

INDIA



* For legend see page 58

Forest resources

India has the world's second-largest population, with about 1.1 billion people, and a land area of 316 million hectares. Over 40% of the population lives below the poverty line as defined by the World Bank (with an income of US\$2 per day or less). Systematic, consistent and accurate information on the geographic extent and physical condition of the country's tropical forest is lacking. According to FAO (2005a), the area under effective forest cover in India is 64.1 million hectares (20% of the land area), of which 31.5 million hectares (49%) is under natural forest cover and agroforestry. On the other hand, FSI (2003) estimated the forest area at 76.8 million hectares, although this probably includes significant areas with no forest cover. These estimates include substantial areas of forest north of the Tropic of Cancer and, therefore, not tropical by the ITTO definition.

India was the only country for which information was not available for this report through at least one of a C&I report, an ITTO mission and/or a national workshop on the ITTO C&I, although both a mission and workshop are planned for 2006. Much of the information contained in this profile has therefore been obtained from secondary sources and personal communications.

Forest types. About 60% of India's forest estate is categorized as closed and 40% as open (FAO 2001). Tropical moist forests account for about 13% of the total forest area. Tropical wet evergreen forests occur in the south, the northeast and in the Andaman and Nicobar islands. The most widely distributed genera are *Dipterocarpus*, *Hopea*, *Callophyllum* and *Syzygium*, and the families Lauraceae and Myrthaceae are also well represented. Tropical moist deciduous forests occur in areas with monsoonal rainfall; some of these are characterized by *Tectona grandis* (teak) and others by *Shorea robusta* (sal). Mangrove and swamp forests are common in southern India.

Dynamics of forest resource change. During the 1970s, India's annual rate of deforestation was 1.3 million hectares (IIFM 2002). In the 1990s, the situation is said to have changed to one of net gain through extensive afforestation. According to FAO (2001), while natural forest was lost at an annual rate of 1.90 million hectares during the 1990s, the area under planted forest increased at an annual rate of 1.93 million hectares. The net gain shown in forest area is somewhat artificial, however, because of the inclusion of rubber plantations, farm woodlots and home gardens as forests, which hitherto were considered to be outside the definition of forest. Continuing deforestation and the practice of moving the boundaries of government forests have made the security of forest resources tenuous.

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural tropical forest ('000 hectares) Source: derived from FAO 2001	PFE ('000 hectares) ^{d,*}			
		Production		Protection	Total
		Natural	Planted		
64.1-76.8*	22,500	13,500	32,600	25,600	71,700

* Tropical and non-tropical

Permanent forest estate. According to the Ministry of Environment and Forests (MOEF 1999), 13.5 million hectares of India's forests are categorized as production forest, 10 million hectares as protection forest, 15.6 million hectares as national parks and wildlife sanctuaries, and 25 million hectares as social forest. The area of natural-forest PFE is therefore estimated to be 39.1 million hectares, comprising 25.6 million hectares of protection forest and 13.5 million hectares of production forest^d. Separate data for the tropical forest PFE are not available; the estimate of PFE in Table 1, therefore, covers India's entire forest estate, including subtropical and temperate forests.

Planted forests. In 2000, there were an estimated 32.6 million hectares of planted forests (FAO 2005). About 25% of all plantations (8 million hectares) are in private, communal and non-forest public land (MOEF 1999). Fifty per cent of plantations established since 1980 are in an agroforestry environment, with varying intensities of management (ibid.). The planting rate in 1990–2000 was estimated to be 1.51 million hectares per year (FAO 2001). Private planting is believed to exceed public planting. India also has an estimated 560,000 hectares of rubber plantations (ibid.).

Institutional arrangements

Forest tenure. All legally constituted forests are under the ownership and control of state governments. With farmers and households increasingly engaged in tree-growing, a new and important category of private forest owners (of farm forests, home gardens and agro-industrial plantations) is emerging.

