

LATIN AMERICA & THE CARIBBEAN

BOLIVIA



*For legend see page 58

Forest resources

The landlocked country of Bolivia has a land area of 110 million hectares and an estimated population of 8.6 million people. It has three broad biogeographical zones: the high-altitude, unforested *altiplano* (highlands in the Andean mountain zone), with peaks exceeding 6,000 m; *los yungas* and *los valles*, which include the valleys on the eastern flank of the Andes; and the tropical lowlands of Amazonia (*El Oriente*), containing moist tropical forests in the northeastern part and subtropical plains in the southeast (*El Chaco*). Recent estimates of forest area include 53.1 million hectares (FAO 2005), 58.6–59.5 million hectares^a and 52.2 million hectares (UNEP-WCMC 2000).

Forest types. Eighty per cent of the forest lies in the tropical moist forest zone (departments of Pando,

La Paz, Beni, northwestern Cochabamba and the mid- and north-western parts of Santa Cruz). This forest is rich in timber species, such as *Swietenia macrophylla* (mara), *Hura crepitans*, *Calophyllum* spp and rubber, and NWFPs such as *Bertholletia excelsa* (Brazil nut). The semi-deciduous forest, the *Chiquitania*, is mainly located in the department of Santa Cruz and is characterized by species such as *Astronium urundeuva*, *Piptadenia macrocarpa* and *Tabebuia* spp. Sub-Andean and Andean forests cover the western flank of the Andean chain at altitudes between 400 and 3,500 m. These are characterized by Lauraceae and Meliaceae up to 900 m, by walnut-pine forests (*Juglans australis* and *Podocarpus* spp) between 1,200 m and 1,700 m and, beyond that up to 2,700 m, by *Alnus acuminata* (aliso).

Dynamics of forest resource change. FAO (2005) estimated deforestation at 161,000 hectares or 0.3% per year over the period 1990–2000. The government of Bolivia estimated the total area deforested in 1993–2000 at 1.9 million hectares and reported that it was highest in the western (non-Amazonian) part of the country^a. Deforestation and forest degradation in Bolivia are linked to planned and unplanned settlement as well as the expansion of agriculture and permanent pasture. On one hand, commercial farmers clear large areas for soybean plantations and, on the other, small-scale farmers also cause deforestation by employing slash-and-burn practices. Uncontrolled forest fires occur regularly at the end of the drier seasons and cause local damage to forest stands that have already been opened up. However, no large fires, droughts or increased storms have been observed recently in Bolivia's tropical forest region^a.

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			Total
		Production*		Protection	
		Natural	Planted		
52.2–59.5	47,999	17,000 ^d	60 ^a	14,700 ^{d**}	31,760 ^d

* Production PFE includes the delimited concession areas of 5.47 million hectares in the Oriente and other production areas (TCOs and ASLs) – see below

** The figure given for protection PFE is subject to the final designation of a number of protected areas

Permanent forest estate. Integrated land-use plans exist for about 76.5 million hectares of the country^a. Out of the 59.5 million hectares of forest as defined in these plans, 31.7 million hectares are classified as permanent forest areas, of which at least 2.3 million hectares have been converted to agricultural land^a. Twenty-five million hectares have been classified as highly productive forests and a further 1.7 million hectares as potentially productive but reserved for recreational or other non-timber use. About 5.47 million hectares are allocated as production forests for timber concessions according to Forest Law 1700 of 1996 (Table 1).

Planted forests. The total area of planted forests in Bolivia is estimated to be around 60,000 hectares^a. The official estimate of the total area of planted forest in the tropical lowlands is 20,000 hectares (Malky Harb 2005), although FAO (2003) put the planted forest area in the Amazon part of Bolivia at 46,000 hectares, including 28,000 hectares for production. Planted forest plots are generally small and include both indigenous and exotic tree species. A large proportion of the planted forest is located in the departments of Cochabamba and Chuquisca. Most has been established under programs supported by international organizations, the main focus being on local communities with various aims including increasing revenues for small landowners, restoring degraded lands and eradicating coca plantations.

Institutional arrangements

Forest tenure. Forests are both publicly and privately owned in Bolivia. In 2002, 28.2 million hectares (53%) of the forest estate were publicly owned and administered by the state (White & Martin 2002). Another nearly 17 million hectares of publicly owned forest are under specific user rights or ownership (*derechos sobre los productos y propiedad*), including more than 12.6 million hectares of indigenous community lands (*tierras comunitarias de origen – TCOs*)^a. A further 2.8 million hectares (5%) are privately owned by 'local social groups' (*agrupaciones sociales del lugar – ASLs*) and another 5.4 million hectares (10%) are privately owned by individuals and industries (White & Martin 2002).

SFM policy framework. In 1995, Bolivia adopted the Tarapoto Proposal of C&I for the Sustainability of the

Amazon Forest, sponsored by the Amazon Cooperation Treaty. The country is also using the ITTO C&I as an instrument to monitor progress towards SFM.

Forest policy and legislation. Forestry is regulated under Forest Law 1700 of 12 July 1996 and its decrees and regulations approved in December 1996. This law was one of the first applications of sustainable development principles in the country. It adopts the concept of SFM as follows: "The goal shall be to regulate the sustainable use and protection of the forests and forest lands for the benefit of present and future generations, harmonizing the social, economic and ecological interests of the country" (Article 1). Since 1996, the ancestral rights of local communities have had precedence over forest concession-holders where these rights overlap, and subsequent laws have strengthened community rights. Together with Environmental Law 1333 of April 1992 and the Law of Agrarian Reform 1715 of October 1996, Law 1700 regulates all aspects of the management and conservation of forest resources. Article 2 of Law 1700 defines the broad objectives of forest development in Bolivia, which are to:

- promote the adoption of sustainable and efficient forest activities and forest conservation to contribute to attaining the socioeconomic development of the nation;
- achieve sustainable and enhanced yields from forest resources and guarantee the conservation of ecosystems, biodiversity and the environment;
- protect and rehabilitate water catchment areas, prevent and check soil erosion and the degradation of forests, grasslands, soil and water, and promote afforestation and reforestation;
- facilitate access to forest resources and their benefits for the whole population, in strict compliance with regulations for protection and sustainability;
- promote forestry and agroforestry research and the dissemination of its results for the benefit of the production, conservation and protection of forest resources; and
- stimulate understanding and promote awareness of the responsible management of catchment areas and their forest resources.

Institutions involved in forests. According to Article 19 of Law 1700, the Ministry of Sustainable Development and Planning (*Ministerio de Desarrollo Sostenible y Medio Ambiente*) has overall responsibility for the national forestry regime. The Directorate General of Forests is responsible for forest policy within this ministry. The Forestry Superintendency (*Superintendencia Forestal*) is the regulating organization and the National Forestry Development Fund (*Fondo Nacional de Desarrollo Forestal – FONABOSQUE*) is the financing mechanism, although it is not in operation. Departmental governments and municipalities should support the development of the forest sector in accordance with specifications in the law. The Renewable Natural Resource Regulatory System (*Sistema de Regulación de Recursos Naturales Renovables – SIRENARE*) regulates, controls and supervises the sustainable utilization of renewable resources (Article 21).

Through Law 1788 on the organization of executive power (*Ley de Organización del Poder Ejecutivo*), the Vice-Minister of the Environment, Natural Resources and Forestry Development is given responsibility for the following strategic objectives related to forests:

- carry out a preliminary evaluation of the potential of national forest resources;
- facilitate technical assistance in the empowerment and strengthening of ASLs and indigenous community land committees (*comités de tierras comunitarias de origen*) by carrying out inventories, management plans and annual operational forest plans;
- identify and classify areas for permanent forest production to be licensed by the Forestry Superintendency;
- apply current policies and standards and develop complementary standards to facilitate the development of forestry activities;
- establish reference lists of forestry permits; and
- follow up and evaluate forestry plans, programs and projects.

The country is strengthening the ability of its personnel to implement SFM by providing in-service training and maintaining forestry education at a high level, including specialization courses in forest

management at the University of Cochabamba (see Achá & Guevara 2003). Through the Law of Popular Participation (Law 1702, 1996), urban and rural municipalities have been created and given new responsibilities and resources, including over the use and management of forests. Territorial grass-roots organizations such as 'peasant communities' and 'neighbours' councils' are being recognized and given important tasks in the new structure for the use of public resources. The Law of Regional Decentralization has created *prefecturas* in the nine departments of the country with responsibility for the regulation, planning and coordination of activities in the municipalities within them.

The FSC has established the Bolivian Council for Voluntary Forest Certification (*Consejo Boliviano para la Certificación Forestal Voluntaria*) to oversee the establishment of this certification system in Bolivia. The private sector is organized through a producers' association coordinated by the Bolivian Forestry Chamber (*Cámara Forestal de Bolivia*). The Chamber also includes a technical component known as the *Promabosque* which, among other tasks, promotes SFM in natural and planted forests. Three forest concessions covering a total area of 262,000 hectares have been granted to the two major universities in Bolivia for educational and research purposes.

Status of forest management

Forest for production

Since 1996, access to forest resources in the PFE has been based on:

- forest concessions in state lands (*tierras fiscales*);
- concessions for ASLs;
- harvesting permits in privately owned forest lands, divided into two categories: (i) sustainable forestry with management plans, and (ii) conversion permits (*permisos de desmonte*); and
- forest management in TCOs.

Under Law 1700, forest concessions are granted for a period of 40 years, subject to a forest management plan audit every five years. Management plans and auditing are also required in TCOs and private forests. The exclusive user rights of indigenous groups over

Table 2 Some commonly harvested species for industrial roundwood*

Timber species	Remarks
<i>Hura crepitans</i> (ochoó)	11% of production, 2002 (about 63,000 m ³)
<i>Amuburana cearensis</i> (roble)	7% of production, 2002
<i>Cedrela odorata</i> (cedro)	Production declined from 103,000 m ³ in 1998 to 20,000 m ³ in 2002
<i>Carinaria ianarensis</i> (yesquero blanco)	4% of production, 2002
<i>Tabebuia</i> spp (tajibo)	8% of production, 2002

* Sources: ^c, SIFOR/BOL (2002)

their forest resources are guaranteed in the TCOs. In privately owned forests, a permit for conversion into other economic land-uses can also be obtained. The rules for forest management plans are described in Law 1700 and complementary regulations (Decree 24453). A management plan has to be prepared by a professional forester who is independent of the concessionaire. Forest management is supervised by the Forestry Superintendency and also by those municipalities in which the concession is situated.

Bolivia has recently made efforts to implement forest policies to meet SFM objectives. SFM, however, is a relatively new concept and still needs to be fully introduced and enforced. In 2003, a total of 86 commercial forest concessions were operating in an area of 5.47 million hectares, most of them with a valid management plan^a. A system of auditing has been developed and the Forestry Superintendency is beginning to operationalize this. The fact that a significant number of forest concessions has been certified over the past five years (see below) indicates the high standard of forest management already being achieved.

Regulations under Law 1700 recognize as a valid five-year audit those forest audits carried out by an international system of voluntary forest certification, properly accredited by credible international bodies. Accordingly, in late 2003 the Forestry Superintendency renewed the forest-concessions rights for 40 more years of FSC-certified forest concessions.

Silviculture and species selection. Management plans prescribe methods of checking the progress of regeneration after forest harvesting, generally through permanent observation plots. They also

prescribe silvicultural operations before, during and after harvesting. Harvesting itself has to be done according to RIL prescriptions and a detailed annual operational plan. Silvicultural prescriptions and RIL are implemented in most certified forest concessions.

There are more than 2,000 tree species in Bolivia, of which at least 220 have been used and marketed in different areas of the country (STCP 2000). In the past, forest operations in Bolivia were based on the selective logging of a few valuable species, in particular mara and *Cedrela odorata* (cedro). In recent years, the number of harvested species has increased and this has resulted in higher removals. For instance, in 1995 (before the new forest law) mara was the most important tree species harvested in the country, accounting for around 16% of the commercial timber removed; currently, however, it officially constitutes less than 1% of commercial timber removed (SIFOR/BOL 2002). In addition to the species listed in Table 2, important timber species harvested in Bolivia include *Sterculia apetala* (sujo) and *Schizolobium amazonicum* (serebó).

Planted forest and trees outside the forest. The major species planted – mostly in higher-altitude areas – are *Eucalyptus globulus* (about 41,000 hectares) and *Pinus patula*; these two occupy about 90% of the area planted. Although considered relatively ineffective for controlling soil erosion, both species were planted for this purpose because they were considered suitable for cool climates. At the moment, these plantations are major providers of fuelwood and local timber. Other plantations are of *Alnus acuminata*, *Pinus radiata*, *P. pseudostrobus*, *Cupressus lusitanica*, *Acacia* spp and other species,

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

Total	Natural			Planted		
	Allocated to concessions/ under licence	With management plans	Sustainably managed	Total	With management plans	Certified
17,000	5,470*	5,470	2,210	60	n.d.	0

* Includes only those concessions allocated for commercial harvesting to the private sector and excludes community-based concessions

both exotic and indigenous. More than 25 species of eucalypt and pine have been tried. Trees from outside the forest are not used to any great extent as a source of traded timber.

Forest certification. Bolivia has the largest area of certified natural tropical forests in Latin America, all under the FSC scheme. The total certified forest area as of December 2005 was 2.21 million hectares (FSC 2005).

Estimate of the area of forest sustainably managed for production. The total area of sustainably managed natural forest for production is estimated to be at least 2.18 million hectares (Table 3), which comprises the area certified plus an estimated 0.5 million hectares of forest undergoing certification processes and 2,705 hectares of community forest in the Chiquiacá and Orozas communities for which a management plan has been developed under an ITTO project (PD 44/99 Rev.2 (F)). In addition, 40,000 hectares of planted forests are believed to be well managed^{a,c}, although not necessarily covered by formal management plans; these consist essentially of community forests in mountain regions.

Timber production and trade. The total sustainable production capacity of the production PFE is estimated to be about 8 million m³, but present production is far less. According to ITTO (2005), the 2003 production of logs was 650,000 m³ and sawnwood 347,000 m³. Sawnwood is the main industrial wood product and most of it is export-oriented.

The diversity of timber species and the lack of markets for lesser-known species is a problem in Bolivia. Although the country produces a significant quantity of certified wood, access to this sensitive international market is still limited.

Non-wood forest products. Brazil nut is by far the most important NWFP exported by Bolivia, while palm hearts and cacao are also significant. Palm hearts are harvested mostly in private forests and are subject to a management plan. Many other NWFPs are used locally and nationally but make little contribution to exports.

Forest for protection

Soil and water. The Environmental Law of 1992 dedicates two chapters to soil and water protection. It also defines soil and watershed conservation as a specific responsibility of the state. Through international cooperation, many small-scale plantations have been established to protect watersheds in the Andes, mainly to control soil erosion but also as a local source of firewood and products for local markets.

Biological diversity. Bolivia is renowned for its biological diversity, considered seventh in the world for the diversity of its birds, tenth for other vertebrates and 15th for primates; it also contains at least 18,000 species of plant. There is a high degree of endemism and many of its ecosystems are undisturbed. Twenty-six mammals, 31 birds, three reptiles, 21 amphibians and 70 plant species are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, twelve mammals, 19 birds, one reptile and 17 amphibians are found in forests (IUCN 2004). Bolivia has listed six plant species in CITES Appendix I and 448 plant species in Appendix II (CITES 2005). Timber species listed in Appendix II include mara and *Podocarpus parlatorei*.

Protective measures in production forests. Detailed regulations have been established under Law 1700 for commercial forestry operations to assist in protecting watersheds and soil. Forest

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
14,700	7,660	6,790	n.d.	2,380 ^d

management plans must make special provision for biological corridors, the regulation of hunting and the conservation of endangered plant and animal species.

Extent of protected areas. There are five official protected-area categories: (i) national parks; (ii) natural monuments; (iii) wildlife sanctuaries; (iv) wildlife reserves; and (v) natural areas for integrated use. Around one-third of the forested area of Bolivia (18.5 million hectares) has been allocated to a total of 36 protected areas^a. These include the *Reservas Naturales de Inmovilización*, which have provisional status as protected areas until a final decision is taken about the category of protected area to which they belong based on their values and characteristics. According to UNEP-WCMC (2004), 7.65 million hectares of forest are in protected areas that conform to IUCN protected-area categories I-IV, including 1.39 million hectares of lowland evergreen broadleaved rainforest and 1.32 million hectares of lower montane forest. Five protected areas, covering a total area of 4 million hectares situated in lowland tropical and subtropical areas, are interconnected through permanent production forests^a.

Estimate of the area of forest sustainably managed for protection. An estimated 10.7 million hectares of forested protected areas are covered by administrative decrees or simple management directives and staffed with forest rangers^a; these include 2.38 million hectares in the Madidi National Park (the subject of an ITTO project), for which a management plan is being developed and activities instigated to strengthen field-level management. This latter area is the extent of the estimated area of sustainably managed protection PFE, since insufficient information was available on the status of management elsewhere.

Socioeconomic aspects

Economic aspects. In 2002, forest-based activities contributed about 3% to Bolivia's GDP; logging and the wood-processing industry employed 60,000 people^a. There is also a significant informal sector involved in logging and industrial operations.

Livelihood values. Tropical forests are of great value to local forest dwellers, including indigenous peoples who have subsistence user rights for non-commercial purposes without the need for permits throughout the forest estate; hunting and fishing are the most important activities. Forest areas are also considered as a reserve of available land and are used for subsistence agriculture. An estimated 300,000 people derive a large part of their living from forest resources^c.

Social relations. The 1996 forest law recognizes local rights governing the use of forest resources, but the system still needs to be fully implemented and enforced. In fact, weak law enforcement and land tenure problems are still major constraints to SFM. Local tensions between legally defined forest users and forest dwellers remain unabated. Illegal logging of mara and cedro in particular still exists. Illegal crops, particularly coca, are planted by migratory farmers in fields and small openings and are often a major reason for violence in forested areas^c.

Summary

Bolivia has made remarkable progress towards SFM over the past decade. It has launched and implemented a comprehensive and ambitious reform of its forest sector and embarked on a major process of conferring property rights for natural forests to indigenous communities. Through an overarching political decentralization process, responsibilities and monitoring functions are being decentralized to municipalities and rural communities; this has generated some tensions. Forest certification has become a major factor in the introduction of SFM practices, and Bolivia has the largest area of certified natural forest in Latin America. However, the reform process faces many obstacles; full implementation still needs time and continuous and strong political will.

Key points

- The PFE comprises an estimated 17.0 million hectares of production forest and 14.7 million hectares of protection forest. A further 16.3 million hectares of forest have not yet been allocated.
- There remain huge, partly unexploited forest resources in the Amazon Basin.
- The estimated area of natural-forest production PFE under sustainable management is at least 2.18 million hectares; the estimated area of protection PFE so managed is at least 2.38 million hectares.
- The Ministry of Sustainable Development and Planning has overall responsibility for the national forestry regime.
- The Forestry Superintendency oversees adherence to the forest law.
- Territorial grassroots organizations are gaining increasing recognition in the new structure for the use of forest resources, but tensions remain.
- A well-established wood-processing industry, good professional knowledge and the establishment of certified forests provide a good basis for SFM. But access to some markets for certified timber remains problematic and the lack of a significant price premium may make it difficult to maintain high standards.
- An auditing system is in place; as it becomes operational, a clearer picture of the overall situation in production forests will emerge.
- Land tenure and, in particular, the absence of clearly defined property rights are key limitations to attracting investments to the Bolivian forest sector and, consequently, to achieving SFM.
- There are ambitious plans for the creation and management of protected areas, but these still need to be acted upon. The status of their management is mostly unclear.
- Illegal logging and illegal crops are constraints to the full adoption of SFM and the effective conservation of protected areas in many localities.

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 - ^d ITTO estimate
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BRAZIL



*For legend see page 58

Forest resources

Brazil has a land area of 846 million hectares and a population of about 177 million people. It shares 16,000 km of borders with ten neighbouring countries and its Atlantic coast is 7,370 km long. Ninety-three per cent of the country is below 800 m in altitude. The highest peaks, of about 2,500 m, are found on the northern border with Venezuela in the territory of Roraima and the state of Amazonas, and in the southeast on the Atlantic coast. Two geographic features stand out: the vast Amazon Basin, which contains the world's largest area of tropical rainforest; and the Brazilian Highlands, an eroded plateau in the south and southeast of the country, which separates Brazil's inland regions from a narrow Atlantic coastal plain. The climate of

Brazil is largely tropical or subtropical; temperatures average about 26°C with little seasonal variation. Annual rainfall varies from 3,000 mm or more in some parts of the northern region to 1,600 mm in central Brazil and 300 mm in the northeast. Estimates of total forest cover range from 544 million hectares (FAO 2005a) to 444 million hectares (UNEP-WCMC 2000); both estimates include tropical and non-tropical forests, although the area of non-tropical forest is small. According to UNEP-WCMC (2000), 430 million hectares of the total are tropical.

Forest types. Brazilian forests can be classified broadly as Amazon rainforest, Atlantic rainforest, central *cerrado* savanna, arid *caatinga* and the wetlands of Pantanal. About 95% of the existing natural forests (and 98% of the potentially productive natural forests) are in the Amazon (Macqueen et al. 2003). The extent of the major forest types are as follows: lowland evergreen broadleaved forests – 217 million hectares; semi-evergreen moist broadleaved forest – 48 million hectares; and sparse trees and parkland – 38 million hectares (UNEP-WCMC 2004). Data about the extent of secondary forests are not available. Mangrove forests cover about 1.6 million hectares (ibid.).

Dynamics of forest resource change. The annual rate of change in forest cover in the period 1990–2000 was estimated by FAO (2005a) to be 0.4%, or 2.31 million hectares per year. However, efforts to reduce this rate may be working; according to the Brazilian government, in the twelve-month period August 2004 to July 2005 some 1.89 million hectares were deforested in the Amazon, down

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)**			Total
		Production		Protection	
		Natural	Planted		
444–544*	489,515	98,100	3,810	271,000	372,910

* Tropical and non-tropical

** Estimate for production and protection PFE are derived from MMA (2001) CIFOR (2003), FAO (2004) and Poore & Thang (2002). Tropical forest area only. The production PFE includes 48.2 million hectares of conservation units for sustainable use and an estimated 50 million hectares of legal reserves for production purposes (CIFOR 2003)

from 2.7 million hectares in the corresponding period in 2003–04 (Damé 2005). While all kinds of forest have been subject to deforestation, it has been most severe in the Atlantic rainforests and in the central plains. Of the original area of Atlantic rainforest, only 7% remains; by comparison, 86% of the Brazilian Amazon remains intact. Many factors contribute to deforestation in the Amazon, the main ones in recent years being the expansion of cattle-raising and commercial agriculture, in particular soybeans. In 2004, about 20% of the total Brazilian cattle herd of 204 million animals was in the Amazon, and the industry is reportedly growing at more than 4% per year (Louven 2005). Other factors in deforestation include unregulated logging, mining and oil extraction, subsistence agriculture and fire.

Natural hazards such as floods, cyclones and droughts are rare, but forest fires have been a conspicuous recent component of forest destruction. Fire is a relatively new phenomenon in the Brazilian Amazon and is mainly human-induced.

Permanent forest estate. In the Amazon the PFE may be considered to comprise 48.2 million hectares of conservation units, 103 million hectares of indigenous lands, 20.4 million hectares of permanent preservation areas and 198 million hectares of legal reserves on private lands, including both production forests and protection areas, amounting to a total of about 370 million hectares^b.

Planted forests. The total plantation forest area was an estimated 4.98 million hectares in 2000 (FAO 2005a), but the split of this between tropical and non-tropical was not reported. Tomaselli and Siqueira (2005) reported a total of 1.96 million hectares of *Pinus* and 3.29 million hectares of *Eucalyptus* plantation (the two genera comprising an estimated 95% of all plantations). Of these 5.25 million hectares, 3.81 million were established in states with a significant proportion or all of their territories in the tropics. Approximately 14,000 hectares of *Tectona grandis* (teak) have been established, and this area is increasing.

Institutional arrangements

Forest tenure. About 70% of the production PFE in the Amazon is owned privately (FAO 2004). There are legal stipulations to set aside conservation areas within each private forest property and requirements

for 'legal reserves' in private forest areas are also defined by law. According to the 1965 forest code and subsequent regulations (eg Decree 1.282 of 1994), 80% of the forest property is to be kept as legal reserve in the Amazon, 35% in the *cerrado* and 20% in other areas. Legal reserves in private lands cover 198 million hectares, and indigenous lands (Indian reserves) cover 103 million hectares (ibid.). Parts of these forests have been set apart as 'extractive reserves' for the harvesting of latex, nuts, fruits, oils and other products as a way of providing sustainable economic benefits from the rainforest. The extractive reserves, which are administered by the Brazilian Institute of Environment and Renewable Resources (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* – IBAMA), now make up about 4 million hectares (0.8%) of the Brazilian Amazon (IBAMA website). The National Council of Rubber Tappers of Brazil has set 10% of the Amazon as its target for extractive reserves. Despite the fact that much production forest land is privately owned, the forests are considered under the Brazilian constitution to be a common asset for all inhabitants, and ownership and tenure disputes are a major problem. Private owners are only able to exercise their rights within the limits imposed by the forest law of 1965, which regulates the harvesting of timber resources.

SFM policy framework. A new national forest policy was launched in 2001. During 2004, the creation of the Coordinating Commission for the National Forestry Program (*Comissão Coordenadora do Programa Nacional de Florestas* – CONAFLO), made up of 42 representatives of major public, private and civil-society interest groups, has added a participative dimension to policy identification and formulation in the country. Policies relating to forestry aim to achieve: better cooperation between the federal and state governments; the creation of national and state forests and extractive reserves; the stimulation of wood and NWFP production; the creation of national parks and biological reserves; the removal of undue incentives for deforestation; new instruments for financing SFM; the elimination of local structural imbalances in forestry enterprises; the establishment of state-level forest programs; the change-over from increased government presence to enhanced people's participation and private investment; and continuous monitoring and evaluation.

Forest policy and legislation. Brazil is a federation of 26 states, a federal district and more than 5,500 local governments (*municípios*). The adoption of a new constitution in 1988 prompted powerful decentralization in the management of natural resources and in the implementation of development programs. Considerable political and tax power and fiscal revenue shifted from the central government to states and *municípios*, and privatization and economic liberalization policies were also pursued. However, unclear rules and the ensuing friction have made it difficult for the state and municipal governments to have a more intense and direct involvement in the management of forestry resources. Moreover, efforts to define the relative responsibilities of different layers of government have proved inadequate, as have efforts to exert sub-national power to improve the management of the sector (Gregersen et al. 2004).

The National Forest Program 2000–2010 (*Programa Nacional de Florestas – PNF*) seeks to ensure the sustainability of the forests. One of the aims is to establish 50 million hectares of sustainably managed national forests (*Florestas Nacionais – FLONAs*) by 2010 and to achieve a target of 20 million hectares of forest plantations on private land. It incorporates six broad program areas, focusing on: the encouragement of the sustainable use of forests; fostering reforestation; the recovery of permanent preservation areas and reserves; the support of indigenous people; the control of deforestation and illegal activities; and the prevention of forest fires. Forest legislation includes: the forest law of 1965 (as amended); the Law of Protection of Fauna of 1967; the National Environmental Policy of 1981; the Water Resources Policy of 1997; Law No 9605 of 1998 on environmental crimes; Decree No 3179 of 1999, establishing penalties for forest crimes; and Decree No 3420 of 2000, creating the PNF. These are complemented by regulations from the National Environmental Council and instructions from the Ministry of the Environment, Water Resources and Amazon (*Ministerio de Medio Ambiente – MMA*) and IBAMA, which provide for a national system of conservation units, penalties for all damages caused to nature, obligatory forest replacement, as well as norms related to felling quotas, land conversions, the prevention of forest fires, etc.

Institutions involved in forests. The MMA is responsible for forestry as well as for planning, coordinating and controlling activities related to the National Environment Policy and policies for developing the Amazon. It supervises the activities of IBAMA, chairs the National Council for the Environment (*Conama Conselho Nacional do Meio Ambiente – CONAMA*) and takes part in the President's Chamber for Natural Resources Policies, which coordinates various aspects related to forests. In addition to MMA, other agencies also have responsibilities related to forest resources, such as the National Colonization and Agrarian Reform Institute (*Instituto Nacional de Colonização e Reforma Agrária – INCRA*). Another federal agency with an important impact on land management is the Indian National Foundation (*Fundação Nacional do Índio – FUNAI*), which is responsible for the preservation of Indian culture. In 1999, a Secretariat for Biodiversity and Forests was created in MMA.

IBAMA, established in 1985, implements and coordinates national forest policy. It was created by merging several earlier federal agencies, including the Brazilian Forest Development Institute; it is responsible for the coordination of national environmental issues. In general, IBAMA administers forests nationwide, monitors and controls forestry programs, and conducts environmental awareness campaigns. It also has authority to transfer some of these powers and responsibilities to sub-national governments, although reportedly this has not happened on a significant scale (Toni 2003). IBAMA has no control over the 113 million hectares of indigenous lands, which remain the responsibility of FUNAI, nor has it any control over conversions in settlement areas.

Forestry research is carried out mainly by the Brazilian Agricultural Research Corporation (*Empresa Brasileira de Pesquisa Agropecuária – EMBRAPA*) through its National Forestry Research Center located in Colombo in the state of Paraná. EMBRAPA has groups of forestry research staff at various centres: for the savanna in Brasília; for the humid tropics in Belém do Pará; and for the *caatinga* in Petrolina, Pernambuco state. It also has forestry research units in the states of Acre, Rondônia, Roraima, Amapá and Amazonas. The National Institute of Amazonian Research (*Instituto Nacional de Pesquisas da Amazonia – INPA*), an autonomous

institution in Manaus, conducts research on forest products and silviculture. Universities, large forestry enterprises, and NGOs such as the Amazon Institute of People and the Environment (*Instituto do Homem e Meio Ambiente da Amazônia* – IMAZON) also engage in forestry research. University education in forestry started in 1960; forest engineering courses are now offered by 20 universities. There are some 7,000 forest engineers working in Brazil, 1,600 with master's degrees and 300 with PhDs.

Various national and international NGOs participate in programs and projects and contribute to raising awareness, increasing political pressure for action and supplying some of the technical expertise that may be lacking in some regions. The federal government and its community program have been fostering linkages between local governments and the local population. Under this program, *municípios* stimulate discussions for the preparation of sustainable local development plans. At the beginning of 2002, some 157 *municípios* (less than 3% of all *municípios*) had participated in the program. In certain cases the priorities of poor local populations have clashed with the interests of entrenched and powerful elites of loggers and cattle ranchers (Toni 2003).

Status of forest management

Forest for production

Even though the need for managing forests according to approved management plans was specified in the 1965 forest law, this was almost completely ignored until 1994 when the government defined SFM in practical terms through Decree 1.282. In 1995, Brazil adopted the Tarapoto Proposal of C&I for the Sustainability of the Amazon Forest, sponsored by the Amazon Cooperation Treaty. This, along with the ITTO C&I, form the basis of sustainable management in Brazil's tropical forests.

