *mainstreamed* into the *core business* of other allied sectors for effective management. Mainstreaming is required both for multiple benefits and staggering losses, emanating from forest and wildlife conservation, that affect, influence

and impact all sectors and strata of the society. Conservation imperatives enjoin that there is a need to look beyond forest and protected area boundaries into the wider landscapes and seascapes and elicit active cooperation and support from all stakeholders. There is a need to sensitize and garner support from the entire gamut of stakeholders by establishing linkages through joint programmes and projects. Forests and wildlife should be managed by adopting an *inclusive management* strategy so that multiple benefits can be accrued from conservation and sustainable use to a wide array of stakeholders.

The sectors having direct and indirect linkages with the forestry sector are numerous and range from judiciary to agriculture and animal husbandry. Institutionalizing the linkages is a key issue and needs to be achieved through a variety of ways. Sensitization and capacity building through focused training programmes of the personnel of these sectors is considered as the most important way to achieve this goal.

There is a need to have a land use planning to meet the challenges arising due to rising demand of land, particularly forest land. Besides the local pressure exerted by demographic escalation in the agrarian rural population, there is an increasing competition for land for mining, infrastructure, housing, tourist facilities, hydropower generation and water supply. Without central or state level codes for integrated land use planning, and without clear guidance on priorities for selection between incompatible land uses, it is inevitable that central and state governments will prefer the higher financial yields apparently available in the short-term non-forest use. This provides another good reason for using total economic value (TEV) in land use planning and coordination, where TEV includes forest services as well as forest goods.

The 'Development Sectors' include among others ministries and departments of agriculture, animal husbandry, veterinary medicine, public health, water resources, tribal welfare, rural development, and tourism. The 'Development Sectors' also have resources both manpower and financial, which need to be appropriately harnessed for biodiversity conservation. The 'Regulatory Sectors' include revenue, judiciary, police, army, paramilitary, customs, excise, etc and have the mandate to prevent crimes and prosecute the offenders indulging in poaching of wild animals, plant species and forest products as well as those involved in the destruction and degradation of forest resources. It is important that personnel of both the sectors are appropriately sensitized with the aims, objectives, mandate and vision of forestry and wildlife.

There are developments that indicate attaching high priority to inter-sectoral planning. The Central Government plans to electrify all rural areas by 2009. The likely impact, this magnitude of electrification is expected to have on fuelwood consumption, which is currently estimated to comprise 85% of woody forest harvest by volume, will require in-depth study. As discussed earlier, the middle income group may use some of the electricity for water heating and even for cooking. Secondly, there is very little private, communal or revenue land available for intensification of agriculture. The absolute number of the rural poor will continue to rise in spite of urban drift and the pull of construction jobs for unskilled labourers in cities. The provision of rural livelihoods requires intensification of agriculture even in marginal areas and/or more opening of notified forestland for licensed agroforestry schemes. However, relevant studies on the extent and intensity of changing demographic pressure on forest boundaries are lacking which may be necessary to answer the above situation in coming years.

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6.2.3 Involvement of Civil Society and NGOs

The level of civil society involvement in sustainable forest management (SFM) varies, depending on the level of awareness which at present is low. Civil society involvement is, often, peripheral in nature. There is need for enhancing people's participation, and incorporating multiple groups of interest in policy and programme formulation, including non-governmental institutions, ethnic groups, rural communities, ecologists, international organisations and others. This intervention is necessary to generate the interest of society in forest and natural resources and in all the environmental benefits associated with them.

The National Forest Policy 1988 envisaged a limited role for non-governmental organizations (NGOs) as catalysts in rural development. There are many NGOs and NGO groupings in India which have the strength and experience to support communities in organizing themselves, to provide training, to deliver extension services, to identify income generating activities, to facilitate market access, to develop microplans and other activities in joint forest management. NGOs could play an important monitoring and communication role between communities and forest services.

