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)			
		Production*		Protection	Total
		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
Hura crepitans (ochoó)	11% of production, 2002 (about 63,000 m^3)
Amuburana cearensis (roble)	7% of production, 2002
Cedrela odorata (cedro)	Production declined from 103,000 m^3 in 1998 to 20,000 m^3 in 2002
Carinaria ianarensis (yesquero blanco)	4% of production, 2002
Tabebuia 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)

Natural					Planted		
Total	Allocated to concessions/ under licence	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
17,000	5,470*	5,470	2,210	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 m^3, but present production is far less. According to ITTO (2005), the 2003 production of logs was 650,000 m^3 and sawnwood 347,000 m^3. 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.

References and other sources

[a] Government of Bolivia 2004. Informe Avances del Manejo Forestal en Bolivia. Submitted to ITTO, February 2004. Prepared by Soledad, M., Ministerio de Desarrollo Sostenible y Planificación, La Paz, Bolivia. Unpublished.

[c] Information derived from the report of, and discussions with participants at, a training workshop on ITTO criteria and indicators, held 1–4 September 2003, Cochambama, Bolivia, attended by 40 people from government, civil society and the private sector.

[d] ITTO estimate

Achá, G. & Guevara, R. 2003. When foresters have a higher calling. ITTO *Tropical Forest Update* 13/4.

CITES 2005. CITES-listed Species Database. Available from: http://www.cites.org/eng/resources/species.html (accessed September 2005).

FAO 2001. *Global Forest Resources Assessment 2000*. FAO Forestry Paper 140. FAO, Rome, Italy.

FAO 2003. *State of Forestry in the Latin American and Caribbean Region 2002*. FAO Regional Office for Latin America and the Caribbean, Santiago, Chile.

FAO 2005. *State of the World's Forests 2005*. FAO, Rome, Italy.

FSC 2005. FSC – Certificates Worldwide. FSC International Center & Working Group, Germany. Available from: http://www.fsc-info.org (accessed December 2005).

Government of Bolivia 2000. Informe de Progreso para Lograr el Objetivo del Año 2000 de la OIMT. Submitted to ITTO, 2000. Ministerio de Desarrollo Sostenible y Planificación, La Paz, Bolivia. Unpublished.

ITTO 1996. The Promotion of Sustainable Forest Development in Bolivia. Report of the Diagnostic Mission. Presented at the twenty-first session of the International Tropical Timber Council, November 1996. ITTO, Yokohama, Japan.

ITTO 2005. *Annual Review and Assessment of the World Timber Situation 2004.* ITTO, Yokohama, Japan.

IUCN 2004. 2004 IUCN Red List of Threatened Species. Available from: http://www.redlist.org (accessed September 2005).

Malky Harb, A. 2005. Sector Forestal en Bolivia. Diagnósticos sectoriales. Unidad de Análisis de Políticas Sociales y Económicas, La Paz, Bolivia. Available from: http://www.udape.gov.bo/diagnosticos/ (accessed November 2005).

SIFOR/BOL 2002. Cámara Forestal de Bolivia. Estadísticas de Exportación de Productos Forestales – Gestión 2002. SIFOR/BOL, Santa Cruz de la Sierra, Bolivia.

STCP 2000. *Plan Estratégico para el Desarrollo del Sector Forestal de Bolivia*. STCP, Curitiba, Brazil.

UNEP-WCMC 2000. Statistical Analysis of Forests & Protection V3.1, July 2000. Available from: http://www.unep-wcmc.org/forest/statistics.htm (accessed June 2005).

UNEP-WCMC 2004. Spatial analysis of forests within protected areas in ITTO countries. UNEP-WCMC, Cambridge, UK. Data prepared for ITTO, 2004 (see Annex 1).

White, A. & Martin, A. 2002. *Who Owns the World's Forests? Forest Tenure and Public Forests in Transition.* Forest Trends, Washington, DC, USA.