Brazilian legislation does not yet provide for forest-utilization concessions in FLONAs or other publicly owned forest areas; thus, there are no conventional forest concessions in Brazil, and almost all production management is conducted by private enterprises in privately owned forests. In line with its desire to introduce SFM to 50 million hectares of FLONAs by 2010, the government has been investigating options for allocating timber production in these

areas, including the introduction of a concession system (Verissimo & Cochrane 2003). An estimated 43.9 million hectares of the production PFE in the Amazon are owned privately; of these, an estimated 21.9 million hectares of accessible forest could produce a sustainable yield of 15.2–21.9 million m³ per year (Tomaselli & Siqueira 2005). By law the use of natural forest resources on private land requires the presentation of a sustainable forest management plan (*plano de manejo florestal sustentável* – PMFS) to IBAMA. Timber may also be harvested when land is converted to other uses such as agriculture. Present legislation allows the conversion of a specified percentage of land into other uses, while the remainder must be maintained under forest cover and requires a PMFS for harvesting. The requirements for the authorization of deforestation are much easier to fulfil than the highly bureaucratic requirements for the approval of forest management plans and annual operation plans. However, control and law enforcement in the Amazon are extremely difficult because of the vastness of the area, poor infrastructure, a lack of capacity and the large number of actors contributing to deforestation^b. Other problems facing forestry in Brazil are: the remoteness of many forests from centres of commerce and control; the weak competitiveness of SFM as a land-use; the lack of competitiveness of the tropical timber industry, for various reasons; extensive degraded forests; lack of full-cost pricing and the abundant availability of low-cost timber; and a serious shortage of management skills^b. In 2001, IBAMA suspended 23% of forest management operations for poor inventory, lack of compliance, lack of zoning and other reasons (Macqueen et al. 2003). It has been reported that only about 7% of forest production is under proper forest management (FAO 2004). However, a new and positive trend is emerging. A few private forestry operations have introduced SFM, incorporating scientific planning, multipurpose management, environmental conservation, social service programs and R&D; these include Orsa Florestal, which restructured its Jari operations, and Cikel Brasil Verde, a fully integrated timber company.

Silviculture and species selection. Technical requirements for logging include inventory and the preparation of stock maps, estimation of the AAC, the fixing of cutting size, harvesting rules, conser-

Table 2 Some commonly harvested tropical timber species for industrial roundwood

Timber species	Remarks
<i>Parkia</i> spp (faveira)	At least five different species are used as plywood
<i>Calophyllum brasiliense</i> (jacareuba)	Widely used for exterior construction, furniture, etc
<i>Hymenaea courbaril</i> (jatobá)	Main dark hardwood for multiple uses
<i>Brosimum utile</i> (amapa)	Widely harvested in the Amazon
<i>Erisma uncinatum</i> (cedrinho)	Widely used locally in the Amazon

vation measures and silvicultural treatment (FAO 2004). The cutting cycle has been reduced from 50 to 30 years, and recently to 25 years. Initially, selective logging was confined to very valuable species such as *Swietenia macrophylla* (mogno) and *Virola surinamensis* (virola), which are both under harvesting moratoriums, but, with increasing demand, the number of species extracted has increased. More and more new species are finding markets, and some 150 species are now being logged in Amazon forests (Macqueen et al. 2003). Nevertheless, the issue of lesser-known and lesser-utilized species is still real, as there is insufficient demand for them and they do not command high prices. Table 2 lists some commonly harvested tropical timber species.

Planted forest and trees outside the forest.

Even though planted forests account for only about 1% of the total forest in Brazil, their contribution to industrial development has been significant. The main industrial tree species used today are various species of *Pinus* and *Eucalyptus*. *E. grandis*, *E. saligna* and *E. urophylla* are the species commonly planted in southern Brazil, and *E. citriodora* and *E. camaldulensis* in the drier parts. The pulp and paper and charcoal industries are dependent on eucalypt plantations and there are plans to expand them. After the failure of large-scale *Gmelina arborea* plantations in the Jari project in the Amazon, there have been considerable improvements in the silviculture and management of hardwood plantations, now being managed on a 25- to 30-year rotation. *Tectona grandis* (teak) has become a favourite (eg in Mato Grosso and Rondônia) because of its high value and quality and its amenability to being raised in an agroforestry environment.

Forest certification. As of December 2005, a total of 3.46 million hectares of natural and planted forests, including Mil Madeireira, ORSA Florestal, Cockel, and Guavirá Industrial e Agroforestral, had been certified under the FSC umbrella in Brazil. Of this, an estimated 1.16 million hectares were natural tropical forest and 1.35 million hectares planted tropical forest (FSC 2005). The Brazilian forest certification system CERFLOR was started in the 1990s and became operational for planted forests in 2003; a system for natural forests is under development with financial assistance from ITTO.

Estimate of the area of forest sustainably managed for production. An estimated 7% of the timber of the Amazon comes from areas covered by approved forest management plans and 25% from approved forest conversion areas (FAO 2004; CIFOR 2003). As described earlier, there is no concession system in Brazil; most legally produced timber in the Amazon is harvested from private lands subject to the approval by IBAMA of a management plan. Information on the implementation of such plans was generally not available for this report. A small amount of state-owned forest is also producing timber. The 65,714-hectare Antimary State Forest in the state of Acre is being managed sustainably according to a management plan developed under an ITTO project; some 16,713 m³ were produced in 2003 from an area of 2,200 hectares; annual production is expected to increase to 52,000 m³ (data supplied by ITTO project PD 94/90 Rev.3 (I)). Some 3,222 hectares of the Tapajós FLONA near Santarém in Pará state is also being managed according to a management plan developed under another ITTO project (PD 68/89 Rev.1 (F)); the management plan covers a total area of 136,000 hectares of

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	
98,100	n.a.	5,250	1,160	1,360	3,810	1,350*	1,350

* Estimate based on the assumption that at least the certified planted forests have management plans

production forest within the FLONA. An estimated 1.16 million hectares of natural tropical forest are certified under the FSC umbrella. Available information indicates that at least an estimated 1.36 million hectares of natural tropical forest are being sustainably managed (Table 3).

Timber production and trade. Total roundwood production amounted to an estimated 236 million m³ in 2003, including 133 million m³ (56%) of fuelwood (FAO 2005b). In 2001, the contribution of plantations to total wood production was 83 million m³ (35% of the total); eucalypts alone accounted for 56 million m³, providing raw material for pulp, fibreboard, particleboard and charcoal (FAO 2003). Brazil produced an estimated 29.7 million m³ of tropical logs in 2003, up slightly from 27.3 million m³ in 1999 (ITTO 2004, 2005). About 15.9 million m³ of tropical sawnwood were produced in 2003, of which 1.32 million m³ were exported. In the same year, Brazil produced an estimated 1.2 million m³ of tropical plywood, of which 738,000 m³ were exported; Brazil does not export logs. Brazil also produces substantial volumes (nearly 80 million m³ in 2003) of non-tropical timber (ibid.). According to an ITTO diagnostic mission, a key constraint to the development of a sustainable timber industry based on natural tropical forests is the fragility of the supply chain, which is subject to disturbance by several factors. Moreover, the financial competitiveness of SFM in natural forests with alternative land-uses is often low, leading to significant deforestation^b.

Non-wood forest products. Brazil owes its name to *brazilin*, a red dye from *Caesalpinia echinata*, and to the dye extractors, *brasileiros*. A large number of NWFPs (food, medicinal plants, perfumes, dyes and tannins, natural rubber, Brazil nut, handicraft and construction materials, exudates, honey and wax) are used locally. The list of plants providing NWFPs is substantial.

Forest for protection

Soil and water. The Amazon River Basin produces 20% of all freshwater in the world; it is therefore vital that its soil and water resources are properly protected. However, no information on the area of forest set aside primarily for soil and water protection was made available for this report.

Biological diversity. Brazil's forests contain a significant share of the world's biodiversity, including an estimated 56,000–62,000 higher plant (not including mosses, lichens and fungi) and mammal species. The Amazon is home to 20% of the world's plant species, 20% of bird species and 10% of mammal species. Seventy-four mammals, 123 birds, 22 reptiles, 24 amphibians and 381 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 45 mammals, 77 birds, five reptiles, 18 amphibians and twelve plants are found in forests (IUCN 2004). Brazil has listed 59 plant species in CITES Appendix I and 610 in Appendix II (CITES 2005). The Brazilian National Policy and Strategy for Biodiversity (ESNABIO) and the National Biodiversity Programme are designed to address the situation through *in situ* and *ex situ* measures and the management of biotechnology.

Protective measures in production forests.

Measures taken to protect the production forests as part of the country's forest conservation strategy include, among others: a moratorium on the harvesting and sale of over-harvested species such as mogno and virola; the introduction and implementation of measures to control illegal logging through high-tech devices for timber-tracing and satellite data transfer; limiting the area allowed for farming in forest properties in the Amazon; yield regulation in natural selection forests; restoration forestry programs; the establishment of ecological

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
271,000	19,000*	n.d.	n.d.	n.d.

* Includes tropical and some non-tropical forest

corridors; incentives for *municípios* that have environmental conservation areas through the transfer of a 'products and services tax'; and broadening the scope of eligible activities for Clean Development Mechanism support.

Extent of protected areas. There is great uncertainty about the extent of protected areas in Brazil, with figures ranging from 27 million hectares to 271 million hectares; partly this stems from differences in the definition of 'protected' and the extent to which extractive uses are permitted. The estimate given in Table 1 and Table 4 includes indigenous reserves and protected areas on private land. According to UNEP-WCMC (2004), 19.0 million hectares of forest (tropical and non-tropical) are in protected areas conforming to IUCN protected-area categories I-IV, including 10.4 million hectares of lowland evergreen broadleaved rain-forest and 5.41 million hectares of unclassified tropical and non-tropical forest. Law 9.985 of 2000 created a National System of Nature Conservation Areas (*Sistema Nacional de Unidades de Conservação*), consisting of two main categories: (i) strictly protected areas (exclusively serving forest and biodiversity conservation), in which timber harvesting and the extraction of NWFPs are not allowed – these include national parks, biological reserves, ecological reserves, national monuments and wildlife refuge areas (IUCN categories I-IV); and (ii) sustainable-use protected areas, where controlled utilization is allowed – these cover national forests, environmental protection areas and extractive reserves. The combined total of 69 million hectares (about 8% of the national territory) is categorized, in terms of responsibility, as federal conservation units (45 million hectares) and state conservation units (24 million hectares).

Estimate of the area of forest sustainably managed for protection. No data were available on the status of management of the protection PFE (Table 4). However, vast areas of the Amazon are currently under no threat from deforestation

or other significant human-induced disturbance due to their remoteness.

Socioeconomic aspects

Economic aspects. Forestry contributes about 5% to Brazil's GDP. It is estimated that 1.8 million people have employment directly related to forests (Virgilio et al. 2002). The timber industry employs, on average, 4% of the total workers in the manufacturing sector. Data on the number of people employed in that part of the sector specifically utilizing natural tropical forests were not available for this report.

Livelihood values. The indigenous communities in the Amazon, dwellers in extractive reserves and rubber tappers, and *caatinga* forest users in the northeast depend in large measure on forests for subsistence; however, no data on the extent of this dependence were available for this report.

Social relations. The majority of the Amazon's inhabitants are recent settlers and the differences in their backgrounds lead to frequent friction. While indigenous peoples comprise 0.2% of Brazil's total population, indigenous lands and ancestral domains – mostly in the Amazon – cover about 11.5% of the total land area^b. Of the 586 indigenous areas, 138 have been recognized formally and 326 areas have reached the final stage of such recognition; in 27 areas, boundaries have been demarcated but in only 19 have the boundaries been fully approved^b. The slow process of recognition and approval of tenure causes dissatisfaction on the part of the indigenous communities. Nevertheless, the situation of indigenous communities has improved in some areas; indigenous organizations are now both stronger and more numerous and the indigenous population has started to grow, thus reducing fears of extinction. On the other hand, the majority of indigenous people still suffer from economic marginalization, malnutrition and inadequate assistance and protection (as they remain under the guardianship of the federal government)^b.

Summary

Brazil is endowed with an incredible abundance and variety of flora and fauna; it has more known species of plant than any other country. The Amazon represents the single largest tract of tropical rainforest and is still 86% intact; in contrast, the Atlantic forest covers less than 7% of its original area (although it still harbours a wide variety of biodiversity). Some of the most significant problems facing forestry in Brazil are: poor infrastructure; the remoteness of many forests from centres of commerce and control; the weak competitiveness of SFM as a land-use; the lack of competitiveness of the tropical timber industry; lack of full-cost pricing and the abundant availability of low-cost timber; a serious shortage of management skills; and a lack of enforcement of laws and regulations. To date, the high level of biodiversity in the Amazon has not been a development asset. Given that development will continue in the region, probably at an accelerated rate, there is an urgent need to find ways of using the biodiversity resource in financially remunerative and sustainable ways. Government has been working to address institutional barriers to SFM and a number of recent initiatives offer hope that the area of production PFE in the Amazon under SFM will expand significantly in the future.

Key points

- Brazil is a forest-rich country with a tropical-forest PFE of 370 million hectares. Despite deforestation in certain parts, there are still huge forest resources in the Amazon region.
- An estimated 1.36 million hectares of natural tropical forest production PFE are being sustainably managed; insufficient information was available to estimate the area of protection PFE so managed.
- Vast areas of the Amazon are currently under no threat from deforestation or other significant human-induced disturbance due to their remoteness.
- Brazil has successfully raised large-scale industrial forest plantations through private investment to ensure a sustainable supply of raw material.
- The majority of the production forest is under private ownership, although ownership and tenure disputes are a major problem.

- A wide range of policies, strategies, laws and regulations have been developed to facilitate forest administration and to achieve SFM.
- Institutional weaknesses and an inadequate capacity for enforcing policy and policy instruments have been a significant constraint.
- Only a small portion of the forest is under management plans; the bulk of wood production, though derived from private sources, is reported to be unauthorized because it is not based on official approvals. Harvests are often not based on any SFM criteria.
- A number of companies have come forward for the voluntary certification of their forest management operations. However, the financial competitiveness of SFM in natural forests with alternative land-uses is often low, leading to significant deforestation and threatening the long-term viability of sustainably managed natural forests.

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COLOMBIA



*For legend see page 58

Forest resources

With a land area of 114 million hectares, Colombia is the fourth-largest country in South America by area; it has a population of 44.2 million people. Colombia is characterized by two well-defined biogeographical zones: the Andean mountain zone of three mountain ranges and three tropical plains – one between the Pacific and the Andes, one fronting the Caribbean coast in the north, and one containing the Amazon and Orinoco basins to the east. Estimates of forest area include 65.6 million hectares (UNEP-WCMC 2000), 53.2 million hectares^a, and 49.6 million hectares (FAO 2005).

Forest types. An estimated 85% of Colombia's closed forests are found in the Amazon Basin and on the Pacific coast (CONIF 2004). In the Amazon, terrace forests contain valuable timber species such as *Virola* spp, *Brosimum utile* and *Humiriastym*

procerum; there are also large tracts of swamp and catival forests characterized by stands of *Mora megistosperma*, *Camptosperma panamensis* and *Prioria copaifeira*. Submontane and montane Andean forests are also extensive and contain patches of *Quercus humboldtii* (roble). Colombia also has a significant mangrove resource.

Dynamics of forest resource change. FAO (2005) estimated the average annual rate of deforestation at about 190,000 hectares (0.4%) in the period 1990–2000. Deforestation is highest in the foothills of the Andes in the departments of Chocó, Cesar, Santanderes, Nariño and Putumayo, where colonists are concentrated and the majority of coca is produced.

Natural hazards affecting forests include those associated with the El Niño/Southern Oscillation phenomenon and volcanic activity; hurricanes occasionally affect forests on the Caribbean coast.

Permanent forest estate. Although it is estimated that harvestable forests for timber may cover as much as 38 million hectares, the utilizable potential is limited by accessibility and ecological factors. The Ministry of Environment estimated an area of permanent production forest of about 5.5 million hectares, containing a growing stock of 200 million m³ (CONIF 2004). There is no PFE *per se* classified in Colombia; figures in Table 1 are indicative only.

Planted forests. FAO (2005) estimated that the area of planted forest was 141,000 hectares in 2000; this corresponds closely to the official estimate of 148,000 hectares^a. However, according to the National Forest Development Plan of 2000 (*Plan Nacional de Desarrollo Forestal*), Colombia had 350,100 hectares of planted forest in 1997.

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares) ^d			Total
		Production		Protection	
		Natural	Planted		
49.6–65.6	51,437	5,500*	148 ^a	8,860**	14,508

* The estimate for natural production PFE is derived from CONIF (2004)

** Protection PFE is the sum of forests classified in IUCN protected-area categories I–IV by UNEP-WCMC (2004)

Institutional arrangements

Forest tenure. The 1991 constitution recognizes the ancestral rights to land of indigenous groups and Afro-Colombian traditional communities. Forest ownership is both public and private. Private land is subdivided into private property and collective property, the second of which includes indigenous, Afro-Colombian and farmer groups. Today, 22.1 million hectares of forest, mostly in the Amazon region, are owned by indigenous communities and 5.4 million hectares, mainly in the Pacific region, by Afro-Colombian communities (CONIF 2004). In addition, many forest areas in the Andean region, in particular planted forests, are privately owned.

SFM policy framework. Colombia has developed its own set of C&I for SFM, based on those proposed by ITTO. The country has extensive legislation on forest management, with detailed instructions on the preparation of management plans. However, the degree of control exercised by regional corporations in charge of forest management (see below) is not clear and there may be huge differences in the way in which management standards are applied in different parts of the country. This may also be caused by the generally difficult governance situation in the country: critical portions of Colombia's Andean, Chocó and Amazonian forests are located in municipalities where armed groups (left-wing guerrillas and right-wing paramilitaries) contest political authority. This is perhaps most evident in the case of the Andes, where the largest continuous forest remnants (Serranía de San Lucas, Nudo del Paramillo, Páramo de Las Hermosas and East Andes) lie in municipalities where both armed groups are present (Alvarez 2005).

Forest policy and legislation. The forest law (*Ley 2 sobre Economía Forestal de la Nación y Conservación de Recursos Naturales Renovables*) dates back to January 1959. It has been complemented by a number of decrees, the most important ones being the forest code of 1974 (*Decreto 2811, Código Nacional de Recursos Naturales Renovables y de Protección al Medio Ambiente*) and the decree of 1996 on forest use (*Decreto 1791 Régimen de Aprovechamiento Forestal*). Regulations that restrict the export of logs from natural forests have been in force for more than ten years; only roundwood coming from planted forests can be exported. A new

forest law was approved by Congress in December 2005 and at the time this report went to press it was awaiting Presidential approval. The new law seeks to: expand the sustainable use of natural forests and make the control of these forests more rigorous; further promote forest plantations and create financial mechanisms for investments; and regulate and further develop forest concessions in the country.

The forest policy (*Política de Bosques*) now in force was approved in 1996; it is being revised and was due to be finalized in 2005. Among the aims of the policy are to: (i) achieve the sustainable use of forests for their conservation; (ii) consolidate the incorporation of the forest sector in the national economy; and (iii) contribute to the improvement of the quality of life of the people. Essential steps include: (i) the modernization of administration; (ii) the conservation, restoration and use of natural forests; and (iii) the strengthening, support and consolidation of the international position of Colombia in forestry matters.

In 1998, the Green Plan (*Plan Verde*) was formulated. This promotes reforestation and, in particular, the restoration and rehabilitation of degraded forest and the management of secondary forests. A National Forestry Development Plan approved in December 2000 has been adopted as official state policy and offers a strategic vision for forest management through 2025. The plan has been developed according to the concepts of the Forests Program of the Convention on Biological Diversity, which takes the ecosystem approach as its conceptual foundation. This approach aims to achieve a balance between conservation, sustainable use and the equitable distribution of benefits. The Forest for Peace (*Bosque para la Paz*) program promotes co-management, reforestation and forest restoration as important elements in social development. Another program is *Familias Guardabosques*, which aims to promote SFM and the substitution of illicit crops such as coca.

Institutions involved in forests. Law 99 created the Ministry of Environment in December 1993, replacing the former forest service (*Instituto de Desarrollo de los Recursos Naturales Renovables – INDERENA*). In 2001, the Ministry of Environment became part of the Ministry of Environment, Housing and Territorial Development (*Ministerio de Ambiente,*

Vivienda y Desarrollo Territorial – MAVDT). MAVDT formulates policy on the environment and renewable natural resources and establishes the broad guidelines, rules and criteria for the environmental regulation of land-use, including forestry. At the national level, the Department of National Planning, the Ministry of Agriculture and Rural Development and the Ministry of Commerce, Industry and Tourism also play roles in forest development and conservation. Technical support and research in natural resource management are confined to a private-public corporation, the National Corporation for Forestry Research and Development (*Corporación Nacional de Investigación y Fomento Forestal – CONIF*), and to universities. The Alexander von Humboldt Institute was created in 1993 to promote, coordinate and perform research on the conservation and sustainable use of biodiversity in Colombia. Fewer than 50 people work on forest management-related activities in the federal government^a.

Colombia is one of the most decentralized countries in Latin America: 40% of total public expenditure is managed locally (by municipalities). The management of forests is part of the National Environmental System (*Sistema Nacional Ambiental – SINA*), which was established by Law 99 and consists of 33 autonomous regional corporations (*corporaciones autónomas regionales y las corporaciones de desarrollo sostenible*). These corporations are responsible for the management and administration of all natural resources in the area of their jurisdiction, including the granting of concessions, permissions and authorizations for forest harvesting.

Local NGOs play an important part in monitoring resource use and in forest development. There are no major industrial associations and support by international donors for forestry is relatively limited. The forestry and agricultural faculties of the various universities in the country also play important roles in forest research and development.

Status of forest management

Forest for production

Colombian law differentiates between permits, concessions and authorizations for timber harvesting, but no forest concession has been allocated in the last 20 years. The present policy is one of 'non-use'

by commercial forestry in natural forests; however, cutting permits are still widely used, which include legal requirements for management procedures. When forests are converted to other land-uses or for the development of infrastructure, the law stipulates compensation measures, generally in the form of afforestation. No information on the area on which timber-harvesting is permitted was made available for this report.

The National Forestry Development Plan proposes that an area of 2 million hectares of forests be identified as potential production forest by 2005, and the government of Colombia is in the process of verifying the management of 3.13 million hectares of production forest^c. Pilot projects have started in different forest areas, including three ITTO-supported field projects – in Guaviare (74,000 hectares, including 2,500 hectares of managed natural forest), Choco (2,000 hectares of protection planted forest) and an area of 64,000 hectares of degraded natural forest and planted forest in San Nicolás/Río Negro. One particular forest production area of several thousand hectares is situated in Atrato, Arenal. In the Amazon region there are a number of pilot areas that include sustained-yield management, totalling about 120,000 hectares. In all these pilot areas, forest management plans have been prepared and are being implemented through a multi-stakeholder approach.

Silviculture and species selection. Forest harvesting is carried out through timber-licence contracts in the forest areas operated by most of the regional corporations; thus, there is no systematic application of silviculture, even though this is required for continuous logging activities under Decree 2811 of 1974 (Article 213) and Decree 1791 of 1996 (Article 5b). Particularly in the Pacific region, many timber species are subject to uncontrolled salvage logging, among them *Brosimum utile* (sande), *Carapa guianensis* (andiroba), *Cedrela odorata* (cedro), *Prioria copaifera* (cativo), *Campnosperma panamensis* (sajo) and *Tabebuia serratifolia/T.rosea* (cedro rosado). An estimated 250 species are used by industry^a. Table 2 lists five commonly harvested timber species in Colombia.

Planted forest and trees outside the forest. Since 1970, the government has provided incentives for forest plantation development and, since 1994, has exempted from some taxes those who invest in

Table 2 Some commonly harvested species for industrial roundwood^c

Timber species	Remarks
<i>Pinus patula</i> (pino candelabro)	From plantations in mountainous regions
<i>Dialyanthera</i> sp (virola)	Particularly in the Pacific region
<i>Prioria copaifera</i> (cativo)	Often in nearly pure stands, partly over-harvested
<i>Brosimum utile</i> (sande)	Particularly in the Pacific region
<i>Cariniana pyriformis</i> (abarco)	Widely distributed, outdoor and indoor use, furniture

the establishment and maintenance of plantations. Since then, more than 70,000 hectares have been reforested as protection forests, mainly in Antioquia, Córdoba, Magdalena, Santander and the Valle del Cauca. The main plantation species are *Pinus caribaea*, *P. oocarpa* and, in particular, *Pinus patula* (pino candelabro); these comprise 55% of the total planted area, followed by eucalypts (20%, including *Eucalyptus globulus*, *E. camaldulensis* and *E. urophylla*) and *Acacia mangium* and other broadleaved species, in particular *Gmelina arborea* and *Tectona grandis* (teak, teca). Indigenous species planted include *Cordia alliodora* (vara de humo), *Bombacopsis quinata* (ceiba tolúa), *Tabebuia rosea*, *Alnus acuminata* (aliso), *Lafoensia speciosa* and roble. The forest law currently under review intends to further promote forest plantations and raise the area covered by them to about 1.5 million hectares.

Forest certification. Since 1996, certification has gained ground in Colombia. The *Grupo de Certificación Forestal Voluntaria* has developed drafts for national certification schemes for both natural and planted forests. Pilot projects are being implemented in eight forest zones, including the certification of a bamboo plantation. As of December 2005, two planted forest areas covering 58,444 hectares had been certified (FSC 2005).

Estimate of the area of forest sustainably managed for production. Little information is available on the quality of natural forest management in Colombia and it is therefore difficult to make a general assessment of forest management standards. Several pilot areas, partly supported by ITTO projects covering about 200,000 hectares of natural forests, are considered to be sustainably managed^c.

Timber production and trade. The production of industrial roundwood from natural and planted forests in 2003 was 3.14 million m³, compared to 2.40 million m³ in 1999 (ITTO 2004, 2005). Nearly all of this wood served the domestic market. The production of sawnwood in 2003 amounted to about 599,000 m³, compared to 729,000 m³ in 1999. Veneer production in 2003 was very small (9,000 m³) and plywood production in 2003 was estimated at 38,000 m³ (ITTO 2005).

Non-wood forest products. More than 300 NWFP species are known and used in Colombia. *Guadua angustifolia* (guadua), a bamboo native to the coffee belt (*región cafetera*), is one of the country's most important NWFPs. It is used mainly for local housing construction, but also by modern architectural designers and in handicrafts. In the departments of Caldas, Quindío, Risaralda, Tolima and Valle del Cauca the natural area of guadua is about 21,000 hectares, supplemented by 5,100 hectares of plantations; total annual production exceeds 250,000 m³ (CONIF 2004). The principal products harvested in natural forests include rubber; palm fruits, particularly *Mauritia flexuosa* (canangucha) and *Euterpe precatoria* (asahí); fruits from *Theobroma grandiflorum* (copoazu); *Euterpe oleracea* (palm hearts); *Chamaedorea* spp (xate leaves) for ornamental use; and wildlife, especially fish and reptiles. Coca, although illegal, is also widely grown. There is great potential for ecotourism but this cannot be developed at present because of security problems.

Forest for protection

Soil and water. Colombia is one of the ten most productive countries worldwide in terms of freshwater yield. It has 19 major irrigation districts

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

Total	Natural				Planted		
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
5,500	2,150 ^{c,d}	n.d.	0	200 ^c	148	80	58

and more than 500 small irrigation areas. Many environmental campaigns have been launched in the cities to inform communities about the importance of water conservation. Fifty-two protection forest areas have been classified, covering about 312,000 hectares; regulations exist for the use and protection of these areas but they are not being implemented^a. CONIF (2004) reports an area of 650,000 hectares in *reservas forestales protectoras de orden nacional* and *distritos de conservación de suelos*. Water shortages could eventually affect more than 14 million people in some parts of the country, particularly in Magdalena and Cauca (CONIF 2004). Through its system of regional corporations, the country emphasizes watershed reforestation projects. Over the past nine years, about 120,000 hectares of new protection plantations have been established (ibid.).

Biological diversity. Colombia is a country with great physical contrasts, resulting in a great variety of ecosystems, a richness of species and many endemics. It has one of the highest levels of species diversity in the world, boasting some 55,000 plant species, of which one-third are endemic (one of the top 20 countries in the world in this respect), 1,721 bird species and 205 reptile species. Thirty-nine mammals, 88 birds, 16 reptiles, 208 amphibians and 225 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 21 mammals, 79 birds, 194 amphibians and five plants are found in forests (IUCN 2004). Colombia has listed nine plant species in CITES Appendix I, 338 plant species in Appendix II and one species in Appendix III (CITES 2005). Timber species listed in Appendix II include *Swietenia macrophylla*, *Guaiacum officinale* and *Tachigali versicolor*; *Cedrela odorata* is the sole listing in Appendix III.

Protective measures in production forests. Timber licences are not granted in critical watershed

protection areas and on steep slopes (government of Colombia 1999). There are no specific provisions for RIL.

Extent of protected areas. Colombia has 49 forest protected areas (national parks, nature reserves, sanctuaries for flora and fauna, and one unique natural area, *Unica Area Natural*), covering 10.3 million hectares; there are no data on connectivity^a. Under Law 2 of 1959, seven zones of forest reserves have been set up for sustainable management and for watershed and biodiversity protection. Today, these areas cover 53.6 million hectares, including 38.2 million hectares in the Amazon Basin (CONIF 2004).

According to UNEP-WCMC (2004), 8.86 million hectares of forest are in protected areas conforming to IUCN protected-area categories I-IV, of which more than 5 million hectares are lowland evergreen rainforest. The integrity of protected areas is threatened, however, by a lack of control, guerrilla activities and drug trafficking^c.

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

Socioeconomic aspects

Economic aspects. When including downstream industries (manufacture of pulp, paper, cardboard, processed wood and furniture), the contribution of the forest sector to GDP is 1.8% (CONIF 2004). The trade balance in forest products is negative because of the import of pulp and paper, although the gap declined from US\$280 million in the 1990s to US\$39 million in 2001 and 2002. It is estimated that the forestry sector provides employment to 54,000 people, comprising 24,000 in forest industry and 30,000 in reforestation^a.

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
8,860	8,860	312	n.d.	n.d.

Livelihood values. It is estimated that more than 2,000 plants are used by local communities for medicinal purposes. Domestication of wild animals (*zoocría*) is another important economic activity, including species as different as crocodiles and butterflies. The gathering of ornamental plants, particularly orchids, is important in the low-level cloud forest and contributes locally to livelihoods. Illegal coca production and trade remain financially the most attractive economic activities for many colonists living in the Amazon and Orinoco basins.

