
Introduction

Forests are a key element of our terrestrial ecological systems. They comprise tree-dominated vegetative associations with an innate complexity, inherent diversity, and serve as a renewable resource base as well as a habitat for a myriad of life forms. Forests render numerous goods and services, and maintain life-support systems so essential for life on earth. Some of these life support systems of major economic and environmental importance are: i) supply of timber, fuelwood, fodder, and a wide range of non-wood forest products, ii) natural habitat for biodiversity and repository of genetic wealth, iii) provision of recreation and opportunity for ecotourism, iv) playing an integral part of the watershed to regulate the water regime, conserve soil, and control floods, and v) carbon sequestration and functions as a carbon sink.

The increase in human and livestock population in recent times and rural poverty have both exerted tremendous pressure on the forest resources of the country, leading to a deterioration in their quality, stocks and productivity.

This chapter deals with Agenda 21, as it addresses issues related to the forestry sector in India. The chapter is divided into sections providing an overview of the sector; a discussion of relevant Agenda 21 concerns; highlights of important policies, acts, programmes and other initiatives; analysis highlighting achievements and concerns under Agenda 21 objectives; and finally strategies for sustainable development in the forestry sector.

Overview of the sector

India supports approximately 16% of the world's human and 18% of the livestock population on 2.5% of its geographical area, which also includes 1.8% of forest area according to the Forest Survey of India (2000). The recorded forest area is 76.52 million ha or 23.28% of the country's total geographical area of 328.73 million ha, most of which (over 90 %) is under public/government ownership and managed by the state forest departments.

The growing stock of the country (including natural forest, forest plantations, and areas other than natural forests) is 4740.8 million cubic metres with an annual increment of 87.62 million cubic metres. Of this, about 60%

(52.62 million cubic metres) is estimated to be timber and 40% (35 million cubic metres) fuelwood. This represents an average volume of 74.42 m³/ha with an incremental annual growth of 1.36 m³/ha/year.

The main pressures on forests in India are on account of factors such as deforestation, over-cutting beyond silviculturally permissible limits, unsustainable fuel and fodder extraction, practice of shifting cultivation, forest fires, over-grazing and diversion of forest land for non-forestry uses. The total forest area diverted to non-forestry purposes between 1950 and 1980 was 4.5 million ha at an average annual rate of about 0.15 million ha. However, after the promulgation of the Forest (Conservation) Act in 1980, the rate of diversion has come down to about 0.02 million ha annually.

Forests contribute 1.7% (MoEF, 1999) to the gross domestic product of the country. However, this figure does not take into account its numerous non-market and external benefits. Collection of non-wood forest products by villagers is also not recorded fully. Studies are underway to provide more accurate estimates of the contribution of forests to the GDP.

Forestry and Agenda 21

Agenda 21 recognizes the need for specific actions to combat deforestation. Chapter 11 of the document identifies four programme areas for action.

Sustaining the multiple roles and functions of all types of forests, forest lands and woodlands

The objective of this programme is to strengthen forest-related institutions in order to enhance the scope and effectiveness of policies, programmes and legislation related to management, conservation and sustainable development of forests. This would involve development of technical and multidisciplinary skills, research capability and support, administrative structures and mechanisms including inter-sectoral coordination, decentralization of responsibility, incentive systems and dissemination of information. This would also require the participation of the public, including the private sector, NGOs, local organizations and women.

Enhancing protection, sustainable management and conservation of all forests, and greening of degraded areas through forest rehabilitation, afforestation, reforestation and other rehabilitative measures

The objective of this programme area is to maintain or restore ecological balance and expand the contribution of forests to human needs and welfare. This can be achieved by the conservation and management of existing forests and expansion of areas under forests and tree cover through the conservation of natural forests, forest protection, rehabilitation, regeneration, afforestation, reforestation and tree planting. This will require the preparation and implementation of national forestry action plans and other related programmes for the management of forests. These programmes should be integrated with other types of land use, and evolved in partnership with private sector and local communities.

Promoting efficient utilization and assessment to recover the full valuation of the goods and services provided by forests, forest lands and woodlands

The objective of this programme is to promote efficient, rational and sustainable utilization of all types of forests and vegetation through the development of efficient forest-based processing industries, value-adding secondary processing and trade in forest products; to promote more efficient and sustainable use of forests and trees for fuelwood and energy supplies; to enhance the economic contribution of forests by incorporating eco-tourism into forest management and planning; and to improve the recognition of the ecological, economic and social values of forests by integrating these functions in national income accounts.

Establishing and/or strengthening capacities for planning, assessment and systematic observation of forests and related programmes, projects and activities, including commercial trade and processes

This programme seeks to strengthen or establish systematic observation and assessment of forests and forestland with a view to assessing the impacts of policies, programmes and activities and to provide planners, economists, and local communities with sound and adequate updated information on forests and forestland resources.