SFM policy framework. India has not yet established a comprehensive SFM framework for the different kinds of forestry taking place in the country. A set of C&I for sustainably managing the dry-zone forests of India has been developed under the Bhopal-India Process initiated by the Indian Institute of Forest Management in 1998, and a similar process is under way for tropical forests under an ITTO project (PD 37/00).

Forest policy and legislation. The national forest policy dates from 1988 and there have been no major changes since. The policy stresses: the

maintenance of environmental stability and the restoration of ecological balance; the conservation of the country's natural heritage and biodiversity; improved soil and water conservation; increasing forest cover through massive afforestation and social forestry programs; providing for the basic needs of rural and tribal populations; increasing forest productivity; improving the efficiency of forest product utilization; and minimizing the pressure on existing forests. The policy stipulates that industrial wood needs should be met increasingly by farm forestry. In tune with these policy objectives, India formulated a national forestry action program (MOEF 1999), but this has not yet been put into full operation.

The guiding legislation still current in India is the Indian Forest Act of 1927 (amended in 1951). While policies have undergone changes, the legislation has not changed correspondingly and it continues to focus on the prevention of offences. Other national legislation relevant to forestry includes: the Mines Act of 1952; the Wildlife (Protection) Act of 1972, which has been recently amended; the Forest Conservation Act of 2003; the Environmental Protection Act of 1986; and the Biological Diversity Act (2002).

Within the country's federal structure, forestry is a 'concurrent subject'; both state and national governments are jointly responsible for the sustainable management of the forest resource. State governments generally have the freedom to manage the forest resources on the basis of forest management plans. However, under the Forest Conservation Act of 2003 (Paragraph 6), state governments must obtain prior approval from the national government for any forest clearance for non-forestry purposes.

Institutions involved in forests. At the national level, forestry falls under the purview of the MOEF; there are also forest departments at the national and state levels with defined functions and responsibilities. While at the national level the role of the Forest Department is mostly the provision of advice and guidance, the state forest departments are custodians of the public forest resource and act as the forest authorities. Often they also perform an enterprise function, becoming involved in production, processing and trade. All the forested states of

India have set up forest development corporations, which are responsible for production within the public forest estate. These corporations are meant to operate as autonomous business entities, but, in effect, most of them function as extensions of the forest departments. A number of specialized institutions are linked directly to the MOEF. These include the Indian Council of Forestry Research and Education the Indian Institute of Forest Management the Indira Gandhi National Forest Academy, the Wildlife Institute of India and the Forest Survey of India.

The National Afforestation Programme (NAP), initiated in 2000, amalgamates all the previous centrally sponsored forest programs except parks and wildlife conservation. The NAP is implemented in a decentralized manner through forest development agencies (FDAs). FDAs, which are different entities to the forest development corporations referred to above, are autonomous entities at the level of forest divisions in which all the village forest committees (VFCs) within the respective forest division are represented. The central government transfers funds directly to the FDAs. FDAs are thus an institutional arrangement to implement the NAP on the basis of micro-plans developed for that purpose. The program of the NAP has effectively been taken up in all states of India since 2002.

Joint forest management (JFM), which was formally introduced by the 1988 national forest policy, is implemented through the involvement of local communities at the village level and through FDAs at the district level. JFM is a forest management strategy by which the forest department and a village community enter into an agreement to jointly protect and manage forest land adjoining villages and to share responsibilities and benefits. JFM has spread throughout the country, covering over 17 million hectares of forest (IIFM 2002). Around 63,000 VFCs in 27 states are engaged in the protection and regeneration of degraded forests in return for certain usufructuary rights and other benefits. Constitutional Amendment No 73 provided for the transfer of ownership of NWFPs to *Gram Sabhas/Panchayats* (village assemblies) in states with sizeable tribal populations. One criticism of JFM was that it covered only the protection and

maintenance of degraded forests. To correct this, in January 2000 the government of India issued a circular concerning the extension of JFM to better-stocked forests. Moreover, it provided for the mandatory (50%) involvement of women in JFM activities.