Social relations. The main forest zones of the country are inhabited nearly exclusively by indigenous communities or Afro-Colombian communities (*Chocó*). Their traditional lifestyles are closely linked to the use of forest resources through shifting cultivation and the gathering of forest products, including hunting and fishing. The constitution of 1991 and laws 99 and 70 of 1993 recognize this and make specific reference to such traditional forest uses. There are conflicts over timber resources and illegal crops between local forest-users and the armed forces of different factions.

Summary

The overall forest management situation in Colombia is not clear. On the one hand, advances have been made at the policy level in the priority activities identified under ITTO's Objective 2000, including the approval of a forest policy, new forestry legislation and the formulation of forest management plans. Forests are administered within the wider context of environmental management, and existing policy goals emphasize protection and conservation functions as well as forest restoration and forest land rehabilitation. However, there is as yet no clear designation of the PFE and inadequate control of forest resources on the ground, in particular in the Amazon region; nor are silvicultural methods applied in natural production forests.

Key points

- Colombia has a rich and largely unexploited forest resource in the Amazon Basin.
- Indigenous communities own 22.1 million hectares of forest, mostly in the Amazon, and Afro-Colombians about 5.4 million hectares, mainly in the Pacific region.
- The PFE is estimated to be 14.5 million hectares – although this has not been designated officially – of which 5.65 million hectares is production PFE and 8.86 million hectares protection PFE.
- The estimated area of natural-forest production PFE under SFM is at least 200,000 hectares. Little information is available on the status of forest management in the protection PFE.
- There is a well-established and well-developed program to establish planted forests. A new forest law awaiting presidential approval would promote an increase in plantations to about 1.5 million hectares.
- There is a lack of forest law enforcement and transparency in the application of laws that deal with forest management. Because of armed conflict, there is little long-term management of or control over resources.
- No specific standards have been established for large-scale production forestry and there are no concession policies.
- However, the new forest law awaiting presidential approval seeks to make major reforms to the management of natural forests.
- National institutions appear to be under-resourced and unable to maintain an effective presence in the field.
- There is a well-established protected area system and a well-established system to monitor biodiversity.
- The wider role of forests in providing environmental services is recognized.

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- ^c Information derived from the report of, and discussions with participants at, a training workshop on ITTO criteria and indicators, held 11–14 February 2003, Rio Negro, Colombia, attended by 45 people from government, civil society and the private sector.
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*For legend see page 58

Forest resources

Ecuador has a land area of 27.7 million hectares and a population of 12.6 million people, and comprises four main biogeographical zones: the Andean mountains (*sierra*); the Pacific coast; the Amazon Basin; and, 1,000 km from the coast in the Pacific Ocean, the Galapagos Islands. Estimates of forest area include 11.4 million hectares (MAE 2000), 10.6 million hectares (FAO 2005) and 8.4 million hectares^c. According to the Ministry of Environment (*Ministerio del Ambiente* – MAE) (2000), there are about 6.98 million hectares of forest in the Amazon, 2.52 million hectares on the wet Andean mountain slopes and 1.95 million hectares in a few remote areas of the Pacific coastal region. The native forest on the Pacific coast is mostly of low crown density and is generally heavily degraded. Intact forest areas are found in the easternmost part of the country (*oriente*).

Forest types. Four major forest types occur at altitudes of up to 2,800 m:

- Amazon rainforest;
- rainforests in the northwest (mainly in Esmeraldas province). Rainfall increases with altitude, ranging from 1,500–3,000 mm at sea level to 6,000 mm and more at 800 m. The most common commercial species are *Protium* and *Dacryodes* spp, Laureaceae, *Brosimum utile*, *Inga* spp, *Pourouma chocoana* and *Ceiba pentandra* (kapok);
- mixed forests of the Andes, on the western and eastern slopes, at lower and upper levels, and towards the Andean high peaks. These include cloud forests; and
- dry forests along the central and southern coast, with *Cordia alliodora*, *Pseudosamanea guachapele*, *Tabebuia* spp and various Bombacaceae (*Ceiba* and *Bombax* spp, and balsa – *Ochroma lagopus*).

Slightly degraded primary forests cover about 3 million hectares, whereas secondary forests and scrublands (*matorrales*) together cover about 4 million hectares^c. Most of the secondary forests are in the Pacific coast region.

Dynamics of forest resource change. FAO (2005) estimated the annual deforestation rate over the years 1990–2000 to be about 137,000 hectares. Deforestation is highest in the dry forest area in the southern coastal region. The cause is mainly conversion – both regulated and unregulated – to agricultural land. Uncontrolled forest fires are a major threat, particularly on the Pacific coast; landslides in mountain regions are also common after heavy rainfall.

Permanent forest estate. Most of Ecuador's forests are owned by communities or privately (see 'forest tenure'). Although most do not yet have land titles,

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			Total
		Production		Protection	
		Natural	Planted		
8.40–11.4	10,854	3,100 ^d	164	4,300 ^d	7,564

the area of forest that might be considered PFE is about 7.56 million hectares (MAE 2000), of which only 600,000 hectares are currently considered economically harvestable due to steep slopes in mountainous terrain, low timber density, difficulty of access and social constraints. All forests classified in the national system of protected areas (*Sistema Nacional de Áreas Protegidas – SNAP*) are considered to be in the protection PFE.

Planted forests. The total area of planted forest in 2002 was about 164,000 hectares^b, of which 80% is eucalypt and pine plantations in the Andes; the remaining 20% is mainly in the coastal region (^c, MAE 2000), including stands of balsa.

Institutional arrangements

Forest tenure. The Ecuadorian Strategy for Forest Sustainable Development (2000; *Estrategia para el Desarrollo Forestal Sostenible*) includes legal provisions to allocate forests to indigenous communities, farmers and other groups already in possession of forest lands on the condition that they guarantee the sustainable management and conservation of the allocated forests. Recently, about 4.5 million hectares of potential production forests were allocated to indigenous communities (ancestral indigenous or Afro-Ecuadorian)^b; these are treated as privately owned. The remaining PFE is mostly in farmers' plots, which generally range in size between 30 and 60 hectares; the process by which these farmers might be granted land tenure still needs to be clarified^b.

SFM policy framework. Ecuador has recently developed its own set of C&I for SFM based on those of ITTO. In 2000, the (1981) forest law (*Ley 74 RO/64 de 4 Agosto de 1981 sobre Ley Forestal y de Conservación de Áreas Naturales y Vida Silvestre*) was revised and a forest policy was formulated that aimed to reduce deforestation and ensure SFM. The law now contains five criteria for SFM: (i) sustainable timber production; (ii) the maintenance of forest cover; (iii) the conservation of biodiversity; (iv) co-responsibility in management; and (v) the reduction of negative social and environmental impacts. The five criteria are accompanied by 33 indicators, which are now being applied but are subject to further evaluation^c.

Forest policy and legislation. Over the past ten years or so, Ecuador has formulated various action plans and policies with the overall aim of promoting the sustainable management of its forest resources. This process has included the formulation of a Forestry Action Plan (1991–1995), a new forest policy (1995), the formulation of strategic goals for national forest actions and a strategy for sustainable forest development in Ecuador (2000), the approval of a law on environmental management (1999), and the formulation of an environmental strategy for sustainable development (2000). The last of these included a number of substantial reforms in the application of the forest law; consequently, Decree 346 was enacted in April 2000 which recognizes that natural forests are highly vulnerable and all interventions should be carried out according to the above-mentioned five SFM criteria.

In 2001, MAE worked with relevant stakeholders representing the private sector and civil society to develop a system of independent monitoring of the forest control system. A forest control entity called *Vigilancia Verde* was created with the overall task of supervising the flow of forest products from the forest to the marketplace, and the *Regencia Forestal* was created to increase the transparency of *Vigilancia Verde*, to provide technical assistance and support law enforcement in forest operations, and to oversee the implementation of the C&I in the management of the forests. In 2002, SGS received a mandate to carry out an independent audit of the new forestry control system under the *Regencia Forestal*. At the end of 2003, however, the Supreme Court of Ecuador declared that the entire control system was incompatible with the country's constitution. As of November 2004, the contractual terms between MAE and SGS were being renegotiated.

Late in 2003, Ecuador launched a process to formulate a national forest and reforestation program with the overall aim of reviving the forest sector and broadening its stakeholder base.

Institutions involved in forests. In early 1999, the Ecuadorian Institute for Forestry, Natural Areas and Wildlife (*Instituto Ecuatoriano Forestal y de Áreas Naturales y Vida Silvestre*) was integrated into the National Directorate of Forests (*Dirección Nacional Forestal*) under MAE – now the sole governing body

Table 2 Some commonly harvested species for industrial roundwood (2001–2003)^c

Timber species	Remarks
<i>Brosimum utile</i> (sande)	Main natural forest species from the Pacific region
<i>Cordia alliodora</i> (laurel)	From forests, secondary forests, pastures and plantations
<i>Cedrela odorata</i> (cedro)	Primary and secondary forests from the Amazonian and Pacific regions
<i>Alnus acuminata</i> (aliso)	In mountainous regions
<i>Humiriastrum procerum</i> (chanul)	From natural forests in the northeast of Ecuador

of the forestry sector. MAE has restructured and modernized the forestry administration in an attempt to decentralize by forming regional centres that have some autonomy in operation and financial control. These centres are, in turn, intended to involve the civil population in planning and decision-making. However, the division of responsibilities between the national and regional levels remains vague and the results of this restructuring are largely unsatisfactory^b.

Both national and international environmental NGOs are very visible in Ecuador. They implement projects in natural resource protection and management and also have an important advocacy role in issues of environmental policy. Forest-owners and timber industries are organized in associations (AIMA, ASOTECA and others). They play an active part in policy-making and forest development.

Status of forest management

Forest for production

There is no coordinated approach to natural forest management in Ecuador; many potential management techniques have not yet been put into practice. There are, however, many examples of management-related activities, including: timber inventories, a system of logging concessions (now dormant), and a continuing program of selection and declaration of protected areas (SNAP), of which a few receive at least some protection and management.

Before 1980, several licensed logging concessions operated in defined areas with defined annual yields. The legal and practical provisions were similar to those operating in many other countries and, as elsewhere, there were serious difficulties of control,

supervision and protection. Due to uncontrolled land reform and subsequent pressure from squatters, concessionaires were forced to withdraw from concessions in the early 1980s and effectively abandoned the use of such agreements as a tool of forest management. Ecuador now uses a system of short-term logging licences which, in addition to its impact on the quality and efficiency of logging operations, has encouraged foresters to consider other ways of ensuring future long-term supplies of timber, particularly through agroforestry. There is strong pressure on the resource from informal and illegal operators who resist regulations they see as unrealistic, and illegal logging is widespread; it may constitute as much as 50–70% of total production^b. SFM is a long way from being achieved in most of Ecuador's PFE: "the forest stock of Ecuador, in view of its importance for national development, has been exploited irrationally. The forest sector presents a picture giving evidence of a clear failure in sustainability" (MAE 2000).

Most timber-harvesting today is done on indigenous and small-farmer community lands and private lands. Legal harvesting is carried out under three kinds of permit: (i) cutting permits (the great majority); (ii) areas harvested according to simplified forest management plans (PAFSIs), which mainly involve non-mechanized extraction; and (iii) areas with integrated management and sustainable management areas (PAFSUs), which are bigger and suitable for industrial harvesting; however, no PAFSUs have been established in the field. More than 1,000 cutting permits were issued in 2003, varying in size from less than one hectare to more than 150, with allowable cuts ranging from less than 5 m³ to more than 2,000 m³ ^c.

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

Total	Natural			Planted		
	Allocated to concessions/ under licence	With management plans	Sustainably managed	With management plans	Certified	Certified
3,100	n.d.	65	101	65	0	21.3*

* T
(20,000 hectares)

Silviculture and species selection. About 120 timber species are used in the domestic market. The prime species harvested in the past include *Swietenia macrophylla* (mara), *Cedrela odorata* (cedro) and *Anacardium excelsum* (marañón), but these have become scarce. Today, 80% of the harvesting volumes from native forests come from about 25 species^c. Besides those listed in Table 2, the more important species are *Virola*, *Otoba glycyarpa* (sangre de gallina), *Cedrelinga catenaeformis* (chuncho), *Podocarpus* spp and *Prumnopitys* spp (romerillo, azucena) from the southeastern forests, and *Trattinnickia glaziovii* (copal).

Planted forest and trees outside the forest. It is estimated that about 1 million hectares of forest land are suitable for forest plantations^b; however, so far there is no firm plan to effectively support an increase in the forest plantation area. The main planted forest species include pines and eucalypts, as well as *Cordia alliodora* (laurel), *Schizolobium parahybum* (pachao) and *Tectona grandis* (teak, teca) in lowland areas and *Alnus acuminata* (aliso) in the mountains. A private company (Durini Group) owns more than 20,000 hectares of plantations. The group established long-rotation plantations (eg with *Cordia alliodora* and *Jacaranda copaia*) in harvested forest plots and has managed these forests for more than 20 years. Balsa, a major export timber from natural forests, is planted today on a limited scale.

Forest certification. Certification is an emerging topic in Ecuador, promoted by NGOs, private enterprises and communities. A first project involving Afro-Ecuadorian communities near Esmeraldas did not succeed. In 2000, the indigenous community, Awa, on the border with Colombia, initiated a

certification process with FSC covering 2,000 hectares, but this was not successful either^c.

The Durini Group, the principal investor in forestry, is engaged with FSC in certifying 10,900 hectares of natural forests; the same group owns 16,220 hectares of certified planted and semi-natural forest (FSC: 9,220 hectares, ISO 14001: 7,000 hectares). Currently, 21,341 hectares are certified under the FSC umbrella (FSC 2005).

Estimate of the area of forest sustainably managed for production. The estimated area of natural-forest production PFE under SFM is at least 101,000 hectares (Table 3); this area includes forests currently in the process of becoming certified as well as some 37 FMUs considered to be sustainably managed^c. The latter areas include private forest lots and planted and natural forests in the *sierra* managed by communities.

Timber production and trade. Total production of logs for industrial purposes was 1.24 million m³ in 2003, down from 1.44 million m³ in 2000. Total sawnwood production was an estimated 52,000 m³, up from 36,000 m³ in 2000. Ecuador exported 11,000 m³ of logs in 2003, down from about 91,000 m³ in 2000. Plywood exports were 70,000 m³ in 2003 (ITTO 2005).

Non-wood forest products. A number of NWFPs are important, in particular fibres; bamboo (*Guadua*); latex; gum; palm products, particularly palm hearts; and medical plants. Tagua or vegetable ivory (seed of the palm *Phytelephas macrocarpa*) is used commercially in handicrafts, as are fibres of *Bactris gasipaes* and *Carludovica palmata* (paja toquilla). A number of ecotourism centres, mostly in the Amazon, attract international visitors.

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
4,300	1,790	2,450*	513	n.d.

* Designated for protection under SNAP but timber production is not excluded

Forest for protection

Soil and water. Protection forest lands include all present, former and potential forest lands that are of special importance for the protection of soil or water resources or for preventing erosion or flooding. They include state land as well as privately owned or occupied land on steep slopes or water catchments and other areas unsuitable for agriculture or livestock production. These areas are distributed in many parts of the country and vary greatly in size and importance; in total they amount to about 2.45 million hectares (Egas 2003).

Biological diversity. Ecuador has a wide range of ecosystems and is considered a mega-biodiverse country. It has more than 16,000 plant species from 273 families, including more than 1,200 ferns and 3,200 orchids. There are 369 native mammals, 1,616 birds, 394 reptiles and 415 amphibians. Thirty-five mammals, 79 birds, eleven reptiles, 163 amphibians and 1,832 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 13 mammals, 65 birds, 145 reptiles and 1,162 plants are found in forests (IUCN 2004). Eleven plants are listed in CITES Appendix I and 1,293 in Appendix II (CITES 2005).

Extent of protected areas. Protected areas on the Ecuador mainland amount to 4.67 million hectares (18% of the total land area), distributed in 31 different legal categories (national parks, biological reserves, ecological reserves, geo-botanical reserves, bird reserves, wildlife reserves, etc). In addition, the biological reserve of the Galapagos Islands covers 14.1 million hectares of land and marine ecosystems. According to UNEP-WCMC (2004), 1.79 million hectares of forest are in protected areas conforming to IUCN protected-area categories I-IV, including 1.55 million hectares of lowland evergreen broad-leaved rainforest. However, some areas that have been officially declared as protection forests are claimed by indigenous communities and colonists.

Estimate of the area of forest sustainably managed for protection. Little information was available for this report on the quality of management in the protection PFE (Table 4). Up to 500,000 hectares are reportedly covered by management plans^c. Management plans have been prepared (under an ITTO project) for two small reserves (totalling 13,000 hectares) and are now starting to be implemented.

Socioeconomic aspects

Economic aspects. Forest-based activities contribute around 2% of GDP^b. However, data are quite unreliable due to the high level of informality in the forest sector. The forest and timber industry is characterized by a high number of small timber extractors and wood-processing units with low capital input and by poor working conditions; it has difficulty delivering high-quality processed products. It is estimated that there are more than 500 units of active extractors and timber companies, most of them producing less than 2,000 m³ annually. An estimated 235,000 people are in employment linked to forestry and timber industries, which is 8% of the country's active economic population^b.

Livelihood values. Forests have great value for local forest dwellers, with hunting and fishing the most important activities. Forests are also considered as a land reserve and are converted for subsistence agriculture.

Social relations. Illegal harvesting is widespread^b and illicit crops are found in certain forest areas. Forest tenure remains a significant problem and there are many conflicts between communities, government and the private sector. The legal system has not yet been able to resolve such issues, to the extent that signed contracts between the forest industry and the communities may remain unfulfilled for many years^b.

Summary

SFM is a long way from being achieved in most of Ecuador's PFE. National forestry institutions remain weak. One reason for this is that there has been no organizational or staffing continuity in the ministry responsible for forests, MAE, and also a lack of clarity in the decentralization process. On the positive side there is a declared political willingness to designate state forests to communes, indigenous communities, settlers and other interested groups if they can prove that they have the capacity to manage and conserve forest resources. Nevertheless, there is little sign of consistent progress towards SFM.

Key points

- Information on the forest sector is quite often poor and contradictory.
- The PFE is estimated to be 7.56 million hectares, of which 3.26 million hectares (including 164,000 hectares of plantations) may be regarded as production PFE.
- At least 101,000 hectares of natural forest in the production PFE are under SFM. Insufficient information was available for an estimate to be made of the extent of protection PFE so managed.
- Native forests are under threat mainly because of the expansion of the agricultural frontier near the coast and in the Amazon area.
- There is strong pressure on the forest from informal and illegal operators resisting change towards SFM, and illegal logging is widespread in all three forest regions.
- Many accessible forests are now degraded and secondary.
- The capacity to implement the national forest program and other forest-related policies and laws is low.
- In many cases, and despite new legislative provisions, forest tenure remains unclear.
- There is a discrepancy between actual harvesting practices and forestry regulations. Harvesting is generally unsustainable, and legal provisions for harvesting operations are unrealistic and may push forest-users towards illegality.

- Institutional weaknesses have created bureaucracy and additional costs, which have been transferred to the private sector. High transaction costs stimulate informality and corruption and increase timber volumes from illegal sources.
- The effective management of protected forests is inhibited by a lack of funding, a lack of sufficient political support to the forest sector and, in some areas, disputes over tenure.

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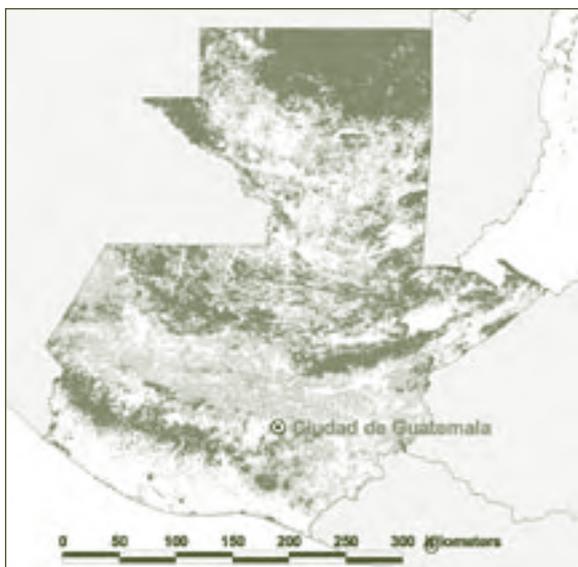
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GUATEMALA



*For legend see page 58

Forest resources

With a population of 12.4 million people and a land area of 10.9 million hectares, Guatemala has the lowest forest area per capita in Central America after El Salvador. The country can be divided into three main biogeographical regions. The first, where most of the population lives, comprises highlands made up of several mountain chains stretching from the border with Mexico southwards to the border with Honduras. The highest peaks are steep volcanic cones reaching more than 4,000 m above sea level; the country's main conifer forests are found here. The second is the Pacific plain, stretching along the Pacific coast, which is characterized by rich volcanic soils. Once covered with tropical moist forest and natural grassland, this region is now mainly developed into sugar, banana and rubber tree plantations, and cattle ranches. The third, the Petén, is a flat, low-lying region situated in the north bordering Mexico

and Belize. This is mainly a limestone plateau covered with dense moist tropical forests, swamps and grasslands, and features the ruins of ancient Mayan cities. Estimates of total forest area include 2.85 million hectares (FAO 2005a) and 4.29 million hectares^a, the latter (for 2002) based on the analysis of satellite imagery.

Forest types. Four major forest types can be distinguished:

- tropical hardwood forests (*bosque latifoliado*): more than 300 tree species have so far been identified, but two genera, *Dialium* and *Brosimum*, dominate;
- closed pine forests in the highlands (*bosque de pino denso*): the most commercially important species is *Pinus oocarpa*;
- mixed hardwood and pine forests (*bosque mixto*) covering about 450,000 hectares, composed of two main tree associations: pine-oak and pine-liquidambar (*Liquidambar styraciflua*). *Cupressus lusitanica* (cypress) is also found in these forests; and
- relicts of mangrove forests (*bosque de manglar*) covering about 17,000 hectares on the Pacific coast^a.

Dynamics of forest resource change. The average annual deforestation rate in 1990–2000 was an estimated 54,000 hectares, or 1.7% of the forest area (FAO 2005a). There has been deforestation in the conifer forests of the highlands for centuries, but today it mostly takes place in the Petén, which was an intact and inaccessible forest area up to the 1960s. Large-scale deforestation started there in the 1970s as a result of a land colonization program initiated by the government and accelerated in the 1980s when entire villages of indigenous people

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			
		Production		Protection	Total
		Natural	Planted		
2.85–4.29	2,824	1,140 ^d	71 ^a	1,240 ^d	2,451

sought refuge from the country's civil war. An estimated 78% of the deforestation in the Petén is caused by shifting cultivation, the remainder by cattle ranching^a. The country has about one million hectares of secondary forests (*bosques secundarios, arbustales*).

Uncontrolled forest fires occur regularly at the end of the drier seasons in the conifer forests and the tropical hardwood forests, causing local damage to forest stands that have already been opened up. Uncontrolled fires damaged over 60,000 hectares of forest in 2003^a. About 4,000 hectares of conifer forests are affected by insect infestations that followed previous fires^a.

Permanent forest estate. Twenty-two per cent of the country's land area (2.36 million hectares) is covered by forests with an integrated land-use plan^a. The estimated total area of natural-forest PFE is 2.38 million hectares^a (Table 1), which can be subdivided into 1.14 million hectares of production forest and 1.24 million hectares of protection forest^{c,d}. The distribution of the PFE by forest type is as follows: tropical hardwood forest – 1.7 million hectares; conifer forest – 50,000 hectares; mixed hardwood and pine forest – 130,000 hectares; and open woodlands and secondary forests – 500,000 hectares^c.

Planted forests. In 2003, there were an estimated 71,000 hectares of planted forest in Guatemala, mainly of local pine species^a. About 3 million hectares of non-forested land are considered suitable for tree-planting^a.

Institutional arrangements

Forest tenure. Forest ownership may be public or private; public is divided into national (federal government), local government or municipal and communal. An estimated 38% (1.5 million hectares) are privately owned, 34% (1.4 million hectares) are national forests and about 930,000 hectares are municipally/communally owned. Indigenous communal lands (*ejidales*) have special status by law. Because of the civil war (which ended formally in 1996), the ownership of about 210,000 hectares is obscure – more than one million people were displaced from their traditional lands in the 1980s and 1990s. Moreover, the complicated system of land tenure has led to many overlapping rights.

As a result, despite recent efforts the problems of insecurity of land tenure and ownership remain critical for the rural poor.

SFM policy framework. Guatemala is actively involved in the Lepaterique C&I process of Central American countries. Since 2001, the country has been making a major effort to test and adopt FSC standards as a binding instrument for monitoring forest management. The country is also considering adapting the ITTO C&I as an instrument to monitor progress towards SFM at the national level^c.

Forest policy and legislation. The present forest law (October 1996, Decree 101-96) emphasizes the importance of reforestation and forest conservation and makes reference to SFM. The ministry in charge of rural development until 2000 (*Ministerio de Agricultura, Ganadería y Alimentación – MAGA*) established an environmental policy in 1998, identifying sustainable development as its primary goal. A new forest policy was formulated in 1999; this promotes the concept of productive management of natural forests (*fomento al manejo productivo de bosques naturales*), with the aim of making natural forests a main feature of economic development in order to conserve biodiversity and improve the living conditions of forest-dependent populations. This aim was to be achieved by intensive silvicultural management to increase the quality and quantity of timber and NWFPs. The policy also makes specific reference to restoration and rehabilitation as major elements of forest development. Based on this new policy, a strategic plan was developed that includes new financial mechanisms, such as incentive payments for reforestation, the Clean Development Mechanism and payments for environmental services, particularly water. A national biodiversity strategy was formulated between 1995 and 1999; it regulates *in situ* and *ex situ* conservation and includes long-term planning and management directives for protected areas. The Law on Protected Areas of February 1989, amended in 1996 and 1997, regulates the system of protected areas known as SIGAP (*Sistema Guatemalteco de Areas Protegidas*). A national strategy for the conservation and sustainable use of biodiversity was also approved in 1999.

Institutions involved in forests. Through a congressional decree approved in December 2000 (Decree 90-2000), the Ministry for Environment

and Natural Resources (*Ministerio de Ambiente y Recursos Naturales* – MARN) shares authority over natural resources with MAGA, but the relative responsibilities of the two ministries for forest management are not clear. The National Forest Institute (*Instituto Nacional de Bosques* – INAB), created in 1996 out of the former forest service as an independent and decentralized state agency, is responsible for developing SFM in natural forests and for the establishment and management of planted forests. The latter is supported through a national incentive program (*Programa de Incentivos Forestales* – PINFOR) that by the end of 2004 had generated more than US\$50 million for forest development activities^c. INAB is also responsible for forest inventories and the preparation of forest management plans in both planted and natural forests. INAB is supervised by a national council (*Junta Directiva del INAB*) that comprises representatives of MAGA, the private sector and civil society and the national association of municipalities. The National Council of Protected Areas (*Consejo Nacional de Areas Protegidas* – CONAP), established under MARN in 1989, is responsible for the management of protected areas. CONAP is also in charge of the overall management of natural forests, and in particular of the Maya Biosphere Reserve, the largest tract of closed moist tropical forest in Guatemala, and the biosphere reserve of *Sierra de las Minas*. CONAP's tasks include the delivery and supervision of long-term community and industrial concessions. In the mid 1990s, CONAP established a new system of community concessions as an incentive for SFM in multiple-use zones in the Petén. Some of the communities that became involved in forest management under this novel concept have managed, with international support, to certify their forest operations.

The process of decentralization is recent and an expression of national reconciliation after the civil war. Each national institution has its own criteria for decentralization. By the end of 2004, a total of 105 municipal forest offices had been established^c. Municipalities are required to create environmental offices and are encouraged to conduct reforestation projects; municipalities can keep 50% of the revenues from concessions and harvesting licences (Ferroukhi 2003).

Guatemala contains 24 ethnic groups; more than two-thirds of the population is of indigenous descent and 61% is rural. There is a long tradition of forest conservation, particularly in the highlands. Local institutions are in charge of forest administration, and a village council generally deals with forest-related issues. However, such local institutions, communities and local NGOs have long been excluded from forest management, except for a few cases in the Petén. Since the end of the civil war there has been some participation in the classification and management of protected areas through national and regional roundtables (*mesas de diálogo*) and in forest development through consultation roundtables convened by INAB together with the National Forest Program Unit. An association of NGOs (*Asociación Nacional de Recursos Naturales y Medio Ambiente*) participates in the supervisory committee of INAB and in the consultative groups of MARN and CONAP.

Status of forest management

Forest for production

The forest law of 1996 made the preparation of forest management plans compulsory for long-term forest users. The management plan itself, however, is in many cases only an improved timber harvesting plan and often does not prescribe any silvicultural prescriptions or measures to conserve biodiversity. To improve the situation, INAB has adopted a methodology prepared by the former Regional Forest Program for Central America (PROCAFOR) and the Tropical Research and Higher Education Centre (*Centro Agronómico Tropical de Investigación y Enseñanza* – CATIE). The method includes the preparation of 'simplified management plans for hardwood forests' and 'forest management plans for conifer forests in Central America'.

The two main forest types harvested over the past century are the conifer forests and the mixed pine/hardwood forests of subtropical areas. Today, the greatest production potential is in the tropical hardwood forests and in secondary forests.

In 2003, a total area of 697,000 hectares in the PFE was covered by management plans, 483,000 hectares in tropical hardwood forests, 172,000 hectares in mixed forests and 37,200 in pine forests^a.

Table 2 Some commonly harvested hardwood species for industrial roundwood^{c,*}

Timber species	Remarks
<i>Swietenia macrophylla</i> (caoba)	15% of export volume in sawnwood and 40% of total export value in 2003
<i>Lonchocarpus castilloi</i> (manchiche)	Mainly for domestic uses
<i>Calophyllum brasiliense</i> (santa maria)	Mainly for domestic uses
<i>Bucida buceras</i> (pucte)	Increasingly exported as a new species for flooring and parqueting

* Tropical hardwood species only; overall, the most important group of commercial timbers in Guatemala is *Pinus* spp

Since 1998, forest concessions have been granted to communities, who manage for both timber and NWFPs. At the beginning of 2004, twelve community concessions and two industrial concessions had been granted, all of them located in the Petén^a. The total area under forest concessions was 463,423 hectares, most of them community based; the smallest concession was 4,149 hectares and the largest 83,558, and the two industrial concessions were 64,869 hectares and 66,548 hectares in size^a. Forest concessions are managed according to a polycyclic silvicultural system with a 40-year rotation^a. All concessions are required by law to obtain certification under the FSC scheme within three years of establishment.

The most serious problem in forest management is small-scale illegal logging of single trees over wide areas. In the tropical hardwood forests, *Swietenia macrophylla* (caoba) and the various species of *Cedrela* are the species most targeted by illegal logging. In the highlands, illegal logging threatens in particular *Abies guatemalensis* (pinabete) and cypress.

