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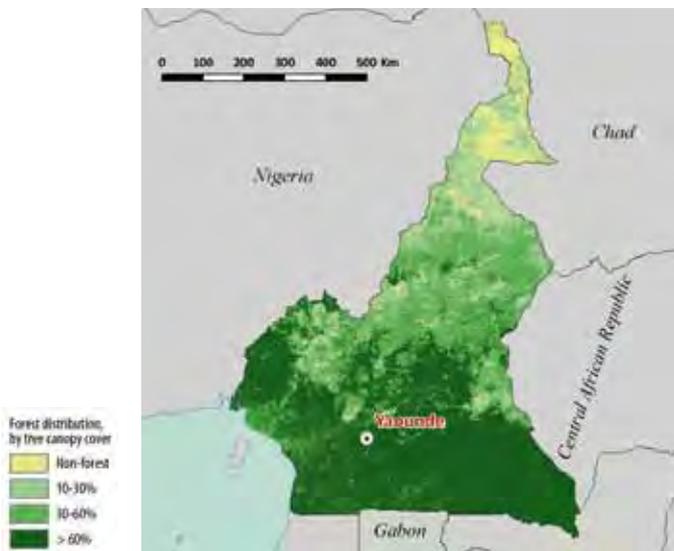
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CAMEROON



Forest resources

Cameroon has a land area of 47.5 million hectares and an estimated population in 2010 of 19.9 million people (United Nations Population Division 2010). Cameroon is ranked 153rd out of 182 countries in UNDP's Human Development Index (UNDP 2009). The country stretches between latitudes 2° and 13° north from the Gulf of Guinea to Lake Chad. The coastal plain is about 600 km long and 100–200 km wide, its inland limit marked by slopes and steep scarps. The southern plateau, the site of Cameroon's major closed-forest area, is 500–800 m in altitude and the central Adamaoua high plateau is generally 1000 m or more above sea level. Estimates of forest area vary from 19.7 million hectares (MINFOF 2008), to 21.2 million hectares (Government of Cameroon 2009, FAO 2010), to 27.2 million hectares (de Wasseige et al. 2008). The latter estimate includes the categories forest–cropland mosaic and forest–savanna mosaic.

Forest types. Cameroon's forests are mainly tropical rainforests of two predominant types: lowland evergreen (54% of total forest area), and lowland semi-deciduous (28%).³ They are particularly rich in commercial species, including various species of Meliaceae, such as *Entandrophragma cylindricum* (sapelli) and *E. utile* (sipo). The evergreen forests can be divided into two broad categories: the Biafran forests, forming an arc around the Gulf

of Guinea, and the Congo Basin forests in Cameroon's south and southeast. The Biafran forest, which formerly covered the entire coastal lowland, has been largely cleared. Where it still exists it consists of secondary forests and degraded primary forests, characterized by species such as *Lophira alata* (azobé) and *Sacoglottis gabonensis* (ozouga). Mangroves are found along most of the Cameroonian coast, with a total area of about 120 000 hectares. The two largest areas are in the Rio del Rey estuary and the Bay of Douala (Spalding et al. 2010).

The Congo Basin forests differ from the Biafran forests in the absence of species of Caesalpiniaceae, with the exception of *Gilbertiodendron dewevrei*; another feature is the importance assumed by *Baillonella toxisperma* (moabi). Inland, semi-evergreen lowland forest gives way to a mosaic of degraded rainforest and secondary grassland. The medium-altitude closed semi-deciduous forests are marked by an abundance of Sterculiaceae, such as *Cola* spp, *Eribroma oblonga* (eyong), *Mansonia altissima* (bété) and *Triplochiton scleroxylon* (ayous). North of this is Sudanian woodland, with predominantly *Acacia* wooded grassland.

Permanent forest estate. The Forest Law (1994) divides the forest area into permanent and non-permanent forest areas (*domaine forestier permanent et non permanent*). The permanent forest includes the categories forest reserves, protected areas and council forests; non-permanent forest includes community forest and private forest (ITTO 2006). The Government of Cameroon (2010) estimated that there is 12.8 million hectares of natural-forest PFE, comprising 7.6 million hectares of production forest and 5.2 million hectares of protection forest (Table 1). The exact extent of protection PFE is unclear, however: figures vary between 3.9 million hectares and 7.2 million hectares (Government of Cameroon 2005).

Forest ecosystem health

Deforestation and forest degradation. Cameroon's net deforestation rate is relatively low (0.14% – about 270 000 hectares per year; Government of Cameroon 2008) compared with many other tropical countries, but it is among the highest in

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	13.3–23.8	19 985	8840	17	3900	12 757
2010	19.7–21.2	16 900**	7600‡	19	5200†	12 800

* As reported in ITTO (2006).

** Dense humid forest, including 120 000 hectares of mangroves (de Wasseige et al. 2008).

‡ Includes FMUs, other production forests, forest reserves and communal forests.

† Includes forest protected areas in IUCN categories I–IV (4.4 million hectares) and the area of conservation FMUs (800 000 hectares).

the Congo Basin. The Government of Cameroon (2008) cited the following as the main direct and indirect drivers of deforestation and forest degradation: the development of agricultural activities – both slash-and-burn subsistence agriculture and cash crops (e.g. cocoa); the illegal exploitation of timber outside the PFE; the exploitation of fuelwood, particularly around major urban centres; and the development of the mining sector (bauxite, cobalt), which attracts workers (and hence increased hunting and other environmental stressors) to forested areas. Population growth is a factor near towns and cities and in the coastal forest zone, where the rate is nearly 5% per year (ibid.).

According to a national forest inventory conducted in 2004, primary forests comprise about 18% and degraded primary forest nearly 50% of total forest cover (Table 2).

Vulnerability of forests to climate change. The Cameroonian agricultural sector is potentially vulnerable to climate change, raising concerns about future food security. According to McSweeney et al. (undated), the mean annual temperature in the country has increased by 0.7 °C since 1960, an average rate of increase of 0.15 °C per decade. Mean annual rainfall per month has decreased by around 2.9 mm (2.2%) per decade since 1960. Cameroon experienced particularly low rainfall between 2003 and 2006 (ibid.). Forests are a means for protecting soils and watersheds and can help

reduce the vulnerability of agriculture, and they can also serve as a social 'safety valve'. Forest fires appear to have been increased in the last decade in the drier northern part of the country and there is anecdotal evidence that this is caused by the lengthening of the dry season.^b

SFM policy framework

Forest tenure. The PFE in Cameroon belongs to the state, although the state has transferred certain rights to legal communes for a portion of it (414 000 hectares of the 12.8 million hectares of PFE; Table 3). The permanent forest in the main forest zone in the south is nearly all state-owned under the categories of timber production, protected and protection forests. Generally, people living in forest areas fully retain their traditional user rights (ITTO 2009a). In the non-PFE (*domaine forestier non permanent*), a process for the allocation of tenure and user rights is under way (ibid.). Stakeholder disputes over forest ownership and the demarcation of boundaries have been common in the past (ITTO 2006) and remain so today.^a

Criteria and indicators. Cameroon adopted the ATO/ITTO principles, criteria and indicators (PCI) for the sustainable management of African natural tropical forests in 2004. However, only those companies that have been or are in a process of certification are applying the PCI as a tool

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Primary forest	-	-	3250
Degraded primary forest	-	-	8600
Secondary forest	-	-	4500
Degraded forest land	-	-	-

Source: Government of Cameroon (2009).