India has many national- and state-level NGOs involved in forestry, wildlife conservation, environmental protection and community development. They play a crucial role in capacity-building and in the implementation of JFM. A number of forest-related international NGOs are also active in India.

Status of forest management

Forest for production

India follows a system of preparation and periodical revision of working plans or management plans for established forest divisions or FMUs. It has been reported that 72% of all India's forests were under prescriptions of working plans in 2000, up from 54% in 1980 (FAO 2001). Nearly 10 million hectares of the production PFE are thought to be currently under such plans, almost half of which have been so managed for more than 30 years^d.

The management of government forest land is the direct responsibility of the public forest administrations. All or most technical operations are undertaken by the state forest departments, employing a permanent or temporary labour force, or through specific job contracts or partnership arrangements. In some cases, industrial units are allowed to extract trees marked under a selection system. There are no long-term timber concessions of the kind practised in Southeast Asian countries. In recent years, logging in natural forests has been discouraged and, in several cases, locally banned. The resulting wood scarcity has provided impetus for the development of farm forestry, homestead forestry and agroforestry. Ninety per cent of forest-based products are manufactured in the private sector. During the last 30 years, several innovative arrangements for greater community participation have been introduced, including JFM, community forestry, out-grower tree-farming, company-community partnerships and cooperative enterprises.

Table 2 Some commonly harvested tropical timber species for industrial roundwood (2002–2004)*

Timber species	Remarks
<i>Eucalyptus</i> spp	For pulp, board and cheap timber
<i>Acacia</i> spp	Pulp and rural construction timber
<i>Dalbergia sissoo</i>	Average quality timber used in woodworking
<i>Tectona grandis</i>	High-quality, high-price timber
<i>Shorea robusta</i>	Quality construction wood

* Source: ITTO 2004a, 2004b

Illegal logging, forest encroachment, the poaching of animals and other illegal activities thrive due to weaknesses in control (Ahmed 1997). Policy and legal instruments are not supported by effective enforcement. Logging is banned in many natural forests, but there are no adequate measures to enforce the ban, thus leading to further forest degradation (ibid.).

Silviculture and species selection. Several different silvicultural systems are followed in India, including a selection system, a shelterwood system, clearfelling and artificial regeneration with valuable species, coppicing, afforestation with exotics to reclaim grasslands, line and block plantations in farms, and agroforestry systems. Table 2 shows five important tropical timber species in production and trade. Other common species include *Hevea brasiliensis* (rubber), *Terminalia paniculata*, *T. tomentosa*, *Grewia* spp, *Xylia xylocarpa*, *Adina cordifolia*, *Artocarpus integrifolius*, *Pterocarpus* spp, *Gmelina arborea* and *Lagerstroemia lanceolata*.

Planted forest and trees outside the forest. Of the estimated planted forest area of 32.6 million hectares, nearly 45% is accounted for by fast-growing (and short-rotation) species of *Eucalyptus* (*E. grandis*, *E. tereticornis*) and *Acacia* (*A. auriculiformis*, *A. mearnsii*, *A. nilitica*) (FAO 2001). Teak accounts for about 8%; other common hardwood species are *Albizia* spp, *Azadirachta indica*, *Casuarina equisetifolia*, *Dalbergia sissoo* and *Gmelina arborea*. Pines and other conifers make up about 10% of the planted forest estate and the remainder are other broadleaved species. While impressive in area, the performance of forest plantations in terms of survival,

growth and yield has often been poor due to inadequacies in site selection and site-species matching, poor planting stock and a lack of maintenance and protection (Saigal et al. 2002).

Since the mid 1980s, most of the plantations have been established under social forestry schemes on community and private land outside the forest area. In recent years, the national forest policy has directed the forest-based industry to obtain their raw material from local private sources. This has prompted some large pulp-and-paper companies to promote farm forestry through the extension of technology for establishing clonal plantations, and a buyback guarantee for the pulpwood produced (outgrowing schemes). A large number of tree-farming and agroforestry enterprises have sprung up all over the country. Private tree-planting now covers an area of over 6 million hectares (Saigal et al. 2002).