Silviculture and species selection. Of the 424 known indigenous tree species, 320 are considered to have some use^a; about 25 species are traded. The main traditional commercial species in the mountainous areas are pines (*Pinus oocarpa*, *P. pseudostrobus*, *P. maxiinoi*), cypress and *Quercus* spp (roble). Caoba and *Cedrela odorata* (cedro) are the main commercial species in the hardwood forests of the Petén; despite heavy logging over the past 60 years or so, both species occur in abundance in all forest layers and cannot be considered threatened^c. The two species constitute the main valuable species for the majority of the certified FMUs^c. FMUs are

closely monitoring regeneration of the two main species and are promoting enrichment planting after harvesting, particularly with caoba. The minimum cutting diameter for caoba and cedro is 60 cm (55 cm in certain FMUs); for other species it is 45 cm.

Planted forest and trees outside the forest.

Relatively small areas of tree plantations are scattered throughout the country; these are often established without a clear purpose^c. Four conifer species (*P. caribaea*, *P. maximinoi*, *P. oocarpa* and *C. lusitanica*) and two broadleaved species (*Tectona grandis* (teak, teca) – 4,000 hectares, and *Gmelina arborea*) make up 70% of existing plantations. *Hevea brasiliensis* is planted for both rubber and timber. Some 18,400 hectares of new plantations were established between 1997 and 2002, mainly through an incentive program for private investors and communities, with an emphasis on teak plantations and agroforests. The present reforestation policy aims to establish another 240,000 hectares of plantation between 2003 and 2016.

Forest certification. The National Council of Sustainable Forest Management Standards (*Consejo Nacional de Estándares de Manejo Forestal Sostenible*) has developed national certification standards for both natural and planted forests. Since December 2003, these standards have been tested at the national level and were expected to be widely implemented by 2005. With international support, a considerable effort has been made to certify forests in the PFE. As of December 2005, 15 FMUs covering a total area of 522,870 hectares had been certified by SmartWood or SGS according to FSC standards (FSC 2005). Of these, 520,410 hectares were in natural forests and 7,566 hectares

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

Total	Natural				Planted		
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
1,140	540	697	520	672 ^d	71	25	7.57

in plantations; most are located in the Maya Biosphere Reserve in the Petén. After Bolivia and Brazil, Guatemala has the largest extent of FSC-certified forests in the tropics.

Estimate of the area of forest sustainably managed for production. About 700,000 hectares of the production PFE are subject to some sort of management, of which an estimated 265,000 hectares are conifer and mixed forests, both natural and planted, outside the moist tropical forest zone. Assessments of the management of community forest concessions indicate that forest management has improved there^c. At least 672,000 hectares of natural-forest production PFE are considered to be under SFM, composed of the certified forest concessions in the Petén and natural pine forests managed according to defined management principles^d. Table 3 summarizes the forest areas managed for production purposes.

Timber production and trade. Total roundwood production in 2002 was an estimated 16.1 million m³, up from 14.7 million m³ in 1999 (FAO 2005b). Total industrial roundwood production in 2003 was an estimated 492,000 m³, of which 392,000 m³ was coniferous. Total sawnwood production was 200,000 m³ (including about 160,000 m³ of conifers); veneer and plywood production each amounted to about 20,000 m³ in 2003 (ITTO 2005). Some of the sawnwood and most of the veneer and plywood production is exported to other countries in Central America and the Caribbean and to North America, mostly as certified products. Firewood and charcoal are important products for the local market for cooking food and for generating energy for small artisanal industries (brick-making, molasses-making, lime-making, etc).

Non-wood forest products. Among the internationally tradable NWFPs are pine resin, pine seeds, copal (*Bursera bipinnata*, *Protium copal* and other species), xate leaves (from the *Chamaedorea* palm), *Pimenta dioica* (pimiento) and *Manilkara zapota* (chicle gum), a dominant tree in the primary forests of the Petén. Pine resin and copal are mainly produced in private forests and chicle, xate and pimiento in public forests^a. Another species used is *Quassia amara*, known as hombre grande, a natural biocide used in organic agriculture in the Petén.

Forest for protection

Soil and water. The system of protected areas in Guatemala, SIGAP, comprises nearly 950,000 hectares of special protection forests (*zonas de amortiguamiento*)^a. An estimated 184,000 hectares of forest land are managed primarily for soil and water protection^a.

Biological diversity. The forests of Guatemala are extremely rich in biodiversity and are characterized by flora and fauna representative of both temperate and tropical America. Ten mammals, eleven birds, eleven reptiles, 74 amphibians and 87 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, six mammals, ten birds, two reptiles, 74 amphibians and three plants are found in forests (IUCN 2004). Guatemala has listed six plant species in CITES Appendix I and 363 plant species, including *Abies guatemalensis*, in Appendix II (CITES 2005).

Protective measures in production forests. Concession-holders are required to, among other things, conserve seed trees, set aside areas from which tree-felling is excluded, make special provisions for biological corridors, regulate hunting, and conserve endangered plants and animals.

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
1,240	836	184	n.d.	n.d.

Extent of protected areas. Forty-seven (39%) of the 120 protected areas in Guatemala are interconnected^a. Legally protected areas that include forest and non-forest land cover 3.1 million hectares, or 28% of the national territory. Forty-three are smaller than 1,000 hectares and five are bigger than 100,000 hectares. According to Guatemala's 1999 forest resource assessment^a, about 2.26 million hectares of forests have some protected area status, as follows:

- conifer forests: 42,000 hectares;
- tropical hardwood forests: 1,820,000 hectares (including IUCN Category VI – multiple use);
- mixed conifer/hardwood forests: 140,000 hectares;
- mangrove forests: 4,000 hectares; and
- secondary forests/matorrales: 250,000 hectares.

Of these, about 45% are in IUCN Protected-area Category I (21 areas, 209,000 hectares), Category II (40 areas, 160,000 hectares) and Category III (seven areas, 102,000 hectares); they include national parks, biological reserves, protected biotopes, cultural monuments and wildlife sanctuaries. The estimate by UNEP-WCMC (2004) of the area of forest in protected areas conforming to IUCN protected-area categories differs, putting no hectares in Category I, 382,000 hectares in Category II, 453,000 hectares in Category III (including 119,000 of 'unclassified' forest), and 1,000 hectares in Category IV, for a total of 836,000 hectares in the four categories.

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

Socioeconomic aspects

Economic aspects. The forest sector contributed approximately 2.5% to GDP in 2003^a. In 2003, the forest sector directly employed an estimated 37,000 people^a.

Livelihood values. Hunting and the gathering of edible plants such as the fruits of chicle have been of great importance for the Mayan culture for centuries. Both indigenous communities and colonists in the tropical moist forest zone use forest products in their households; products include the fibres of bayal (*Desmoncus* spp) and palm leaves (*sabal*) for housing. In the highlands (the most populated areas), fuelwood from the forests is the most important source of energy.

Social relations. A specific program was launched in 2001 known as the communal forestry program (*Proyecto Fortalecimiento Forestal Municipal y Comunal – BOSCOM*) to counter pressure on natural resources and to provide work for the unemployed; it involves 102 municipalities that carry out reforestation and protection measures. The program also provides incentives for small-scale timber producers in forest management.

Summary

Forests play an important role in Guatemala. They provide a source of income and household products for many poor and a resource for the commercial timber sector. However, SFM has been hindered in the past by, among other things, a protracted civil war, and deforestation was widespread. As the lowland rainforests of the Petén are also opened up, the sector is attempting to improve forest management. Great strides are being made by both private operators and communities, to the extent that more than half the production PFE is now considered to be under SFM.

Key points

- The PFE comprises an estimated 1.14 million hectares of natural-forest production forest, 71,000 hectares of plantations and 1.24 million hectares of protection forest.
- At least 672,000 hectares of production PFE are estimated to be under SFM; insufficient data were available to estimate the area of protection PFE so managed.
- The system of protected areas and the monitoring of biodiversity have both been long established. However, information on the status of their management is lacking.
- A large part of the natural forest estate in the highlands has been over-harvested, and development is proceeding rapidly in the Petén.
- Enormous efforts have been made since the end of the civil war to reorganize the control and management of forest resources; this has included the decentralization of management and monitoring. But support for existing community forest management institutions remains weak.
- There is long-standing experience in the management of conifer forests. The recent implementation of a well-defined concession management policy in moist forest areas also constitutes a solid basis for SFM.
- Forest management certification has been widely introduced with the support of international donors in the community concessions in the Petén, but its long-term prospects will depend on its financial viability once donor support is withdrawn.

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GUYANA



*For legend see page 58

Forest resources

Located on the Atlantic seaboard in northeastern South America between Suriname and Venezuela, Guyana has a land area of 21.4 million hectares and a population of about 800,000 people. It has a very humid climate and can be divided into four biogeographical zones: (i) the narrow coastal plain, where 90% of the population lives and which is largely used for agriculture. It has a narrow fringe of mangroves; (ii) the so-called rolling hills, an extensive, forested area with sandy acid infertile soils reaching 90 m above sea level; (iii) a Precambrian lowland region of tropical rainforest; and (iv) the Pakaraima Mountains, a forested sandstone plateau along the borders with Venezuela and Brazil that stands between 1,000 and 1,200 m above sea level (reaching 2,740 m at Mt Roraima). Forest

cover is an estimated 16.9 million hectares, or 78% of the land area (FAO 2005).

Forest types. The major vegetation types are rainforest, seasonal forest, dry evergreen forest, marsh forest (including mangrove and swamp forest) and mountain forest. The composition of the forest changes considerably from north to south and reflects varied topographic and geological conditions. Rainforest is the most common type and the most important source of timber. Seasonal forests have a lower, more even canopy and include deciduous trees; they are found in the north Rupununi and upper Berbice areas. Dry evergreen forests occupy belts of leached white sands and are also found throughout the Pakaraima Mountains.

Dynamics of forest resource change. Most of Guyana's forests are still intact, unexploited and not threatened by the expansion of agriculture. The annual rate of deforestation is estimated variously to be 0.3% (49,000 hectares, FAO 2005) and less than 0.1%^b. Deforestation is mainly caused by semi-urban expansion and mining.

Permanent forest estate. About 13.6 million hectares have been classified as state forest and may be considered potential production forest. Of these, 5.8 million hectares are allocated to commercial use, 500,000 hectares to research and protection and 63,000 hectares are protected and outside the jurisdiction of the forest service. About 7 million hectares (56% of the state forest), mainly in the south of the country, have not yet been allocated to timber harvesting or other uses; a lack of ready access and long distances to market make the commercial harvesting of these forests economically infeasible at present.

Table 1 PFE*

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares) ^d			
		Production		Protection	Total
		Natural	Planted		
16.9	16,916	5,450	12	980**	6,442

* Amerindian lands are not included here as part of the PFE. A conservation concession area initiated with the support of Conservation International of about 300,000 hectares is included as part of the protection PFE

** Source: UNEP-WCMC (2004)

Planted forests. The estimated total area of planted forest is 12,000 hectares (FAO 2005). No significant reforestation activity is taking place.

Institutional arrangements

Forest tenure. Ownership of the PFE is vested in the state; the remainder of the forest comprises 'other state land', Amerindian land and private property. No Amerindian lands are considered part of the PFE, although many are surrounded by it. Nine indigenous (Amerindian) tribes (Akawaio, Arawak, Arekuna, Carib, Macusi, Patamona, Waiwai, Wapisiaana and Warao), with a total population of about 40,000, have legal title to approximately 1.4 million hectares of land, including forest.

SFM policy framework. Guyana was a participant in the development of the Tarapoto C&I under the Amazon Cooperation Treaty. In 2001, the Guyana Forestry Commission (GFC) reviewed both the Tarapoto and ITTO C&I in the development of a new national forest plan.

Forest policy and legislation. The current forest act was promulgated in 1953. The GFC drafted a new forest act in the late 1990s with technical assistance from the UK Department for International Development; this was approved by the Cabinet Subcommittee on Natural Resources but by late 2004 had not been passed by Parliament. The draft forest act provides the basis for control in state forest, assistance to hinterland communities, and the sound management of forest in Amerindian lands through the provision of advisory group services^b.

The national forest policy was formulated in an open and transparent way with extensive consultation with a wide range of stakeholders and approved in 1997. It is now accepted by all stakeholders as a sound guide for the forest sector as a whole. An ITTO diagnostic mission to Guyana in 2003 found that the national forest policy framework was both comprehensive and sensible, although it was predicated on mutually supportive approaches by government and industry which had not yet developed at the level required^b.

Institutions involved in forests. The president has direct responsibility for forestry, although the day-to-day administration is delegated to the Minister of Agriculture. The Office of the President is also

responsible for other matters related to the environment and natural resources (such as wildlife and protected areas). Two statutory bodies are responsible for coordinating developments in natural resources: (i) the Cabinet Sub-Committee on Natural Resources and Environment, which discusses all matters requiring policy decisions before they are presented to the full cabinet; and (ii) the Natural Resources and Environment Advisory Committee, which includes the heads of Forestry, Geology and Mines, Lands and Surveys, the Guyana Natural Resources Agency, the energy agencies, the Land-use Planning Unit, the Institute of Applied Sciences and Technology, the Hydro-meteorological Department, and the Environmental Protection Agency (EPA). The Presidential Adviser for Natural Resource Management is responsible for coordinating the work of the individual agencies involved in natural resources and the environment. The GFC Board of Directors has direct responsibility for formulating policy guidelines and planning frameworks for the development, use and management of forests.

The GFC, a semi-autonomous public agency, was created in 1979 to replace the Forest Department, which was set up in 1925. The GFC advises the minister on issues relating to forest policy, forest laws and regulations. Guided by the national forest plan, it has the legal mandate to manage and control the utilization of all state forest lands to ensure the optimal use and sustained yield of forest produce and the maintenance and improvement of the forest environment. The GFC also develops and monitors standards for forest-sector operations, develops and implements forest protection and conservation strategies, oversees forest research, and provides support and guidance to forest education and training. It is also involved in a number of initiatives to address emerging social issues in forestry.

The EPA, which was established in 1996, carries out environmental impact assessments on all major land-based developments; before any operation can commence in a forest concession, a company must submit an environmental impact assessment for approval by the EPA and the GFC. The GFC has also established an Environmental Monitoring Unit to monitor all environmental matters pertaining to forestry. The EPA delegates the routine monitoring of forestry developments to the GFC.

One forest producers' association and a number of smaller community-based loggers' associations represent loggers and sawmillers in the forestry sector and endeavour to ensure collaboration in activities such as training, information, public awareness and institutional development. National environmental NGOs are weak, but international environmental organizations are assuming independent roles in forest control and information-sharing, partly in collaboration with the forest administration.

Status of forest management

Forest for production

Current forest harvesting permits are allocated according to three categories based on area and length of contract. The categories are:

- timber sales agreements (TSAs): concessions are granted on a lease for 20 years or more over an area of 24,000 hectares or more. As of October 2004, 23 TSAs had been allocated to local and international companies covering an area of more than 4.0 million hectares (65% of all commercial allocations). The average size of a TSA is 176,000 hectares (ranging from 29,500 to 1.67 million hectares), and companies can hold more than one TSA at a time (Tropical Forest Foundation (TFF) pers. comm., October 2004);
- wood cutting leases (WCLs): licences are granted on 3–10-year leases theoretically for areas of 8,000–24,281 hectares, although a few of the actual WCLs exceed this. In October 2004, five licences were in existence covering a total area of about 327,500 hectares (ibid.) The average size of a WCL was therefore 65,500 hectares;
- state forest permits (SFPs): cutting permits are granted on an annual basis for areas of state forest up to 8,094 hectares in size. SFPs are generally issued to small-scale operators; 284 permits covering a total area of 1.33 million hectares were allocated in 2004 (21% of all commercial allocations) (ibid.). The average size of an SFP is about 4,600 hectares; and
- exploratory permits: before a WCL or a TSA is issued, a three-year exploratory period is granted in order to gather all the necessary information for the preparation of an investment proposal,

an environmental and social impact assessment, and a forest management plan; this requires an exploratory permit. The permit process has been developed to ensure transparency in concession allocation, that the proposed investment is in the national interest, and that the proposed investment is designed to achieve the maximum beneficial use of the forest resource. The permit does not convey the right to harvest or remove any forest produce or to construct roads, buildings or other infrastructure. Permission may be granted to fell and remove forest produce for research purposes only. In 2004, three exploratory permits covering an area of 376,728 hectares had been issued (ibid.). Exploratory permits are also prescribed in the draft forest act.

In 1998, the GFC introduced a Code of Practice for Timber Harvesting based on FAO's Model Code of Forest Practice; the code, which was revised in 2002, prescribes internationally accepted standards for exclusion areas and buffer zones, 100% pre-harvest inventory, road construction, felling, skidding, trucking, operational and camp hygiene, and occupational health and safety. Besides exclusion areas and buffer zones, the code also restricts logging on slopes greater than 40% and sets a minimum distance of 10 m between harvest trees to minimize the size of canopy openings. A log-tagging system to assist the monitoring of timber harvesting and reduce illegal cutting has been in effect since 1999. For the SFPs, a quota system has been put in place that is determined by the size and assumed stocking of the area. The GFC has also developed a draft code of practice for the harvesting of NWFPs.

The draft forest act prescribes the issue of forest concession agreements to replace TSAs and WCLs, and also allows 'forest concession agreements for conservation purposes' and 'use permits'. The former are designed to allow conservation organizations to pay an amount equivalent to that which would have been paid for commercial harvesting rights for the exclusion of timber harvesting from particular forest areas; the latter are designed to address matters such as the collection of orchids or ecotourism where a full concession agreement is not required.

Guyana's forests are characterized by a predominance of relatively slow-growing, high-density timber species and smaller trees than in most other tropical

Table 2 Some commonly harvested species for industrial roundwood*

Timber species	Remarks
<i>Catastemma commune</i> (baromalli)	38% of total log production in 1999–2000
<i>Eperua falcata</i> (wallaba)	Predominantly used for roundwood and splitwood products
<i>Chlorocardium rodiei</i> (greenheart)	20% of total log production
<i>Mora excelsa</i> (mora) and other <i>Mora</i> spp	5% of total log production
<i>Peltogyne venosa</i> (purpleheart)	9% of total production

* Source: TFF pers. comm., October 2004

regions due to the inherently low fertility of soils derived from the ancient Guiana Shield. Commercial timber occurs in spatially segregated ‘reefs’ or stands in which one or two commercial species are dominant. Nevertheless, a large proportion of the commercial stock in these stands is defective (hollow or crooked), possibly due to the poor nutrient availability of the soils and a very low rate of natural disturbance (which seems to have resulted in over-mature stands), and commercially viable stands are usually separated by stands that are nearly devoid of commercial species. Forest harvesting is, therefore, highly selective; on average, two to three trees are felled per hectare, with an average yield of about 7 m³. The national forest plan prescriptions allow up to 20 m³ per hectare to be harvested on a 60-year cycle, but few concessionaires take even half of this (TFF pers. comm., October 2004). Because of poor operational planning and poor matching of timber resources with markets, most companies re-enter logged-over areas before the end of the cutting cycle, particularly in the more easily accessible areas (ibid.).

Detailed forest management plans are not required for SFPs. The code of practice applies to TSAs and WCLs but is presently only mandatory for new concessions. Nevertheless, companies are being monitored for the implementation of its requirements and violations are reported. The new forest act, once adopted into law, will make the code mandatory for all forest concession areas. At present, few if any companies fully conform to the code, particularly where harvest restrictions (steep slopes, buffer zones, 10 m rule) are concerned, although a few companies conduct 100% pre-harvest forest inven-

tories and harvest planning (ibid.). Log-tagging appears to have been accepted by the industry and has increased the capability of the GFC to monitor timber transactions. RIL techniques are promoted by the ITTO-funded Forestry Training Centre, a subsidiary of GFC, through demonstration forests and hands-on training. This training program, which had trained some 90 forest operators by 2004, has been well received and has led to a growing acceptance and awareness of the GFC’s code of practice and RIL practices, and an increasing demand for RIL training. The Iwokrama International Centre for Rainforest Conservation and Development (known as the ‘Iwokrama forest’) is responsible for the management, conservation and sustainable development of 360,000 hectares of tropical rainforest, which the government of Guyana allocated as a way of demonstrating that tropical forests can provide economic benefits while also conserving biodiversity. Its operation has been supported by a range of donors, including ITTO.

The lack of security associated with logging permits discourages investments in SFM. These arrangements provide little guarantee that the investor will continue to have access rights to the same concession area in the future, thereby encouraging excessive logging and other unsustainable practices. Indeed, it would appear that there is an entrenched culture of forest extraction and utilization within the industry rather than a commitment to enhancing the productivity or value of the forest that is left after harvesting^b.

Silviculture and species selection. The default silvicultural system is natural regeneration with polycyclic cuts, without post-harvest silvicultural

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
5,450	3,800	3,730	0	520	12	0

interventions. Under the 1953 Forest Act, yield is regulated by a minimum diameter limit of 34 cm, while forest management plans for WCLs and TSAs must specify the cutting cycle and yield per cutting cycle; they must also indicate species for harvesting and harvesting rules.

There are more than 1,000 tree species but only a few are commercially known and marketed. About 16 species are known to be marketable (Table 2 shows five of these), *Chlorocardium rodiei* (greenheart), *Peltogyne venosa* (purpleheart), *Eperua* spp (wallaba), and *Hymenaea courbaril* (locust) being the favoured species on the international market.

Greenheart is resistant to attack by marine borers and has long been valued as piling for wharves and for other marine applications. *Catostemma commune* (baromalli), the predominant species harvested for plywood production in 2001, was never harvested commercially in any significant way before 1992. Greenheart's share in the total wood production is greater than suggested by log production volumes (of which its share was 20% in 1999–2000), since the production of piles and chainsaw lumber is not included in these figures. Other important species include *Goupia glabra* (kabukalli), *Trattinickia* spp (ulu), *Pouteria speciosa* (suya), *Aspidosperma* spp (shibadan), *Simarouba amara* (marupá) and *Carapa guianensis* (crabwood).

Planted forest and trees outside the forest. About 12,000 hectares of forest plantations, mainly *Pinus caribaea*, were established in the 1960s. They were originally intended to supply a pulp industry but are currently untended. No major reforestation activity is taking place.

Forest certification. Certification became an issue in Guyana when, in 2000, overseas buyers requested evidence of SFM for timber imported from Guyana. An FSC-endorsed national working group has

developed a national certification standard based on FSC and the Peru and Bolivia examples; this was to be submitted to the FSC for endorsement in early 2005. To date, there is no certified forest in Guyana, but two concessionaires are engaged in the process of certifying forest management and chain-of-custody under the FSC scheme, while two more concessionaires have shown an interest in pursuing certification.

Estimate of the area of forest sustainably managed for production. The area of production PFE estimated to be sustainably managed is at least 520,000 hectares^d (Table 3); this is the sum of the concession areas applying for certification and the production forest area of the Iwokrama forest.

Timber production and trade. Total industrial log production was 251,000 m³ in 2003, down from 435,000 m³ in 1999 (ITTO 2004, 2006 in prep.). The ten-year average for 1994–2003 was 342,000 m³, and the highest was in 1997 (521,500 m³) (ITTO 2004). Sawnwood production was 38,000 m³ in 2003, compared to 50,000m³ in 1999. Plywood production also declined, from 87,000 m³ in 1999 to 75,000 m³ in 2003 (ITTO 2004, 2006 in prep.).

Guyana is a net timber exporter. It allows log exports of all timber species except crabwood and locust, while a ban is proposed for purpleheart to benefit the furniture industry. The total export value of logs, sawnwood and plywood in 2003 was US\$26.4 million, compared to US\$31.3 million in 1999 (ITTO 2002, 2005). Some 66,000 m³ of logs, 27,000 m³ of sawnwood and 53,000 m³ of plywood were exported in 2003 (ITTO 2005).

Non-wood forest products. Many NWFPs are harvested from natural forests but only a few are extracted commercially. *Euterpe oleracea* (palm

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
980	980	n.d.	243 ^d	243 ^d

heart, manicole) is an important product that is exported in large quantities, valued at more than US\$5 million per year (van Andel et al. 2003). Nibi and kufa (rattan-like *Heteropsis flexuosa* and *Clusia* spp) are used for furniture-making and exported to the Caribbean islands, the UK and North America. Fibres of *Mauritia flexuosa* (ité palm) are used to make baskets, mats and other items for export. Other products include latex from *Manilkara bidentata* (balata), *Bixa orellana* (annatto dye) and *Carapa guianensis* (crabwood oil). Mangrove bark is exported for tanning leather. There is a legal trade in wildlife, especially birds, reptiles and amphibians; the export revenue from this is estimated at US\$1.5–2 million per year (ibid.).

Forest for protection

Soil and water. Forests are still intact over large areas and no specific measures have been set out for large-scale soil and watershed conservation. There are, however, threats to biodiversity and to soil and water, of which gold mining may be the greatest. Small-scale gold mining takes place over a wide area; impacts include localized deforestation, the removal of topsoil and the pollution of water-courses with sediment and mercury. Trees felled by gold-miners cause blockages to rivers, sometimes resulting in downstream flooding.

Biological diversity. Guyana's large areas of intact forest ecosystems have a very high conservation and ecological value. More than 1,200 vertebrate species were counted in a 1997 inventory, including 198 mammals, 728 birds, 137 reptiles, 105 amphibians, and more than 6,000 plant species, of which about one hundred are forest trees of commercial interest. It is almost certain that many more species remain to be discovered. Thirteen mammals, three birds, six reptiles, six amphibians and 23 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, five mammals, three

birds, five amphibians and two plants are found in forests (IUCN 2004). Guyana has listed three plant species in CITES Appendix I and 57 in Appendix II (CITES 2005).

Protective measures in production forests. The code of harvesting practice includes provisions for protecting watercourses, reducing the impact of logging on residual stands and conserving protected wildlife. Forest management plans must identify biodiversity reserves (4.5% of the productive forest area). The GFC's monitoring division monitors TSAs against the standards prescribed by the code.

Extent of protected areas. Guyana has only one protected area managed under the Environmental Protection Act – the Kaieteur National Park, which is 63,000 hectares in size. In addition, 16 forest reserves cover a total of 7,700 hectares and the Mabura Hill Forest Reserve extends over 2,000 hectares of forest. According to UNEP-WCMC (2004), 980,000 hectares of Guyana's forest estate are in protected areas conforming to IUCN protected-area categories I-IV. Of the 360,000 hectares of primary forest managed by the Iwokrama International Centre for Rainforest Conservation and Development, 180,000 hectares have been set aside for forest conservation purposes. Conservation International has been awarded a conservation concession of 82,000 hectares to the south of Iwokrama^b. A project funded by the GEF will assist the government with the establishment of a representative system of protected areas. The project has set up an independent Protected Areas Commission and has started to establish a system of protected areas by identifying and supporting the management and development of two pilot areas.

Estimate of the area of forest sustainably managed for protection. The estimated area of protection PFE under sustainable management is at least 243,000 hectares. This area comprises the Kaieteur National Park and the conservation area set aside in the Iwokrama forest.

Socioeconomic aspects

Economic aspects. In 2003, forest-based activities contributed 3.3% to GDP, generating US\$842,700 in royalties (Bank of Guyana 2004) and providing employment for 14,000–16,000 people in 720 enterprises, including sawmills and timber dealers (actual forest-based activities employ approximately 7,000 people)^b. There is also considerable informal and unrecorded employment and economic activity.

Livelihood values. Forests are an integral part of Amerindian culture and are important for building materials, fibres for textiles and weaving, and tannins and dyes, as well as for wildlife, fruit, seeds and nuts that are hunted or gathered for food. Medicines are obtained from more than 130 plant species (van Andel et al. 2003). Some communities have undertaken the commercial harvesting of these resources.

Social relations. Amerindian communities are generally located in remote areas away from urban centres and rely on subsistence fishing, shifting cultivation and hunting for a living. The creation of a Ministry of Amerindian Affairs in 1992 has facilitated a more participatory role for these communities in national development; this takes place mainly through regional democratic councils. Not all Amerindian claims have been fully addressed, but there have been major developments in this direction. Amerindian communities are afflicted by severe social and health problems, particularly in communities adjacent to gold-mining and timber concessions. The Ministry of Amerindian Affairs and the Guyana Geology & Mines Commission (GGMC) have collaborated to train a number of rural residents as rangers to complement GGMC's monitoring efforts in mining districts. The Iwokrama forest initiative has had significant success in involving local Amerindian communities in forest management (Bakken Jensen 2005).

Summary

Guyana has a broad forest resource base and large growing-stock of hardwood timber. It has introduced and implemented a well-designed forest management and control system in its timber production forests. However, there is a gap between the well-functioning core staff of the GFC and the industry that has to implement forest management in the field. Political and social uncertainty, lack of secure tenure, lack of understanding and awareness, lack of skilled labour, outdated management practices and, recently, a difficult economic environment have imposed major challenges for the achievement of SFM. Progress is being made in improving forest harvesting practice.

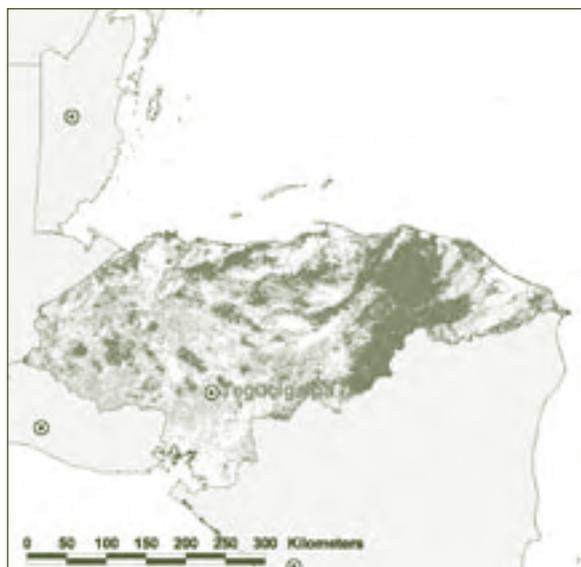
Key points

- Guyana's forests are still largely intact.
- The PFE comprises an estimated 5.45 million hectares of production forest and 980,000 hectares of protection forest. A further 7.35 million hectares of state forest have not yet been allocated.
- Uncontrolled gold mining is a significant cause of forest degradation and environmental pollution.
- At least 520,000 hectares of production PFE and 243,000 hectares of protection PFE are being managed sustainably.
- A detailed management provision and control system has been elaborated but is inadequately implemented.
- Progress is being made in the training of logging operators.
- The area of totally protected forests is low and there is not enough control and management in protected areas.
- The national forest policy is widely accepted as a sound guide for the forest sector but is yet to be fully implemented.
- A new forest law, which would establish a forest concession system in place of the current TSAs and WCLs, has been drafted but is yet to be enacted.