Each of these programme areas would require, apart from institutional capacity-building and management-related activities, the strengthening of data and information systems in the country. In addition, these would also require the active involvement of all stakeholders including local communities, women

and youth, local organizations and the private sector, and active cooperation of the regional and international community.

Review and analysis of legislation, policies, programmes and other initiatives

Highlights of legislation, policies, programmes and other initiatives

Forestry is a concurrent subject in the Indian Constitution, being under the purview of both the central and state government. Systematic management of forests, began in the mid-nineteenth century. The first forest policy of India enunciated in 1894 focused on commercial exploitation of timber and gave importance to permanent cultivation. The 1952 revision of the policy recognized the protective role of forests and proposed that one-third of the land area of the country be retained under forest and tree cover. The New Forest policy of 1988 focused on environmental stability and maintenance of ecological balance. The initiatives and developments that have addressed the concerns of the forestry sector are summarized in Table 9.1 below:

Table 9.1 Highlights of major developments in the forestry sector

Year	Action taken	Scope
1972 and amended in 1991	Wildlife (Protection) Act 42 nd amendment of the Constitution of India	To protect wild animals, birds and plants including their habitat. Article 48a under the Directive Principles of State Policy and Article 51A (g) of the fundamental duties in the Constitution mention that the 'State shall endeavour to protect and improve the environment and safeguard forests and wildlife in the country and protect and improve the natural environment including forests, lakes, rivers, wildlife and have compassion for living creatures'
1976		
1980	Forest Conservation Act	Control diversion of forest land for non-forestry use
1981	The Forest Survey of India	To assess forest cover for planning and monitoring purposes
1985	Ministry of Environment and Forests	Nodal agency for planning, coordination and implementation of environmental and forestry programmes
1988	National Forest Policy	Objectives summarized in Box 9.1

1990	Joint Forest Management	To protect and regenerate degraded forests through peoples' participation
1991	Coastal Regulation Zones	Notification issued under the Environment (Protection) Act, 1986 for the protection of coastal areas
1992	National Afforestation and Ecodevelopment Board (NAEB)	To promote afforestation and ecodevelopment
1994	Environmental Impact Assessment notification	Issued under the Environment (Protection) Act 1986 making EIAs mandatory for 30 sectors
1996	Convention to Combat Desertification	To combat desertification
1999	National Forestry Action Programme	A comprehensive strategy and long-term work plan for the next 20 years formulated to address the issues underlying the major problems of the forestry sector in line with the National Forest Policy, 1988
2000	National Forestry Research Plan	Prioritise and carry out research on various aspects of forestry required for sustainable development

Box 9.1 National Forest Policy 1988

The main objectives of the NFP are:

- Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been disturbed by the serious depletion of forests of the country.
- Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represents the remarkable biological diversity and genetic resources of the country.
- Checking soil erosion and denudation in the catchment areas of rivers, lakes, reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for the retardation of siltation of reservoirs. Also checking the extension of sand-dunes.
- Increasing substantially the forest/tree cover in the country through massive afforestation and social forestry programmes, especially on all denuded and degraded, and unproductive lands.
- Meeting the requirements of fuelwood, fodder, minor forest produce and small timber of the rural and tribal population.
- Increasing the productivity of forests to meet the essential national needs.
- Encouraging efficient utilization of forest produce and maximizing substitution of wood.
- Creating a massive people's movement involving women, for achieving these objectives and to minimize pressure on existing forests.

The evolving priorities of the National Forestry Policy have also found reflection in the Five-Year Plans of the Government of India as outlined below.

- **First and Second Five-Year Plans:** Rehabilitation of degraded forests, introduction of economic species, survey and demarcation;
- **Third and Fourth Five-Year Plans:** Enhancing productivity of forests through plantation of fast-growing species, scientific assessments and modern logging;
- **Fifth Five-Year Plan:** Large-scale plantation, social forestry and forest conservation;
- **Sixth Five-Year Plan:** Social forestry and fuelwood reserves to save natural forests;
- **Seventh Five-Year Plan:** Forest conservation, massive afforestation and wasteland development;
- **Eighth and Ninth Five-Year Plans:** Preservation of biological and genetic diversity (both flora and fauna), protection of forest against biotic interference, utilisation of wastelands, and promotion of people's participation through Joint Forest Management (JFM).

The following section analyses the government's initiatives and other stakeholders to bring out achievements and concerns vis-à-vis Agenda 21 objectives.