6.2.4 External Assistance in Forestry

External assistance is sought in the forestry sector for augmenting of insufficient resource availability from internal sources.There is lack of means of implementation for Sustainable Forest Management (SFM), particularly in developing countries including India. It is eveident from one of the shared global objecives for sustainable development of all types of forests agreed at UNFF-7 which is for revesring the decline of ODA. There are two windows namely National Forest Programme (NFP) Facility and Programme on Forestry (PROFOR) available for getting financial resources to implement sustainable forest management. NFP Facility is being operated by FAO and provides 300000 US$ for three years. India does not have NFP Facility. The Japan Bank of International Cooperation (JBIC) is the main funding agency in the country for providing soft loans (1000 million US$ for five years) to the forestry sector in India. The country needs around 1.5 billion US$ annually to implement sustainable forest management. The forestry sector is getting around 30% of the need from national budget. There is big gap between need and availability of the funds. India is advocating to establish a Global Forest Fund dedicated to supplement national efforts in the implementation of SFM, particularly in developing countries. Another key area in the country is to build capacity of local communities living in and around forests for implementing SFM. The communities have been empowered with the ownership of minor forest produce and right to conserve and protect Community Forest Resource. The Community may not be able to implement SFM without strengthening their capacity. Around 350-400 million people are dependant fully or partially on forests and most of them have been assigned the right to protect and conserve forests through a national level legislation. It is a key area to attract the attention of external assistance to supplement the efforts of India to build the capacity of the people for implementing SFM.

6.3 Institutional Changes

A number of relatively new institutions are gradually becoming prominent to influence forestry development in India. Joint forest management (JFM) is more than 17 years old. *Gram sabha* (an assembly of elected villagers) is emerging as another powerful rural decentralized governance. In the wake of Forest Rights Act 2006 it is to be vested with SFM and sustainable use of scarce forest resources. This institution has onerous responsibility of addressing the bona fide ownership and livelihood issue of forest dwellers and other rural poor and at the same time assist in conservation of forests and biological diversity for posterity. Historically, forests and people have lived in harmony which is reflected by higher per capita forest area in tribal dominated areas. The Forest Department will also have to make a balance between conservation and livelihood and for this it should have a flexible approach so that they become relevant in the conflict resolution and framework development in the wake of implementation of Forest Rights Act 2006.

Rural youth is attracted towards urban areas resulting in migration. According to an estimate, the present trend of over 70% of population living in rural areas may come down to 50%. The exact magnitude will depend upon how quickly the national development priority addresses the development needs of rural areas providing urban types of facilities there. In either case there is going to be more pressure on urban land for housing and other facilities. The availability of green space will become scarce. There may be more trees on road sides and other public places. The pressure on existing green spaces will increase and people will be seeking alternative places. The agricultural land in the vicinity of urban areas may be acquired by well-off urbanites to develop farm houses and resorts. This may indirectly create pressure on forest areas as dispossessed farmers may encroach upon forestland. Civic bodies will have greater role to plan urban growth taking above points into consideration.

In order to get maximum advantage out of non-timber forest produce and medicinal plants it is possible to see the advent of self help groups, cooperatives and other institutions. Civil society and NGOs will also have greater role in providing institutional support to forest- dependent people

6.4. Technological Changes

The dynamic dimension of science and technology ensures that the frontier of knowledge is continually expanding; answers/solutions are being found for problems, and sustainable development is being enabled. This applies also to forestry. The technological base of forestry should be strengthened and modern technologies, which are available, should be put to use. Research and education in agriculture and forestry must give more attention to productive technologies related to appropriate land use. This should also be given a greater emphasis in the programmes for education, extension and training in agriculture and forestry. Land survey and classification should be expedited with the use of modern methods such as satellite and aerial surveys supported by ground surveys. Multiplication of the appropriate species can be accelerated by the use of modern technologies relating to tissue culture, clonal propagation, etc.

Technology demands that the adoption of the appropriate land use should be supported by a total treatment of catchments and watersheds. A master plan for the treatment of catchments and watersheds, particularly in those areas where the land resource has been substantially eroded or degraded, should be prepared and implemented within a specified time limit. The prescription of land use may itself not lead to the expected levels of productivity. Enforcement of land use should,

therefore, go hand in hand with adequate investments in the protection, shaping and management of the land mass both at the macro as well as the micro level. Urgent action is, therefore, needed for the preparation and implementation of integrated watershed management projects.

Clonal plantations of eucalyptus and poplar have revolutionized the production forestry. While the natural forests of teak and *sal* (*Shorea robusta)* have been giving an increment of 3-5 cubic metre per hectare per year. The plantations of eucalyptus and poplars are giving the mean annual increment (MAI) of 20-60 cubic metre per hectare per year. The use of quality planting material will become a norm for all futuristic forestry plantations and drip irrigation and watershed management approach would become a traditional mode of plantation management.

National R&D institutions in many cases need to be strengthened with more funds, facilities, clear plan and priorities. Available research information and results have to be properly disseminated and converted into technological packages for adoption. Irrelevance of research conducted without appropriate problem analysis or consultation with the clients about their needs, is often an issue.