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HONDURAS



*For legend see page 58

Forest resources

Honduras, the second-largest country in Central America, has a land area of 11.2 million hectares and a population of 6.9 million people. It comprises three distinct biogeographic regions. The central highlands cover about 60% of the country, with fertile valleys and steep slopes between 700 and 1,900 m above sea level, the highest peak reaching more than 2,800 m. A second region is the vast northern coastal plain abutting the Caribbean Sea, which can be divided into two sub-regions: the central plain, mainly covered by grassland, swamps, secondary palm forests and pine forests; and the northeastern plain, the Mosquito Coast (*La Mosquitia*), which is sparsely populated and covered by pine forests, tropical moist forest and some mangrove forests. The third biogeographic region is a narrow strip of land along the Gulf of Fonseca on the southern

Pacific coast, which mainly comprises agricultural land and some remnant mangroves. In total, forest covers an estimated 5.38 million hectares, or 48% of the Honduran land area (FAO 2005). The central highlands and the *La Mosquitia* savannas are covered by 1.5 million hectares of pine forests, while more than 3 million hectares of rainforest cover much of the Caribbean coast, the Agalta Mountains and the eastern lowlands; these constitute the country's major closed forests.

Forest types. Honduras is one of the few tropical countries with large areas of natural conifer forests, which are composed of one or several of seven *Pinus* species, as well as species of the genus *Abies*. At lower altitudes up to 700 m, *P. caribaea* (pino costanero) dominates; between 700 and 1,400 m, *P. oocarpa* occurs often in pure stands; and above 1,500 m up to 1,900 m a mixture of *P. oocarpa* (pino ocote), *P. maximinoi* (pino llorón) and *P. tecumumanii* (pino rojo) constitutes the major forest layer. Above 2,000 m, *P. pseudostrobus*, *P. ayacahuite* (pino blanco), *P. pseudostrobus* (pinabete), *P. hartwegii* (pino de montaña) and species of the genus *Abies* occur. Natural pine forests are used intensively by local communities and by industry. Tropical moist forests are found mostly in the north. The most common species are *Vochysia hondurensis*, *Virola koschnyi*, *V. sebifera*, *Luehea seemanii*, *Terminalia amazonia*, *Cordia alliodora*, *Cedrela mexicana*, *Ceiba pentandra*, *Tabebuia guayacan* and *Swietenia macrophylla*. The *Acrocomia* palm is common over all these forests.

Dynamics of forest resource change. Deforestation averaged an estimated 59,000 hectares per year between 1990 and 2000, which is about 1% of the forest area (FAO 2005). In the past, deforestation

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			Total
		Production		Protection	
		Natural	Planted		
5.38	3,811	1,590*	48 ^a	1,600 ^d	3,238

* Includes 1.5 million hectares of pine forests and 90,000 hectares of broadleaved tropical rainforests

was due to agro-industrial development, mainly banana plantations. Today, demand for land by small-scale farmers is thought to be the major cause^a, along with a constant expansion of pasture. The growth in the cattle industry was stimulated until recently by subsidized credit schemes favouring cattle ranching over forest management.

The existence of pine forests in Honduras is closely linked to repeated fire and the regeneration of pines. Nevertheless, frequent human-induced fires have led to widespread degradation in these forests. The worst natural disaster in recent years was Hurricane Mitch in October 1999, which killed thousands of people and caused significant damage to forests.

Permanent forest estate. Some 53% of the national territory was in forest use in 2002^a. The closed forest area is estimated at 3.8 million hectares, both PFE and non-PFE. The permanent forest land, which includes deforested areas in legally gazetted forest, covers 5.93 million hectares, distributed as follows:

- Closed pine forests (*bosque de pino denso*): 695,000 hectares;
- Open pine forests (*bosque de pino ralo*): 1.82 million hectares;
- Tropical hardwood forests (*bosque latifoliado*): 2.86 million hectares;
- Mixed hardwood/pine forests (*bosque mixto*): 559,000 hectares;
- Mangrove forests (*bosque de mangle*): 54,000 hectares.

Table 1 shows the estimated actual area of closed forest in the PFE.

Planted forests. Planted forest covered about 48,000 hectares in 2000^a. Most is privately owned.

Institutional arrangements

Forest tenure. With the passing of a law on the modernization of agriculture (*Ley de Modernización Agrícola*) in 1992, some state-owned forests were transferred to municipal and private ownership. Today, there are three main types of forest ownership: (i) public (*tierras nacionales*), which is under the direct administration of the forest service; (ii) municipal (*ejidales*); and (iii) privately owned/

community forest. There are many claims for the use of forests, particularly over public lands, and large tracts of moist forest have no clear ownership status.

SFM policy framework. Honduras has adopted the ITTO C&I to monitor its progress towards SFM. The forestry action plan 1996–2015 (*Plan de Acción Forestal – PLANFOR*) adopts the principles of sustainable forest development, the conservation of ecosystems and integrated management of watersheds, forest utilization and industrialization, and forestry extension and research. The plan is complementary to another important development plan, *Plan de Ordenamiento Territorial*, particularly in relation to the reduction of deforestation. Nevertheless, outside the PFE and at the forest frontier there is an almost complete lack of adequate control; illegal timber extraction and land conversion are reportedly widespread, driven partly by an increased flow of money from drug trafficking (Contreras-Hermosilla 2003, EIA 2005).

Forest policy and legislation. There is a great diversity of laws and regulations – at least 38 – referring to forests. The current forest law (*Ley Forestal 85/72*) was promulgated in 1972, while a subsequent regulation (*Acuerdo 634/84*) issued in 1984 established detailed instructions for SFM. This constitutes a framework for SFM. Nevertheless, in general the legal provisions pertaining to forests are weak and have features that encourage illegal action by some actors (*ibid.*). The legal system is perceived by some forest communities as unfair (*ibid.*) A revision of forest-related legislation was started in 2002 as part of the Honduras Forestry Agenda (*Agenda Forestal Hondureña*) and includes laws relating to wildlife and protected areas based on the pillars of sustainability, economic profitability, ecological sustainability and social development. The new law, if enacted, will address the conservation of national forests and introduce provisions to support the management of forests by communities, such as technical support and tree-planting subsidies.

Institutions involved in forests. Twelve agencies are engaged in forest development, the most important being: the Secretariat for Agriculture (*Secretaría de Agricultura y Ganadería*); the Secretariat for Natural Resources and Environment (*Secretaría de Recursos Naturales y Ambiente* –

Table 2 Some commonly harvested species for industrial roundwood*

Timber species	Remarks
<i>Pinus caribaea</i> (pino costanero)	From natural pine forests and plantations
<i>Pinus oocarpa</i> (pino ocote)	From natural pine forests
<i>Calophyllum brasiliense</i> (santa maria)	Mainly for domestic use
<i>Cordia alliodora</i> (laurel)	From off-forest areas, village plantations and natural forests
<i>Ceiba pentandra</i> (ceiba)	Mainly off-forest trees are harvested

* Source: AFE-COHDEFOR website, 2003

SERNA), and the State Forestry Administration (*Administración Forestal del Estado-Corporación Hondureña de Desarrollo Forestal – AFE-COHDEFOR*). AFE-COHDEFOR is responsible for the formulation, implementation and control of norms and rules for forest management in *ejidales* and private forests. AFE-COHDEFOR also manages state forests and organizes the marketing of forest products. In early 2004, there were discussions regarding the reorganization of the institutions surrounding forests and the creation of a national forest service (*Servicio Forestal Nacional – SEFONAC*) to replace AFE-COHDEFOR. Generally the forest administration lacks the finance and staff necessary to adequately enforce the law and manage the forests. Approximately 1,000 professionals work in the twelve agencies involved in forestry^a.

Non-governmental organizations are mainly involved in rural development activities, agroforestry and the management of protected areas rather than in production forestry. There is an increased interest among civil-society actors in promoting forest certification and, in the private sector, an increase in action to combat illegal activities.

Status of forest management

Forest for production

Forest management plans have been mandatory in production forests since 1992; they span five years and include a yearly operational plan. Management and silvicultural norms were prepared by AFE-COHDEFOR for conifer forests, mixed forests and forest plantations in 1995 and for hardwood

forests in 1996. Before a forest management plan is prepared, the forest owner must clearly establish legal tenure. Management plans are prepared by foresters according to the norms set by AFE-COHDEFOR. Besides directions for silviculture and harvesting, management plans should contain prescriptions covering the protection of soil and water, biodiversity, and measures against fires, pests and diseases. Forest harvesting is based on a contract between AFE-COHDEFOR and the forest owner, which also specifies the silvicultural and conservation measures of the management plan. Before harvesting, the owner must give a bank guarantee in favour of AFE-COHDEFOR; this is cancelled once all silvicultural and conservation measures are complete. Incentives to promote SFM include: exemption from taxes up to a certain amount if a forest owner invests in reforestation; technical assistance to prepare reforestation plans; and the provision of seeds and nursery stock to private investors.

The pine forests are relatively easy to manage sustainably. They have a great capacity for regeneration if fire can be controlled and used effectively to accelerate regrowth and if regenerating seedlings are protected from animals. Pines are fast-growing and, if management guidelines are followed, continuous production is assured. However, in many cases, the harvesting plan is the only component of the management plan applied. Illegal practices are common in FMUs and there is a general problem of non-compliance with management prescriptions (Contreras-Hermosilla 2003). There is little experience in the management of broadleaved rainforests and few management prescriptions to secure sustainable

Table 3 Management of the production PFE ('000 hectares)^{a,d}

Total	Natural			Planted			
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	With management plans	Certified	
1,590	1,070	671	37	187	48	28	0

management in them. A recently completed ITTO project examined the impacts of intensified harvesting on lesser-used species in the broadleaved rainforest of northeastern Honduras and should result in new management prescriptions.

In 2003, management plans covered 1.0 million hectares of pine forests, most of them privately owned, and 96,000 hectares of tropical moist forests (AFE-COHDEFOR website). In total, 903 FMUs had management plans, 97 of which were in public forests, 78 in the *ejidales* and 728 in private forests (ibid.). The total annual allowable cut in the pine forests was 1.97 million m³ (ibid.).

Silviculture and species selection. Of 400 potential timber species, 25 are commonly used commercially. The two most important species by far are *P. caribaea* (pino costanero) and *P. oocarpa* (pino ocote) (Table 2). Important hardwood species from the tropical moist forest include *Vochysia hondurensis* (san juán), *Virola koschnyi* (palo de sangre), *Terminalia amazonica* (cumbillo), *Swietenia macrophylla*, *Calophyllum brasiliense* (santa maría), *Carapa guianensis*, *Cedrela odorata* and *Tabebuia rosea*.

Planted forest and trees outside the forest.

Because natural pine forests are so abundant, planted forests have not been developed to any great extent. The main plantation species are native pines (up to one-third of all plantations), with an estimated total planted area of 16,000 hectares. Species such as *Gliricidia sepium*, *Leucaena* spp, *Gmelina arborea* and eucalypts are an essential part of agroforestry; another important planted tree is *Tectona grandis* (teak, teca). The Programme for the Development of Commercial Forest Plantations (*Programa para el Desarrollo de Plantaciones Forestales Comerciales* – PRODEPLAN) was launched in 1997 to stimulate the expansion of the plantation estate.

Forest certification. As of December 2005, three forests with a total area of 37,281 hectares had been certified under the FSC umbrella; two of these were *ejidales* in natural broadleaved forest and one was a private *Pinus* forest (FSC 2005). Some of the bigger private timber companies have recently started to reinvest in their own forests through reforestation and integrated management and have shown interest in certification.

Estimate of the area of forest sustainably managed for production. About 700,000 hectares of the production PFE are subject to some kind of management, a figure which includes an estimated 265,000 hectares of conifer and mixed forests outside the moist tropical forest zone. It is estimated that an area of at least 187,000 hectares is sustainably managed; this includes certified forest, just under 100,000 hectares of natural pine forest, and about 50,000 hectares of tropical broadleaved forest in the upper Cangrejal River Basin, where an ITTO-funded project (see above) helped local communities improve forest management in some of the areas allocated to them.

Timber production and trade. The total annual roundwood production for 1996–2000 was approximately 7 million m³ (FAO 2003). In 2003, the production of industrial pine logs was an estimated 780,000 m³ and tropical hardwood was 21,000 m³ (ITTO 2005); the remainder was for non-industrial uses, particularly fuelwood. The estimated total sawnwood production in 2003 was 525,000 m³, slightly more than in 1999 (404,000 m³) (ITTO 2004, 2005). Nearly all recorded Honduran wood production serves the domestic market; a small amount of pine sawnwood is exported to other countries in Central America and the Caribbean.

Non-wood forest products. The total number of NWFPs used at the regional and national levels is not known. Firewood is the most important NWFP,

and charcoal is also important in local markets. Internationally tradable NWFPs include pine resin (production in 2002: 15,200 barrels), resin of liquidambar (251 barrels), and pine seed for export (more than 460 kg in 2002 for seed banks) (AFE-COHDEFOR website). Much emphasis is given to valuing environmental services and Honduras participates actively in initiatives to develop markets for them.

Forest for protection

Soil and water. Many municipalities manage micro-watersheds declared for the protection of freshwater sources, as per Article 64 of the 1985 Forest Law. Such micro-watersheds are delimited in the field (generally fenced) and no use is permitted other than the protection of water sources. A total forest area of 352,342 hectares has been classified for the primary purpose of protecting soil and water.

Biological diversity. The forests of Honduras are characterized by flora and fauna representative of both temperate and tropical America. Detailed biological inventories are not available; however, it is known that there are more than 700 breeding bird species and an additional 225 that are migratory. Ten mammals, six birds, eleven reptiles, 53 amphibians and 111 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, five mammals, six birds, four reptiles and 53 amphibians are found in forests (IUCN 2004). Honduras has three plant species in CITES Appendix I and 217 in Appendix II (CITES 2005).

Protective measures in production forests. Forest management plans contain some prescriptions, such as for protection strips along watercourses and RIL, but they are not widely applied in forest harvesting (Contreras-Hermosilla 2003).

Extent of protected areas. The extent and status of protected forest areas are not clear. Some 18% of the national territory has some kind of protected area status^a, which corresponds to a total area of about 2 million hectares. According to UNEP-WCMC (2004), 433,700 hectares of forest are in protected areas conforming to IUCN protected-area categories I–IV, including 88,000 hectares of needleleaf forest and 99,000 hectares of montane forest. The Rio Platano UNESCO Biosphere Reserve in northeastern Honduras is designed to protect the largest intact

lowland tropical and pine forests within Honduras. All cloud forests (*bosques nublados*) are protected in ten national parks, eight wildlife reserves and 18 biological reserves; even so, most are heavily degraded (Contreras-Hermosilla 2003). Honduras is part of the Mesoamerican Biological Corridor.

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

Socioeconomic aspects

Economic aspects. Forestry contributes significantly to Honduras's national income, reaching a peak of 10% of GDP late in the 1990s. Nevertheless, its potential is constrained by such factors as the uncertainty of land tenure, high transaction costs, scarcity of public support and specialized services, and economic distortions that depress the prices that primary producers receive for their timber. It is estimated that, in 1999, about 60,500 people were formally employed in the forest sector: 18,500 in forest operations and 42,000 in forest industry^a.

Livelihood values. Honduras has serious problems of infant mortality, illiteracy and overall poverty, and forests constitute an important supplement to livelihoods – both in the provision of goods and services and for land. Informal harvesting and trade in forest products are important for many in forested areas. Collaborative arrangements still need to be developed to make such informal harvesting compatible with the objectives of SFM.

Social relations. Despite the fact that the law has made provisions for local communities to own forests, there are great difficulties in practice in protecting these forests from encroachment, timber theft and illegal hunting. For example, the biosphere reserve of *La Mosquitia* as well as the indigenous communities of Miskito, Pech and Garifuna are greatly threatened by unregulated colonization (IC 2004). On the other hand, the involvement of rural people in forest management reportedly increased in 1998–2002; for example, some 30,000 families benefited from increased participation in the management of about 560,000 hectares, 373 agroforestry groups received technical assistance, and 135 capacity-building events were carried out involving 2,025 participants (AFE-COHDEFOR 2002).

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
1,600	434	n.d.	n.d.	n.d.

Summary

Present management of the broadleaved natural forests in Honduras is sometimes more a matter of extracting only the most valuable species than of silvicultural management. Silvicultural and conservation measures described in forest management plans are often not respected and there is a risk that logged-over areas will become degraded. Illegal logging is widespread and nourishes an informal wood sector that competes with legally produced timber and timber products. Protected forest areas are not clearly delimited and there are difficulties in protecting remote forest areas from forest degradation and deforestation. On the other hand, recent efforts have been made to overcome illegal activities and corruption and to strengthen institutions in order to integrate forests into sustainable development; the wider importance of forests for goods and environmental services has been recognized and the forest law is being revised. The challenge will be to translate a good theoretical framework of law and policy into effective implementation in the field.

Key points

- The PFE comprises an estimated 1.59 million hectares of production forest and 1.60 million hectares of protection forest.
- At least 187,000 hectares of production PFE are being managed sustainably. Insufficient information was available to estimate the area of protection PFE so managed.
- The broadleaved moist forest could make a larger contribution to sustainable development in Honduras, although the potential for timber production is not known.
- Management norms for the pine forests have been formulated and are being implemented in some forests; prescriptions for the sustainable management of the moist forests also exist but are less clear.

- Illegal logging is thought to be prevalent.
- The extent and status of protected forest areas are not clear. Few data are available on the level of protection afforded by forested protected areas.
- Many protected areas are threatened by land conversion.
- A revision and modernization of forest legislation was started in 2002 as part of the Honduras Forestry Agenda, but the new law is yet to be enacted.
- Forest tenure, particularly on public land, is subject to dispute; large tracts of moist forest have no clear ownership status.
- Generally, the forest administration lacks the finance and staff necessary to adequately enforce the law and manage the forests.

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MEXICO



*For legend see page 58

Forest resources

Mexico has a population of 105 million people and a land area of 195 million hectares, making it the third-largest country in Latin America after Brazil and Argentina. It is bordered in the north by the United States; in the west and south by the Pacific Ocean; in the southeast by Guatemala, Belize and the Caribbean Sea; and in the northeast by the Gulf of Mexico. It is mainly mountainous, with less than 35% of its surface area below 500 m and more than half of it above 1,000 m. The northwest of the country contains dry, open forest but rainfall is higher farther south, where tropical moist forests occur. The Southern Highlands, located south of the central plateau, are composed of a number of steep mountain ranges, deep valleys and dry plateaux, including the Chiapas Highlands bordering Guatemala that constitute an important forest zone. The total

forest area including bushland (*matorrales*) and non-tropical forest is estimated by Torres Rojo (2004) to be 64 million hectares and by FAO (2005a) to be 55.2 million hectares. The National Commission for Forests (*Comisión Nacional Forestal – CONAFOR*) estimates the forest area to be 56.9 million hectares along with another 58.5 million hectares of 'vegetation' cover in arid zones^b. There are an estimated 26.4^b to 33.1 million hectares (FAO 2001) of natural tropical forests.

Forest types. Mexico's ecoclimatic zones can be divided into three approximately equal areas: tropical, subtropical/temperate, and semi-arid/arid. The tropical region includes rainforests, which originally covered 6% of the country but probably about half that now^c. The major forest type in the temperate and subtropical north is *Quercus* forest, which may be pure or mixed with other temperate-climate broadleaved species such as *Liquidambar styraciflua* (sweet gum) and *Fagus mexicana* (beech). The 'conifer and broadleaved forests' category of the national forestry inventory is characterized by a few dominant species, including conifers such as *Pinus* and *Abies* combined with various species of *Quercus*, *Cupressus* and *Juniperus*. Tropical forests are found on slopes along the Gulf of Mexico and the Pacific Ocean, the Isthmus of Tehuantepec and in southern Yucatán in the states of Campeche, Chiapas, Oaxaca, Quintana Roo and Veracruz. Among typical tree species are *Terminalia amazonia*, *Dialium* spp, *Brosimum* spp, *Manilkara zapota*, *Lonchocarpus* spp and *Terminalia oblonga*.

Dynamics of forest resource change. The average annual deforestation rate in 1990–2000 was estimated to be 631,000 hectares, or 1.1% of the forest area (FAO 2005a); it is currently

Table 1 Tropical PFE

Estimated total forest area, range (million hectares)	Total closed tropical natural forest ('000 hectares) Source: derived from FAO 2001	PFE ('000 hectares)			
		Production		Protection	Total
		Natural	Planted		
55.2–64.0*	33,120	7,880 ^c	100	5,600 ^b	13,580

* Includes non-tropical forest

an estimated 400,000 hectares and falling^b. Deforestation is caused mainly by conversion to agricultural land and uncontrolled forest fire. An estimated 550,000 hectares of vegetation are disturbed each year, indicating a rapid degradation process^b. Forest degradation is often the starting point for deforestation; direct causes of deforestation and forest degradation include incentives for forest land conversion, high levels of rural poverty, illegal logging and the cultivation of illegal crops. Shifting cultivation practices that have been applied successfully for centuries are now a major cause of forest destruction in tropical forests. At the national level, a total of 278,000 hectares of forest are rehabilitated to some extent each year^b.

The Yucatán Peninsula is subject to frequent hurricanes; at the time of report preparation no information was available on the effects of Hurricane Wilma, which hit the Peninsula in October 2005. Forest fires occur mainly in the semi-arid part of the country but also in humid tropical forest areas. Fire is a serious problem and is caused mainly by agricultural and grazing activities; it is exacerbated by the effects of hurricanes, which greatly increase the volume of flammable biomass. The country has made a major effort to combat forest fires^b.

Permanent forest estate. The allocation of PFE *per se* is not done in Mexico. The estimate of the tropical production PFE in Table 1 is based on data supplied by the government of Mexico to ITTO in conjunction with a C&I workshop convened in April 2005 and the estimate of protection PFE is based on data reported by an ITTO diagnostic mission to Mexico.

Planted forests. Estimates vary on the extent of plantations. The ITTO mission reported about 100,000 hectares of planted forest for timber production, mainly in the tropical zone, and about 590,000 hectares for protection and rehabilitation^b. FAO (2001) estimated a total plantation estate of 256,000 hectares (plus 11,000 hectares of rubber) and an annual planting rate of 35,000 hectares per year.

Institutional arrangements

Forest tenure. Article 5 of the 2003 forest law (see below) states that the forest resources belong to communes (*ejidos*), local communities, indigenous

peoples and indigenous communities, private landowners or the government, depending on the location of the forest. An estimated 80% of Mexico's forests are owned by *ejidos* and local communities. These forests are also known as *propiedad social*, or forests under social property. They are owned by about 8,500 communities, or *núcleos agrarios*^b. Around 15% of the forest area is owned privately and 5% is classified as national land.

SFM policy framework. Mexico has a comprehensive national forest program spanning 2001–2006 and a national Strategic Forestry Plan 2025 (*Programa Estratégico Forestal – PEF 2025*) that sets the framework of SFM. Mexico has developed a C&I framework for temperate forests and is now formulating a proposal to ITTO to develop a set of C&I specifically for its tropical forests, based on the ITTO framework.

Forest policy and legislation. A new forest law (*Ley General de Desarrollo Forestal Sustentable*) for the management of production forests was enacted in 2003 and became effective when the decree (*Reglamento de la Ley General de Desarrollo Sustentable*) was enacted in February 2005. It emphasizes the importance of forest services and their inclusion in forest management. There appears to be some inconsistency in the interpretation of the different laws that affect forest management, including the forest law, the General Law on Ecological Balance and Environment (*Ley General del Equilibrio Ecológico y Protección al Ambiente*) and the General Law on Wildlife (*Ley General de Vida Silvestre*). In addition, many state governments have created their own forestry/environmental laws.

A number of special programs were set up in the 1990s to bring about greater consistency in forest policy. The most important ones are: the National Forest Development Program (*Programa Nacional de Desarrollo Forestal – PRODEFOR*); the national reforestation program (*Programa Nacional de Reforestación*), which is designed to promote the reforestation of deforested areas; the community forest development program (*Programa de Conservación y Manejo Sustentable de Recursos Forestales en México*); and the national reforestation program, PRODEPLAN, for promoting commercial plantations. These programs are geared mainly towards community development and the reduction of poverty through the restoration of natural capital.

In October 2003, CONAFOR launched a pilot program in markets for environmental services to increase funding for forest conservation and management.

Institutions involved in forests. Mexico is a representative, democratic and federal republic comprising 31 states and one federal district. Each state is autonomous in all internal affairs. In many of the states there is a major interest in environmental issues such as forest restoration and conservation. Several states have their own secretariat for environmental and forestry issues. At the federal level, the Secretariat for Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales de México* – SEMARNAT) is the responsible government agency for natural resources, including forests. Various directorates are responsible for technical aspects of forestry, particularly the Directorate for Forest and Soil Management (*Dirección de Gestión Forestal y Suelos*).

CONAFOR was created by presidential decree in 2001 as a public organ with a decentralized function and the overall objective of integrating natural resource management into the national sustainable development program. Through its 13 regional offices, CONAFOR is responsible for, among other things, the implementation of PEF 2025. The Federal Office for Environmental Protection (*Procuraduría Federal de Protección al Ambiente* – PROFEPA) is in charge of auditing and monitoring production areas and natural protected areas. In addition, there are technical and capacity-building institutes such as the National Forest and Agriculture Research Institute (*Instituto Nacional de Investigaciones Forestales y Agropecuarias*).

NGOs play a major advocacy role on behalf of communities and are also important for information-sharing and capacity-building in respect to collaborative forest management. Community organizations have a strong influence on the use and management of forest areas.

Status of forest management

Forest for production

Forest management is conducted mainly in the *ejido*-owned forests, most of which are located in the temperate and subtropical forest zone; the forest of each *ejido* can be considered as an FMU.

Harvesting in *ejidos* and privately owned forests is implemented through cutting permits. Three kinds of permits are given out: small-scale harvesting permits in areas of up to 20 hectares, medium-sized harvesting permits for areas of between 20 and 250 hectares, and commercial logging permits for areas above 250 hectares. Logging in tropical forests is carried out mainly by forest owners and communities as well as contractors working for timber traders or the forest industry. Forest owners must employ at least one forestry professional who is in charge of forest management, and they must also present a forest management plan (*programa de manejo forestal*) and a yearly harvesting plan. The minimum cutting diameters tend to vary by state. In the (tropical) state of Quintana Roo, for example, harvesting includes trees of high-value species with a diameter of 55 cm and above and trees of other species with a diameter of 35 cm and above.

About 8,500 *ejidos* and local communities in the country possess forested areas, but in some areas private ownership is also important. The extent of forest within *ejidos* varies, the smallest ones being around 300 hectares and the largest nearly 450,000 hectares. An estimated 7.1 million hectares of closed forests (both temperate and tropical) are covered by management plans (FAO 2001) for timber and/or non-timber forest production. The estimated total tropical forest area harvested annually is 179,000 hectares, distributed in 584 forest management units^c. Timber harvesting in moist tropical forest involves the selective cutting of high-value tree species, in particular *Cedrela odorata* (cedro rojo) and *Swietenia macrophylla* (caoba). Both were once abundant in the forests of Yucatán, but over-harvesting – including through illegal logging, a widespread problem in Mexico's forests^c – and a lack of regeneration of these light-demanding species in closed forests have brought the sustainable harvesting level to below 1 m³ per hectare^b. Well-established silvicultural systems known as the Silvicultural Development Method (*Método de Desarrollo Silvícola*) and the Mexican Method of Forest Management (*Método Mexicano de Ordenación de Montes*) are applied in the temperate and pine forests. In the Mayan zone in the state of Quintana Roo, several well-functioning FMUs are applying polycyclic forest management; some are also certified. In general, however, *ejidos* find

Table 2 Some commonly harvested tropical timber species for industrial roundwood^c

Timber species	Remarks
<i>Swietenia macrophylla</i> (caoba, kobchi)	Remains the major logged species in value in all states of Yucatán
<i>Cedrela odorata</i> (cedro rojo)	Both caoba and cedro rojo are being planted due to shortage of supply
<i>Lysiloma latisiliquum</i> (tzalam)	
<i>Lonchocarpus castilloi</i> (machiche)	
<i>Metopium brownei</i> (chechen)	

themselves in a vicious circle: income derived from forest activities is insufficient to justify the investments required to improve their operations^b. The Mexican government has taken a wide range of actions in the fight against illegal logging. What is still missing is the involvement of public and private buyers through clear purchasing policies that will prevent the access of illegal products to national markets; improved information on the problem is also needed^b.

Silviculture and species selection. Around one-third of hardwood timber production comes from tropical species, among them the species listed in Table 2 as well as *Pseudobombax ellipticum* (amapola), *Dendropanax arboreus* (sac-chaca), *Dalbergia retusa* (guanciban), *Brosimum alicastum* (ramon), *Bucida buceras* (pucte) and *Simarouba glauca* (pasak).

Planted forest and trees outside the forest. Species of *Eucalyptus* are predominant, with a planted area of about 105,000 hectares, followed by pines (85,000 hectares) and *Tectona grandis* (teak, teca – about 3,000 hectares); the latter is becoming increasingly important as a plantation species^c. A national forest inventory in 1994 estimated that 10.7 million hectares of land were available for the establishment of planted forest (CONAFOR 2001), but only 4–5 million hectares are suitable for that purpose^b.

Forest certification. As of September 2005, there were 41 FSC-certified FMUs covering a total area of 707,829 hectares of natural forest, the great majority community-owned (FSC 2005). Of these, twelve FMUs covering about 163,000 hectares are located in the tropical part of Mexico.

Estimate of the area of forest sustainably managed for production. Mexico has significantly strengthened its system for implementing SFM and many of the necessary elements are operational. However, the process to improve production has been slow due to limited capacity and willingness of the private sector to change forest management and industrial processing systems^b. An estimated 8.6 million hectares of natural forest are under some form of forest management (Torres Rojo 2004); this figure is more than the total estimated PFE and might include some non-tropical forests in states that are mostly tropical. Of the 8,500 *ejidos*, 2,417 implemented commercial harvesting in 2002^b. The production potential of 'high and medium' forests in the tropics is an estimated 1.4 million m³, much more than current (official) production^b. The area of tropical production PFE being managed sustainably is estimated to be at least 111,000 hectares (Table 3); this includes only certified forests, as no information was available regarding the management of other forests in the production PFE.

Timber production and trade. In 1994, the total growing stock of Mexican forests was an estimated 2.8 billion m³, of which 1.0 billion m³ were in tropical regions (CONAFOR 2001); total roundwood production was an estimated 45.5 million m³ in 2003 (FAO 2005b). Official industrial roundwood production was 6.28 million m³ in 2003, of which an estimated 781,000 m³ was non-coniferous and 606,000 m³ was tropical (ITTO 2006 in prep.); PROFEPA estimates the illegal volume of roundwood from all forests to be in the range of 5–7 million m³^b. Most of the industrial roundwood production is consumed within the country (ITTO 2005). There

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

Total	Natural				Planted		
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
7,880	8,600	8,600	163	163	100	34	0

are more than 278 sawmills to process tropical timber, with an average capacity of 5,100 m³ annual log consumption^b.