Achievements

Sustaining the multiple roles and functions of all types of forests, forest lands and woodlands

Institutional set-up

The country has a strong institutional set-up for the conservation and management of forests. The Ministry of Environment and Forests (MoEF) is the nodal agency for planning, promotion, coordination and overseeing the implementation of various environment and forestry programmes.

The Ministry's mandate includes conservation and survey of flora, fauna, forests and wildlife, prevention and control of pollution, afforestation and regeneration of degraded areas and protection of environment. These objectives are being achieved through programmes such as environmental impact assessments, eco-regeneration, assistance to organizations implementing environmental and forestry programmes, promotion of environmental and forestry research, extension, education and training, dissemination of environmental information, international cooperation, and creation of environmental awareness in the country. These functions are supported technically by an extensive institutional set-up. This comprises institutions such

as Indian Institute of Forest Management (Bhopal), Indira Gandhi National Forest Academy (Dehra Dun), Wildlife Institute of India (Dehra Dun), the Indian Council of Forestry Research and Education (Dehra Dun) with its constituent institutes in different parts of the country, and the State Forest Service Colleges at Dehra Dun, Burnihat and Coimbatore, Botanical Survey of India (Kolkatta), Zoological Survey of India, and Forest Survey of India (Dehra Dun), and other affiliated institutes such as the National Museum of Natural History, New Delhi, GB Pant Institute of Himalayan Environment and Development, Almora, Salim Ali Centre for Ornithology and Natural History, Coimbatore, Central Zoo Authority, Delhi, Centre for Ecological Research and Training, Bangalore, and Central Pollution Control Board, New Delhi. At the state level, public sector forests are governed by the state forest departments and managed by well-trained and experienced forest service personnel.

In order to strengthen the system of forestry research in India, the Indian Council of Forestry Research and Education (ICFRE) an autonomous umbrella organization, was established in 1986, financially supported by MoEF and donors. ICFRE has the mandate to undertake, aid, promote and coordinate forestry research and its application; function as a clearing house for research results and information; and disseminate technology. ICFRE works through its network of ten institutes and centres. Outside the ICFRE network there are a number of research facilities under auspices of different agencies such as the Kerala Forest Research Institute (Peechi), Madhya Pradesh Forest Research Institute (Jabalpur), Indian Plywood Industries Research and Training Institute (Bangalore), and forestry faculties of the state agricultural universities. In addition, the state forest departments have research divisions to address their practical problems.

An increasing number of private companies and NGOs are funding their own research in areas such as tree breeding, medicinal plants and NWFPs.

People's participation

The growing depletion of forest resources and increasing deforestation, led to the realization that active and willing participation of the forest fringe communities is necessary for any forest regeneration programme to succeed. It was also realized that village communities will have little incentive to participate unless they benefit directly and have sufficient authority. Therefore a new strategy, called Joint Forest management (JFM) was adopted to protect and regenerate degraded forests.

Participatory forest management as an effective means of protecting and regenerating degraded forests has been gaining ground in India. In 1990, the Government of India issued guidelines to state governments highlighting the need and the procedure for the involvement of village communities and voluntary agencies in the management, planning and implementation of programmes for the protection and development of degraded forests provision of fuelwood, fodder, NWFP and timber to people living in and around forests. In response, 27 states have issued orders enabling mechanisms for public participation in the management of degraded forests promoting active participation and involvement of the people in forest conservation and development, including the development of micro-level plans and their implementation. One of the important elements of the Participatory Forest Management System relates to the use of indigenous capacity and local knowledge about different aspects of conservation, development and use of forests. Rural people, particularly women and the tribal community, have an intimate knowledge of species, their growth characteristics, utility, medicinal value, etc. They are also well informed about the species to be planted in a given locality to satisfy specific requirements of fuel, fodder, timber, and other non-wood forest products. This knowledge is utilized under the JFM for the benefit of the community.

The JFM programme has led to several positive impacts the major ones being, i) change in attitude and relationships of local communities and forest officials towards each other and forests, ii) improvement in the condition of forests, iii) reduction in encroachment, iv) increase in income of the local people and v) involvement of NGOs.

However, there are a number of issues that need attention before the JFM programme can be institutionalized in the country. At present 14.25 million hectares of forest area are being maintained through 62890 JFM groups in 27 states.

There is a symbiotic relationship between tribal people and forests. In 1991, several issues related to forest-tribal interface were examined and detailed guidelines issued by the Government of India to the state governments in order to ameliorate the socio-economic conditions of tribal people. These guidelines cover a number of subjects that include encroachments of forest lands, disputed claims over forest land, elimination of intermediaries to stop exploitation, conversion of forest villages to revenue villages, and payment of compensation for loss of life and property due to depredation by wild animals. Problems and conflicts arising from the tribal-forest interface are resolved through

administrative measures including the creation of village-based Forest Protection Committees, an experiment which has met with remarkable success in some parts of the country.