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	-	12 400	State forest: includes forest reserves (production and protection forests, reforestation areas and others) and protected areas.
Other public entities (e.g. villages, municipalities)	414	414	Forests owned by legal communes.
Total public	-	12 800	Only figures for PFE available.
Owned by local communities and/or Indigenous groups	652	0	In the non-PFE: area designated for communities and Indigenous peoples, including (in 2009) 171 community forests with signed contracts and simple forest management plans. ^a
Private owned by firms, individuals, other corporate	-	-	Private forests have never been inventoried and their area is unknown. ^a

Source: Government of Cameroon (2009).

for control and monitoring (ITTO 2009a). The Government of Cameroon used the ITTO C&I in its submission to ITTO for this report.^a

Forest policy and legislation. Cameroon's forest policy was published in 1993 and adapted over time. In 2005 the Forestry and Environment Policy Letter (Government of Cameroon 2005) was signed between the Ministry for the Environment and the Protection of Nature (MINEP) and the Ministry for Forestry and Wildlife, setting out the basic principles for sustainably managing Cameroon's forest estate (see also Topa et al. 2009). The Forestry Code was adopted in 1994 (Law 94/01) and the Environment Code in 1996 (Law 96/12). Cameroon's forest policy and strategic framework centres on the following aspects (Government of Cameroon 2005):

- The sustainable management of forests, with the creation of a PFE and the setting up of FMUs to replace forest permits.
- Contributing to economic growth and poverty alleviation by ceding part of the income from tax revenue to village councils, creating jobs and allocating community forests.
- Participatory management through consultation with civil society and the private sector, increasing the understanding of rural people about their responsibilities for forests, and permanent dialogue with the international community.
- The conservation of biodiversity through a national network of protected areas.
- Building the capacity of the public sector in the performance of its key functions and the transfer of productive functions to the private sector.

- Putting in place a legal framework conducive to the development of the private sector, based on long-term conventions and industrialization.
- The harmonization of the regional management system through a zoning plan.
- The improvement of governance through increased transparency and the systematic dissemination of information to the public.

Through close collaboration with its development partners, Cameroon has made significant achievements in implementing its forest policy, including the maintenance of a well-conserved forest resource and relatively good control over deforestation; the improvement of forest management practices in the formal forest industry; growing recognition of customary rights and the contribution of forests to social welfare; and effective collaboration between forest institutions and civil society, which has led to improved forest governance and transparency (Topa et al. 2009). Outstanding needs include an improved approach to addressing the needs of Indigenous peoples; greater attention to NTFPs; financing for forest conservation efforts; the reshaping of community forestry; and greater attention to small-scale forest management and domestic forest product markets (ibid.).

At the international level, Cameroon signed a FLEGT VPA with the European Union in May 2010 and the first VPA-licensed products were expected in December 2011. Cameroon is a signatory to the Yaoundé Declaration and a member of the Commission in Charge of Forests in Central Africa (*Commission en Charge des Forêts d'Afrique Centrale* – COMIFAC).

Institutions involved in forests. In December 2004 the Ministry of Environment and Forests (MINEF) was replaced by two successor ministries, the Ministry of Forests and Fauna (*Ministère des Forêts et de la Faune* – MINFOF) and MINEP, which is also responsible for the development of REDD+. MINFOF is primarily responsible for forest policy, the forest legislative framework and the enforcement of forest laws, as well as for international conventions with respect to forests and wildlife (ITTO 2009a).

Within MINFOF are three main technical directorates dealing with forestry: the Directorate of Forests (*Direction des Forêts*), which is responsible for forest management, inventories, law enforcement, reforestation and community forestry; the Directorate of Promotion and Transformation, which deals with the wood-processing industry, NTFPs, forest statistics and timber certification; and the Directorate of Wildlife and Protected Areas, which manages protected areas. MINFOF is represented in all provinces and the country's 58 divisions. It employs 101 people centrally and 930 people in total, including 220 forest engineers and 25 agronomists and technical engineers.^a The National Agency for Forestry Development (*Agence Nationale de Développement des Forêts* – ANAFOR) is a parastatal technical agency whose mandate is to promote forest plantations by individual farmers, communities and the private sector.^a

Forest research is conducted by several institutions (i.e. the Institute of Agricultural Research for Development – IRAD, the World Agroforestry Centre – ICRAF, the Center for International Forestry Research – CIFOR, and the International Institute of Tropical Agriculture – IITA) and forestry courses are offered by the universities of Dschang and Yaoundé, the Forestry School of Mbalmayo, the Wildlife School of Garoua and the regional agricultural teaching centre, *Centre d'Enseignement Spécialisé en Agriculture* (ITTO 2009a). Many national and international NGOs, including major international conservation NGOs, play a direct role in the forest sector through partnerships with governmental agencies or in support of civil society. International donor agencies coordinate their support for MINFOF through the coordination body, *Cercle de Concertation des Partenaires du MINFOF*.

Status of forest management

Forest for production

Law 94/01 provides a good basis for introducing SFM. It stipulates the compulsory preparation and implementation of long-term forest management plans in concessions and simple forest management plans (*plan simple de gestion*) in forests attributed to communities; the introduction of provisions for concession allocation; and the creation of forest brigades and an inspection panel at the national and provincial levels for forest control. Commercial forestry is implemented in the PFE mainly through concessions and timber-licence contracts between the state and private entrepreneurs. FMUs (*unités forestières d'aménagement*) are the basic unit of timber harvesting. They are limited to a maximum size of 200 000 hectares and allocated by public tender (ITTO 2006). A forest concession consists of one or several FMUs. A systematic bidding, management and business concept for the attribution and management of FMUs was introduced between 1998 and 2007. The procedures are described in ITTO (2006), and a detailed analysis on their effectiveness was carried out by Topa et al. (2009). In 2005, 32 of the 72 FMUs had approved management plans (ITTO 2006).

Today, the proportion of Cameroon's production forests covered by forest management plans is high compared with most tropical countries (Topa et al. 2009). In 2009, 103 FMUs had been attributed over a total area of 6.1 million hectares, of which 74 had an approved management plan; this corresponds to an area of just over 5 million hectares.^a Of the 74 FMUs with management plans, 41 (covering an area of 2.9 million hectares) have been managed under forest management plans for



Log landing in a Cameroonian concession.

more than five years.^a Poor logging practice, illegal logging and encroachment that had reportedly been common in the past (ITTO 2006) have been reduced in these managed FMUs in the last five years.^a

In addition to the allocation of large tracts of production forests to industrial investors through timber concessions, there are seven other types of timber-harvesting contracts, including community forest contracts and council contracts. For example, communities can manage community forests for timber and non-timber production (up to 5000 hectares) using simplified forest management plans. In 2008, six council forests covering an area of about 141 000 hectares had been allocated, four of them with fully formulated forest management plans, and 177 community forest contracts had been allocated for 632 000 hectares, 143 of which (covering an area of 546 000 hectares) had simple forest management plans (de Wasseige et al. 2008).

Silviculture and species selection. A 1998 decree of Law 94/01 stipulates silvicultural standards for forest management. The felling cycle is set at 30 years and minimum harvesting diameters are indicated for each species (ITTO 2006). The standards further describe a polycyclic management regime, which includes the designation of future crop trees, the tending of natural regeneration, thinning, enrichment planting and refinement (Topa et al. 2009). Cameroon has over 600 tree species, of which about 300 are fairly common in the humid forests. Of those, fewer than 30 are currently used in significant quantities for timber and fewer than a dozen species make up the bulk (80%) of domestic utilization and trade (ITTO 2006). Besides the five species listed in Table 4, other commonly harvested timber species are *Terminalia superba* (fraké), *Cylicodiscus gabunensis* (okan/adoum), *Distemonanthus benthamianus* (movingui), *Entandrophragma candollei* (kossipo) and *Pterocarpus* spp (red padouk) (MINFOF 2008).

Planted forest and trees outside the forest.

About 2000 hectares of new plantations were created between 2005 and 2009 (ITTO 2009a). Despite the newly created ANAFOR, which aims to support community and private investment in forest plantations, no information is available about private planted forests. There are extensive agro-industrial plantations, including more than 50 000 hectares of rubber.^a Many timber plantations were established during the 1950s, with species such as *Terminalia ivorensis*, *Aucoumea klaineana*, *Tectona grandis*, *Pinus* spp, various Meliaceae and eucalypts. In addition, *Gmelina arborea* was planted to produce matches. Fuelwood plantations, and plantations to protect soil and farmland and for other purposes, were started about 30 years ago with good results; species used include *Cassia siamea* and *Dalbergia sissoo* (ITTO 2006).