Non-wood forest products. More than 1,000 species of NWFPs are used, of which 70 are subject to some form of control (Torres Rojo 2004). National commercial NWFP production was 143,000 tonnes in 2002, of which only 4% was sourced from states in the southeastern region of the country; the total value of this portion was 73 million pesos^b. NWFPs include ornamental plants, resin, bamboo fibres, wax, tannin and gums, medicine, fruits, nuts, spices and honey. The most important products from tropical regions include copal, products from different palms such as *Chamaedorea* spp (palma camedor), *Sabal* spp (palma de sombrero), *Scheelea liebmannii* (palma real), *Byrsonima crassifolia* (fruits of nanche), *Pimenta dioica* (pimiento gorda) and *Manilkara zapota* (chicozapote gum).

Forest for protection

Soil and water. Large parts of Mexican forests are classified as water protection areas (*cuencas de amortiguamiento*). Data on their extent are not available.

Biological diversity. Mexico is among the top ten most biologically diverse countries in respect to the number of vertebrates and vascular plants. It has the highest diversity of reptiles of any country and is third for bird diversity and fourth for terrestrial mammals. There are more plant species in Mexico than in the US and Canada combined. Seventy-four mammals, 62 birds, 21 reptiles, 191 amphibians and 262 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 13 mammals, 39 birds, three reptiles, 176 amphibians and 113 plants are

found in forests (IUCN 2004). Mexico has listed 103 plant species in CITES Appendix I and 2,100 plant species in Appendix II (CITES 2005).

Extent of protected areas. Protected areas (*áreas naturales protegidas* – ANPs) cover about 17.9 million hectares (9.2%) of the national territory. This is an increase of almost 70% in the last decade; they cover about 5.6 million hectares in tropical and sub-tropical areas^b. The system includes 34 biosphere reserves (10.4 million hectares), 65 national parks (1.39 million hectares), four natural monuments, 27 protection areas of flora and fauna (5.5 million hectares), four natural protected areas for reclassification and one natural-resources protection area. Discrepancies remain in the definition and number of protected areas; for example, it appears that some designated protected areas occur on private land, and their protection status is unclear. According to UNEP-WCMC (2004), 1.04 million hectares of tropical forest are in protected areas classified in IUCN categories I–IV, of which 419,000 hectares are lowland evergreen broadleaved rainforest.

Estimate of the area of forest sustainably managed for protection. No data were available on the status of management of the protection PFE (Table 4).

Socioeconomic aspects

Economic aspects. The direct contribution of the tropical timber sector to employment could be as high as 60,000, but a considerable number of these people work informally and are not counted in official statistics^b. The contribution of the national forest sector to GDP was about 17 billion pesos, or 1%, in 2003^b.

Livelihood values. It is estimated that about 12 million people live in or adjacent to forest. They are generally considered the poorest segment

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

Total	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
5,600	1,040	n.d.	n.d.	n.d.

of the rural population, and forests and *matorrales* form an important component of their livelihoods. A substantial number of *ejidos* depend mainly on forest activities for their livelihoods^b.

Social relations. Often, communities lack the organization and funds to manage forests and woodlands effectively. There is also often a divergence between national interests to protect and manage forests and particular local interests. Recent conflicts have arisen due to the extension of protection areas without proper consultations with the people living in these areas^b. Another area of conflict is excessive utilization and unauthorized land conversion. There is an ongoing conflict in tropical forest areas of the states of Chiapas and Oaxaca over a lack of access to land and insecurity of tenure.

Summary

The management of Mexico's forests differs greatly between the pine and oak forests in the temperate zone, the forests in subtropical regions and the moist tropical forests in the south. The rate of deforestation has apparently slowed but is still high. Over-harvesting and illegal harvesting of forest resources is widespread (although less so in the tropics than in the temperate zone); they exceed sustainable levels in many areas. Community management is the major form of forest management but, in many cases, communities are not equipped to manage their forests sustainably. Some of the problems that obstruct progress towards the sustainable management of the closed forest areas in communes (*ejidos*) include a lack of resources and know-how for the economic use of forest resources and discrepancies in the objectives between communities, the private sector and forest authorities. On the other hand, good progress has been achieved in forest certification, although much of this to date has been outside the tropics. Moreover, the government has taken steps to address shortcomings in the sector and is attempting to combat illegal logging and fire.

Key points

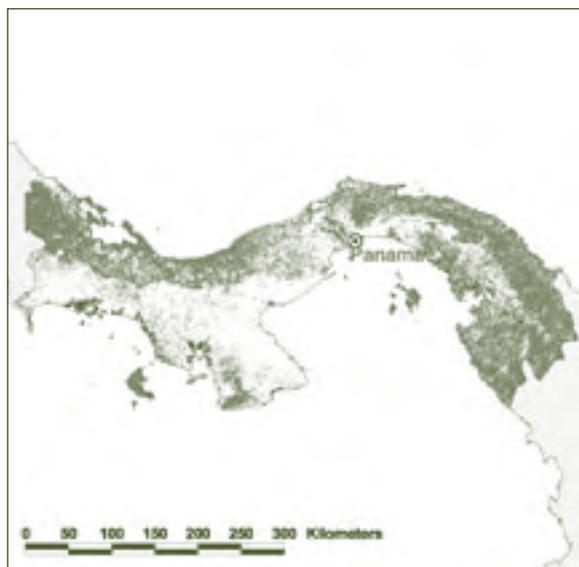
- The rate of deforestation has apparently slowed but is still high.
- Mexico has not formally designated a PFE. ITTO estimates that about 13.6 million hectares can be considered to constitute a tropical PFE, comprising 7.88 million hectares of natural-forest production PFE, 5.60 million hectares of protection PFE and 100,000 hectares of industrial timber plantations.
- The area of natural tropical production PFE under SFM is estimated to be at least 111,000 hectares, corresponding to the total area of certified natural tropical forest; insufficient information was available on the forest management outside these areas for an estimate to be made for the wider tropical production PFE.
- No data were made available on the status of management of Mexico's tropical protection PFE.
- About 8,500 *ejidos* and local communities own an estimated 80% of Mexico's forests. About 15% is owned privately and 5% is national land.
- A forest law enacted in 2003 governs the management of production forests, including in *ejidos*. Some states have also enacted their own forestry/environmental laws.
- The low financial viability of natural forest management appears to be inhibiting the uptake of SFM in some *ejidos*.
- The national government has taken steps to combat illegal logging and forest fire, but both these problems are still prevalent.
- The production potential of the natural forests in the tropics is an estimated 1.4 million m³, much more than current (official) production.
- Continuing conflicts over land-use are apparently inhibiting SFM in some areas.

- Some forests are classified as protected areas but are privately or communally owned, and their protection status is unclear.

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PANAMA



*For legend see page 58

Forest resources

Panama has a land area of 7.56 million hectares and a population of about 3 million people. It can be divided into four biogeographical zones: (i) the Cordillera de Talamanca, which extends southwards from Costa Rica in the west, with peaks of more than 3,000 m; (ii) the central lowlands, bisected by the Panama Canal; (iii) the largely forested eastern region, characterized by a series of lower mountain ranges (San Blas and Portobello ranges) of up to 1,000 m and hilly landscapes up to 800 m (Darien); and (iv) the lowlands on the Caribbean coast. Nearly 90% of the country lies below 1,000 m. Estimates of forest cover include 2.88 million hectares (FAO 2005), 3.01 million hectares^b, 3.3 million hectares (ANAM 2003), and 3.48 million hectares^a. About 2.6 million hectares are degraded primary forests and secondary forests (*rastrojos*), of which about

1.1 million hectares can be considered young secondary forests that are partly used for shifting agriculture (ANAM 2003).

Forest types. The prevalent forest type in Panama is semi-deciduous tropical moist forest, together with lowland, sub-montane and montane evergreen forests. Mangrove forests can be found on the Pacific coast. Tropical moist forests are typical of the low-lying and medium-altitude parts of Darien, where they cover a considerable area. These stands are heterogeneous but always dominated by *Cavallinesia platanifolia*, sometimes in combination with *Anacardium excelsum* in the dominant storey, and average 22–25 m or more in height. The lower storey contains various species of palms. Other forest types in the country characterized by the dominance of a few species are:

- *Quercus* (oak) forests, which are found in the Talamanca Mountains. These are sometimes fully closed, with a dominant storey of two species of oak and a few other species;
- *cativo* (*Prioria copaifera*) forests, which are found alongside mixed forest stands, always in the proximity of rivers on inundated areas; and
- *Campnosperma panamensis* forests, which occur on poorly drained ground in the western Atlantic coastal region.

Dynamics of forest resource change. An estimated 47,000 hectares of forest were lost annually between 1992 and 2000 (ANAM 2003), a rate of 1.3% per year. The highest rate of deforestation was in *Comarca Ngobe Bugle* in the northwest of the country, with 10,000 hectares per year (2.7%), and in the Province of Darien, with 17,000 hectares per year (1.7%). Deforestation is

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			
		Production		Protection	Total
		Natural	Planted		
2.88–3.48	3,052	350 ^b	56 ^{a,b}	1,580 ^b	1,986

caused by urbanization, cattle ranching and agro-industrial development, but also by unregulated shifting cultivation (*rozás*) and, in already degraded forest areas, by poor logging practices^c.

Permanent forest estate. According to existing land-use plans, 75% (5.6 million hectares) of the land is suitable for forest use and only 20% has good agricultural potential. The forest law of 1994 (*Ley 1/94*) classifies forest into production, protection and special areas; these latter include scientific, historic, educational, tourist and recreational areas. Of the present forested area, 350,000 hectares are set aside for production, although this has not yet been mapped or demarcated on the ground^{b,c}. About 140,000 hectares in the provinces of Colón, Bocas del Toro and Veraguas have not yet been harvested and may be considered potential production forest. The National Environmental Authority (*Autoridad Nacional del Ambiente – ANAM*) (2003) estimated the area of protection forests to be 1.18 million hectares, comprising 1.08 million hectares of forested areas in national parks^b and 96,000 hectares of forest reserves. The total area of protection PFE is an estimated 1.58 million hectares^b. Nearly 1 million hectares have not yet been allocated; many of these areas, however, are classified under a protected-area category^b.

Planted forests. In 2004, there were about 56,000 hectares^{a,b} of planted forest, most of them privately owned^c. About 1.2 million hectares of land are available for plantation development^a.

Institutional arrangements

Forest tenure. Forests are divided into public, private and *comarcas*, or indigenous reserves, but the majority of the forest estate is state-owned. Regarding indigenous forest lands, the 1972 constitution recognizes the collective landholding units known as *comarcas* and gives them authority to manage their lands according to customary law. Most of the closed forest area is situated within the *comarcas* (*Comarca de Emberá-Wounaan*, *Comarca Kuna de Wargandi*, *Comarca Kuna Yala* and *Comarca de Madungandi*). The *comarcas* comprise 28% of the national territory (2.2 million hectares); large parts are forested.

SFM policy framework. The forest law (*Ley 1/94*) provides a framework for SFM (articles 26, 28 and

44). The ITTO C&I are used to monitor progress towards SFM. No integrated planning for land-use has been applied, nor is there any clear demarcation of a PFE. Boundaries have been delimited and management plans prepared for some protected areas.

Forest policy and legislation. A number of legislative changes during the 1990s affected forestry. Law 1/94 of 1994, which replaced Law 39 of 1966, was designed to conserve and manage forest resources sustainably. Law 1/94 also established a National Fund for Forest Development and Protection (*Fondo de Protección y Desarrollo Forestal – FONDEFOR*) to assist in forest promotion, protection management, supervision, control and research, and forestry extension. The fund, however, is not yet functioning, and all forest-related taxes go to general revenue. Article 43 of Law 1/94 states that all private forest land covered by forests, either natural or artificial, is exempt from national taxes, provided that the landowner is registered in the *Registro Forestal* and a certificate of ownership has been issued.

The most important recent change, however, was the introduction in 1998 of the general environmental law (*Ley 41/98*), which established principles and norms for the protection, conservation and restoration of the environment, and for promoting the sustainable use of natural resources. Under this new legislation, land capability planning has started to provide a basis for environmental management. The law also recognizes the rights of indigenous communities to manage forests in the *comarcas* (Article 44). More recently, Decree Law No 2 of January 2003 approved a set of forest management guidelines for Panama.

Institutions involved in forests. Law 41/98 established ANAM, in charge of the overall supervision and control of forestry. There are 200 forest professionals in Panama, of which approximately 40 work for ANAM (ANAM 2004).

Various national and international NGOs are active in forest management and conservation. These include the National Association for the Conservation of Nature (*Asociación Nacional para la Conservación de la Naturaleza – ANCON*) and other associations such as Fundación NATURA and the National Parks and Environment Foundation (Fundación Parques Nacionales y Medio Ambiente – PA.NA.M.A.).

Table 2 Some commonly harvested species for industrial roundwood (2001-2003)^c

Timber species	Remarks
<i>Bombacopsis quinata</i> (cedro espino)	Important timber species that has maintained its value over many years
<i>Anacardium excelsum</i> (espavé)	Important timber species over the past ten years
<i>Miroxylum balsamum</i> (bálsamo)	Major timber species in the national market
<i>Prioria copaifera</i> (cativo)	Losing its value because of competition from cheap plywood imports
<i>Tectona grandis</i> (teak, teca)	From plantations, increasingly important in the national timber market

Status of forest management

Forest for production

The framework for natural forest management is set by Law 1/94 and its regulation 5/98. Forest management in natural forests is carried out by way of various types of timber-cutting licences, including logging permits on private lands, special permits for subsistence (granted to individuals for cutting a small number of trees for personal use), five-year forest concessions for 1,000–5,000 hectares and for areas larger than 5,000 hectares, logging permits and forest concessions for indigenous communities in the *comarcas*, and logging permits for community forest plantations. Between 1991 and 1999, 29 forest concessions were granted over 67,150 hectares, but forest concession licences have been suspended since 2002. Seventeen permits (over 3,400 hectares) have been granted on private farms and 66 permits for communities over 15,000 hectares. Six community permits were in operation in September 2004, while ANAM granted approximately 5,200 subsistence permits in 2004^b. Logging under existing community permits is selective, generally done without regard to forest management guidelines, and is very detrimental to the remaining forest^b. Moreover, indigenous communities have been known to sell their rights to such permits to private companies for meagre prices. Management is occurring in some privately owned plantations and national parks, and in privately owned tracts of forests located mostly in eastern Panama. Law 1/93 stipulates that the granting of licences for new concessions is conditional on integrated forest

management plans for SFM and independent monitoring of implementation, but few such plans have been prepared. Forests are being high-graded through cutting permits, without regard to long-term sustainability^c. Logged-over forests are generally degraded.

Silviculture and species selection. No formal silvicultural systems are applied in the natural forests. The total number of tree species harvested and marketed to a significant extent is between twelve and 15; the most commonly harvested are shown in Table 2, but new species are now being considered in the market, including *Miroxylon balsamum* (bálsamo), *Platymiscium pinnatum* (quira), *Hieronyma alchorneoides* (zapatero), *Puteria* spp (platano), *Gyranthera darinensis* (cucharo) and *Astronium graveolens* (zorro). Those most harvested previously included *Carapa guianensis* (tangare), *Cedrela odorata* (cedro amargo), *Tabebuia rosea* (oak), *Calophyllum brasiliense* (maria), *Copaifera aromatica* (cabimo), *Dalbergia retusa* (cocobolo), *Ocotea* spp (bambito) and *Swietenia macrophylla* (caoba).

Planted forest and trees outside the forest. Of the estimated 56,000 hectares of plantations in 2003, 44,000 hectares have been established since 1992^b, the majority by private and community landowners. While the main plantation species before 1990 was *Pinus caribaea* (pino caribe) at 7,000 hectares, after 1995 *Tectona grandis* (teak, teca) became the major species, with nearly 28,000 hectares of new plantations. Teak and pino caribe account for about 80% of the planted area. Other species planted are valuable hardwoods such as *Cordia alliodora* (laurel), *Bombacopsis quinata*

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

Total	Natural				Planted		
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
350	86	63	0	0	56	32	12.2

(cedro espino), *Terminalia amazonia* (amarillo), caoba, *Hieronyma alchorneoides* and *Dipteryx panamensis* (almendro).

Forest certification. As of December 2005, six plantations with a total area of 12,240 hectares had been certified under the FSC umbrella (FSC 2005). ANAM supports the development of voluntary certification through technical workshops, which have been held with NGOs and the private sector.

Estimate of the area of forest sustainably managed for production. The total area of forest covered by management plans is about 63,000 hectares. Few if any of the existing concessions are thought to manage their forests sustainably^c. More than 1,000 small landowners manage about 32,000 hectares of planted forest.

Timber production and trade. Total roundwood production was an estimated 1.2 million m³ in 2000 (ANAM 2004), 95% of which was for fuelwood and charcoal. Official industrial log production was about 100,000 m³ in 2003, up from 48,000 m³ in 1999 (ITTO 2004, 2005); an estimated 50,000 m³ of logs are entering the local market from illegal sources^c. Sawnwood production in 2003 was about 27,000 m³ (ITTO 2005). The total installed sawmill capacity is approximately 200,000 m³ (ANAM 2004), which is double current official industrial log production. The primary-processing industry is very small, uses antiquated equipment and is located mainly in the periphery of Panama City; it is in such a poor state that it faces extinction within five years^b.

Non-wood forest products. Numerous wildlife species provide important sources of protein in indigenous territories, including tapir, *Agouti paca* (conejo pintado), and other mammal species. Many plants are collected for medicinal purposes. The palm fruit *Phytelephas seemannii* (tagua) and such

fibres as *Astrocaryum* sp (chunga) and *Carludovica palmata* (the 'Panama-hat palm') are used for handicrafts, as is the wood of *Dalbergia retusa* (cocolobo). Poles and leaves of *Cryosophila guagara* (guagara) are used for local construction. Fruits and nuts from forest trees are collected for local use and sale, including *Borojoa patinoi* (borojó), a fruit with aphrodisiac properties.

Forest for protection

Soil and water. Forests managed principally to protect soil and water cover about 326,000 hectares; most of these are situated in the watershed of the Panama Canal, which covers an area of 518,000 hectares^b. They have the important function of protecting the Panama Canal from siltation and ensuring an adequate supply of water for the locks. The Ministry of Health has a program of forest restoration and reforestation in watersheds that serve as water sources for rural communities and municipalities.

Biological diversity. Panama is very biodiverse for its size. Estimates indicate over 10,000 species of vascular plants, 218 mammal species, 929 bird species, 226 reptiles and 164 amphibians (UNEP-WCMC website). Eighteen mammals, 20 birds, seven reptiles and 52 amphibians are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, seven mammals, 18 birds, 52 amphibians and four plants are found in forests (IUCN 2004). Another estimate of endangered species of flora and fauna is 5,308 species^b. Six plant species are listed in CITES Appendix I and 543 in Appendix II, including caoba and *Swietenia humilis* (CITES 2005).

Extent of protected areas. The newly created National System of Protected Areas has 50 protected areas divided into 13 categories with an area

Table 4 Management of the protection PFE ('000 hectares)^{b,c}

Total	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
1,580	1,040	326	396 ^d	180 ^c

of 2.45 million hectares^b (32% of the national territory). However, encroachment and timber theft in the protection PFE are widespread^c. Protected areas are distributed according to the following main management categories: 17 national parks with a total area of 1.3 million hectares, out of which 1.08 million hectares are forested; forest reserves; four wildlife refuges (32,000 hectares); protection forests; wetlands; natural monuments; natural areas; hydro protection zones; wild areas; biological corridors; and multiple-use areas^a. The Darien National Park encompasses nearly 50% of the total forest protected area. Six protected areas out of 43 are interconnected. An estimated 1.04 million hectares of forest are contained within protected areas conforming to IUCN protected-area categories I-IV, including 741,000 hectares of lowland evergreen broadleaved rainforest (UNEP-WCMC 2004).

Estimate of the area of forest sustainably managed for protection. Insufficient information was made available for this report to enable an estimate to be made of the area being sustainably managed over the entire protection PFE. However, an estimated 722,000 hectares of such forests are covered by administrative instruments^b and benefit from some form of management^a. Simple management plans exist for several protected forest areas, but they are generally not implemented due to a lack of financial resources and personnel^b. The core protected forest area in the watershed of the Panama Canal (about 180,000 hectares) is generally considered well managed^c (Table 4).

Socioeconomic aspects

Economic aspects. The contribution of the forest sector to GDP is very low (less than 1% in 2002^a). However, it is an important economic factor locally, particularly for indigenous communities; the forest sector employs about 6,500 people, many of them rural poor^a.

Livelihood values. Special consideration has been given to the *comarcas* where community forest concessions can contribute to the livelihood of local communities; such approaches have been tested through an ITTO project in the Kuna Yala communities on the Atlantic coast with limited success. Forests are generally considered a common good and there is little perception of their sustainable use on the part of stakeholders, including local communities, settlers invading forest areas from other regions and commercial logging operators.

Summary

The management of Panama's PFE is problematic. Concessions have been suspended, and smaller-scale logging is being carried out with little oversight and without detailed management plans or silvicultural prescriptions. The timber industry is in a poor state, with antiquated equipment and an under-supply of legally produced timber. Large areas of forest are classified as protected areas; nevertheless, they are generally not managed or controlled effectively. Forest plantations are being developed, mainly on private properties. Forest management appears strongest in the watershed of the Panama Canal.

Key points

- The PFE comprises an estimated 350,000 hectares of natural production forest and 1.58 million hectares of protection forest. A further 1.60 million hectares of forest have not yet been allocated.
- No production PFE is considered to be under sustainable management. The estimated area of protection PFE under SFM is estimated to be at least 180,000 hectares, comprising the core protection area of the Panama Canal.
- The forest law recognizes the rights of indigenous communities to manage forests in indigenous reserves (called *comarcas*).

- ANAM has insufficient human and financial resources to carry out the field-level monitoring and control of forestry operations necessary to ensure adherence to forest-related laws and regulations.
- The private sector and civil society have been minimally involved in the preparation of SFM policies and strategies.
- There is a lack of information on the silviculture of the country's natural forests and an apparent lack of research and training capacity.
- Most of the protected areas and protection forests are not well delimited and are threatened by encroachment.
- Illegal logging is widespread in the moist forest area, even in protected areas. This is a significant impediment to long-term SFM.

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PERU



*For legend see page 58

Forest resources

Peru, the third-largest country in South America, has a land area of 129 million hectares and a population of 27.1 million people. It has three distinct biogeographical zones. The desert coastal region covers 13.6 million hectares, the semi-arid Andean mountain range (*sierra*) 39.2 million hectares, and the moist tropical Amazon Basin, including the eastern humid slopes of the Andes, 75.7 million hectares. Ninety-two per cent of Peru's forests lie in the Amazon Basin. Estimates of Peru's forest area include 65.2 million hectares (FAO 2005a), 71.1 million hectares (UNEP-WCMC 2004), 78.6 million hectares^a and 86.4 million hectares (government of Peru 2000). Peru has the second-largest forest estate in Latin America and the eighth-largest globally.

Forest types. The main forest type in Peru is tropical moist forest (rainforest), with subtypes that depend on altitude and the different soils within the Amazon Basin, particularly their position in relation to rivers. The alluvial forests, including those on the lower river terraces, offer some of the best potential for integrated forest management and agroforestry because of their vigorous growth, flat terrain and better accessibility; their upper stories are generally 35–40 m in height. These forests have been used intensively in the past, leaving large expanses of secondary forest (*purma*) dominated by stands of fast-growing, light-demanding pioneer species. Hill forests – on rolling terrain with moderate slopes – are the most widespread forest type in the tropical moist forest area.

Dynamics of forest resource change. Annual deforestation in Peru averaged an estimated 0.4% in the period 1990–2000 (FAO 2005a); the current rate is an estimated 269,000 hectares per year^a. Deforestation is caused mainly by the establishment of new settlements due to migration from the Andes, migratory agriculture, illicit cultivation of coca, and the expansion of urban centres such as Iquitos and Pucallpa.

Permanent forest estate. Under the forest law of 2000 (*Ley 27308/2000*), the forest is classified into the following categories:

- production forests (permanent and in reserve);
- forests on protection land;
- forests for future use (forest plantations, secondary forests and degraded forests for restoration);

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares) ^{a,d,*}			
		Production		Protection	Total
		Natural	Planted		
65.2–86.4	64,204	24,600	200–300	16,300	41,150**

* CIEF pers. comm., December 2005

** Includes 250,000 hectares of plantations

- natural protected areas;
- forests in native and rural communities; and
- local forests.

Permanent production forests are intended for timber production and the conservation of forest resources; an approved forest management plan is required. As of 2005, 24.6 million hectares of permanent production forests had been established in the Amazon Basin in the departments of Loreto (14.8 million hectares), Ucayali (4.09 million hectares), Madre de Dios (2.52 million hectares), San Martín (1.5 million hectares), Huanuco (880,000 hectares), Junín (250,000 hectares), Pasco (180,000 hectares), Cuzco (170,000 hectares), and Ayacucho and Puno (CIEF pers. comm., December 2005).

Planted forests. There is some uncertainty about the area of planted forests. According to one estimate, the total forest plantation area was 650,000 hectares in 2001^a. The planned planting rate since 1997 is reported to be 50,000 hectares per year^a, but this may not have been fully achieved. Current realistic estimates suggest the total forestry plantation area to be between 200,000 and 300,000 hectares (CIEF pers. comm., December 2005). Most plantations are located in the Andean region, the main species there being *Eucalyptus globulus*. About 70% of all planted forest is privately or community owned, and 30% is owned publicly.

Institutional arrangements

Forest tenure. Forest lands are classified into public, private and indigenous. Large parts of the forest are owned by communities. In 2002, 8.4 million hectares of forests were classified as public forests reserved for communities and indigenous groups, of which 6.2 million hectares had land titles^a. In the Peruvian Amazon, 1,192 indigenous communities possess land rights. There is uncertainty regarding the extent of ownership of Amazonian forest by community and indigenous groups. FAO (2003a) estimated that some 22.5 million hectares were so owned; others suggest that clear land titles only cover around 10 million hectares (J. Leigh, pers. comm., December 2005).

SFM policy framework. Peru has recently developed standards for forest management. It has adopted national C&I based on the Tarapoto process and has

accepted ITTO's C&I to be used at the FMU level. Specific C&I were prepared for the first permanent production forest in Biabo in 1999. The concession management plans for all other production forests are based on these C&I.

Forest policy and legislation. The forest legislation of 1975 was completely revised recently with the support of an ITTO project (PD 42/96 (F)). The current forestry and wildlife law and its regulations (*Ley Forestal y de Fauna Silvestre – Ley 27308* – and *Reglamento de la Ley Forestal y de Fauna Silvestre – Decreto Supremo 014/2001-AG*) were approved in 2000 and 2001 respectively, and a new national forest strategy was prepared in 2002. This strategy presents an historic analysis/baseline for the forest sector; defines a vision and strategic principles, strategic objectives, expected outputs, and programs for the development of the sector; and provides indicators to monitor the progress made. The document has been widely discussed in a participatory process and was officially adopted by the Peruvian government in August 2004 (*Decreto Supremo 031-2004-AG*). The new forestry and wildlife law embodies the forest policy of the country (articles 3–7) and prescribes several options for SFM and reforestation, including:

- 40-year concessions for commercial timber, NWFPs, ecotourism and environmental services (Article 10);
- the sustainable management of forests belonging to indigenous communities (Article 12);
- the sustainable management of local forests by local governments and rural populations (Decree 014/2001); and
- the establishment of 40-year reforestation concessions (Article 28).

Forestry is a major part of the changing political context in Peru. Forests have become a major issue in the National Governance Agreement that institutionalizes dialogue between different actors, defines approaches to development and strategies for poverty reduction, and aims to improve food security, employment and social cohesion. The administration of forest resources will also be included in the continuing political decentralization from central to regional governments. Moreover, forestry is an important element in defining a policy for rural development.

Institutions involved in forests. The forest sector is overseen by the National Institute for Natural Resources (*Instituto Nacional de Recursos Naturales* – INRENA), which was set up in 1992 under the Ministry of Agriculture. INRENA also runs the state system of natural protected areas (*Sistema Nacional de Areas Naturales Protegidas por el Estado* – SINANPE). The National Consultative Council for Forest Policy (*Consejo Nacional Consultivo de Política Forestal*) is a legally constituted national consultative council to supervise environmental and forest policy. However, as of December 2005 it had not been physically established. In addition, an independent forest control and supervision agency (*Organismo Supervisor de los Recursos Forestales Maderables* – OSINFOR) was created in 2000 and subsequently incorporated into INRENA with limited autonomy. An independent agency for the promotion of forest-based production and forest industries and the marketing of environmental services of forests (*Fondebosque*) has been created and is supported by several international donors; it provides technical assistance, training and financial services to timber producers. National development institutions such as the Peruvian Amazon Research Institute (*Instituto de Investigación de la Amazonía Peruana* – IIAPI) play important roles in the promotion of SFM at the local level. With the assistance of an ITTO project, INRENA has enhanced its forest production statistical capabilities through its Centre for Strategic Forestry Information (*Centro de Información Estratégica Forestal* – CIEF).

National and international NGOs are very active in Peruvian forestry and are influential in the development of policy; WWF Peru, Foro Ecológico, Conservation International Peru, ProNaturaleza (*Fundación Peruana para la Conservación de la Naturaleza*) and Red Ambiental, for example, are important in driving forest conservation and the forest concession reform process. Various private-sector organizations are also involved, the most active being the National Forestry Chamber (*Cámara Forestal Nacional*), the National Timber Corporation (*Corporación Nacional de la Madera del Perú*) and regional forest producer associations, in particular those of Madre de Dios and Ucayali⁹. Indigenous peoples' associations such as the National Development Institute of the Andeans, Amazon People and Afro-Peruvians (*Instituto Nacional de Desarrollo*

de Pueblos Andinos, Amazónicos y Afroperuanos) are also strongly involved in forest issues. The University of La Molina has a strong forestry faculty that is actively involved in SFM research. All the aforementioned, together with government institutions and private-sector representatives, are also official members of the National and Regional Forestry Dialogue and Consensus Roundtables (*Mesas de Diálogo y Concertación Forestal Nacional y Regionales*), which meet periodically to discuss the implementation of forest policies.

Status of forest management

Forest for production

Up to mid 2002, some 1.85 million hectares of forests were harvested under the old harvesting regime through more than 1,500 harvesting contracts, most of them with an area of less than 1,000 hectares. The total cumulative authorized timber volume under these contracts was 3.64 million m³. Concessionaires often worked with subcontractors, who brought in their own equipment and personnel and were paid on volume extracted. However, basic silvicultural and operational measures such as RIL that might ensure sustainable yield were generally not applied. Extraction remained selective, concentrating on the species of high commercial value or wide industrial use. By mid 2003, only 151,000 hectares of forest licences were still operating under this old regime.