Private forestry initiatives

The private sector comprising individuals/farmers, cooperatives, and industry has a large role to play in management of forests. Though responsibility for conservation and expansion of forest area is mainly with the government, rural people have been practising tree-planting in their farms, homesteads and village woodlots to meet household requirements of fuel, poles, timber and medicinal plants. After the emphasis given to social forestry by the National Commission of Agriculture (1976), plantations were raised in wastelands, degraded forests, private forests, private marginal lands and agricultural farms. Currently, the area of private tree planting (under agroforestry, farm forestry in block and line plantations) covers over six million ha (MoEF, 1999). Other non-forest sources of wood are rubber, coconut, cashew, and mango plantations. Non-forest private sources contribute 30 to 90% of the total wood supply in different states with an all-India average of about 50%. Non-forest sources together provide about 50% of the total wood supply in the country; and probably an equal or larger share of NWFPs. There are also a large number of small private nurseries meeting the local demand of seedlings (MoEF, 1999). Apart from its contribution to wood supply, the private sector has also demonstrated its ability to enhance the productivity of forests. In addition, the private sector is dominant in the areas of wood-harvesting and processing. However, these private initiatives require more support from the government.

Enhancing protection, sustainable management and conservation of all forests, and greening of degraded areas through forest rehabilitations, afforestation, reforestation and other rehabilitative measures

The policies and programmes in forestry, particularly over the last fifteen years, have been largely in consonance with the Forest Principles adopted during the United Nations Conference on Environment and Development (UNCED).

The Forest (Conservation) Act of 1980 initiated a process by which India's forests were treated as an environmental and social resource rather than as a revenue or commercial resource. Strict controls have been placed on the diversion of forestland to other uses. In the rare cases when this is permitted for developmental purposes, compensatory afforestation is a prior requirement.

This is reflected in the sharp fall in the area diverted to non-forestry purposes after the promulgation of the Forest (Conservation) Act in 1980.

India's achievement in raising forest plantations in terms of area has been impressive. Upto 1997/98, the total area of tree plantations, under different schemes, was 28.38 million ha. Of this, some 3.54 million ha were raised before 1980, 13.51 million ha during 1980s and the rest during the 1990s. The current rate of tree planting is about 1.2 million ha per annum (MoEF, 1999). In terms of the area declared as national parks, sanctuaries and other reserves, India's achievement in protected area development is significant. India has an extensive protected area encompassing at present 88 national parks and 490 wildlife sanctuaries covering an area of 15.3 million ha. This accounts for about 5 per cent of the country's total geographical area (MoEF, 2001). Further details have been provided in the chapter on Biodiversity.

Concern has been expressed over the productivity of plantations due to several factors such as inadequacies in site selection and site-species matching, poor planting stock, lack of proper maintenance and protection, financial and capacity constraints, etc. In addition, the deficiency in regeneration of natural forests is also a matter of serious concern. Such issues are being addressed through policy initiatives of the government. The National Forest Policy (1988), formulated four years before the Earth Summit, embodies the direction emphasized in the Rio Principles. The National Forestry Action Programme (MoEF, 1999) prepared with support from the United Nations Development Programme (UNDP) and the Food and Agricultural Organization (FAO) is a comprehensive work plan for sustainable development of forests in India for the next 20 years, that has been evolved in consultation with the state governments. The objective of the NFAP is to evolve issue-based programmes in line with the provisions of the National Forest Policy (1988) by integrating the forestry development programmes in India within the framework of National Five-Year Plans. The programme areas of the NFAP are summed up in Box 9.2.

Box 9.2 National Forestry Action Programme

The NFAP identified five interrelated basic issues confronting forestry development in India which form the basis of the following programme structure.

- **Protect Existing Forests Resources**
It has three main sub-programmes of (i) forest protection, (ii) soil and water conservation, and (iii) protected areas and biodiversity conservation. These include the works of forest survey, demarcation and mapping, inventory, biodiversity conservation, protected area management, protection against poaching, encroachment and fire etc., and other related issues.
- **Improve Forest Productivity**
It has four main sub-programmes of (i) rehabilitation of degraded forests, (ii) research and technology development, (iii) development of NWFPs, and (iv) assisting private initiatives with

community participation. These involve mainly research, improvement in technology, enrichment planting, soil and water conservation, regeneration, rehabilitation and afforestation mainly in existing forests.

- Reduce Total Demand

It has three main sub-programmes for the efficient uses of (i) fuelwood and fodder, (ii) timber, and (iii) NWFPs. This includes the programmes for reduction of demand placed on forests through the technology of preservation, seasoning, substitutions, and other measures for the efficient utilization of forest products and also through biomass plantations.