Forest certification. In 2005 there were no certified forests in Cameroon (ITTO 2006), but third-party certification has progressed rapidly in recent years. In July 2010, five concessions (Lokoundjé – 69 000 hectares; SFIL Decolvenare – 70912 hectares; TRC – 125 500 hectares; Palisso – 341 700 hectares; Cafeco Wijma – 71 800 hectares; and Wijma – 97 000 hectares) hold valid Forest Stewardship Council (FSC) forest management certificates (FSC 2010). An additional 1.2 million hectares of FMUs are in the process of certification (ITTO 2009a). Along with all other ITTO member countries in the subregion, Cameroon has been participating, since 2005, in a regional ITTO project that is helping to build capacity for the implementation of the ATO/ITTO PCI at the national level in African ITTO member countries. It aims to train at least 60 forestry staff in each country in the implementation of the PCI, develop an auditing framework for African forests, and train at least 60 trainers in the procedures for conducting audits based on the PCI at the FMU level. This project has contributed to the progress of certification in Cameroon.

Table 4 Commonly harvested species for industrial roundwood

Species	Notes**
<i>Triplochiton scleroxylon</i> (ayous)*	About 800 000 m ³ annually (35% of total production).
<i>Entandrophragma cylindricum</i> (sapelli)*	About 390 000 m ³ annually (17%).
<i>Erythrophleum ivorensis</i> (tali)	About 170 000 m ³ annually (7%).
<i>Lophira alata</i> (azobe, bongossi)*	About 5% of total production.
<i>Chlorophora excelsa</i> (iroko)*	About 4% of total production.

* Also listed in ITTO (2006).

** According to MINFOF (2008); average production for 2005–07.

Estimate of the area of forest sustainably managed for production. A significant volume of timber is now harvested in FMUs that are subject to rigorous regulations (Topa et al. 2009). The total area of FMUs that are FSC-certified is 705 000 hectares (as of July 2010). About 550 000 hectares of FMUs are close to certification.^b The area of certified forest and the area of forest close to certification comprise the estimated area of sustainably managed forest shown in Table 5.

Timber production and trade. The total annual roundwood production (2005–09) is estimated at about 14 million m³, of which 9.5–12 million m³ is fuelwood.^a According to ITTO (2011), the average annual industrial roundwood production in the period 2007–09 was 2.27 million m³, compared with 1.75 million m³ per year in 2004 and 2.65 million m³ in 1999. Average annual sawnwood production in 2007–09 was about 773 000 m³, compared with 702 000 m³ in 2004 and 600 000 m³ in 1999. Plywood production was 24 000 m³ in 2009, compared with 36 000 m³ in 2004 and a significantly higher 92 000 m³ in 1999. An estimated 79 000 m³ of veneer were produced in 2009, compared with 43 000 m³ in 2004 and 53 000 m³ in 1999.

The ratio of domestically used timber to exported timber is 2.4:1 (ITTO 2009b). The informal domestic market also provides timber to neighbouring Chad, Nigeria and Sudan. Cameroon is now the tenth-largest tropical timber exporter (it was the seventh-largest in 2005) and is still the second-largest timber exporter among African ITTO producer countries after Gabon. The main export destinations are the European Union (about 60% of all timber exports) and Asia (22%).

Non-timber forest products. The NTFP sector is expanding rapidly, but few reliable data are available on production and trade (ITTO 2009a). NTFPs are traded regionally, in particular with Nigeria. Bush meat is of major significance in

both rural and urban areas. The bark and fruits of *Garcinia kola* and *G. lucida* (onie and essok) are used as medicines and stimulants, and the leaves of *Gnetum* spp are consumed as a delicious meal and traded locally and regionally with Nigeria. Palm oil is extracted from the nuts of *Elaeis guineensis* (Eton palm) and palm wine is extracted from the upper part of the stem. *Irvingia* spp (andok or wild mango) and *Riciodendron heudelotii* (ezezung) are used as condiments and *Dacryodes edulis* (plum or assa) is a popular food. The bark of *Prunus africana* is sold to pharmaceutical companies for use in the treatment of prostate-related disorders. The powdered bark of *P. africanum* (also known as pygeum or *Pygeum africanum*) is also used worldwide to control urinary disorders in men and as a herbal supplement for benign prostatic hyperplasia. *Baillonella toxisperma* (moabi), a high-priced hardwood species of the Sapotaceae family, is traditionally used by forest-dwellers for the oil from its seeds. All these products, as well as extracts of *Tabernante iboga*, *Cinchona* spp, *Strophanthus* spp, *Voacanga africana*, *Rauwolfia vomitaria* and *Paunsinstalia yohimbe*, are commercialized in Cameroon, generally in local markets. There are reportedly conflicts in some forest areas between concessionaires and local people, in particular Pygmy communities, over the use of forest products, in particular in the cases of moabi and *Entandrophragma cylindricum* (sapelli) (ibid.).

Forest carbon. Gibbs et al. (2007) estimated Cameroon's national-level forest biomass carbon stock at 3454–3721 MtC, Eggleston et al. (2006) estimated it at 6138 MtC and FAO (2010) estimated it at 2696 MtC. Cameroon is participating in the Forest Carbon Partnership Facility and submitted a readiness idea note in 2008 (Government of Cameroon 2008), in which the main potential REDD strategies were listed as the development of integrated protected areas in the PFE; the strengthening of sustainably managed production forests; the fight against illegal logging; the effective distribution of revenues; and support

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	8840	4950	1760	0	500	17	-	0
2010	7600	6100^a	5000	705	1255	19	2	0

* As reported in ITTO (2006).

for the agricultural sector to reduce pressure on forests. Table 6 shows the estimated forest carbon potential of the country. There is good potential to reduce forest degradation and enhance forest carbon sinks, in particular through restoration and reforestation, but there is a need to strengthen inventory and monitoring capacities.

Forest for protection

Soil and water. No estimate of the extent of natural forest and planted forest set aside primarily for water and soil protection was available for this report.

Biological diversity. Cameroon is rich in biodiversity, accommodating more than 8300 plant species, about 297 mammal species and 848 bird species. Nearly half of all the bird and mammal species of Africa are present in Cameroon's forests (ITTO 2006).

Twenty-eight mammals, eleven birds, 50 amphibians, two reptiles, eleven arthropods and 246 plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Twenty-five plant species are listed in CITES Appendix II, including two tree species, *Pericopsis elata* (afroormosia) and *Prunus africana* (UNEP-WCMC 2011).

Protective measures in production forests. The forest management prescriptions have gradually been widened since 1998 to include measures to protect soil, biodiversity and the flow of water in concession areas. They also include a series of stand treatments to encourage the regeneration of commercial tree species in natural stands.

Extent of protected areas. An estimated 5.2 million hectares of closed and open forests are in reserves conforming to IUCN protected-area categories I–IV, comprising 15 national parks (2.7 million hectares, of which seven national parks are

located in the Sudanian savanna and woodland vegetation in the north of the country), six wildlife reserves (740 000 hectares), four wildlife sanctuaries (95 000 hectares) and 77 forest reserves covering 880 000 hectares. A further 867 000 hectares of former production FMUs have been set aside for conservation purposes (ITTO 2006).

In mid 2010, seven national parks and one wildlife reserve had approved management plans. Two transboundary protected areas are supported by ITTO: the Lobéké National Park (part of the tri-national Sangha transboundary conservation area); and the tri-national protected area of Dja-Odzala-Minkébé (TRIDOM), comprising forest in Cameroon, Congo and Gabon.

Estimate of the area of forest sustainably managed for protection. Although considerable progress has been made since 2005 in the preparation of management plans for protected areas and in re-classifying forest protected areas, it remains difficult to estimate the real extent of forest protected areas and in particular the area of protection PFE that is under SFM (Table 7). The Biosphere Reserve of Dja, which has received continuous support since 1992 by the ECOFAC (*Ecosystem Forestier d'Afrique Centrale*) program of the European Union, with a total area of 526 000 hectares, can be considered well managed, as can the nine conservation concessions (non-allocated FMUs) registered with MINFOF, totalling 895 000 hectares.