The new forestry and wildlife law eliminated the former harvesting contracts and established long-term concessions over larger areas; these are allocated by public auction and carry an obligation to present and comply with a long-term forest management plan and yearly operational plans. Silvicultural treatments and RIL now form part of the terms of reference for management plans and yearly plans of operation and are being applied in at least 40% of the concessions (CIEF pers. comm., December 2005). The public forests so far classified as permanent production forest and registered in public registries have been divided into harvesting units that range in size from 5,000 to 10,000 hectares. The granting of concessions has been organized through public competition with the following conditions: the length of concession

Table 2 Some commonly harvested species for industrial roundwood (1991–2004)^{c, *}

Timber species	Remarks **
<i>Cedrelinga catenaeformis</i> (tornillo)	112,441 m ³ /year
<i>Swietenia macrophylla</i> (caoba)	53,256 m ³ /year
<i>Cedrela odorata</i> (cedro)	52,997 m ³ /year
<i>Virola</i> spp (cumala)	42,719 m ³ /year
<i>Hura crepitans</i> (catahua)	27,731 m ³ /year

* CIEF pers. comm., December 2005

** Average sawnwood production over the period

is 40 years and renewable; the total area designated for concessions until 2005 was 24.6 million hectares; bidding is open to national and foreign companies under two types of bidding system – public auction (*subasta publica*) for concessions of 10,000–50,000 hectares, and public bidding (*concurso público*) for concessions of 5,000–10,000 hectares; and the maximum cumulative area for a concessionaire is 100,000 hectares under the public auction system and 50,000 hectares under the public bidding system.

By 2005, long-term concessions covering 7.54 million hectares had been allocated as follows (CIEF pers. comm., December 2005):

- Department Madre de Dios:
85 concessions totalling 1.30 million hectares;
- Department Loreto:
242 concessions totalling 2.58 million hectares;
- Department Ucayali:
171 concessions totalling 2.88 million hectares;
- Department San Martin:
34 concessions totalling 498,000 hectares; and
- Department Huanuco:
48 concessions totalling 286,000 hectares.

Many of these concessions are in formerly selectively harvested areas such as the flood zone along Amazonian tributaries and constitute what in some areas will be the third intervention within the last 30–40 years. Generally, the species harvested have changed, as many primary species are no longer present in large volumes. It is expected that the new concessions will harvest increasingly

lesser-known species and intensify their logging operations, at least until the silvicultural prescriptions to be implemented as part of the management plans developed under the new forest concessions regime achieve harvestable volumes of the high-value commercial species. The financial viability of the concessions will depend in large measure on their ability to obtain good prices for such species. Concession areas are also generally relatively small, typically 12,000–20,000 hectares. There is some question about whether concessions of such size will encourage substantial capital investment.

The new forest law specifies forest audits every five years and the renewal or suspension of concession agreements depends absolutely on the results of such audits, which are based on the application of a set of C&I for SFM derived from ITTO and the Tarapoto process. In addition, extraordinary inspections are being carried out in the forest concessions as part of the country's CITES-Appendix II mahogany observation strategy. Through CIEF, INRENA has the capacity to track the volumes and species of all legally harvested timber from concessions and other permits.

Silviculture and species selection. At least 90 species are used for timber and timber products; about 20 meet 80% of the demand^c. In the past, the major timber species harvested in the Peruvian Amazon was *Swietenia macrophylla* (caoba), and this is still an important species; Peru became the largest single exporter of it after Brazil banned its harvesting and export. Its high value also encourages illegal activities: INRENA has reported that, in 2003, 90% of illegally traded logs were of caoba; there are also indications that caoba and other high-value

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

Total	Natural			Planted			
	Allocated to concessions/ under licence	With management plans	Sustainably managed	Total	With management plans	Certified	
24,600	8,000	5,000	59.5*	560	200–300	8	0

* Includes 32,600 hectares of semi-natural and mixed plantation and natural forest

species are being obtained illegally from protected and indigenous areas^c. *Guazuma* spp (bolaina) and *Calycophyllum spruceanum* (capirona) are the species most traded in the domestic market. Other important species include *Virola* spp (cumala), *Amburana cearensis* (ishipingo), *Dipteryx micrantha* (shihua-huaco), *Hura crepitans* (catahua), and *Cariniana decandra* (cachimbo). Table 2 shows the five most commonly harvested species, ranked by average sawnwood production for the period 1991–2004.

Planted forest and trees outside the forest. 1997 was declared the 'Year of Reforestation' in Peru and in 1999 an ambitious reforestation scheme was started under the name *Sierra Verde*. Between 1997 and 2000 *Prosopis* was sown over more than 400,000 hectares to thicken sparse woody formations and to establish new woody cover where there was none before. However, it is estimated that only 10% survived. In 2005, reforestation was declared of national interest by Supreme Decree 003-2005-AG; a national reforestation plan has been developed and is to be launched shortly. A considerable number of long-term reforestation and enrichment-planting trials of native species such as *Cedrelinga catenaeformis* (tornillo), *Simarouba amara* (marupa), *Parkia velutina* (pashaco) and others in the Peruvian Amazon (eg in Jenaro Herrera, Bosque Von Humbolt and Tingo Maria) have been established, with good results. However, these trials have not yet been expanded to an operational scale.

Forest certification. According to FSC (2005), one natural forest covering 26,936 hectares was certified as of December 2005, and one semi-natural and mixed plantation and natural forest area covering about 32,600 hectares. Both belong to indigenous communities in Ucayali. A national working group on forest certification, coordinated by WWF Peru, is working on the establishment of an FSC-accredited

system for the voluntary certification of forest products, and several companies have commenced a pre-certification process^c.

Estimate of the area of forest sustainably managed for production. It is difficult to estimate the area of forest that is sustainably managed. The system of forest concessions is very new and there is little information on how that part of the PFE with management plans is being managed. An estimated 500,000 hectares of concessions are undergoing certification processes and, with the already-certified forest, form the minimum set of sustainably managed forest shown in Table 3.

Timber production and trade. Roundwood production in 2003 was estimated to be 10.3 million m³, of which 9.10 million m³ was fuelwood (FAO 2005b). National production of industrial timber in 2003 was an estimated 1.29 million m³ of logs, 528,000 m³ of sawnwood and about 101,000 m³ of plywood (ITTO 2006 in prep.). It is estimated that the maximum sustainable harvest under a 40-year polycyclic system is in the range 25–40 m³ per hectare^b; current offtake would appear to be well below that. It is estimated that there are 250 sawmills in Peru, the majority with a small installed capacity (averaging 2,900 m³/yr)^b. About 25% of them have bandsaws and a capacity of 10,000 m³ per year or more. There are also five veneer mills, twelve plywood mills, 20 parquet plants and 80 small workshops producing fruit boxes, etc (FAO 2003a). Almost all the wood is used domestically; only a very small amount is exported. The export of logs is not permitted; only processed products may be exported.

Non-wood forest products. The use of NWFPs is widespread in Peru, particularly in the Peruvian Amazon, where over 130 products have been identified for major local consumption and national and international trade. Important products for

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
16,300	3,130	390	n.d.	1,540 ^d

the international market include *Prosopis juliflora* (algarroba) from dry zones (6.5 million kg per year), *Uncaria tomentosa* (uña de gato or cat's claw, 500,000 kg per year), *Bertholletia excelsa* (castaña or Brazil nut, 1 million kg per year), *Caesalpinia tara* (tara fruit, 3.9 million kg per year), palmito (palm heart, 200,000 kg per year), *Croton lechleri* (sangre de grado), caña brava and caña hueca (1.1 million units per year), and a great number of medicinal and aromatic plants^a. Trade in NWFPs in 2000 earned more than US\$14 million^a.

Forest for protection

Soil and water. Soil and watershed conservation is important, particularly in the Andes. The National Program for the Management of Water Catchments and Soil Conservation (*Programa Nacional de Manejo de Cuencas hidrográficas y de Conservación de Suelos*) has been carrying out the most extensive forestry program in the country; it aims to use participatory programs of social development to contribute to soil and water conservation based on reforestation. A total of 390,000 hectares of forest are classified as exclusively for soil and water protection^a. The total forest carbon stock is estimated at 6.4 billion tons, 95% of which is in Amazonian forests^a.

Biological diversity. Peru has a great range of geographical conditions and is very biodiverse. It contains 10% of the global total of flowering plants (40,000–50,000 plant species), 462 mammals, 1,816 birds, 360 reptiles, 332 amphibians, 2,000 sea fish and 797 fresh water fish. Forty-eight mammals, 97 birds, eight reptiles, 78 amphibians and 276 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 19 mammals, 70 birds, 62 amphibians and two plants are found in forests (IUCN 2004). Twelve plants are listed in CITES Appendix I; 463, including caoba, in Appendix II; and one in Appendix III (CITES 2005).

Protective measures in production forests.

Management-plan prescriptions for forest concessions give clear guidance on leaving protection strips along streams; they specify species to be protected and refer to wildlife protection in concession areas. There are also prescriptions for RIL.

Extent of protected areas. In 2001, new natural protected areas were defined and existing protected areas were reclassified. The well-developed and relatively well-funded system of protected areas, SINANPE, now contains 61 protected areas covering an area of 17.7 million hectares, or 14% of the country. Protected areas include national parks, national reserves, national sanctuaries, historic sanctuaries, hunting reserves, communal reserves, reserved zones and protection forests. Their main purpose is to protect representative ecosystems and their biodiversity. According to UNEP-WCMC (2004), 3.13 million hectares of forest are in protected areas conforming to IUCN protected-area categories I–IV, including 1.9 million hectares of lowland evergreen broadleaved rainforest. Based on provisions in the new forestry and wildlife law, in July 2001 INRENA granted an area of 135,832 hectares as a 'conservation concession' for a period of 40 years to a private association (the Amazon Watershed Conservation Association – *Asociación para la Conservación de la Cuenca Amazónica – ACCA*). In such concessions, protection activities, ecotourism and the sustainable use of NWFPs may be carried out, but not logging. It is expected that more concessions will be granted in the future for NWFPs and conservation.

Estimate of the area of forest sustainably managed for protection. The area of protection PFE managed sustainably is estimated to be at least 1.54 million hectares, which includes the core water protection forests of about 60,000 hectares^c; the totally protected portion of the Peruvian part of the transboundary protected areas of Tambopata (1.09 million hectares) and El Condor (253,000

hectares), which are supported by ITTO projects; and the ACCA conservation concession (136,000 hectares). Moreover, large areas of the protection PFE, even if not formally under SFM, are under no imminent threat due to their remoteness.

Socioeconomic aspects

Economic aspects. The contribution of the forest sector to GDP is around 1%^a. An estimated 250,000 jobs are generated directly by forestry activities, over 50% of them in the Peruvian Amazon^b. The forest industry and small- to medium-sized enterprises are mostly located in Lima, Trujillo, Chiclayo, Cuzco, Iquitos, Pucallpa and Tarapoto and employ more than 82,000 people. The contribution of forestry, however, is not only made through direct employment but also through the provision of a wide range of goods for consumption, handicrafts and small commerce. Fuelwood collection is still the main extractive use of the country's natural forests. Small-scale logging is important both economically and socially in the Amazon; nearly all forest areas close to the main rivers have been heavily harvested.

Livelihood values. Many NWFPs are used and traded locally, such as fruits and vegetables like *Mauritia flexuosa* (aguaje), camu-camu and palmito, local bamboo (*Guadua angustifolia*), palms and fibres. Wildlife, particularly fish, is an important source of protein throughout the Amazon.

Social relations. The Peruvian Amazon remains a frontier for settlers from other parts of Peru, many of whom engage in small-scale and often illegal logging. The social impacts of the new concession system are unknown. Illegal harvesting of the two most important species, caoba and cedro, is widespread^c. Logging by outsiders of indigenous and community lands can cause intra-community conflicts, including over the distribution of payments. Narcotic crops, particularly coca, are planted by shifting cultivators in fields and small openings in the forest^c.

Summary

Over the past three years, Peru has taken significant steps towards integrating the forest sector into the broader macroeconomic objectives of sustainable development. The new forestry and wildlife law

embodies the forest policy of the country and prescribes several options for SFM and reforestation. An independent forest-control mechanism has been established and a broad coalition of stakeholders from the public and private sectors and civil society works together to develop joint approaches to SFM. Nevertheless, Peru still faces some major challenges in enforcing and applying regulations and planning instruments in the country's vast Amazon forests.

Key points

- Peru has a large forest resource with good potential for sustainable management.
- The PFE comprises an estimated 24.6 million hectares of natural production forest, 200,000–300,000 hectares of plantations and 16.3 million hectares of protection forest. A further 19.1 million hectares of forest have not yet been allocated.
- At least 560,000 hectares of production PFE and 1.54 million hectares of protection PFE are being managed sustainably. Moreover, large areas of the protection PFE, even if not formally under SFM, are under no imminent threat due to their remoteness.
- 59,600 hectares of natural forests have been certified in indigenous territories.
- The deforestation rate of about 269,000 hectares per year is one of the highest in the region; it is caused largely by the influx of settlers to the Amazon region and subsequent clearance for agriculture.
- A new forestry and wildlife law and its regulations were approved in 2000/2001, a national forest strategy was adopted in 2004 and a national reforestation plan was prepared in 2005.
- The forestry and wildlife law is a bold initiative to promote SFM; its effective implementation will probably require substantial investments in human resources in both the public and private sectors.
- Among other things, the new law sets out the parameters of a new concession system.
- An independent forest control and supervision agency has been created to oversee the implementation of this new system.

- The financial viability of SFM will depend in large measure on the prices that can be obtained for a range of lesser-known species.
- There are many informal forest operations, especially linked to caoba and cedro, but these species are becoming economically scarcer. Harvesting pressure for such timbers is increasing both in protected areas and in forests belonging to indigenous communities.
- The capacity to implement SFM at the field level is low, although considerable efforts are being made to address this through training and technical assistance.

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SURINAME



*For legend see page 58

Forest resources

The Republic of Suriname has a land area of 16.3 million hectares and an estimated population of 400,000 people. A lowland region and the southern highlands account for 80% of the land area and form part of the pre-Cambrian Guyana Shield that straddles Suriname, Guyana and French Guiana. In contrast to neighbouring Guyana, however, sandstone mountains are confined to a few areas and only rise as high as 1,280 m above sea level. Along the northern edge of the shield lies a savanna belt, beyond which is a narrow swampy coastal plain where 90% of the population is concentrated. Estimates of forest area include 14.1 million hectares (FAO 2005), 14.8 million hectares^b and 13.6 million hectares (UNEP-WCMC 2004).

Forest types. Three major forest types can be distinguished, corresponding to the three major biogeographical zones: (i) the hydrophytic forests in the north, which comprise swamp forests, mangroves and ridge and marsh forests; (ii) xerophytic savanna forests in the savanna belt; and (iii) the predominant mesophytic moist forest types of the Guyana Shield^b.

Dynamics of forest resource change. Suriname does not face the population and migration pressures that have led to deforestation in other countries; FAO (2005) estimated the rate of deforestation in 1990–2000 to be virtually zero. More than 400,000 hectares of swamp and savanna forests are degraded due to poor-quality logging and mining operations^b. Occasional forest fire is considered to be the main present threat to forest resources.

Permanent forest estate. A first attempt was made to establish a PFE (Table 1) following the enactment of the Forest Management Act in 1992; the total PFE is estimated to be 11.3 million hectares, of which 6.89 million is allocated to production. ITTO (2003), however, estimated the accessible production forest to be 4.5 million hectares^b.

Planted forests. An estimated 52,347 hectares of planted forest once existed in Suriname, but only about 7,000 hectares remain today^b.

Institutional arrangements

Forest tenure. According to the 1987 constitution, all forests, except those on privately owned land, belong to the state. The constitution does not provide for collective rights or the collective

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares) ^d			
		Production		Protection	Total
		Natural	Planted		
13.6–14.8	14,100	6,890*	7 ^b	4,430**	11,327

* Estimate based on Republic of Suriname (2000)

** The protection PFE includes protection forest, special protected forest and nature conservation forest. Not all this area has been formally designated^b

use of land, but Amerindian and Maroon people (the latter being descendants of slaves of African origin) claim these rights.

SFM policy framework. The Forest Management Act (1992) provides criteria for the sustainable use of forest resources. In addition, the government plans to develop national C&I for SFM as part of the Amazon Cooperation Treaty initiative. A recent ITTO diagnostic mission to Suriname proposed the establishment of a forestry database that would include: the classification of the potential of forest land; a national forest inventory; an assessment of forest industry with economic analyses; a survey of the wood-processing industry; and an update of the concession database^b.

Forest policy and legislation. The Forest Management Act covers the sustainable and rational use of forest resources, taking into account the interests of forest-dwellers and the conservation of nature and biological diversity. Its provisions cover: the classification of forests for production, protection and conservation; regulations for forest management and harvesting to stimulate the sustainable use of timber; and regulations for forest transport and the processing industry.

Rules for the implementation of the act were prepared between 1997 and 2000 with technical assistance from FAO and funding from the Netherlands^b. A new national forest policy was adopted in 2003 that lays down guidelines for achieving SFM. The Forest Management Act is now being revised to provide more coherence in the legislation, clearer management prescriptions for SFM and, eventually, to establish a single forest authority. The national forest policy has been described as a balanced policy conducive to achieving SFM, although in the view of two stakeholder groups it is not yet concrete enough and may leave too much room for manoeuvring^b.

A draft environmental act is also being discussed in Parliament. This will have important procedural consequences for the issuance of timber licences and the installation of timber-processing units. In the absence of agreed national C&I, the environmental impact assessments described in this act will be essential for monitoring progress towards SFM.

Institutions involved in forests. The semi-autonomous Foundation for Forest Management and Forest

Control (*Stichting voor Bosbeheer en Bostoezicht – SBB*), which was established in 2001, is responsible for forest management and the monitoring and control of logging; it derives its mandate from the forest service (*Lichtwet en BosBeheer – LBB*). The LBB is in charge of nature conservation and the management of nature reserves in collaboration with the Foundation for Nature Conservation (*STINASU*)^b. Preparations are now being made to establish a single forest authority (see above), which will also be responsible for nature conservation. Some research and development related to sustainable management is conducted by SBB, partly implemented with international support. This includes a study on the promotion of the efficient use of forest resources through management planning, the issuance of forest licences, guidelines for forest inventory, and the rehabilitation of the forestry training centre for vocational training.

National environmental NGOs are weak, but the influence of international environmental organizations in various aspects of natural resource management is high. The Amazon Conservation Team is working on the use of NWFPs and participatory land-use mapping involving local communities and the government (Tropenbos International 2004).

Status of forest management

Forest for production

In 1993, Suriname invited international investors to establish logging concessions in the country. The requirements for management plans address criteria or methods for SFM in only a limited way, and management plans appear to serve as an administrative tool for charging levies and fees rather than providing guidance in SFM. There are several systems for timber licensing, including concessions, communal wood-cutting permits (*houtkapvergunningen – HKVs*) and 'incidental cutting licences' (ICLs). The procedures for granting concessions and licences were not transparent in the past. Concessions vary in length between one and 20 years, but it is now proposed by the forest authority that this should be increased to 25 years.

As of late 2003, 67 concessions had been allocated over a total area of 1.74 million hectares. Thirty-three licences are for areas smaller than

Table 2 Some commonly harvested species for industrial roundwood (2001-2003)^b

Timber species
<i>Dicorynia guianensis</i> (basralocus)
<i>Virola spp</i> (baboen)
<i>Qualea rosea</i> (gronfolo)
<i>Goupia glabra</i> (kopie)
<i>Ocotea rubra</i> (wana)

5,000 hectares in size, ten between 5,000 and 10,000 hectares, and eight are large, foreign-owned concessions between 100,000 and 150,000 hectares totalling 1.09 million hectares. Of the latter, 740,000 hectares have been considered idle or non-compliant and are waiting for final withdrawal notice^b. HKVs are granted to Amerindian or Maroon communities on state-owned lands; approximately 435,000 hectares of forests have either been granted as HKVs or, since the Forest Management Act of 1992, have been allocated as 'community forests' to such communities. Community forests are for local use only, and not for commercial purposes. ICLs are granted to individuals for subsistence purposes and are used generally for converting forest to subsistence agriculture. HKVs are usually negotiated between the community chief and a logging enterprise and may bring little benefit to the community as a whole. About 200 small- and medium-sized logging companies are active, with an annual production capacity of up to 500,000 m³ (with present equipment)^b. About 40% of logs come from regulated forest concessions; the remainder is derived from HKVs, ICLs and illegal sources^b. Budgetary constraints make it difficult for the government to fund law enforcement.

Planned oil-palm plantations and clearcutting for gold and bauxite mining (if continued) will lead to a substantial increase in salvage timber in competition with the output of selective logging, with the likely effect of depressing timber prices and decreasing the incentive to achieve SFM.

Silviculture and species selection. The forests are characterized by a high variety of species;

more than 600 tree species have been described. Some 50 species are known as class A commercial species and about 100 as class B. The species listed in Table 2 are harvested in the highest volumes. International markets particularly seek *Tabebuia serratifolia* (groenhart), *Peltogyne venosa* (purperhart), *Dicorynia guianensis* (basralocus), *Hymenae courbaril* (rode locus) and *Ocotea rubra* (wana)^b. The Celos Management System – an experiment in polycyclic silviculture to sustain timber production by RIL and post-harvesting silvicultural treatments – was applied in Suriname on a limited scale in the 1980s and 1990s.

Planted forest and trees outside the forest.

The predominant planted species for industrial purposes is *Pinus caribaea* – about 58% of the plantations. The rest are planted with broadleaved species and are more of an experimental nature. The principal indigenous species are *Cedrela spp*, *Cordia alliodora* and *Simaruba amara*; the main exotic species are eucalypts. Some of the forest plantations are mature enough to harvest, but many have not yet been thinned. There is little information about standing volume, growth rates or current condition.

Forest certification. There are no certified forests in Suriname. An FSC National Working Group was established in June 1998; this evolved into a working group on forest certification in 2002 under the auspices of SBB and WWF, which is an initiative to advance the institutional, policy and – if needed – legal framework in Suriname for the introduction of forest certification^b.

Estimate of the area of forest sustainably managed for production. The accessible productive forest area is about 4.5 million hectares; the present net productive area is considered to be 2.5 million hectares^b. Only one concession has a fully developed forest management plan. The total sustainably managed forest area is therefore probably close to zero.

Timber production and trade. The annual production of industrial roundwood increased from 183,000 m³ to 250,000 m³ between 1997 and 1999; sawnwood increased from 41,000 to 50,000 m³ and plywood from 7,800 to 8,000 m³ (ITTO 2003). Since 2000, official production has remained stable at about 160,000 m³ per year (ITTO 2005). There are 68

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
6,890	1,740	73	0	0	7	0

sawmills with an estimated installed capacity of 500,000 m³ of roundwood; the present recovery rate is about 40%^b. The use of wood for fuel is negligible. Suriname is a net timber exporter but it also imports wood products such as particleboard, fibreboard and, to a certain extent, plywood. In 2003, Suriname exported logs and sawnwood valued at US\$495,000 and US\$1.89 million respectively (ITTO 2005).

Non-wood forest products. As in neighbouring Guyana, *Euterpe oleracea* (palm heart, manicole) is a major export. Nibi and cufa (rattan-like *Heteropsis flexuosa* and *Clusia* spp) are used locally for furniture-making and exported to the Caribbean. Fibres of *Mauritia flexuosa* (mauritia palm) are used to make baskets, mats and other items for export. Other products include latex from *Manilkara bidentata*, *Bixa orellana* (annatto dye) and *Carapa guianensis* (crabwood oil).

Forest for protection

Soil and water. About 22% of the total forest area has been classified as protection forest and conservation areas (3.27 million hectares) to protect water and soils and to conserve biodiversity.

Suriname's forests are generally intact but threats do exist. For example, river pollution is a problem: some waterways are contaminated with mercury as a result of uncontrolled gold mining, and river siltation and soil erosion are prevalent^b.

Biological diversity. Suriname has large intact forest ecosystems of global significance and the forest area has extremely high conservation and ecological value, particularly in the swamps and on the Guyana Shield. No biological inventory was available for this report, but the richness of the forest is not in doubt and it is certain that much remains to be discovered. Twelve mammals, six

reptiles, two amphibians and 27 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, five mammals, two amphibians and one plant are found in forests (IUCN 2004). Suriname has listed two plant species in CITES Appendix I and 41 in Appendix II; none is a timber species (CITES 2005). The country has started to explore the possibility of biodiversity prospecting: a Surinamese pharmaceutical firm and the National Herbarium have established a partnership with Conservation International and others to look for anti-HIV and anti-cancer compounds^b.

Extent of protected areas. According to UNEP-WCMC (2004), an estimated 1.39 million hectares of forest are contained within protected areas classified in IUCN protected-area categories I-IV, including 1.15 million hectares of lowland evergreen broadleaved rainforest.

Estimate of the area of forest sustainably managed for protection. Insufficient data were available to estimate the area of protection PFE being managed sustainably. However, most of the protected area is intact due to a lack of development pressure.

Socioeconomic aspects

Economic aspects. Forest-based activities contributed 2.5% to GDP in 2000 and provided direct employment in logging and the wood-processing industry for around 4,500 people (4.5% of the entire work force)^b. There is also considerable informal and unrecorded employment and economic activity in the sector. Government revenue from forest concessions and other logging activities in the past was practically zero; an exception has been the revenue from export taxes on forest products. Stumpage fees and export fees recently increased significantly, and forest charges may be further

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
4,430	1,390	1,160	n.d.	n.d.

increased under revisions of the Forest Management Act. Log production in Suriname is probably as much as 50% more costly than in Brazil (for example) due to low yields, poor access, a lack of management capacity and a shortage of trained people at all levels. Capital investment in forestry is low and interest rates are high (20% or more), making credit unobtainable for small- and medium-scale investors.

Livelihood values. Subsistence from the forest is a lifeline for most Amerindians and Maroons; about 40,000 people from these tribal communities make their living in the rainforest area^b. Forest resources are important to them for medicines, building materials and fibres, but particularly for wild animals, fruit, seeds and nuts, which are major food sources. More than a thousand plant and animal species are known to be used in one form or another (van Andel et al. 2003). Some communities have also undertaken small-scale timber extraction for commercial use.

Social relations. Suriname's people comprise a racial mix of Amerindians, Creoles, Hindus, Maroons, Javanese, Chinese and Caucasians. About 10% of the population is Amerindians and Maroons, who claim collective land-use rights, including to forests. Mechanisms for structured consultation and participation are urgently needed to resolve conflicts over land tenure, which occur particularly in the coastal zone and in the northern forest area. A recent report by the Inter-American Development Bank (IDB 2005) found that logging concessions have been granted on indigenous and community lands without prior consultation with the communities concerned.

Summary

Suriname has a large forest resource base that contains a sizeable growing stock of valuable hardwood timber. However, its forest-management institutions are not yet equipped to oversee the

introduction of SFM in a commercial sector that has materialized only in the last decade or so. In addition, insecure tenure and recent difficult economic circumstances jeopardize the implementation of SFM.

Key points

- More than 80% of Suriname is forested, and very little deforestation is taking place.
- The PFE comprises an estimated 6.89 million hectares of natural production forest and 4.43 million hectares of protection forest. A further 2.59 million hectares of forest have not yet been allocated.
- As of late 2003, 67 logging concessions had been allocated over a total area of 1.74 million hectares.
- A coherent forest policy and legislation is under development, and the 1992 forest law is currently being revised.
- Current requirements for forest management plans do not have a strong focus on SFM.
- No area of either production or protection PFE has been identified in this report as under sustainable management. Nevertheless, most of the PFE is intact due to a lack of development pressure.
- Suriname's forests produce an estimated 160,000 m³ of industrial roundwood per year; the sector is a significant employer.

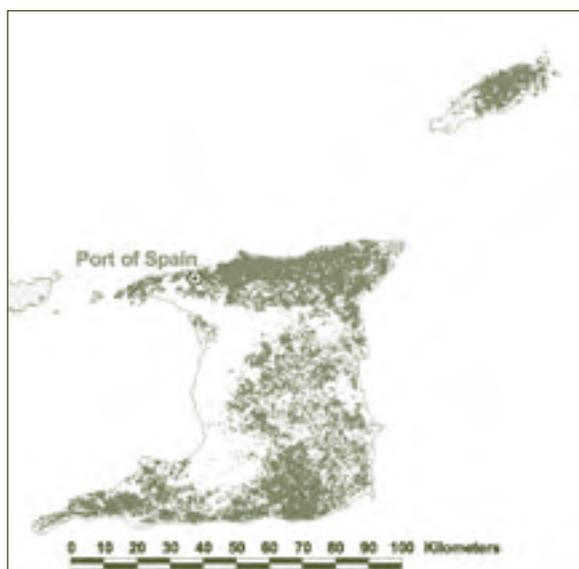
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^d ITTO estimate

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TRINIDAD & TOBAGO



*For legend see page 58

Forest resources

The country of Trinidad and Tobago consists of two main islands and a number of small islets; it has a total land area of 513,000 hectares and a population of 1.3 million people. Trinidad, the much larger island, is traversed by three ranges of hills running more-or-less east to west with a highest point in the northern range of 936 m. These ranges separate two areas of lowland terraces, alluvial plains and swamps. Tobago has a central ridge running for two-thirds the length of the island and rising to 576 m; the southern and western parts of the island are relatively flat. FAO (2005) estimated the forest area to be 259,000 hectares in 2000; another estimate (for 2003) is 248,000 hectares^b.

Forest types. The most widespread forest formation is semi-evergreen seasonal forest (about 100,000 hectares), characterized in the lowlands by

two main canopy species, *Carapa guianensis* (crappo) and *Eschweilera subglandulosa* (guatecare). Tropical evergreen submontane and montane forests occur in the mountains of the northern range. Some swamp forests remain (17,000 hectares), as well as mangrove relicts around the coast^a.

Dynamics of forest resource change. The annual deforestation rate between 1990 and 2000 was an estimated 2,000 hectares, or 0.8% of the forest area (FAO 2005). In 2000, secondary forests accounted for about 17,000 hectares of the forest estate^a. Fires and occasional hurricanes are the main natural hazards affecting the forests.

Permanent forest estate. Of the 192,200 hectares of state-owned forest, 131,500 hectares are designated as 'proclaimed forest reserves' and 11,700 hectares as 'unproclaimed forest reserves'. These – and some other protection forests – constitute the PFE (Table 1); only state forests are counted, since the permanency of private forest is unreported.

Planted forests. The total planted forest is estimated to be about 15,400 hectares, comprising 9,100 hectares of *Tectona grandis* (teak, introduced from Myanmar in 1913), 4,200 hectares of *Pinus caribaea* (Caribbean pine) and other pine species, and 2,100 hectares of mixed hardwoods^b.