- Strengthen Policy and Institutional Framework

It has three main sub-programmes of strengthening of (i) central forestry administration, (ii) central forestry institutions, and (iii) state forestry administration and institutions. These include the development of infrastructures such as buildings, communications etc. and strengthening of staff including HRD. This issue also covers all aspects of capacity-building, forest policy and legislation, public forest administration and organizational structure, research, planning and budgeting etc.

- Expand Forest Area

It has two main sub-programmes of (i) tree plantation on forest and non-forest lands, and (ii) people's participation in plantations and its protection. This issue includes the extension of forestry programmes in all kind of wastelands and marginal farm lands. It also includes the programmes of certain of plantation forests through wasteland reclamation, afforestation and promotion of agroforestry.

A National Afforestation and Eco-development Board (NAEB) was created for promoting afforestation, tree planting, ecological restoration, and ecodevelopment. The NAEB pays special attention to the regeneration of degraded forests and serves as a vital interface between external agencies and the state governments. Tree planting is the main focus, particularly through the Area-Orientated Fuelwood and Fodder Scheme, and the Integrated Afforestation and Ecodevelopment Programme. Efforts are being made to ensure that weaker sections of society and women emerge as the major beneficiaries of the activities of NAEB.

The introduction of the Eco-Development Programme has been one of the recent developments in the field of wildlife management. The objective is economic development for the people living in and around sanctuaries and national parks, in order to reduce their dependence on forest products and improve the ecological health of the protected areas. The scheme aims to increase land and forest resource productivity so that alternative avenues of employment and income are made in the immediate neighbourhood of people.

In addition to state-supported programmes, there is an array of management practices outside the formally declared forest areas that are followed in different parts of the country with different models involving agricultural crops, shrubs or non-wood vegetation. These include agro-forestry, community forestry, farm forestry, interface forestry, village woodlots, block plantations, strip plantations, improved fallow, alley cropping, road/canal/railway track-side plantations, etc.

However, accurate information on the land area covered by different models or on its economic performance is not available. There is a great scope for farm forestry in India which was initiated in the early seventies and is the largest segment of the national afforestation programme. More than 30 per cent of seedlings planted under afforestation programmes go to farm forestry.

However, sound research and counselling on potential species, improved planting materials, spacing and species combination, multiple uses, short rotation high value mixtures and market information needs to be promoted.

In addition to these conservation efforts, there are several sacred groves retained in the original undisturbed state due to their sanctity in different forest areas of the country. However, estimates of their area and details of the status of vegetation are not available.

India is working with several international organizations and other nations, bilaterally as well as multilaterally to achieve the aforesaid objectives. The Ministry of Environment and Forests is the nodal environmental agency in the country. It coordinates participation in international agreements relating to environment and handles bilateral cooperation, matters relating to regional bodies such as UNEP, ESCAP, SAARC, SACEP, the National Environmental Council and the India-Canada Environment Facility.

India has been pursuing its commitments under various conventions vigorously by initiating several measures nationally and by taking several important initiatives in the region. India is a party to the United Nations Framework Conventions on Climate Change, the objective of which is stabilization of the greenhouse gas concentrations in the atmosphere at levels that would prevent dangerous anthropogenic interference with the climate system. The convention enjoins upon the parties to implement commitments contained in its various provisions. India has actively participated in the deliberations of the Intergovernmental Panel on Forests, established by the Commission on Sustainable Development.

The MoEF is the technical nodal point for GEF facilities in India and, so far, nine projects related to the theme areas of GEF are being implemented while one has been completed. In addition, eleven projects have been approved in principle by GEF and are in the preparatory phase. The Small Grants Programme started in 1992 and managed by the UNDP on behalf of the GEF, is providing support to small scale, community-based activities which can contribute to the four GEF thematic areas.

India has participated in all the IPF/IFF meetings and agrees with the overall action relating to National Forest Programme, forest assessment, criteria

and indicators, traditional forest-related causes and underlying causes of deforestation. However, India has taken the view that there has to be an instrument to coordinate the efforts of international instruments and institutions. Accordingly, India has moved for the creation of a permanent forum such as the Global Forest Facility on the lines of the Global Environmental Facility (GEF), to continue the dialogue and discussions on contentious and unresolved issues. India has also taken the view that financial resources/funding is one a major problem area and therefore, it is necessary to assign this exclusive function to one of the International Arrangements and Mechanisms (IAMS). In consonance with the recommendations of the IPF, India prepared the National Forestry Action Programme in the year 1999 in consultation with the FAO, which incorporates the agreed commitments by India.