Socioeconomic aspects

Economic aspects. Forest products are a principal source of export income in Cameroon. The export value of timber was about 320 billion FCFA (US\$650 million) in 2004 (ITTO 2009a), up from US\$210 million in 2001. According to their licence contracts, forest concession-holders must link their concessions with industrial processing units, thus providing stable employment in remote

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
3454–3721	54	++	++	++	+	++	++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	3900	2650	-	-	-
2010	5200	4400	-	2230**	1420

* As reported in ITTO (2006).

** MINFOF (2008).

rural communities and additional revenue flows for the state (ITTO 2006). An economic study in 2006 estimated the manpower engaged in the timber industry at 16 000^a; if the domestic wood sector is included, total forest-based employment is estimated at 45 000 (ITTO 2009a). Harvesting taxes provide an important revenue stream, which is shared between the state (50%), communes (40%) and local communities (10%). In 2005, for example, the total tax revenue was US\$26 million (ibid.). The amount has increased steadily over the years (Topa et al. 2009).

Livelihood values. Forests provide many local communities with foods, medicines and locally traded goods. Forests also have a major spiritual value for many ethnic groups. Forestry has been included in the country's poverty reduction strategy.^a

Social relations. Cameroon contains around 230 ethnic groups, many of them with a close association with forests. The Pygmy people, who are traditional hunters and gatherers, are the ethnic group most threatened in their traditional way of life by forest loss and degradation, restrictions on forest access and a lack of basic human rights (Government of Cameroon 2008). Progress has been made in recent years in the recognition of local user rights in forests, in the consultation process of opening-up new harvesting permits, and in the system for sharing tax revenues with local communities. Increasingly, permits are being granted to local communities to manage forests for timber and NTFPs.

Summary

Cameroon possesses significant forest resources and has confirmed over the past five years its considerable potential for SFM. The policy environment is sound and governmental responsibility for forests is vested in a single ministry, the Ministry of Forests and Fauna, MINFOF. A joint 2005 Forest and Environment

Sector Policy Letter defines the common responsibility for forests between MINFOF and the Ministry for Environment and Protection of Nature, the latter being responsible for climate-change adaptation and mitigation and REDD+. However, the capacity of both ministries to fully enforce the forest law and implement forest and environmental policies is low. Cameroon is progressing well towards SFM, in particular in some selected FMUs, but has yet to translate many of its ambitious forest management goals into practice and to effectively protect its PFE.

Key points

- Cameroon has an estimated 12.8 million hectares of PFE (similar to 2005), comprising 7.60 million hectares of natural production forests (compared with 8.84 million hectares in 2005), 5.20 million hectares of protection forests (compared with 3.90 million hectares in 2005) and 19 000 hectares of industrial timber plantations (compared with 17 000 hectares in 2005).
- At least 1.25 million hectares of natural-forest production PFE are estimated to be under SFM. Forest management plans have been developed for and are being implemented in 5.0 million hectares of the production PFE (compared with 1.76 million hectares in 2005). An estimated 1.42 million hectares of the protection PFE is under SFM.
- Despite considerable efforts in forest law enforcement in the past five years, the integrity of the PFE is threatened by encroachment, poaching and poor logging practices, including illegal logging, but no official data on the extent of these are available.
- Mining is an increasing threat to forest stability, as is population pressure, especially in coastal forests. Cameroon has good potential to develop REDD+ initiatives that address these threats.

- Forests are the living environment of many ethnic groups, particularly Pygmy communities. Ensuring the rights of these ethnic groups remains a major challenge for achieving SFM.

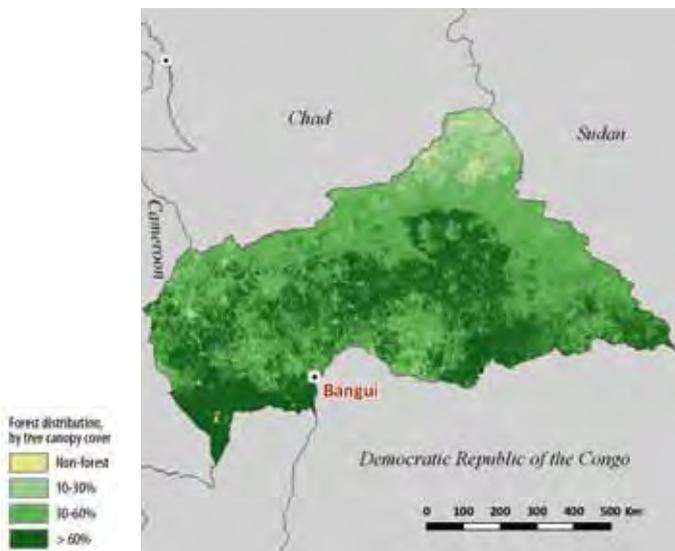
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- a Government of Cameroon (2009).
- b Personal communications with officials in the Government of Cameroon, 2010.

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CENTRAL AFRICAN REPUBLIC



Forest resources

The Central African Republic (CAR) has a land area of 62.3 million hectares and an estimated population in 2010 of 4.5 million people (United Nations Population Division 2010). Numerous political crises have seriously damaged the country's social and economic web and weakened economic capacity. As a result, CAR is one of the world's least-developed countries, ranked 179th out of 182 countries in UNDP's Human Development Index (UNDP 2009). Situated in the northern Congo Basin, this landlocked country comprises three broad bio-geographical zones. They are, from south to north, the humid Guinean zone, with annual precipitation between 1500 and 1800 mm and covered by dense humid forest; the Sudano-Guinean zone (including its drier component to the north), containing scattered semi-humid forests and open dry forests and savanna; and the Sahel zone, characterized by dry savanna and annual precipitation of less than 800 mm. The general relief of the country is formed by a plateau with altitudes varying between 500 m and 700 m and two separate basins, the Chad Basin in the north and the Congo Basin in the south. Estimates of forest area range from 22.7 million hectares (FAO 2010) to more than 30 million hectares (Government of CAR 2008; de Wasseige et al. 2009). The larger estimates include forest-savanna mosaic, forest-cropland mosaic and dense deciduous (miombo) forests.

Forest types. The forest types of CAR are very diverse. The major closed forest type is semi-deciduous rainforest, located in the southwestern and southeastern parts of the country (the southwestern massif and the *Forêt de Bangassou*), the latter covering about 6.5 million hectares.^a Large parts of these forests are unexploited. The semi-deciduous forests in the southwest, which form part of the Congo Basin rainforests, extend over an area of about 5.2 million hectares^a; they are among the richest in Africa, containing a high density of high-value timber species such as *Terminalia superba* (limba), *Entandrophragma cylindricum* (sapelli) and *Triplochiton scleroxylon* (ayous), as well as large mammals such as gorillas, forest elephants and bongo.

The total standing volume of timber in the southwestern forests was estimated in a forest inventory conducted in 1991–93 to be more than 127 million³ (ITTO 2006). North of the closed forest is a transition zone between forest and savanna which stretches in an east–west direction. Beyond this, gallery forests border large rivers. But by far the largest forest area is the open bushy savanna that gives way to the Sahel, covering about 17 million hectares (ibid.).

Permanent forest estate. The total PFE, as defined in the 2008 Forest Code, extends over about 5.8 million hectares and includes 5.2 million hectares of production PFE and 520 000 hectares of protection PFE. The PFE includes the inventoried forests in the southwest (3.8 million hectares) and the less known, largely unexploited forest of Bangassou in the southeast (1.9 million hectares).^a About 3.1 million hectares in the southwest has been allocated to forest concessions and the remaining closed forest area is protection PFE.^a Countrywide 46 classified forests (*forêts classées*), ranging in size from 20 to 120 000 hectares and covering a total area of 633 000 hectares, were set aside between 1948 and 1955 for conservation and production purposes. Many of these classified forests are no longer forested, however.

Table 1 shows the estimated PFE. The projected total PFE is larger in extent than the closed forest area determined by satellite imagery. There

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	22.9–29.3	4826	3500	3	300	3803
2010	22.7– 30.1**	4600**	5200†	3	560†	5763

* As reported in ITTO (2006).