Institutional arrangements

Forest tenure. Most forested land is owned and administered by the state. State-owned forest accounts for 192,200 hectares, including all the PFE; the remainder is in private hands.

SFM policy framework. Trinidad and Tobago has long had a systematic approach to SFM; for

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			Total
		Production		Protection	
		Natural	Planted		
0.248–0.259	250	127 ^d	15.4 ^b	59.1 ^{b,*}	201.5

* Includes forested area above 90 m contour (where logging is not permitted), wildlife sanctuaries, nature reserves and windbelts within reserves.

Table 2 Some commonly harvested species for industrial roundwood

Timber species	Remarks
<i>Tectona grandis</i> (teak)	From plantations, most valuable timber, 25% of all logs used ^a
<i>Pinus</i> spp	From plantations, 34% of all logs produced ^a
<i>Swietenia macrophylla</i>	From plantations
<i>Cedrela mexicana</i>	From plantations
<i>Cordia alliodora</i> (cypre)	From plantations

example, its block management and shelterwood systems have been applied for more than 60 years^b. However, it lacks a system of C&I suited to its needs, which would be an important part of an SFM policy framework.

Forest policy and legislation. Trinidad and Tobago adopted its first forest policy for the sustainable management of its PFE in 1942. A revision was made in 1981 to take into account the significant social, economic, political and technological changes that had taken place in the country since 1942, but it was never adopted by government. A further revision took place in 1998 and while the cabinet has approved this revision it has not been formally adopted. There is an absence of an agreed strategy and policy in the forest sector^b. Two major pieces of legislation have been revised and amended: the Forests Act (revised 1999) and the Sawmills Act (revised 1999). The 1998 policy revision proposed sustainability within two pillars of forest management:

- (i) the regulation of yield of all types (recreation, wildlife, timber, aesthetics, water, etc); and
- (ii) the improvement of the quantity and quality of stock.

Institutions involved in forests. In Trinidad, the Forestry Division of the Ministry of Public Utilities and the Environment (MPUE) is the state's sole management authority for the sector, being responsible for forestry, watershed management, wildlife, parks, utilization, research and services in support of the private forestry sector. Specific user rights (fuelwood gathering, use of NWFPs) are guaranteed by law for people living adjacent to the forests. However, the absence of an agreed strategy and policy for the forest sector is a source of uncertainty for the Forestry Division and weakens

its operational capacity^b. In 2001, a new strategic plan was developed for the Division for the period 2001–2005 and this was approved in principle by the government. It was expected that this plan would enable the Division to be more effective and efficient in delivering goods and services demanded by new and emerging challenges. Apart from a restructuring of the existing professional staff, several specialist positions are now being sought to meet the challenges of added roles and responsibilities. In Tobago, forests are under the jurisdiction of the Assistant Conservator of Forests, who reports to the Secretary of Agriculture, Land Marketing and the Environment^b.

There is no direct involvement by civil-society organizations in forest management.

Status of forest management

Forest for production

Both natural forests and particularly planted forests are actively managed. About 75,000 hectares of natural forests are regarded as intensively managed and have management plans. All the forest reserves and the external boundaries of the PFE have been fully demarcated. However, the boundaries are not properly maintained and there are frequent incursions/encroachments^a. The police force participates in forest patrols to help control illegal activities.

Up to the 1980s, management plans for forest reserves were written and followed. Subsequently, working plans have not been revised in some cases and the prescriptions have not been followed in others. Harvesting is conducted in accordance with a block system in which areas are opened up for sale on a polycyclic basis. The management of natural

Table 3 Management of the production PFE ('000 hectares)^{b,d}

Total	Natural			Planted			
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	With management plans	Certified	
127	75	75	0	15 ^d	15.4	15.4	0

forests has followed a form of selection known as the 'open range system'. Several variations of this have been introduced from time to time, known variously as silvicultural marking in blocks, the periodic block system and the tropical shelterwood system. Because forest resources are limited, there are no forest concessions: individually licensed loggers are allowed to cut a specified number of trees or volume as defined by the Forestry Division. In many cases this has amounted to a 'logger's selection system', uncontrolled by the Forestry Division^b. Some 400 private loggers (mainly woodworkers) are registered (licensed) by the Forestry Division and allotted marked trees for extraction and use^b. Illegal encroachment and illegal logging certainly occur in the PFE, although their extent is unknown; the police-assisted patrols no doubt reduce their prevalence^b. In the case of plantations, particularly teak, coupes to be clearfelled are sub-divided into five-hectare units, and coupes to be thinned are sub-divided into ten-hectare plots for allocation to licensees.

Silviculture and species selection. A large part of timber is derived from planted forests (Table 2). Enrichment planting in natural forests is still practised in depleted and poorly stocked forest to improve the growing stock and thereby support multiple use and sustainability.

Planted forest and trees outside the forest. The total industrial plantation area of about 15,400 hectares is stable, with felled plantations replaced with new plantations and no new areas being planted. Besides the major species of teak and Caribbean pine, a number of other species have been planted on a limited scale in both pure and mixed stands, including by enrichment planting; these include *Cedrela odorata* (cedar), *Cordia alliodora* (cypre), *Swietenia macrophylla* (mahogany) and *Tabebuia rosea* (apamate). All plantations are owned by the state, although it has been reported

that some 1,240 hectares of teak and mixed species have been raised by farmers in private farmlands (Ramnarine & Jhilmit 2003). Forest fires are the most significant threat to planted forests. Trees outside natural and planted forests are probably important as a source of fruit, nuts, fuelwood and timber for local use, but no data on this are available.

Forest certification. So far no forests have been certified.

Estimate of the area of forest sustainably managed for production. Of the natural forests, 15,000 hectares have been managed for many years according to management plans which conform to basic principles of SFM and are harvested according to the periodic block system, which is considered generally consistent with sustainability^b. The balance of production forest has been managed under the open-range system and is now considered to be degraded^b.

Timber production and trade. Trinidad and Tobago produces modest quantities of industrial timber and depends mainly on imports to cover its needs for sawnwood, plywood and paper products; its net timber import bill in 2001 amounted to US\$106 million^b. Total industrial roundwood production in 2003 was 70,000 m³ (ITTO 2005). Plantation areas to be thinned or clearfelled are allocated to sawmillers and woodworkers on a quota system. Annual blocks to be thinned or clearfelled are notified for sale; sawmillers are expected to indicate their interest in working in particular areas. In 2000, there were 85 licensed sawmills whose combined input capacity was 100,000 m³ per year. These ranged in size from typical family enterprises to large companies and processed both the domestic supply of timber and imports of round logs and squares from neighbouring Guyana and Suriname. In 2000, there were

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
59.1	29.2	n.d.	12	n.d.

113 registered and several unregistered furniture factories that processed the lumber into finished products for domestic use and for exports^a.

Non-wood forest products. Little information was made available for this report on the domestic production of the country's major NWFPs. Bamboo is grown as a commercial crop. Some NWFPs are imported from Venezuela and the countries of the Guyana Shield. Edible products such as wild tubers, wild meat, honey, beeswax and thatching grass are used extensively by rural communities. The value of forest products used for subsistence in 2000 is estimated to be about US\$825,000^a.

Forest for protection

Soil and water. There are about 2,000 hectares of protection plantations in the coastal regions^a. It is generally recognized that there is a need to reforest and rehabilitate critical watersheds, but land outside the forest is generally occupied. Some efforts are being made to rehabilitate degraded land through tree-planting in parts of the islands. Some 37,000 hectares of forest are reportedly managed primarily for the protection of soil and water^a.

Biological diversity. Trinidad has surprising biodiversity for its size, brought about by its proximity to other Caribbean islands and, particularly, to continental South America. More than 2,280 species have been recorded, 215 of them endemic. There are over 100 mammals (the richest in the Caribbean), 420 birds and 70 reptiles. One mammal, four birds, five reptiles, nine amphibians and one plant are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, three birds and eight amphibians are found in forests (IUCN 2004). Trinidad and Tobago has listed 49 plant species in CITES Appendix II (CITES 2005).

Protective measures in production forests. Forest management plans prescribe measures to protect riverbanks, rare plants and wildlife in production forests.

Extent of protected areas. A system of 61 national parks and other protected areas was proposed in 1980, about 40 of which have been established and are managed by the Forestry Division; two are being developed with funds from the IDB. According to UNEP-WCMC (2004), 29,300 hectares of forest are in protected areas that conform to IUCN protected-area categories I-IV, including 11,900 hectares of semi-evergreen moist broadleaved forest.

Estimate of the area of forest sustainably managed for protection. Insufficient information was available to estimate the area of sustainably managed protection PFE (Table 4). Some protection forests are covered by management plans and are widely used for ecotourism.

Socioeconomic aspects

Economic aspects. Forests cover most requirements for fuelwood and some of the nation's timber needs. At present, about 10,000 people are employed in local forestry-related jobs and many others are indirectly linked to forestry^b. The Tourism Master Plan aims to make Trinidad and Tobago the foremost tourism destination in the Caribbean. This will involve ecotourism, in which forests will undoubtedly play a substantial role.

Livelihood values. Forests do not generally provide the living area of the poor but they provide important subsistence products for many people. There is no direct conflict between timber-harvesting and livelihood interests, but forest is still being cleared for agricultural and other purposes.

Social relations. Although there are no significant social conflicts associated with the management of the country's forests, the current forest policy proposes increased involvement of local communities in forest management^b. Some ten sites have been earmarked for recreation and are visited by approximately 300,000 people annually^a.

Summary

Trinidad and Tobago's strong tradition in forest management means that SFM has a good footing in the country; however, significant institutional and policy weaknesses could see the deterioration of this tradition unless remedial measures are taken^b. Both natural forests and plantations are affected by over-harvesting, encroachment, fires and other forms of damage, although the extent of these has not been quantified and police patrols probably help reduce illegal activities. There appear to be few social conflicts over forest use, and stronger community involvement in forest management has been foreshadowed.

Key points

- The PFE comprises an estimated 142,000 hectares of production forest (including just over 15,000 hectares of plantations) and 59,000 hectares of protection forest.
- Most timber production derives from planted forests; the main species are teak and Caribbean pine.
- At least 15,000 hectares of natural-forest production PFE are being sustainably managed.
- The country has yet to develop a workable set of C&I for SFM suited to its special needs.
- Individually licensed loggers are able to cut a specified number of trees or volume as defined by the Forestry Division. In many cases this may have amounted to a 'logger's selection system'.
- Trinidad and Tobago imports round logs and squares from neighbouring Guyana and Suriname for local processing; it is a net importer of timber.

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VENEZUELA



*For legend see page 58

Forest resources

Venezuela has a land area of 91.2 million hectares and a population of 25.7 million people. It can be divided into three main biogeographical regions: (i) a narrow coastal area; (ii) the Andean mountain range, which reaches 5,000 m above sea level and supports dry, humid-mountain and cloud forests; and (iii) the basins of the Orinoco and Amazon rivers. The Orinoco Plain, 20% of the country, is mainly covered by heavily degraded evergreen and semi-deciduous forests (*llanos*). The Guayana region (the states of Bolivar and Amazonas) occupies about half of the country and contains 70% of its forests. Estimates of forest area vary from 49.5 million hectares (FAO 2005) to 55 million hectares^a.

Forest types. Tropical moist forest, Venezuela's most extensive forest type, is present in the Orinoco delta, the Guayana region and in small areas south and southwest of Lake Maracaibo; the most common

species are *Couropita guianensis*, *Ceiba pentandra*, *Coumarouna punctata*, *Erismia uncinatum* and *Carapa guianensis*. Tropical mountain forest is found in three mountain zones: the Merida range, the coastal range by the Caribbean and the eastern massif in Sucre and Monagas states. Cloud forest forms in the misty climate of the Andes between 500 and 2,000 m; valuable timber species found there include *Cedrela mexicana*, *Guarea* spp, *Roupala montana*, *Terminalia* spp, *Virola sebifera*, *Rollinia fendleri*, *Calophyllum brasiliense* and, in higher areas, species of *Podocarpus*. The Orinoco Plain was once covered by *llanos* but this has been mostly converted to agriculture and pasture. Once-common species in these forests include *Swietenia macrophylla* (caoba), *Tabebuia pentaphylla* and *Ceiba pentandra*.

Dynamics of forest resource change.

Deforestation in the period 1982–2000 was an estimated 261,000 hectares (0.6%) per year^a; FAO (2005) estimated an average annual rate of deforestation of 218,000 hectares between 1990 and 2000. In the past, deforestation was highest in the *llanos*; for the last 15 years it has been highest in the dry, northwestern Zulia region, which has lost almost two-thirds of its forest cover. Deforestation has also been relatively high (36,000 hectares per year) in the state of Bolivar in the tropical moist forest region, which is also the most important forest development area of the country. Only small areas of secondary forests (*purmas*) remain, since deforested areas have mostly been transformed into pasturelands. Uncontrolled forest fires occur regularly, both in natural and planted forest^a.

Permanent forest estate. The entire forest area is contained within specially designated *Areas Bajo Régimen de Administración Especial (ABRAEs)* –

Table 1 PFE

Estimated total forest area, range (million hectares)	Total closed natural forest ('000 hectares) Source: FAO 2001	PFE ('000 hectares)			
		Production		Protection	Total
		Natural	Planted		
49.5–55.0	49,926	13,000 ^d	863	20,600 ^d	34,463 ^d

land managed for special purposes according to special laws. As of August 2001, 362 ABRAEs had been established in 25 different categories covering approximately 46% of the total land area. It appears that about 13 million hectares of the country's estimated 29.9 million hectares of closed forests are allocated for production as part of the PFE. This is made up of forest reserves (11.8 million hectares) and forest lots (*lotes boscosos* – 1.2 million hectares). Figures for the natural-forest PFE in Table 1 are ITTO estimates based on data from the Ministry of the Environment and Natural Resources (*Ministerio del Ambiente y de los Recursos Naturales* – MARN 2000, 2004).

Planted forests. There has been a tradition of official and private plantations in Venezuela for more than 50 years. In 1998, there were an estimated 727,000 hectares of planted forests (115,000 hectares being private); 53% of these were industrial plantations^a. The plantation rate has declined recently, from 30,000 hectares per year several years ago to less than 5,000 hectares per year; FAO (2001) estimated the total planted forest area at 863,000 hectares. By far the most important plantation species is *Pinus caribaea* (pino caribe).

Institutional arrangements

Forest tenure. It is estimated that more than 90% of the forest is owned by the state^c. There are private forest lots in both natural and planted forest areas, but their extent is not known. The 1999 constitution recognizes the right of indigenous people to the collective ownership of forest territories, access to resources and rights to cultural uses, but there is no demarcation or formal recognition process in place. The extent to which local communities have the right to administer, conserve and manage timber resources in ABRAEs remains unclear.

SFM policy framework. Venezuela has a long tradition of forest management and professional foresters are involved at all levels of forest production and conservation activities. The country subscribes to the Tarapoto Process, which developed C&I for SFM for the eight Amazon countries, but also plans to develop its own C&I based on the latest revision of ITTO's C&I^c.

Forest policy and legislation. The notion of SFM dates back to the Forest Law of 1966. In 1992, the Penal Law of the Environment came into force, defining offences against the environment. The national forest policy that applied up to 1998 was reviewed by the General Board of Forest Resources, which concluded that the policy needed to be refocused in order to better integrate social concerns and broader environmental issues into forest management. The new approach includes the use of C&I for assessing SFM and considers the recommendations for action made in the United Nations Forum on Forests process. A new forest law is being drafted that will legislate for, regulate and supervise the management of national forests for single and multiple uses in accordance with principles of sustainability, diversification in the use of community goods and services, and participation. In addition, the Organic Environmental Law and the Organic Territorial Management Law are being revised and amended. Under a 2001 resolution, the commercial harvesting from natural forests of caoba, *Cedrela odorata* (cedro), *Anacardium excelsum* (mijao), *Cordia alliodora* (pardillo) and *Tabebuia spectabilis* (pau d'arco) has been banned for six years.

The domestic timber trade is regulated by the 1966 Forest Law for Soil and Water (*Ley Forestal de Suelos y de Aguas*) and the international trade by the Fiscal Law (*Ley de Timbre Fiscal*). The latter includes tariff instruments for the control of imports and exports and stipulates that logs harvested from natural forests cannot be exported. Industrial logging (since 1978; Decree 269) and mining (since 1989; Decree 2,552) are prohibited by legal regulations in the state of Amazonas, the second-largest state after Bolivar.

Institutions involved in forests. Forests are under the jurisdiction of MARN, which was created under the Organic Environmental Law in 1999. Nevertheless, and particularly in the forest area south of Orinoco, there is a lack of clarity in the relative roles and responsibilities of various institutions, in particular between MARN, the Ministry of Agriculture and the Ministry for Energy and Mining (*Ministerio de Energía y Minas*). MARN has established the General Directorate of Forests to look after the administration, classification and sustainable management of forests. The Directorate

is tasked with developing action plans for strengthening the classification of areas for permanent forest production and the control of timber production.

Decentralization is a process that was proposed in the Law of Decentralization in 1989 and reinforced by principles embodied in the 1999 constitution. However, natural resource management and, in particular, forest management, remain under the control of a centrally organized forest service – with the exception of urban forestry, which is managed directly by the municipalities.

The Association of Forest Engineers, the forestry university in Merida and other professional organizations play important roles in the monitoring of forest resources. The Venezuelan Association for the Conservation of Natural Areas (*Asociación Venezolana para la Conservación de Áreas Naturales* – ACOANA), the Foundation for the Defence of Nature (*Fundación para la Defensa de la Naturaleza* – FUDENA) and other conservation NGOs, as well as organizations such as the Federation of Indigenous People and Bioguayana, are national bodies with strong links to international NGOs such as Conservation International, The Nature Conservancy and WWF. They are becoming increasingly engaged in the forest debate.

Status of forest management

Forest for production

Timber harvesting in natural forests is done on a relatively small scale in Venezuela and there is still a great deal of experimentation with forest management regimes. Under the new national forest policy, the integrated co-management of forests will involve multiple land-uses and the production of timber, NWFPs and environmental services. This new approach is being tested through 'integrated community forest management programs' (*programas de manejo integral comunitario del bosque*) in forest reserves such as Ticoporo and Caparo in the Llanos region. Under the term 'territorial management of forest areas' (*manejo territorial de áreas forestales*) SFM for timber production is being tested in the Imataca Forest Reserve in the Guayana region.

Two kinds of permits for timber production are available: forest concessions, granted for areas of more than 5,000 hectares, and annual logging permits, for areas smaller than 5,000 hectares. Forest concessions are granted for 20–40 years in forest reserves and forest lots, the latter established by MARN. Forest lots are special FMUs designated for long-term forest management in those parts of the country where forest reserves have not been classified in the past. The forest concession policy lacks clarity; concessions are officially granted at public auction, but information about the process is not publicly available and the criteria for awarding concessions are not transparent^c. Concessionaires often struggle to comply with the forest law, but there is no public information on how and to what extent they fail to comply^c.

Because nearly all forest reserves north of the Orinoco River are deforested, all forest concessions are now south of the Orinoco in the Guayana region. As of mid 2003, 14 forest concessions were operating in forest reserves and in forest lots over a total of 1.21 million hectares^c. All concessionaires are Venezuelan nationals. Concession management is based on fully-fledged forest management plans (*planes de ordenación y manejo forestal* – POMFs) that include an inventory of commercial timber species; high-grading, in which only the most valuable species are extracted, is commonplace (GFW 2002). By law, all concessions must be managed by professional forest engineers and trained foresters. Harvesting in concessions is carried out on the basis of an annual cutting plan approved by MARN. Concessionaires are required to establish line enrichment planting after harvesting at a distance between strips of 30–50 m. Annual logging permits require a simplified management plan prepared by a forest engineer.

Silviculture and species selection. The minimum cutting diameter for all cutting permits in natural forests is 40 cm at breast height. At least 20 species are harvested from natural forests in volumes exceeding 50,000 m³ per year; some of the most commonly harvested species include those shown in Table 2. Others include *Copaifera officinalis* (aceite), *Tabebuia rosea* (apamate), *Hymenaea courbaril* (algarrobo), *Catostemma commune* (baramán), *Sterculia apetala* (camoruco),

Table 2 Some commonly harvested species for industrial roundwood (2001–2003)^c

Timber species	Remarks
<i>Pinus caribaea</i> (pino caribe)	From plantations, 53% of the total harvest
<i>Pithecellobium saman</i> (samán)	From open forests, about 13% of total harvest
<i>Bombacopsis quinata</i> (saqui saqui)	From the Llanos region, about 10% of total harvest
<i>Erismia uncinatum</i> (moreillo)	From the Guayana region, about 9% of total harvest
<i>Hymenaea courbaril</i> (algarrobo)	From the Guayana region, about 8% of total harvested

Carapa guianensis (carapa), cedro, *Simarouba amara* (cedro blanco), *Ceiba petandra* (ceiba), *Brosimum alicastrum* (charo), *Pterocarpus officinalis* (drago), *Hura crepitans* (jabillo), *Qualea dinizii* (guarapo), *Spondias mombin* (jobo), *Nectandra* spp (laurel), *Anacardium excelsum* (mijao), *Mora excelsa* (mora), *Erismia uncinatum* (moreillo), *Piptadenia* spp (palo blanco), *Cordia alliodora* (pardillo), *Manilkara bidentata* (purguo), *Tabebuia serratifolia* (puy) and *Peltogyne pubescens* (zapatero). *Pithecellobium saman* (samán) and *Bombacopsis quinata* (saqui saqui) are the main species remaining from the scattered forests north of the Orinoco region.

Planted forest and trees outside the forest.

Plantations were mainly established in the 1980s; today the management of existing planted forest is more important than the establishment of new plantations. Pino caribe plantations provide more than 50% of the country's total roundwood production^c. Besides these and various tropical eucalypts and teak, hardwood species are planted mainly in natural forest in enrichment lines using, among others, teak, moreillo, pardillo, mijao, cedro and caoba.

Forest certification. As of December 2005, Venezuela had one certified planted forest of pino caribe; this covered an area of 139,650 hectares and belongs to the multinational Terranova Company (FSC 2005). Natural-forest certification has not yet attracted much interest because the entire production is used to satisfy the high-price domestic market, which is not demanding certified timber at this point.

Estimate of the area of forest sustainably managed for production. MARN (2000) estimated that 77% of the volume of timber harvested – 40% from areas under POMFs and 37% from plantations

of pino caribe – was derived from sustainably managed sources and therefore met the ITTO Year 2000 Objective. The estimate of sustainably managed natural-forest PFE given in Table 3 is more conservative and corresponds to timber concessions that have been managed according to forest management plans for more than 20 years. Detracting from the overall status of forest management is the generally weak enforcement of forestry regulations, particularly given that commercial logging is far from the centres of control; illegal logging, hunting and encroachment are reportedly widespread (GFW 2002).

Timber production and trade. Nearly the entire volume of timber production serves the domestic market. Total industrial roundwood production in 2003 was 1.06 million m³, of which 638,000 m³ came from conifers (ITTO 2005); in 1999, conifers accounted for 910,000 m³ of the 1.66 million m³ total log production (ITTO 2004). In the last decade, there has been a shift in production from natural forest to plantations and to regulated forest concessions with POMFs. In 1993, nearly 55% of production came from cutting licences in natural forests, 35% from forest concessions and 15% from plantations; in 2000, 40% of wood production came from plantations, 40% from concessions and only 20% from cutting licences^a. Production of sawnwood is between 240,000 m³ and 300,000 m³ per year. The bulk of industrial roundwood production (about 65%) is used for pulp and paper. Exports of primary timber products are negligible, but imports of forest products have grown to over US\$20 million per year recently, mostly comprising sawnwood, plywood and particleboard. Hardwood from Roraima state in the Brazilian Amazon is increasingly important because of a new and well-maintained road system.

Table 3 Management of the production PFE ('000 hectares)^{c,d}

Total	Natural				Planted		
	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
13,000	3,120	1,480	0	480	863	727	140

Non-wood forest products. Between 30 and 50 NWFPs are important and used at local, regional and national levels. Among them are different palm products for food, construction, medicine and handicrafts, including the fruits of *Bactris gasipaes* (pejibaye), *Mauritia flexuosa* (moriche palm) and *Dipteryx odorata* (sarrapia). Other products are pepper, cinnamon, bamboo, nutmeg, aniseed, cumin, ginger, cucumber and resins. Many of them enter the national market and, ultimately, international trade. Mamure, a local liana (*Heteropsis spruceana*), has been used for a long time as a raw material for furniture but is now threatened by overuse. Palm heart (palmito) from *Euterpe oleracea* is an important export product; it is now increasingly planted. The value of palm hearts exported in 2002 exceeded US\$150,000^a.

Forest for protection

Soil and water. A significant area of forest is set aside for the protection of soil and water within the ABRAEs. These forests are classified under 'normative protection' (*protección normada*) and include:

- protection zones (*zonas protectoras*): 12.7 million hectares;
- watershed reserves (*reservas hidráulicas*): 1.17 million hectares;
- reserves for dams and reservoirs (*zonas de reserva para construcción de presas y embalses*): 7,800 hectares;
- protected areas for public infrastructure (*áreas de protección de obras públicas*): 133,400 hectares;
- critical areas for restoration (*áreas críticas con prioridad de tratamiento*): 4.5 million hectares; and

- environmental rehabilitation and protection areas (*áreas de protección y recuperación ambiental*): 2,350 hectares^a.

Forests in the Guayana region help to regulate the flow of water for the Guri Dam, which provides 70% of the nation's electricity. The most extensive protected areas are located in the Andean mountain belt, where forest is important in watershed protection. Some attention has recently been accorded to payments for environmental services, but so far there has been no real action.

Biological diversity. Venezuela harbours a significant portion of the world's biodiversity, ranking in the top 20 countries in the number of endemic plants, birds, amphibians and reptiles. More than 8,000 plant species have been recognized as endemic, as have some 122 amphibians, 66 reptiles, 40 birds and 15 mammals. Twenty-eight mammals, 25 birds, 13 reptiles, 68 amphibians and 69 plants are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species; of these, 14 mammals, 21 birds, 61 amphibians and one plant are found in forests (IUCN 2004). Six plants are listed in CITES Appendix I and 221, including *Swietenia macrophylla* and *S. humilis*, in Appendix II (CITES 2005).

Protective measures in production forests. The draft new forest law would require that 10% of the managed production forest be protected as a preservation zone, with emphasis on areas along watercourses and swamps. So far, there are no prescriptions for RIL.

Extent of protected areas. The estimated total area contained in reserves compatible with IUCN categories I-IV is 17.9 million hectares, as follows:

- national parks (*parques nacionales*): 13.6 million hectares;

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
20,600	20,600	1,740	7,210*	n.d.

* Ext

use (Bevilacqua et al. 2004)

- natural monuments (*monumentos naturales*): 4.27 million hectares; and
- wildlife refuges (*refugios de fauna silvestre*): 53,500 hectares; (Bevilacqua et al. 2004).

This area amounts to about 20% of the national territory, making Venezuela one of the world's leading conservation nations. Aside from forests, it includes high mountain ecosystems and other non-forested areas. UNEP-WCMC (2004) estimated the total area of forests in protected areas conforming to IUCN protected-area categories I-IV to be 20.6 million hectares (even higher than the Bevilacqua et al. 2004 estimate of the total area in such reserves), of which 14.0 million hectares are lowland evergreen broadleaved rainforest.

Although the declared protected area is huge, only about 15% has land-use and zoning plans. In addition, many conservation sites are subject to unresolved land claims by indigenous groups who may have been living there before the reserves were officially declared.

Estimate of the area of forest sustainably managed for protection. Of the 265 special areas with protection status, 70 have a forest management plan (Bevilacqua et al. 2004). Thirty-five per cent of the protected areas in IUCN protected-area categories I-IV have a management plan or instructions for its use (*reglamentos de uso*) (ibid.); however, insufficient information was available to estimate the area of protection PFE sustainably managed (Table 4), although a large part of the estate is intact and faces little development pressure.

Socioeconomic aspects

Economic aspects. Forests provide less than 0.5% of GDP^a. Data on the number of people employed in the forest sector were not available for this report.

Livelihood values. NWFPs are essential for the livelihood of all indigenous peoples living in the Guayana and Amazonas regions. Wildlife and fish still supplement the protein needs of a large part of the population in the states of Bolivar and Amazonas. Wildlife also provides raw material for handicrafts and medicine. Intensified hunting and fishing with new techniques and in-migration into frontier areas may well increase pressure on some animal species.

Social relations. The development of natural forests has a great social effect in the Guayana region, characterized by a relatively small and mainly indigenous population. The two main economic activities are logging and mining for gold and diamonds. These have brought improved health and education services to local people and induced a trend towards settlement. Logging and mining have also brought non-indigenous settlers (*colonos*) into the region, who use natural resources to supplement their subsistence needs and cash income. This has increased the likelihood of conflicts and pressure on the existing forest resources, especially along access roads and around settlements. North of the Orinoco River, particularly in the Province of Barninas bordering Colombia, nearly all forest reserves have been encroached by *colonos*. It is not yet clear how such illegal occupation will be handled or if the concept of forest reserves in these areas will be abandoned.

Summary

Venezuela still possesses vast unexploited forest resources in its two largest states of Bolivar and Amazonas. Relatively modest logging concessions and cutting permits have been granted over the past 35 years. Instead of increasing the harvesting of natural forests, plantation forestry has been developed for many years. Today, much of the

domestic need for industrial wood is met by planted forest. The country's forest-related laws contain strong environmental provisions, and a large proportion of its territory is in designated protected areas (although in some places under tenurial dispute by indigenous communities). However, there is a gap between the legal provisions and their implementation in the field. SFM for production and conservation has not yet been fully achieved; the enforcement of forestry regulations is considered to be far from optimal, and illegal logging, hunting and encroachment are reportedly widespread. Nevertheless, a basis has been laid for the development of SFM and effective forest conservation.

Key points

- The PFE comprises an estimated 13 million hectares of natural production forest and 20.6 million hectares of protection forest. There is also a substantial plantation estate (about 863,000 hectares).
- It is estimated that at least 480,000 hectares of the natural-forest production PFE is managed sustainably; insufficient information was available to estimate the extent of the protection PFE so managed.
- The forests north of the Orinoco River are heavily degraded and encroached. South of the Orinoco River, Venezuela still has extensive and timber-rich forest resources with good potential for SFM.
- The monitoring of forest resources and implementation of forest management are both deficient, particularly in more remote areas.
- There is a lack of clarity in administrative roles and responsibilities for forests, in particular between MARN, the Ministry of Agriculture and the Ministry for Energy and Mining.
- The new national forest policy is not yet finalized or backed up with effective legislation, and the forest concession policy lacks clarity.
- Wood production is shifting from natural forest to plantations and to regulated forest concessions with management plans.
- Despite regulations to the contrary, logging in natural forests concentrates on the most valuable timber species.

- The long-term viability of the protection PFE depends on the continuous provision of financial resources and acceptance by local stakeholders.

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