Forest certification. There are no formal bodies or systems for forest certification. The certification of products manufactured with wood from non-forest sources (eg rubberwood) by external certification bodies/agencies is reportedly taking place, but details are not available.

Estimate of the area of forest sustainably managed for production. Close to 10 million hectares of the production PFE are being managed under regular working plans, of which at least 4.8 million hectares can be considered to be sustainably managed^d. This area comprises forest reserves that have been managed according to working plans for more than 30 years. In addition, an area of about 8.15 million hectares of planted forests are intensively managed for timber production.

Table 3 Management of the production PFE ('000 hectares)

Total	Natural			Planted			
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	With management plans	Certified	
13,500	13,500	9,720	0	4,800 ^d	32,600	8,150	0

Timber production and trade. About 50% of India's wood supply is provided by non-forest sources. The rest is accounted for by imports and supply from public forests, mainly forest plantations. India's official total roundwood production in 2003 was 296 million m³, of which 277 million m³ (94%) was fuelwood (FAO 2005b). Total production of tropical logs was an estimated 14.0 million m³ in 1999 and 13.5 million m³ in 2003 (ITTO 2004a, 2005). Tropical sawnwood production declined by an estimated 12% in the period 1999–2003, from 6.8 to 6.0 million m³, while the production of tropical veneer jumped from 15,000 m³ in 1999 to 246,000 m³ in 2003, and tropical plywood from 300,000 m³ to 1.76 million m³ (ITTO 2004a, 2005).

India is the world's third-largest importer of (particularly tropical) logs, importing 2.69 million m³ in 2003, up from to 1.98 million m³ in 1999 (ITTO 2004a, 2005). These logs come mainly from Malaysia, Myanmar and, increasingly, from Africa. The value of imports of all primary forest-based products in 2003 was US\$596 million, of which US\$567 million was tropical (ITTO 2005). According to a recent report (ITTO 2004b), the Indian timber market is highly disorganized, reducing timber's competitiveness against substitute products.

Non-wood forest products. NWFPs such as bamboo (eg *Melocanna baccifera* – muli), thatching materials and medicinal plants are essential components of the livelihoods of many local communities. Some NWFPs, such as latex, bamboo, gums, sandalwood, resins and aroma chemicals, support value-added processing, niche marketing and export trade. NWFPs contribute over 75% of total forest export revenue in India and add significantly to the income of about 30% of rural people. Recently a national bamboo mission was launched to establish about 5 million hectares of bamboo plantations. A national

medicinal plant board and state medicinal plant boards have been set up to promote the sustainable management and trade of medicinal plants.

Forest for protection

Soil and water. The federal government emphasizes the environmental protection and conservation roles of forest in preference to their economic role. Measures are being taken to protect upland watersheds through forest conservation and afforestation. Data on the extent of forests managed primarily for soil and water protection are not available.

Biological diversity. India is one of the twelve mega-biodiverse countries, hosting 7% of the world's biodiversity and supporting 16% of major forest types. Eighty-nine mammals, 83 birds, 26 reptiles, 66 amphibians and 247 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 56 mammals, 48 birds, one reptile, 62 amphibians and two plants are found in forests (IUCN 2004). Thirteen plants are listed in CITES Appendix I and 484 in Appendix II (CITES 2005).

Protective measures in production forests. India's 1988 national forest policy requires that production forests are managed in ways that are consistent with environmental conservation, and this stipulation must be reflected in the prescriptions and practice of working and management plans.