** Dense humid forest, based on land cover data (de Wasseige et al. 2009). This figure is 8.69 million hectares when calculated using the ratio of forest with greater than 60% forest cover estimated by UNEP-WCMC (2010) and the estimated total natural forest area according to FAO (2010).

† Projected.

‡ Only the protected areas in the humid forest zone are counted here. The total protected area, most of which is located in savanna, is estimated at 6.04 million hectares.^a

is a significant area of degraded primary and secondary forest – nearly 1 million hectares in the southwestern forest area, in particular in the zone of Lobaye – that has the potential to be productive under SFM (ITTO 2006).

Forest ecosystem health

Deforestation and forest degradation. The annual deforestation rate in 1990–2000 was estimated at 0.19% (de Wasseige et al. 2009). Bushfires are widespread, particularly in the savanna and in the transition zone from forest to savanna and it is difficult to give a conclusive figure about the extent of deforestation (ITTO 2006). Forest degradation is significant in the production forest zone and in areas near urban centres that are under heavy pressure for fuelwood collection. The main direct causes of deforestation are the expansion of subsistence and cash agriculture, which particular affects gallery forests along waterways, human-induced wildfire in the savanna, wood-gathering around human settlements, and mining (for gold, diamonds and uranium) (Government of CAR 2008).

Table 2 indicates forest condition in the main southeastern forested region, based on the 1991–93 forest inventory (ITTO 2006). Due to intensive logging activities in the last 15 years, the share of primary forest has diminished today and the share of degraded and secondary forest has increased.

Vulnerability of forests to climate change. Given its location between the humid and dry tropics, agricultural production capacity is low in CAR and cannot satisfy the needs of the growing population, even without the effects of climate change (Government of CAR 2008). With the increases in temperature and decreases in precipitation projected by climate models, agricultural productivity will decline further, exacerbating poverty and reducing food security (ibid.). The semi-arid climatic zone is projected to become more arid, while in the humid zone a projected increase in the risk of periodic drought and wildfire will increase forest vulnerability. The forested zones have potential for agriculture in the face of climate-induced food shortages, which could lead to increased deforestation. The country's NAPA (MEFCPE 2008) prioritizes the prevention of forest

Table 2 Forest condition*

	PFE*	Non-PFE	Total
	'000 ha		
Area of primary forest	2400	-	2400
Area of degraded primary forest	900	-	900
Area of secondary forest	80	-	80
Area of degraded forest land**	220	-	220

* Southwestern forest area only.

** Partly savanna and raphia wetland.

Source: ITTO (2006).

degradation and the sustainable management of existing forests as options (among others concerning other sectors) to help in climate-change adaptation.

SFM policy framework

Forest tenure. All land belongs to the state (Table 3). The non-permanent forest estate is composed of communal, community and private forests.^a A legal framework specific to communal and community forests is yet to be produced.

Criteria and indicators. In 2009 the Government of CAR adopted the ATO/ITTO PCI for the sustainable management of African natural tropical forests as an instrument for monitoring progress towards SFM. With the support of a regional ATO/ITTO project, the CAR PCI were improved with a definition of the means of verification and related sources of information. The Government of CAR's submission to ITTO for this report was not in the ITTO C&I reporting format.^a

Forest policy and legislation. As part of its poverty reduction strategy, the government's aim is to enhance the transparency of forest and wildlife resource management while creating a more attractive business environment. A process is ongoing to replace the forest policy adopted in 1989 (see ITTO 2006) and to develop a sectoral policy for the sustainable management of forest resources that will rationalize their potential and use; protect biodiversity; combat desertification and its damaging effects; and increase the sector's contribution to economic growth and job creation.

The new Forest Code (*Code Forestier*, Law 08-022), which supersedes a 1990 forest code (Law 90-003), was prepared through a participatory approach that involved various stakeholders and was promulgated by the Head of State on 17 October 2008. Also

in 2008 a new environmental code (Law 07-018) was enacted. Several other reforms have been undertaken, including two decrees that appointed border control inspectors and created mobile 'forestry and wildlife' intervention and verification brigades. The main purpose of these inspectors and brigades is to control the movement of timber, secure forestry and wildlife revenues, and strengthen monitoring and control capacities. Another decree, issued in 2008, created the Forest Industry Observatory within the Ministry of Water, Forests, Hunting, Fishing and Environment (*Ministère des Eaux, Forêts, Chasses, Pêches et de l'Environnement* – MEFCPE), which will support decision-making and supply reliable and relevant economic information on the industry.

In 2009, two new decrees on the modalities of the implementation of the Forest Code and the allocation of timber concessions were introduced. Forestry and wildlife revenues are now being deposited in a bank account opened in the central bank in the name of communities in the affected areas. These revenues are supervised by a technical committee comprising representatives of the ministries concerned (the Ministry of the Interior, the Ministry of Finance and Budget, and MEFCPE) and it is intended that there will be local management of these funds. The principal task of the technical committee is to validate the employment programs developed by municipalities and to monitor projects financed from these funds as part of the campaign against rural poverty in communities in or bordering forest lands under operating permits. Such dynamic lawmaking activities are part of a sectoral adjustment program under the poverty alleviation strategy.

The Government of CAR is actively involved in various regional initiatives to promote SFM in the

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	22 700	5763	
Other public entities (e.g. municipalities, villages)	0	0	
Total public	22 700	5763	
Owned by local communities and/or Indigenous groups	0	0	
Privately owned by individuals, firms, other corporate	0	0	Small areas of forest plantations are privately owned or owned by communities.

Source: Government of CAR (2010).

Congo Basin, in particular through COMIFAC. It recently requested formal discussions with the European Union for developing a VPA. In 2008, a FLEGT working group, which includes representatives of civil society, was set up, and formal negotiations commenced in 2009.

Institutions involved in forests. Forests are administered by the MEFCPE. While the overall mission of the MEFCPE has remained the same since 1982, there is political instability in leadership; between 2003 and 2008, for example, there were ten different ministers.^a The MEFCPE, through the General Forestry and Water Commission and the Wildlife and Protected Areas Department, is responsible for forest management and conservation as well as for the monitoring of forest resources. It enforces forest laws through its forestry and wildlife brigades. The Department of Forest Inventory and Management Planning deals with inventories and forest management planning.^a The total staff of the MEFCPE for forests and wildlife management, at both the central and decentralized levels, was about 190 in 2008 (de Wasseige et al. 2009).

Staff training and forestry research are undertaken by the University of Bangui and its Agronomic Research Institute. However, both are constrained by a lack of funds and capacity and most professional and technical training is provided on the job by forest companies (ITTO 2006). The Higher Institute for Rural Development trains technicians and engineers.^a A number of local NGOs, such as the Committee for the Integrated Development of Communities, Green Pavilion, *Amis de la Nature*, the *Mouvement Femmes-Environnement* and the *Organisation Centrafricaine de Défense de la Nature*, are also active in the forest sector, although they still play only a marginal role in forestry matters.^a WWF supports staff training, C&I development and certification efforts.^a A number of development partners, including

the African Development Bank, GTZ and the International Monetary Fund, also support the development of the forest sector.

Status of forest management

Forest for production

Large-scale industrial harvesting started in 1968 in the southwestern forests, following an intensive inventory. A second forest inventory carried out in 1991–1993 estimated the standing volume of the 18 most important species at 93 million m³. Based on a 30-year rotation, the commercial volume harvestable per hectare was estimated at 15–20 m³ per year (ITTO 2006).