The geographical information system (GIS) and remote sensing technology are going to be used in greater proportion than presently being used for forest management decision making. Detection of fire and illicit felling will become easier by equipping the frontline foresters with modern tools such as global positioning system (GPS) and mobile phones

Non-timber forest produce including medicinal, aromatic and dye plants will be in greater focus. The technology upgradation will ensure better use of bamboo resources. There is some technology using bamboo for manufacturing bamboo plywood. More technological applications will improve the economic returns from bamboo. Technology upgradation in paper and pulp mills, and other processed-wood and saw mills will have to be implemented to play a key role in the business of forest-based employment, income generation and export.

Technology will also be used for collection of data and preliminary analysis, preparation of digital map and other purposes. It is possible that with the technological development many judicial pronouncements would replace use of impressionistic evidences. They will demand more technological database for effective and quick delivery of justice.

Right to Information Act is another area which is likely to reduce the instances of subjective judgment. This will improve the access of common man to the implications of forest management decision making.

Box.6.1

Fire Alert and Messaging System (FAMS) Introduction

Fire alert and messaging system is a small but very useful computer program which combines GIS and MIS technologies. It uses processed remote sensing data of active fire locations obtained from MODIS satellite and sends alerts to concerned field staff from beat guard to CF through short message service (SMS) and e-mail. It also builds the database of fire locations which can be used to identify fire sensitive zones scientifically and also to plan fire control strategy.

The response module is designed to collect feedback about correctness of alert locations, extent of fires and also the gap time to attend the fire for control.

How it works?

Fire Information Resource Management System (FIRMS) is developed and maintained by University of Maryland and NASA to provide various services regarding fire information and resource management. FIRMS updates the active fire data every 6 hours. The FAMS download this data daily and further process it using spatial query over digitized map of beats to identify the concerned beat. When the beat is identified this automated system sends SMS immediately to concerned frontline field staff (beat guard, range assistant, range officer) and monitoring authorities (subdivisional forest officer, divisional forest officer and conservator). An e-mail which contains the location map and questionnaire is also sent to the division and range office. This questionnaire is filled by field staff after inspecting the said fire location and action taken.

Results

This system was started in April 2007 and in the whole fire season of 2007 a total of 1612 fire locations were identified. Feedback from the field has been obtained and is being analyzed. The major achievement is that for the first time a complete fire database of the state of Madhya Pradesh has been authentically prepared and is being analyzed.

Preliminary statistics show that 78% of the fires detected were correct and about 67% of the fires were attended to within two hours of reporting thereby preventing major losses. The extent of burnt area is estimated to be roughly 2.36% of the total forest area. The forests of Sehore, Obedullahganj, Raisen, Narsingpur, Jabalpur, Burhanpur, and Sheopur divisions witnessed maximum and repeated fire occurrences and may be considered as fire-prone forests of the state.

Chapter 7: Conclusion

The forestry sector in India has traditionally been one of the most organized sectors with more than 140 years old tradition of scientific management. However, of late, like other sectors it has been affected by several factors among which rapid increase in human and livestock population, insufficient infrastructure, inadequate investment and diversion of forestland for agriculture and developmental activities. In addition to this, there are several other problems which are unique to forestry sector. These include inadequate public awareness about multiple function of forests, under-valuation of forest contribution to GDP, technological weakness, insufficient funds and lack of capacity of the community.

Sustainability of forests ecosystem is an essential component of the environmental conservation efforts and any degradation of forests will have an adverse impact on various systems such as water resources, agriculture, biodiversity, environment, climate change and human health besides the subsistence and livelihood opportunities of forest-dependent communities living in and around forests. Having about 2.5 of world's geographic area, India is supporting 16% of planet's human population and 18% of cattle population. About 41% of forest cover has already been degraded and dense forests are also loosing its crown density. A large percentage of India's livestock population graze in forests causing damage to regeneration and productivity.

The requirement of fuelwood, timber and other forest products are much more than that available sustainably from forests. Although the deficit is being met from agroforestry and import. The deficit of forest products compared to demand of is extremely large, which will further increase in future with the increase of population, high economic growth and rise in literacy level. It is also to be noted that availability of NTFP and its value-added products are vital for the economy of 350-400 million rural people living in and around forests.

The National Forest Policy of the country has been revised in 1988 with the principal aim for environmental stability and ecological balance including atmospheric equilibrium which are vital for sustenance of all life forms including human, animal and plant. This policy gives priority to the sustenance and livelihood needs of the forest-dependent communities, particularly tribals and also involves them in protection, conservation and management of forests. The present forest policy was formulated four years before Earth Summit which embodies all elements of sustainable forest management. India' forests are primarily considered social and environmental resource. India at present has assigned more than 22 million hectare of forests to the community under Joint Forest Management Programme with benefit sharing mechanism on the principle of care and share.