Extent of protected areas. Protected areas in India cover about 15.6 million hectares, comprising 83 national parks, 447 wildlife sanctuaries and 23 tiger reserves (Ahmed 1997). The condition of several protected areas is poor because of fire, grazing and inadequate management; most are not covered by management plans (MOEF 1999). The straying of some animals from protected areas – notably tigers, elephants and some grazing mammals – causes

Table 4 Management of the protection PFE ('000 hectares)

Total	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
25,600	3,060	n.d.	n.d.	n.d.

tensions in communities living adjacent to such protected areas. According to UNEP-WCMC (2004), 3.06 million hectares of tropical forests are in protected areas that conform to IUCN protected-area categories I-IV, of which deciduous/semi-deciduous broadleaved forest accounts for 1.72 million hectares and lowland evergreen broadleaved rainforest 334,000 hectares.

Estimate of the area of forest sustainably managed for protection. Insufficient information was available to estimate the extent of the protection PFE managed sustainably.

Socioeconomic aspects

Economic aspects. Forestry's contribution to GDP fell from about 2.9% in 1981 to 1.7% in 1991 and to around 1% in 2001 (FSI 2003). This figure excludes the contributions of forest-based industries (which are counted under manufacturing). It is estimated that about 7.5 million people, mostly in rural and tribal settings, are in forest-related employment (ibid.).

The lack of a system of forest resource accounting is a major deficiency. For example, the value of forest-provided benefits – including wood products, fuelwood and charcoal, non-wood construction material, forest grazing and forest fodder, food and medicinal plants – was estimated to be US\$43.8 billion annually in the 1990s (National Forestry Action Plan, reported in FSI 1999), against a reported GNP share of forestry of US\$2.9 billion in 1993.

Livelihood values. About 400 million people in India live below the poverty line. Many live in mountain, upland and ecologically fragile areas, and forestry is often one of the main sources of employment and income. A new concept (initiated in the states of Madhya Pradesh and Chhattisgarh) is the 'people's protected area' (PPA). PPAs are based on a sustainable livelihood approach allied with biodiversity conservation and involve conservation and development

combined with the non-destructive and sustainable harvesting of NWFPs.

Social relations. Local rights 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 requires the settling of tenure issues and the rationalization of the system of people's participation in forestry. JFM is India's flagship program in people's participation and it has the support of the national forest policy. But the program has several constraints that call for attention. For example, a general complaint is that government officials still play an overpowering role in decision-making and their dominance in the governing bodies makes people's participation less effective (Saigal et al. 2002).

Summary

In India, state forest departments are custodians of the public forest resource and act as the forest authorities. Timber production is shifting away from natural forests, stimulating the development of community-based approaches. All forest states have set up forest development corporations, which are responsible for production within the public forest estate. Increasingly, some responsibilities for and benefits from the forests are being shared with local communities. For example, joint forest management, which usually involves an agreement between the forest department and a village to jointly protect and manage forest land, has become widespread. Moreover, farmers are becoming more involved in tree-growing, the private sector is participating more in forest management, and partnerships between forest-product manufacturing companies and local farmers are developing. However, several components of SFM are still missing, including an accurate inventory of resources, the classification of land by capability and function, efficient utilization and sustained investment.

Key points

- The estimated 39.1 million hectares of India's natural-forest PFE comprises 13.5 million hectares of production forest and 25.6 million hectares of protection forest. Not all of this PFE is tropical.
- There are also 32.6 million hectares of planted forest in the PFE.
- While there was a net positive change in the area of forest during the 1990s, natural forest continues to be lost or degraded.
- In production forests, India follows a system of preparation and periodic revision of working plans.
- Information on the extent and management of forests is fragmentary at best, and often unreliable.
- Nevertheless, it is estimated that at least 4.80 million hectares of natural-forest production PFE (tropical and non-tropical) are being managed sustainably; insufficient information was available to estimate the area of protection PFE so managed.
- The condition of several of the protected areas is poor because of fire, grazing and inadequate management.
- Forest management is becoming increasingly decentralized and community-based approaches are becoming more common.
- A national afforestation program was initiated in 2000 and operates at the level of forest divisions within states through forest development agencies and village forest committees.
- India's wood-based industries face a serious scarcity of raw materials and, increasingly, they depend on non-forest and external sources. The country has become a major importer of tropical timber, particularly logs.

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^d ITTO estimate

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