Harvesting in the PFE is carried out in large-scale concessions using a permit known as a PEA (*permis d'exploitation et d'aménagement*). Under the 2008 Forest Code, artisanal logging is allowable in production forest in areas of ten hectares or less, although permits (*permis artisanal*) need to be renewed annually. PEAs that in the past had been awarded for the lifetime of the company (ITTO 2006) are now valid for only one harvesting rotation, generally 30 years.^a They are allocated through an open bidding process and subject to long-term forest management plans, five-year business plans (*plans de gestion quinquennaux*) and annual operational plans.^a

In early 2010, twelve timber companies had been allocated concessions in the southwest of the country over a total area of 2.3 million hectares of PEA. At least three more concessions may be leased out, which would increase the allocated southwest production forest area to 3.1 million hectares.^a The size of forest concessions varies between 156 000 and 475 000 hectares. One small concession of 42 000 hectares still operates under a special cutting permit.^a As of September 2010, eight companies had finalized the preparation of their long-term forest management plans over a total area of 2.4

Table 4 Commonly harvested species for industrial roundwood

Species	Estimated annual log production
<i>Entandrophragma cylindricum</i> (sapelli)*	300 000 m ³
<i>Triplochiton scleroxylon</i> (ayous)*	90 000 m ³
<i>Aningeria</i> spp (aniegré-longhi)*	30 000 m ³
<i>Entandrophragma utile</i> (sipo)*	25 000 m ³
<i>Chlorophora excelsa</i> (iroko)*	20 000 m ³

* Also listed in ITTO (2006).
Source: Government of CAR (2010).



Log landing in a concession in the Central African Republic.

million hectares and management planning was progressing for another 580 000 hectares (D. Hubert, pers. comm., 2010).

PEAs stipulate that local people living in or adjacent to concessions must be involved in the process of establishing permits (ITTO 2006). With recent investments in a wider sector adjustment program, the MEFCPE has increased its capacity to oversee the management of the PFE and to enforce the law^a; its effectiveness still needs to be proven, however. Concession-holders pay rent on the area and a flexible fee related to the volume produced and exported.^a

Silviculture and species selection. While the 1990 Forest Code made specific reference to silvicultural management criteria, including quantitative limits on logging to avoid creaming and favour natural regeneration (see ITTO 2006), the 2008 Forest Code only includes general guidance on forest management planning. In principle, PEAs are renewable; long-term management and harvest planning should therefore be possible. There are about 300 potential timber species in the closed forest area but only 34 species are harvested.^a Table 4 lists the five species that made up 85% of production between 2005 and 2008. Other

important species that are increasingly harvested are *Entandrophragma candollei* (kossipo), *Guarea cedrata* (bossé), *E angolense* (tiama), *Pterocarpus* spp (padouk) and *Lovoa trichilioides* (dibétou bibolo).

Planted forest and trees outside the forest.

Planted forests cover an estimated 1800–3000 hectares. In addition, the country's single *Hevea brasiliensis* (rubber) plantation covers about 1000 hectares. There are no reports of new plantations established since 2005.

Various tropical hardwoods, including *Tectona grandis* and *Gmelina arborea*, have performed quite well in experimental trials, but these have not been scaled up (ITTO 2006). Small community-based fuelwood plantations of eucalypts, *Acacia mangium* and *Cassia siamea* are important in non-forested areas. In drier areas, trees planted outside forests are of some importance, including neem, *Butyrospermum parkii* (karité), *Anacardium excelsum* and *Acacia albida* (ibid.).

Forest certification. As of mid 2010, no forest had been certified as well managed in CAR (e.g. FSC 2010). ITTO (2006) referred to one concession, *Industrie Forestière de Batalimo*, 186 000 hectares in size, that was in an advanced process of

certification, but it has not achieved certification to date. One company – OLB – operating in a forest of 195 000 hectares, has had a certificate of timber origin and legality since 2007. The Government of CAR is actively engaged in the VPA process and negotiations with the European Commission on a VPA were expected to be reaching a conclusion in late 2010 (Anon. 2010).

Estimate of the area of forest sustainably managed for production. The objective of the Government of CAR is that, by 2011, all forests are under forest management plans.^a In 2009, of the eleven PEAs operating in the southwestern part of the PFE, eight were operating under full management plans and three were developing their management plans.^a This indicates significant progress towards SFM, since in 2005 only two companies with concessions totaling about 650 000 hectares were working under comprehensive forest management plans (ITTO 2006). However, the MEFCPE still lacks the know-how and capacity to monitor the implementation of these management plans effectively.^a With finance from the African Development Bank a major project is under way in the southwestern forest area with the overall aim of achieving the sustainable management of forests and woodlots by communities.^a Despite these positive developments, a lack of strong evidence of the extent to which management plans are being implemented means that no forest can be classified as under SFM (Table 5).

Timber production and trade. Total roundwood production in 2008 was an estimated 3 million m³, of which at least 2.5 million m³ was fuelwood.^a CAR produces relatively low volumes of mostly high-value timbers. In 2009, total industrial timber production amounted to an estimated 533 000 m³, slightly more than the 509 000 m³ produced in 2004 (ITTO 2010). The country produced 95 000 m³ of sawnwood in 2009, up from 67 000 m³ in 2004. About 81 000 m³ of logs were exported in 2009, compared with 93 000 m³ in 2004. The decline in log exports was matched by an increase in sawnwood exports, from 11 000 m³ in 2004 to 22 000 m³ in 2009 (ITTO 2010). CAR's exports face numerous constraints: as a land-locked country it needs to transport its products either through neighbouring Congo by train or by road through Cameroon. The main export destinations are China and Hong Kong (37%), European Union countries (40%), Turkey and, increasingly, Cameroon.^a

Non-timber forest products. The forests play a fundamental role in the lives of many people in CAR, including by providing medicinal and edible plants, fruits and fungi, game, timber and fuelwood.^a Bush meat is the most economically important forest product besides fuelwood and timber. Many foodstuffs, medicinal plants and condiments – including *Piper guineense* (forest pepper), *Xylopia aethiopica* and *Aframomum* spp – are collected in closed and savanna forests and sold locally or exported (ITTO 2006). No quantitative data were available on NTFP production and trade.

Forest carbon. The total carbon stock in forests and woodlands in CAR is estimated at 5500 MtC, of which about 900 MtC are in the closed humid forests (de Wasseige et al. 2009). Gibbs et al. (2007) estimated the national forest biomass carbon stock at 3176–4096 MtC, Eggleston et al. (2006) estimated it at 7405 MtC and FAO (2010) estimated it at 2861 MtC.

The Government of CAR is participating in the Forest Carbon Partnership Facility and submitted a readiness idea note in 2008 (Government of CAR 2008). Proposed REDD+ strategies include in particular the further development and financing of integrated protected areas; improved fuelwood management in peri-urban areas; and improved management of forest mosaics and savanna. Table 6 indicates the country's forest carbon potential. Capacity needs to be strengthened considerably if the country is to implement REDD+. There is considerable potential to reduce GHG emissions and enhance carbon sinks, in particular through the improved control of wildfire in the savanna.

Forest for protection

Soil and water. A number of small areas totalling about 5700 hectares has been set aside for catchment protection purposes (*mise en défense*) (ITTO 2006).

Biological diversity. CAR contains more than 3600 plant species, 224 mammal species and 668 bird species. Seven mammals, one bird and eight plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). One non-tree plant species is listed in CITES Appendix I and two in Appendix II (UNEP-WCMC 2011).

Several other mammals are locally threatened. The elephant population, for example, has reportedly

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	3500	2920	650	0	186	3	-	0
2010	5200	3100	2320	0**	0	3	0	0

* As reported in ITTO (2006).

** A certificate of legality has been issued for 155 000 hectares of forest, however.

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
3176-4096	38	+	++	+	+	+++	+

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

decreased to a critical level due to unabated poaching, especially in the north. Nevertheless, the country probably still has the highest densities of lowland gorillas and forest elephants in Africa (de Wasseige et al. 2009).

Protective measures in production forests.

The 2008 Forest Code makes provisions for the protection of biodiversity and to set aside ecologically fragile zones in PEAs (articles 83 and 87). Protective measures must be described in the long-term and mid-term forest management plans.

Extent of protected areas. The first forest conservation areas to protect the now locally extinct white rhinoceros were created in 1925 (Réserve de Zimongo and the parks of Baminigui, Bangoran and Manovo-Gonda-Saint Floris), covering more than 1 million hectares of open savanna (ITTO 2006). The total area in IUCN protected-area categories I-IV is now about 6 million hectares, including one integral reserve (IUCN category I),

five national parks (category II), and two special reserves, five wildlife reserves and two biosphere reserves (category IV).^a These mostly comprise savanna and dry shrub land. The Dzanga Sangha Special Reserve, the Dzanga Ndoki National Park (CAR's part of a tri-national protected area between CAR, the Republic of the Congo and Cameroon), and two smaller reserves are the only forested protected areas, covering a total of about 560 000 hectares.^a

Estimate of the area of forest sustainably managed for protection. Few data are available on the status of forest management in CAR's production PFE. Considerable efforts have been made to protect the 122 000-hectare Dzanga-N'doki National Park, which provides habitat for large mammals such as forest elephants, bongos and gorillas. The Dzanga-N'doki National Park is counted in Table 7 as under SFM.