India's economic and trade policies which have a bearing on forest and forest products are being progressively fine-tuned to facilitate the conservation and sustainable use of forests. This is reflected in liberal imports of forest products to relieve pressures on forests, nationalization of the trade of certain forest products, incentives for wood substitution, subsidies for the use of fuel-saving devices and alternative sources of energy such as biogas and solar energy, and financial incentives to supply seedlings free of cost or at subsidized rates.

Several bilateral cooperation programmes and follow up of MoU/Joint Statements of Intent have been signed with Brazil, China, Germany, Iran, Russia, Tajikistan, Turkmenistan, USA and Vietnam in connection with the above-mentioned objectives.

External assistance for the Forestry Sector started in a meaningful manner in 1979 and since then 15 forestry projects implemented with external assistance have been completed in 14 states as on March 31, 1998 (MoEF, 1999). Approximately 2.57 mha have been covered under afforestation and 1679 million seedlings distributed through these projects at a cost of Rs 1700 crore. The thrust of external assistance is now on implementing projects geared towards overall development of the forest sector. The main donors for forestry projects are the World Bank, JBIC (Japan), DFID-UK, SIDA, EEC, UNDP Germany, etc.

Between 1981-1982 and 1991-1992, the percentage share of donor assistance in total plan outlay was around 30%. The provision for external assistance has shown an upward trend since 1994-1995. The combined outlay for these projects

was Rs 230 crore during 1994-1995 and has gone up to Rs 830 crore during 1998-1999.

Promoting efficient utilization and assessment to recover the full valuation of the goods and services provided by forests, forest lands and woodlands

India's economic and trade policies, which have a bearing on forest, and forest products are being progressively evolved to facilitate the conservation and sustainable use of forests. These policies are also in tune with Agenda 21's call for greater use of international trade. Average tariff rates in India have gone down as can be seen from the Figure 9.1 below. This has resulted in liberal imports of forest products, which have gone up over time (Table 9.2). In addition, there are incentives for wood substitution, subsidies for the use of fuel-saving devices and alternative sources of energy such as biogas and solar energy, and financial incentives to supply seedlings free of cost or at subsidized rates.

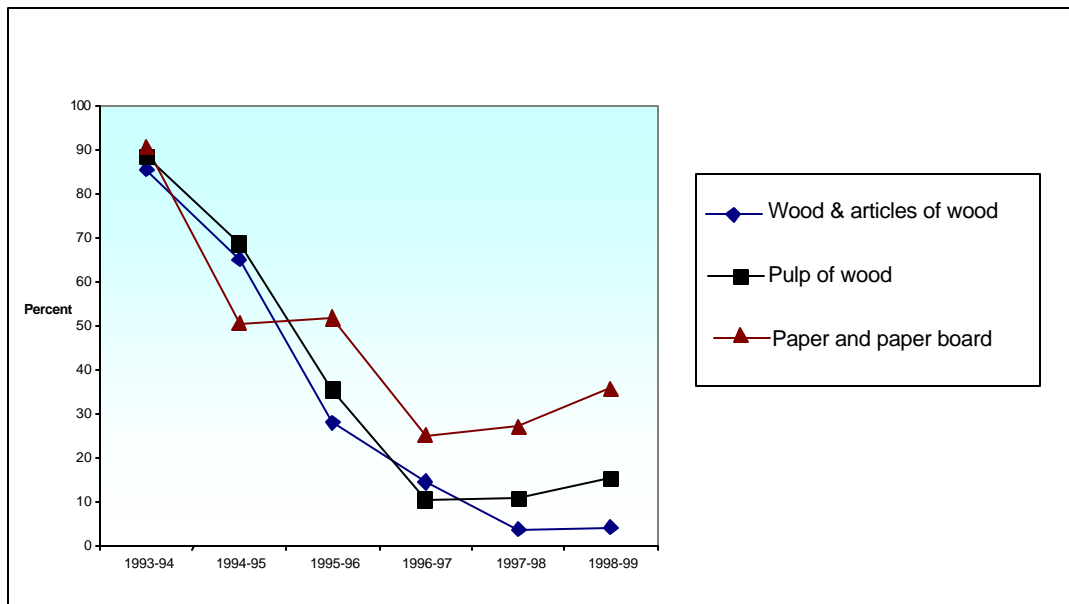


Figure 9.1 India's average tariff rates on select forest products 1993-1999 (%)

Table 9.2 Production and trade in industrial round wood and forest products

Year	Export		Import		Production	Forest Products	
	Industrial	Industrial	Industrial	Industrial		Imports	Exports
	(Quantity cum)	(value \$1000)	(Quantity cum)	(value \$1000)	(Quantity cum)	(Value 1000\$)	(Value 1000\$)
1993	2,314	663	272,463	30,570	24,691,00	291,381	16,799
1994	5,757	973	284,651	38,099	24,785,00	301,699	35,396
1995	5,867	977	355,580	48,754	24,879,00	478,735	37,466
1996	17,700	1,907	893,600	108,069	24,971,00	753,888	25,001
1997	16,700	1,810	1,052,400	130,231	25,064,00	785,514	36,062
1998	400	131	1,761,300	186,360	23,948,00	778,176	37,607
1999	400	131	2,099,000	198,640	24,038,00	789,321	54,971
2000	400	131	2,099,000	198,640	24,038,00	789,321	54,971