It is a fact that forest and poverty co-exist. Degradation of forests could not be checked without alleviating poverty in the forest fringe areas. India has made effort to recognize the tenurial rights of tribals on forests with the issuance of guidelines to the state governments in 1990. India has also taken a milestone step to provide occupation and habitation rights to forest-dependent communities living in and around forests through a national level legislation along with right to protect, conserve and regenerate forests. The decision making of the community will be more in future. The empowerment of community with ownership of non- timber forest produce (NTFP) for the purpose of collection, processing, trade and marketing is a key step for improving the economy of the forest-dependent communities. The Government of India has to look forward for building their capacity.

India has strong legal, policy and institutional framework for the sustainable development of forests in the country. The institutional framework is shifting from regulatory to participatory mode of administration, and it will be more people-oriented in future. The promulgation of Forest Conservation Act 1980 was a milestone step in the history of forestry for the conservation of forests. Wildlife Protection Act provides legal regime for wildlife conservation in the country. India is in the process to amend Indian Forest Act 1927 with respect to the people-oriented approach of the National Forest Policy 1988. The newly enacted Schedule Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 assigns right to protect around 40 million hectare community forest resource to village level democratic institution. The fine tuning of other forest-related legislations are needed with respect to the said Act. India recently reviewed its forest-related policies and legislations through National Forest Commission. The Commission has also given certain recommendations for sustainable development of forests without suggesting any amendment in the National Forest Policy, 1988.

The major task before the country is to rehabilitate the degraded forests and increase their productivity, augment the contribution of forests towards poverty alleviation of the people living in and around forests, and extend the area under forest and tree cover to 33%. The lack of capacity of the community and inadequate investment are the big challenges for the country to overcome the constraints in the implementation of sustainable forest management. The country has taken steps for

rationalization of regulatory and policy constraints for trees grown on private land which would have 85% potential of achieving 33% forest and tree cover. Another big task for the country is to bridge demand and supply gap of wood and wood products. The demand and supply gap would be bridged mainly from import and private sector in the country. India will be a big market for wood and wood-based products and its demand would be 3-4 folds more in 2020. India's forests will be fulfilling the socio-economic needs of the people living in and around forests and ecological security of the nation in future.

It is very important to understand the multidisciplinary function of forests. Overgrazing is causing degradation to the forests. A separate grazing policy is urgently needed to cater to 18% livestock of the globe in the country. The forestry sector is impacted directly by the policies of other sectors such as agriculture, rural development, *panchayati raj*, education, energy, and water resources and indirectly by the policies of petroleum, chemical and fertilizers, and industry and commerce. The National Policy for Farmers 2007 has taken care to improve the economy of rural people, particularly the people living in and around forests with the inclusion of agroforestry and NTFP in the definition of farmers.

There is need to invest more than 1.5 billion US$ in the forestry sector to implement SFM. The contribution of the national budget is around 30% of the need. There will be more investment by private entrepreanure to grow more trees in the agroforestry sector.India has developed an innovative funding mechanism at national level to supplement the efforts of the State Governments in the implementation of SFM. At present ,this mechanism has around 2000 million US$ as corpus.It is likely to increase in future and only interest generated through this mechanism will be spent on sustianble development of forests in the country. India has also enacted National Rural Employment Guarntee Act, 2005 to provide assured employment of 100 days to the adult member of each family for creating natural resource base . Afforestation and plantation is one of the activities under this scheme. Huges financial resources are available for plantations and afforestation.

India is looking forward to overcome the challenges emerging due to high human and livestock population, change in demographic structure, poverty in forest fringe areas, high economic growth particularly in urban areas and climate change, with policy and legislative interventions along with capacity building of community and R&D for high productivity in future. India will be the net importer of wood and wood products. It may be one of the possibilities that exporting countries could not be in a position to meet the demand of countries raised due to high economic growth. India must focus on production forestry to become self-sufficient in wood production. The forest and tree cover will be higher but the quality of forest may suffer due to grazing and domestic energy requirement in the rural areas. The community will be playing crucial role in the implementation of sustainable forest management by 2020. The ecological security of the nation would be maintained through protected area network with emphasis on the conservation of tiger which will result into a healthy ecosystem in future.

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Annexe A1

Notification

Of

The

National Level Steering Committee

Of

Asia-Pacific Forestry Sector Outlook Study (APSSOS)

F.No.4-5/20060FIC
Government of India
Ministry of Environment & Forests
***

Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi –110003
Dated: 27.2.2007

Sub: National Level Steering Committee for Asia –Pacific Forestry Sector Outlook Study(APFSOS).