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	300	3090	6	-	-
2010	560	6040**	6	120	120

* As reported in ITTO (2006).

** UNEP-WCMC (2010).

Socioeconomic aspects

Economic aspects. The main exports of CAR are coffee, cotton, diamonds, gold and timber, with diamonds and timber representing almost 80% of total export revenues (International Monetary Fund 2009). Forest taxes account for about 14% of state revenues and its contribution to GDP rose from 2.6% in 1997 to 5% in 2005.^a About 4000 people are employed directly in the formal forest sector (ITTO 2006). Rents and felling taxes on forest harvesting are required to be distributed among beneficiaries as follows: 30% to the Treasury, 40% to the Forest and Tourism Development Fund, and 30% to communities (ITTO 2006). There is an important artisanal timber sector. The bush-meat industry has a turnover of more than 2% of GDP (de Wasseige et al. 2009).

Livelihood values. Bush meat and the gathering of edible fruits, nuts, insects and roots are of great importance for local communities dependent on forests, in particular Pygmy communities. Yams (*Dioscorea* spp) are a staple food of the Pygmies (ITTO 2006).

Social relations. The population of CAR is ethnically diverse and the unifying factor is Sangö, the national language. The 2008 Forest Code recognizes the traditional rights of local users and mentions, in particular, the rights of Indigenous peoples in PEAs. However, there are restrictions on forest use in protected areas (articles 14–18).

Summary

CAR is one of the poorest countries in the world. Forest products play an important role in generating state income but also in the livelihoods of the majority of the people. The largest proportion of forests is savanna woodland; closed humid forests are found in the south and southwestern part of the country. Nearly the entire closed forest area is either occupied by timber concessions or has some form of protected-area status. Progress has been made in recent years to improve the quality of forest concession management and to regulate protected areas.

Key points

- CAR has an estimated 5.78 million hectares of PFE (compared with 3.80 million hectares in 2005), comprising 5.2 million hectares of

natural production forest (compared with 3.50 million hectares in 2005) and 560 000 hectares of protection forest (compared with 300 000 hectares in 2005).

- No part of the production PFE is considered to be under SFM. Nevertheless there has been a dramatic increase in the area of production forest covered by forest management plans, from 650 000 hectares in 2005 to 2.32 million hectares. An estimated 122 000 hectares of protection PFE is under SFM.
- Twelve privately owned timber companies manage a total area of 2.3 million hectares of production PFE in the southwestern part of the country. Management permits (*Permis d'exploitation et d'aménagement*) are now valid for only one harvesting rotation, generally 30 years.
- There are no community forests, but the 2008 Forest Code provides for the establishment of community and municipal forests. The ministry in charge of forests, MEFCPE, lacks capacity to oversee management of the PFE and to enforce the law.
- Forest production provides important export revenue and contributes 5% or more to GDP. The forest sector generates about 14% of state revenues through logging activities. According to the Forest Code, a significant share of revenues generated by forest taxes is to be redistributed to local communities. However, such revenues are unevenly distributed between and within such communities.

Endnote

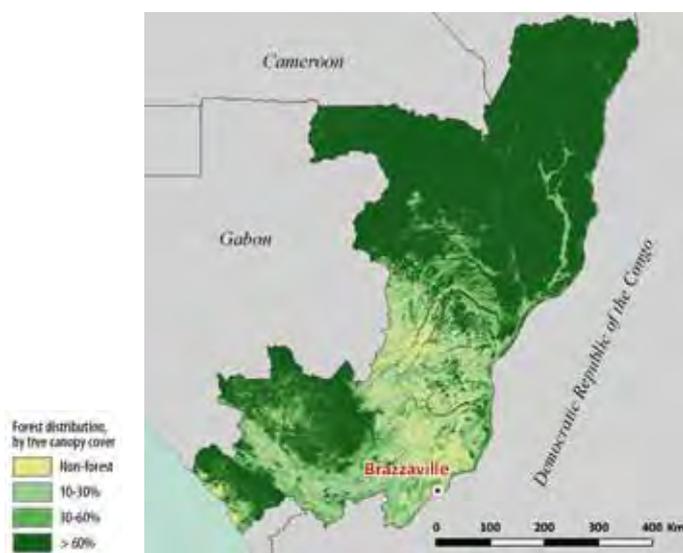
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CONGO



Forest resources

The Congo (officially known as Republic of the Congo) has a land area of 34.2 million hectares. In 2010 it had an estimated population of 3.7 million people (United Nations Population Division 2010). Congo is ranked 136th out of 182 countries in UNDP's Human Development Index (UNDP 2009). Stretching from 3° north to 5° south, it can be divided into three broad biogeographical zones: the southern zone, which covers the forested Mayombe and Chaillu mountains and savanna; the central zone, which consists of the Bateke Plateau highlands, wholly covered by grass or shrub savanna apart from gallery forests and scattered forest islands; and the northern zone, located mostly north of the equator, which consists of three heavily forested subregions, from south to north Cuvette, Sangha and Likouala.

The total forest area is estimated at about 22.4 million hectares (CNIAF 2008; FAO 2009). de Wasseige et al. (2009) estimated the extent of dense humid forests on the basis of land-cover data at 18.5 million hectares, and there was an additional 8.4 million hectares of forest–cropland mosaic, forest–savanna mosaic and semi-deciduous miombo forests. Congo has an estimated 1670 hectares of mangroves (Spalding et al. 2010).

Forest types. The Mayombe forest, originally rich in *Aucoumea klaineana* (okoumé), has been heavily cleared due to colonization along the

road between Brazzaville and Pointe-Noire and repeated logging. It covers less than 1 million hectares, including extensive secondary forests (ITTO 2006). The Chaillu forest area, covering about 3.4 million hectares, is rich in okoumé, *Terminalia superba* (limba), *Pycnanthus angolensis* (ilomba) and *Entandrophragma utile* (sipo); it has been locally over-harvested and is increasingly encroached upon by farmers. Together, these two forest areas form the southern sector. The northern forests contain redwoods, especially sipo, *Entandrophragma cylindricum* (sapelli) and *Millettia laurentii* (wengé), as well as light hardwoods (e.g. *Triplochiton scleroxylon* – ayous); they cover 16.5 million hectares, about 40% of which is situated on soils that are flooded for a large part of the year (ITTO 2006).

Permanent forest estate. The PFE includes forests in the national forest estate, forests owned publicly, communes and other local collectives (articles 5 and 6, Law16/2000). The non-permanent forest estate comprises non-gazetted protected forests (Article 13, Law16/2000). Since the 1960s, Congo has divided its national forest estate into three sectors and a variable number of forest management units (*unités d'aménagement forestier* – UFAs); virtually all closed natural forest is contained within Congo's PFE (Table 1). Some UFAs in the south and in the centre are subdivided further into forest logging units (*unités forestières d'exploitation* – UFEs). In mid 2009, 52 forest management/forest logging units covering an area of nearly 12 million hectares had been established, the majority in the north. The plan is that 15.2 million hectares will be allocated for production forestry. An area of about 3.2 million hectares of PFE is unallocated. UFAs can be managed for both production and protection.

Forest ecosystem health

Deforestation and forest degradation. Congo is a country with high forest cover and low rates of deforestation and forest degradation. The Government of Congo (2010b) estimated the annual deforestation rate at 0.03% (67 000 hectares per year) and the annual degradation rate at 0.01%. Deforestation is more intense in the south; the north is only sparsely populated

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	20.3–22.1	22 000	18 400	72	2860	21 300
2010	22.4–26.9	18 500**	15 200‡	85	3650	18 900

* As reported in ITTO (2006).