Source. FAO

Another way of exploiting the economic potential of forests efficiently is through 'eco tourism', as has also been recognised by the NFAP. The most inaccessible tropical rainforests, the most fragile coral reef systems and the tribal people in remote areas are within the reach of the global tourists. Eco-tourism, in its accepted sense, has assumed the shape of an industry, which makes minimal adverse impact on environment as well as on the local culture and heritage while helping to generate employment and income for the locals. Several state governments have taken steps to promote eco-tourism.

The economic value of the goods and services rendered by forests are usually underestimated. Agenda 21 calls for the development and improvement of methodologies for economic and non-economic values of all types of forests. In India, attempts have been made to develop and apply methods to quantify the tangible and intangible benefits of forests. To understand the real contribution of forests to the economy, the Government of India has initiated a process for Natural Resource Accounting, to be integrated with the conventional system of income accounts.

Establishing and/or strengthening capacities for planning, assessment and systematic observation of forests and related

programmes, projects and activities, including commercial trade and processes

There is a well-developed system for assessing and collating forestry data in the country. The Forest Survey of India, under the MoEF, objectively assesses the forest resources. The main activities are an assessment of the forest cover and preparation of forest cover maps biennially using remote-sensing data, estimation of growing stock and other land uses in different parts of the country through field inventory, preparation of thematic maps using aerial photographs and imparting in-service training to the officials of the forest departments of states/union territories in the applications of remote-sensing, Geographic Information System (GIS) and preparation of inventory essential for forest resource planning and management.

Forest Survey of India assessments since 1987 reveal that the country has been maintaining a fairly stable forest cover over the period (Table 9.3). The seventh assessment of 1999 reveals an increase in forest cover by 3896 sq km over the figure of 633,397 sq km in 1997.

Table 9.3 Forest cover estimates from 1987 to 1999

Assessment Year	Forest cover (sq km)	Percentage of geographic area
1987	640819	19.49
1989	638804	19.43
1991	639364	19.45
1993	639386	19.45
1995	638879	19.43
1997	633397	19.27
1999	637293	19.39

Source. Forest Survey of India (State of Forest Report - 1987 to 1999)

Concerns and strategies for sustainable development

The most common problem confronting the forestry sector is its inability to satisfy the many conflicting and escalating demands being placed on it. It is evident that future sustainable forestry development for India will require a comprehensive balanced and targeted strategy.

It is estimated that about 270 million tonnes of fuelwood, 280 million tonnes of fodder, over 12 million cubic metres of timber and countless non-wood forest products are removed from the forests annually, which are far beyond the sustainable limits. The average volume of 74.42 m³/ha with an incremental

annual growth of 1.36 m³/ha/year of Indian forests compares poorly with the global average volume of 120 m³/ha and average annual growth of 2.1 m³/ha. In addition, although the pace of diversion of forestland has come down, the area stipulated for compensatory afforestation has not been commensurate.

It is clear that the country's forest resources are not being managed to their full potential. Some of the reasons contributing to the present status are: sustainable forest management is complex, costly and difficult; and research and technology inputs have been low and sporadic.

One major factor that has contributed to the deterioration of forest resources in the country is the lack of adequate financial resources. Although share of forestry in the plan outlay, has increased over time, it is still small—the total outlay ranging from 0.32 per cent in the First Five-Year Plan to 0.94 per cent in the Eighth Five-Year Plan. To fulfil the objective of covering 33 per cent of the country's area by forests and tree cover (NFP, 1988), an annual programme of afforestation and regeneration of 3 million ha is required against the present level of 1.2 million ha/annum. To reach this target, the NFAP estimated an annual budget requirement of Rs 39.85 billion as against Rs 16.14 billion made available for the forestry and wildlife sector in 1998/99. This resource gap needs to be bridged by proper allocation of funds and also other innovative measures, including private sector involvement.

The involvement of the private sector needs to be encouraged through research and extension support, input supplies (e.g. technology, planting stock), credit facilities, utilization and marketing facilities, and other incentives. Often, available marketing arrangements for wood come through middlemen, and farmers do not obtain remunerative prices. High-return forestry and agro-forestry models for marginal areas are yet to be developed and extended. In some cases, legal restrictions on the harvesting and transport of forest products are a disincentive for private sector participation. Despite these impediments, the experience has shown that a wide range of functions could be entrusted to the private sector. Private initiatives have also demonstrated the ability to improve the productivity of forests. It is not enough to provide resources. The people's participation has to be ensured on a sustained basis. JFM, which has shown the potential benefits from community participation needs to be reinforced.