India is also the home of more than billion people with fast economic growth and also indicating the social change. Another peculiar situation in India is having around 700 million population below 35 years of
Age. The nation has decided to settle the habitation and occupation rights of the people on forests. India depends largely on agro –forestry for meeting its demand of wood and wood products. The prime objective of the national policy is to maintain ecological security of the country. Moreover, India will remain net importer of wood and wood products in future. Forest sector lacks political commitment resulting into the inadequate investment to this sector. The policies of cross cutting sectors such as agriculture, tribal and rural etc. have impacted forest sector in the country. Keeping these views into consideration, it is important for us to analyze the forestry scenario to 2020.

One of the important activities of the APFSOS at the national level is the preparation of a country outlook paper. The country outlook paper for vision of forestry sector to 2020 will provide an overview of the forest sector, factor impacting on the sector, and the sector's possible future development for each country in the Asia Pacific region. These papers will be assimilated with other information sources to develop an overall outlook for forestry in the region.

The following national level steering committee is hereby constituted to identify the major change of drivers impacting forest sector and also to finalize the country outlook paper:-

1. DGF&SS, MoEF	-Chairman
2. Addl. DGF (FC), MoEF	-Member
3.Addl. DGF (WL), MoEF	-Member
4. PCCF, Uttaranchal, Dehradun	-Member
5. PCCF, Orissa	-Member
6. PCCF, Tamilnadu	-Member
7. PCCF, Gujarat	-Member
8. PCCF, M.P.	-Member
9. Inspector General of Forests (FC), MoEF	-Member
10.DIGF (RT), MoEF	-Member
11.DIGF (FPD), MoEF	-Member
12.IGF (NAEB), MoEF	-Member
13. DG(ICFRE), Dehradun	-Member
14. Director (FRI), Dehradun	-Member
15. DG (FSI), Dehradun	-Member
16. Director, IPRITI	-Member

17. Director, WII, Dehradun -Member
18. Director, IIFM, Bhopal -Member
19. Director, IGNFA, Dehradun -Member
20. Representative from M/o Agriculture, Delhi -Member
21. Representative from M/o R&D, Delhi -Member
22. Representative from M/o Commerce, Delhi -Member
23. Representative from M/o Tribal Affairs, Delhi -Member
24. Representative from M/o Panchayti Raj, Delhi -Member
25. Dr. S.K.Khanduri, Planning Commission, Delhi -Member
26. Dr. S.N.Rai, ATREE -Member
27. Dr. P.P.Bhojvaid, TERI, Delhi -Member
28. Representative from CII -Member
29. Dr. R.K.Singh, SIRD, Chhattisgarh -Member
30. Dr. Vinay Sinha, IIFM, Bhopal -Member
31. Dr. Ram Prasad, NGO -Member
32. Shri D.C.Khanduri, Delhi -Member
33.Dr. T.P.Singh, IUCN -Member
34 Shri R.B.S.Rawa, ICMOD -Member
35.Shri Pramod Krishnan, JD (WL), MoEF -Member
36.Shri R.K.Garg, CF, Jhansi -Member
37.DIG (FP), MoEF -Member Secretary

The TOR for the steering committee will be to identify theme for the diver change in the forest sector to 2020.

This issues with the approval of the Secretary (E&F).

(A.K.Sinha)
Under Secretary to the Government of India
Tele:24363013, Fax: 24360549

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37.Shri R.K.Garg, CF, Jhansi
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Annexe A2

Notification

Of

Drafting Committee

For

Asia-Pacific Forestry Sector Outlook Study-II

F.No.4-5/2006 –FIC

Government of India
Ministry of Environment & Forests
***

Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi –110003
Dated: 27.2.2007

Sub: Drafting Committee for Preparing Country Outlook paper for Vision for Forest Sector 2020.

India is also the home of more than billion people with fast economic growth and also indicating the social change. Another peculiar situation in India is having around 700 million population below 35 years of age. The nation has decided to settle the habitation and occupation rights of the people on forests. India depends largely on agro –forestry for meeting its demand of wood and wood products. The prime objective of the national policy is to maintain ecological security of the country. Moreover, India will remain net importer of wood and wood products in future. Forest sector lacks political commitment resulting into the inadequate investment to this sector. The policies of cross cutting sectors such as agriculture, tribal and rural etc. have impacted forest sector in the country. Keeping these views into consideration, it is important for us to analyze the forestry scenario to 2020.

One of the important activities of the APFSOS at the national level is the preparation of a country outlook paper. The country outlook paper for vision of forestry sector to 2020 will provide an overview of the forest sector, factor impacting on the sector, and the sector's possible future development for each country in the Asia Pacific region. These country papers will be assimilated with other information sources to develop an overall outlook for forestry in the region.