The National Forestry Action Programme recognized these imperatives and provided the road map for future developments in the forestry sector (Box 9.2). These concerns and proposed solutions are echoed in the approach paper to the Tenth Five-Year Plan that will guide the country's planning for the next five

years (2002-2007) (Box 9.3). It is envisioned that country will achieve 25% area under forests by the end of the X plan period and 33% by the end of the XI plan period, 2012.

Box 9.3 Approach Paper for the Tenth Five-Year Plan: Forests

The Approach Paper sums up the main concerns in the forestry sector as follows. *The problems and constraints in the forestry development include lack of awareness about multiple roles and benefits of forests, especially its role in drought proofing and prevention of soil and water run-off, no linkage between management and livelihood security of the people, low level of technology, inadequate research and extension, weak planning capability, wastage in harvesting and processing, market imperfections, overemphasis on government involvement and control, low level of people's participation and NGOs involvement, lack of private sector participation, unwanted restrictions on felling, transport and marketing of forests produce grown by people, lack of inter-sectoral coordination and weakness and conflicting roles of public forest administration.*

The following strategies are proposed to address these concerns.

- Strengthening farm forestry and tree plantation in marginal and wastelands belonging to the poor.
- Integrated land-use planning
- Measures to sustain JFM beyond the project period
- Protecting women's usufruct rights and enabling women groups to collect and market non-timber forest products
- Rationalizing policies such as subsidies on government auctions of wood and bamboo to industries, which work against farmer interests and inhibits farm forestry
- Upgradation of forest technology such as to promote more gatherable biomass
- Conservation and promoting of bamboo by inter alia classifying it as an NTFP
- Prevention and control of forest fires
- Priority to agroforestry, mountain, watershed development, river valleys, arid areas, wastelands afforestation programmes
- Conservation and development of medicinal plants
- Research and technological development to increase productivity and production of new products along with focus on value addition, improved marketing, export and productive employment generation
- Promotion of coastal shelter belt plantations for prevention of natural calamities

It is also proposed that the government gradually withdraw from some segments and tap the potential of the local communities or an efficient market such as in the areas of marketing NTFPs or retail sale of fuelwood and bamboo.

The National Afforestation and Eco-development Board (NAEB) has prepared a proposal for an ambitious National Afforestation Programme (NAP) to be implemented from the Tenth Five-Year Plan. NAP will be a central sector scheme to be implemented through the Forest Development Agencies (FDAs) that are being created in Territorial and Wildlife Divisions. All existing schemes of the NAEB are to be merged into the NAP.

With these initiatives, it is expected that the objective of the National Forestry Action Programme—to enhance the contribution of forestry and tree resources to ecological stability and people centred development through qualitative and quantitative improvement in the forest resources—would be realized.

References

- Agenda 21, United Nations
<http://www.un.org/esa/sustdev>
- Chopra K and Kadekodi.1997
Natural resource accounting in the Yamuna Basin: accounting for forest resources
New Delhi: Institute of Economic Growth
- F S I. 2000
State of Forest Report –1999
Dehra Dun: Forest Survey of India
- Mehta R. 1999
Tariff and non-tariff barriers of Indian economy: a profile
New Delhi: Research and Information System for the Non-Aligned and Other Developing Countries
- MoEF. 1999
National Forestry Action Plan
New Delhi: Ministry of Environment and Forests
- MoEF. 2000
Annual Report –1999-2000
New Delhi: Ministry of Environment and Forests
- MoEF and Kalpavriksh. 2000
Natinal biodiversity strategy and action plan-India
Proceedings of the Inaugural national workshop, 23-24 June 2000
New Delhi: Ministry of Environment and Forests
- Parikh J K and Haripriya G S. 1998
Environmental accounting in India: trial estimates for forest resources
Mumbai: Indira Gandhi Institute for Development Research
- Planning Commission. 2000
Mid term Appraisal of Ninth Five-Year Plan (1997-2002)
New Delhi: Planning Commission, Government of India. 510 pp.
- Prasad R. 1999
Fuel wood based energy scenario and its impact on natural forests in India
New Delhi: Ministry of Environment and Forests
- TERI. 1999
GREEN India 2047
New Delhi: Tata Energy Research Institute
- UNEP. 1992
Convention on biodiversity
Neirobi: United Nations Environment Programme
- Verma M. 2000
Economic values of forests of Himachal Pradesh
London: International Institute for Environment and Development