1. Director, FRI, Dehradun	-Chairman
2. Dr. S.K.Khanduri, Planning Commission, Delhi	-Member
3. Dr. R.K.Singh, SIRD, Chattisgarh	-Member
4. Dr. Vinay Kumar, IIFM, Bhopal	-Member
5. Dr. Ram Prasad, NGO	-Member
6. Shri D.C.Khanduri	-Member
7. Shri Pramod Krishnan, JD (WL), MoEF	-Member
8. Shri R.K.Garg, CF, Jhansi	-Member
9. DIG (FP/FIC), MoEF	-Member Secretary

This issues with the approval of the Secretary (E&F).

(A.K.Sinha)
Under Secretary to the Govt. of India
Tele:24363013, Fax:24360549

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Annexe B1

Minutes of the First Meeting of the National Level Steering Committee (APFSOS) held at Van Vigyan Bhawan, R.K. Puram, New Delhi on 18.05.07. under the Chairmanship of Sh. G.K. Prasad, DG, Forests, MoEF.

The list of Members present is given as Annexe I

At the outset, the Chairman, in his opening remarks, underlined the need of such Study and gave direction to the Committee members as to how they might take the way ahead. He flagged the key issues and threw ample light on the emerging challenges, new horizons, policy imperatives, and International coordination; among other Issues. He also touched upon the following points:

Growth of consumerism in Indian society
Opportunities and challenges created by development in other sectors within country
Opportunities and challenges created by development in the International arena
Influence of deliberations on Joint Forest Management, Multi-stakeholder partnership, policy changes on tribal welfare particularly right of habitation and occupation in forest land granted to tribals and other forest dwellers
Juvenile and small timbers for meeting demands of local communities
Potential of creating employment opportunities in agro-forestry, medicinal plants and NTFPs, watershed conservation and tree planting particularly in light of the huge fund available for implementing the National Rural Employment Guarantee Act could be used massive afforestation activities.

Shri J.V. Sharma, Member Secretary, apprised the members about background, perspective, context and relevance of such Study. Later, Dr. S.S. Negi, Chairman Drafting Committee and Shri J.V. Sharma made a brief presentation on the progress made during the previous two meetings of the Drafting Committee.

Dr. C.T.S. Nair, through his elaborate presentation, summed up APFSOS process and explained the major objectives of the Study and the purpose. He also outlined Asia Pacific Forestry Commission – background, pressure on forests, global studies, regional studies, political changes etc. He intimated the members that such studies have already been completed in Latin American countries. He also quoted figures on Indian Imports on wood and the likely increase in future. He also stressed for political will and views of common people in regard of forestry. He emphasized the necessity to conduct more studies on bio-fuels. His presentation highlighted the following points:

Outlook 2010 to Outlook 2020
Regional and thematic studies coordinated by FAO
Demand – supply study of products
Judicial interventions (activism)
Role of NTFPs

Achievements of Millennium Development Goals through forestry
Major changes in social aspects of forest management by Gram Sabha
Global outlook of future wood supply from forest plantations
Plantations in production process – projections and drivers
Rising timber import bill – approx. Rs. 1.3 billion during the past five years and possibly Rs. 3.2 billion during the next five years
Impact of globalization; e.g., China imposed much appreciated ban on logging after the flood in Yangtze River: accelerated logging in Africa and other areas
Illegal logging at global level causes loss of revenue in the range of 10-12 billion US$
Issue of comparative advantages in location of activities
Asymmetric globalization of water, energy and wood

After initial Presentation, Shri J.V. Sharma placed before the members and Suggestive Outline for the proposed Paper – topic wise and sub theme wise. The house was then open for discussion by the Chairman. The members responded with their suggestions:

Shri R.B.S. Rawat expressed inadequacy in dealing the issues of shifting cultivation in NE India, gregarious flowering in Bamboos, role of mangroves in the context of tsunami, alpine pasture and hydrological cycle in Himalayas and suggested these to be dealt with emphatically in the Study. He also underlined use and dependence on fuel – wood as source of energy as well as bio-fuel initiatives and growing use of advocacy in the sector.

Mr. Thampi IGF highlighted about poverty alleviation through JFM and made a mention of number of hybrid cattle in India.

Dr. Nair opined that India is huge country and lot of progress is there in many fields like IT etc and its best use will depend much on the political will, Kerala is the classic example of increasing incomes irrespective of high population. He was in favour of identifying crucial factors for expansion of forestry.

Dr. D. Pandey wished to know the status of the earlier similar Study carried by the FAO for India. He also emphasized for Review of projections made; unprecedented growth and uncertainties in environment protection should be considered, Perusal of the World Bank Report on Impact on Environment could be useful. Economic modelling, if already done, for assessing impacts of various policy and institutional changes
He gave example of Goa where no body is using Diesel/Petrol but LPG only. Forest sector should work in close collaboration with Ministry of Power/Non conventional Energy.

Shri D.C. Khanduri informed that Animal Census in India is lacking to form grazing policy.

Sh. J.V. Sharma further brought to focus the following points:

Global commitment to encourage import-export from Sustainably managed forests
Inadequate financial support to forestry – NFAP awaiting funding
Implementing NAREGA could provide funds at the district level

Impact of forest-related decision making and implementing mechanism due to transfer of ownership and control to Gram Sabha particularly in the scheduled areas and use of terminology like empowerment

Mr. M.L. Sharma enquired about the Outlook study carried by APFC in 1988 and how it is feasible in present day context after a big time gap. He also suggested that before taking it on national level Study, regional level Studies could also be undertaken on identified specific areas.

Dr. Ram Prasad expressed concern over lack of representation from other ministries in the meeting. He reiterated that the forestry should be taken as a whole in integrated manner i.e. its impact of the environment like CDM etc. In this regard, he suggested that DG Forests should request every SFD to provide necessary data for inclusion in the Paper.

Shri A.K. Goyal stressed for Study of implications of implementation of Tribal Act in India. He added that some important issues to be considered could be (a) sustained supply of water from forest areas, (b) climate change, (c) rural energy sources other than wood, (d) NTFP and medicinal plants, and (e) productivity of forest land

Mrs. Rekha Pai laid stress on community participation and opined that reports should not be ended only with forestry itself but other conservations should also be taken. Sacrificing some trees for development is inevitable. Community participation is must at every stage. She wondered what will be the balance the realities and the public opinion and people's awareness about forests and wildlife?

Shri R.B.S. Rawat gave some suggestions for report contents such as sensitizing the policy makers in forestry, contribution of forestry in GDP, CDM scenario, social and gender analysis etc.

Dr. Vinay Sinha suggested for visiting different parts of the country to collect necessary information. He further suggested for Focus on current assessment, projections and likely scenario with casual factors (and the mechanisms) affecting the projections. Avoid prescription Examine the common interests (convergence) and conflicts of forest & wildlife and related sectors: lessons from watershed projects.

Mr. Thampi suggested that report should not be based merely on rigorous statistics. He opined to make efforts to include or incorporate opinions of outsiders' view (experts) from other sectors, develop through regional to national perspectives pay adequate attention to grazing, fuelwood and governance (including politicisation)

Dr. S.S. Negi suggested that no new survey was required; the study should be based on available literature.

Mr. A.K. Lal viewed that the proposed report should be such as to give a vision based on current scenario, and after careful in depth study of facts and trends as on today by the Committee through their collective wisdom in order to bring it closer to real conditions prevailing in 2020.

The discussion and suggestions were followed by wrap up by the Chairman and tentatively drawing the time frame.

The following other decisions were also taken:

1. It was general agreement to approach the identified Eminent Persons / Experts and seek write ups from them on the selected sub theme in a month time.

2. The modifications as suggested and agreed would be incorporated in the otherwise okayed Outline placed by Sh. J.V. Sharma.

3. The Drafting Committee will circulate the contributions of the member / outside experts to all the members for the improvement.

4. The Drafting Committee would Meet in a month to initiate preparing the first draft. The full Committee would meet after 3 months preferably mid August.

5. The members may further submit their suggestions in write up to the Drafting Committee within a month.

The Meeting ended with thanks to the Chair.

Annexure – I

The List of Participants

1. Shri G.K. Prasad, DGF&SS, MoEF	-	Chairman
2. Shri M.L. Sharma, PCCF, Gujrat	-	Member
3. Shri K.B. Thampi, IGF (NAEB), MoEF	-	Member
4. Shri Ansar Ahmed, IGF (FP)	-	Member
5. Dr. D. Pandey, DG (FSI), Dehradun	-	Member
6. Dr. S.S. Negi Director, FRI, Dehradun	-	Member
7. Dr. S.K. Khanduri, Planning Commission, Delhi	-	Member
8. Dr. Vinay Sinha, IIFM, Bhopal	-	Member
9. Dr. Ram Prasad, NGO	-	Member
10. Shri D.C. Khanduri, Reliance, Delhi	-	Member
11. Shri R.B.S. Rawat, ICMOD	-	Member
12. Smt. Rekha Pai, DIGF (FPD), MoEF	-	Member
13. Shri A.K. Goyal, DIG (RT)	-	Member
14. Dr. Rawat, WII	-	WII Representative
15. Dr. C.T.S. Nair, Chief Economist, FAO	-	Special Invitee
16. Shri A.K. Lal, Dean, FRI	-	Co-opted Member
17. Shri Mohit Gera	-	TERI Representative
18. Shri J.V. Sharma DIG (FP), MoEF	-	Member Secretary

Annexe B2

Minutes of the Meeting
of

Drafting Committee
For

Preparing

Country Report
For

Asia Pacific Forestry Sector Outlook Study-II

Minutes of the Meeting of the Drafting Committee for preparing Country Outlook Paper for Vision of Forest Sector 2020 held in FRI, Dehradun on 4th April, 2007.

The following officers attended the Meeting:-

1.	Dr. S.S.Negi, Director, FRI, Dehradun	-Chairman
2.	Shri D.C.Khanduri Retd., Forester	-Member
3.	Dr. Vinay Kumar, IIFM, Bhopal	-Member
4.	Dr. S.K.Khanduri, Planning Commission	-Member
5.	Shri R.K.Garg, CF, Jhansi	-Member
6.	Shri J.V.Sharma, DIG (FP/FIC), MoEF	-Member
7.	Shri Ajay K.Lal Dean (Academic), FRI	- Co –opted Member

The Draft Committee Co- opted Shri Ajay K. Lal Dean (Academic), FRI in the Drafting Committee and entrusted him to be the nodal officer.

DIG (FP/FIC) Shri J.V.Sharma initiated the proceedings by giving an account of the background of the proposed Outlook Study and apprised the Members of the important developments in this regard. He also suggested ways which could be discussed in order to proceed. The Members then expressed their view points and after deliberations an outline framework for the proposed Paper was drafted and adopted as a guiding structure for further going ahead (annex I). The main points agreed to included: First, the paper should contain overview of the Sector, factors impacting on the Sector and its possible future development by 2020. Further, it should be a focused document consisting around 75 pages with emphasis on Vision and a Road Map to realize that Vision.

Themes were identified in order to build the Structure of the Study Paper (Annex II). The Members were distributed tasks as per the following details:

Dr. Vinay Sinha: (theme 3) Linkages (including trade); Shri D.C.Khanduri: Grazing, fuel wood; Dr. R.K.Singh: Institutional Issues (theme 4); Shri Pramod Krishnan: Biodiversity, Wildlife related issues; Shri J.V.Sharma: NTFP, International Coordination (theme 1), Shri Ajay K. Lal: Services (theme 2); Dr. S.K.Khanduri: Forest (theme 1), land use etc; Shri Rajiv Garg: People, Social, tribal, cultural issues.

It was agreed to undertake the thematic studies latest by 7 May so as to synthesize them in the main Study Paper draft to be made ready before 19 May i.e. Meeting of the full National steering Committee. The next Meeting of the Draft Committee will be held on 7 May in Delhi.

The Meeting ended with thanks to the chair.

This issues with the approval from the Chairman.

(Ajay Kumar Lal)
Nodal Officer

Annexure –I

Proposed Structure (COP) (Suggestive)

Executive Summary

Chapter 1: Introduction
Chapter 2: Forest Sector of India:
Historical perspective: Post in dependent development the Present Situation

Chapter 3: Extent, Health and Vitality of Indian Forest Resources

Productive, Protective and Socio Economic Functions of India Forest Resources

Chapter 4: Factors Impacting on the Forest Sector

Chapter 5: Institutional, People and Private Initiatives in the Forest Sector

Policy and Legal Framework
Budget System,
Forest Administration and Sectoral Institutions
Forest Information System
Interface with other Sectors
Monitoring and Evaluation
Forestry Research
Forestry Education and Extension
Judicial Activism
Changing Role of the Private Sector
Non Governmental Influences
Peoples Participation

Chapter 6: Emerging Needs and Goals of Forest Sector
Chapter 7: Roadmap towards Sustainable Forest Management: Vision 2020
Chapter 8: Conclusions

Annex –II

PROPOSED/ IDENTIFIED THEMES

1. Forest: Land use classification (reserved, protected and un –classed forests, farm lands, trees outside forest areas, etc.)

Products: timber, fuelwood, NTFP (highlighting medicinal plants), grazing

2. Service:- Environmental, water harvesting, soil conservation, employment, eco- tourism, carbon sequestration & climate change,

3. Linkages: Industry (paper & pulp, sawmills, veener, plywood, etc.), people, trade, international coordination, social and cultural linkages

4. Institutional: HRD, information management, e –governance

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