** Based on de Wasseige et al. (2009).

‡ Data on the extent of the production PFE are contradictory, even within the same ministry. This figure is estimated according to the plan for the PFE set out by MEF.

and to a large extent inaccessible. The main direct causes of deforestation and forest degradation are unsustainable slash-and-burn practices; unsustainable fuelwood production and consumption; unsustainable and illegal logging; and urban development. These direct causes are compounded by underlying factors such as a lack of a common land-planning vision among stakeholders; rural poverty; population growth; a lack of alternative sources of energy adapted to low incomes; inefficient charcoal production and use; and weak forest governance (Government of Congo 2010b). Table 2 provides an estimate of forest condition.

Vulnerability of forests to climate change. Congo has not submitted a NAPA to the UNFCCC and no information was available for this report on the country's strategy to adapt to climate change. Increasing vulnerability in Congo may be expected in peri-urban areas, particularly with regard to a dwindling water supply and associated health risks. A drying of the climate would likely increase the incidence of forest fire in the southwest and in the savanna.

SFM policy framework

Forest tenure. Under Article 35 of the Forest Code (2000) the state recognizes the ownership rights of private forest owners, based on tenure titles or customary tenure rights, as recognized by the 1991

Sovereign National Conference. Theoretically, state forest can belong to government, local councils (*collectivités locales*) and public bodies. Once declared, any community or communal forest is registered as the private domain of the relevant group. Although the principle of ownership rights for local communities is in effect, no transfers have been implemented. As for individuals, the registration of customary titles remains an issue. The presumption of ownership remains with the state, which is still the sole owner and manager of forests (Table 3).

Criteria and indicators. Congo developed its own set of PCI based on those of ITTO and ATO in 2007. The Government of Congo used the ITTO C&I in its submission to ITTO for this report.^a

Forest policy and legislation. The legal framework for government policy on forests and the environment mainly includes: Law 003/91 (1991), on environmental protection; Law 20/96 (1996, amending the 1984 law), instituting Tree Day; Law 16/2000 (2000), which sets out the Forest Code; Law 17/2000 (2000), on tenure; Law 10/2004 (2004), providing for the State Estate Code; and Law 37/2008 (2008) on fauna and protected areas. The Forest Code, the law on fauna and protected areas and all other laws developed after the United Nations Conference on Environment and Development in 1992 integrate wider concerns to ensure the economic, environmental and

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	7500	-	7500
Area of degraded primary forest	15 100	-	15 100
Area of secondary forest			
Area of degraded forest land*	-	-	-

Source: Government of Congo (2010a).

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial governments)	22 100	18 787	The exact extent of the state forest area is not known.
Other public entities (e.g. municipalities, villages)	113	113	Refers to allocated <i>réserves communautaires</i> .
Total public	22 200	18 900	
Owned by local communities and/or Indigenous groups	-	-	
Private owned by individuals, firms, other corporate	-	-	The area of planted forest by the private sector is unknown.

Source: ITTO estimate based on Government of Congo (2010a).

social sustainability of natural resources (land, forest, water and fauna). Under the Forest Code, development plans must be prepared for each UFA. The Forest Code describes the bidding process for the allocation of UFAs and, through subsequent decrees, regulates forest management planning and makes specific technical management directives, including on community development. National standards for additional studies (e.g. socioeconomic and environmental) were added by decree in 2005.

The forest policy is linked with the wider development agenda of the country. The National Land Planning Scheme (2005), the Poverty Reduction Strategy Paper (2008) and the National Action Plan (2008) all include forests as an important element in the country's development. Congo is a signatory to the Treaty on the Conservation and Sustainable Management of Forest Ecosystems in Central Africa (signed in Brazzaville in 2005; ratified by Congo in Law 35/2006, 2006) and participates in COMIFAC.

Institutions involved in forests. The mission of the former Ministry of Forestry Economy and Environment (*Ministère de l'Economie Forestière et de l'Environnement*) has been reassigned to the Ministry of Forest Economy (*Ministère de l'Economie Forestière* – MEF) and the Ministry of Tourism and the Environment. MEF is responsible for forest policies and strategies, the monitoring of forest management, the forest economy, the supervision of rural forestry, the management of wildlife resources, and training and research. The total staff assigned for these tasks is about 750, of whom 350 are technicians. MEF lacks the human and material resources to manage the country's large forest estate effectively. There are four state agencies with specific tasks: the Forestry Fund

(*Fonds Forestier*); the National Reforestation Service (*Service National de Reboisement*); the National Centre for the Inventory and Management of Forest and Wildlife Resources (*Centre National d'Inventaire et d'Aménagement des Ressources Forestières et Fauniques* – CNIAF), which is in charge of developing forest management plans and the monitoring of their implementation; and the Monitoring Service for the Export and Import of Forest and Wildlife Products (*Service de Contrôle des Produits Forestiers et Fauniques à l'Exportation et l'Importation*), which has outsourced offices in the country's main production forest areas. Law enforcement is carried out by MEF's departmental directorates.

Research and technological development from ministries and NGOs is coordinated by a specific body, the Office for Scientific and Technological Research (*Délégation Générale de la Recherche Scientifique et Technique*). There are two training institutes, the *Ecole Nationale des Eaux et Forêts* in Mosendjo and the *Institut de Développement Rural*. Several international NGOs operate in Congo in close partnership with MEF, including the Wildlife Conservation Society in protected-area management, and the World Resources Institute, which supports the monitoring of commercial forestry operations.

Status of forest management

Forest for production

Timber has been harvested commercially in southern Congo since 1910 and in northern Congo since the 1970s.³ Today, 70% of timber production occurs in the sparsely populated northern Congo, which contains large areas of primary forest. Concessions in the UFAs are allocated either



Forest inventory at the CIB Pokola concession.

through an industrial processing agreement (*convention de transformation industrielle*), a management and processing agreement (*convention d'aménagement et de transformation*) or a special permit (*permis spécial*). In addition to these, Article 65 of the 2000 Forest Code specifies *les permis de coupe des bois de plantations* for the harvesting of plantations. Enterprises that are candidates for the development of a UFA are selected by tender. Harvesting is carried out in designated areas according to an AAC, which corresponds to the maximum annual volume authorized by the forest administration.

In mid 2009, 52 UFAs and UFEs covering an area of nearly 12 million hectares had been established, about 8 million hectares of which were in the north as large-scale concessions and about 4 million hectares of which were in the south and on the plateau, often divided into UFEs that are, on average, about 50 000 hectares in size.^a Forest management is very different in the southern Mayombe and Chaillu regions compared with the northern part of Congo. Southern forests are degraded, and current timber harvesting is often the third or fourth re-entry into logged-over forests (ITTO 2006). In addition, the former UFAs have been divided into smaller logging units, providing mainly national extractors with access to the resources. Many of these logging units have been subcontracted to logging operators without

knowledge of, interest in or capital for forest management, and damage is widespread.^a

In northern Congo, in contrast, the integrity of large UFAs has been maintained and the average size of UFAs is about 400 000 hectares. These concessions have been allocated to large industrial companies with an annual production capacity of over 100 000 m³, large enough to warrant investment in wood-processing units (ITTO 2006). The concessionaires already implement or are preparing forest management plans. In theory, these plans are to be prepared by the forest administration in close collaboration with the forest concession-holders, but, in practice, the concession-holders undertake most of the work (ibid.). By mid 2009, forest management plans had been finalized for 3.83 million hectares of concessions and was ongoing for an additional 6.84 million hectares. It is estimated that, by 2012, about 13.4 million hectares of production forests will be under management plans (Government of Congo 2010a).

Silviculture and species selection. Congo has a long tradition of forest research and education, and there is broad scientific knowledge of silviculture and forest dynamics in natural and planted forests. Under the 2000 Forest Code, forest management plans must specify the species selected for felling and for conservation, silvicultural treatments, including enrichment planting, and the silvicultural planning schedule for each harvesting plot. Felling cycles may vary between 25 and 50 years and harvestable diameters between 60 and 80 cm according to species (ITTO 2006). Harvesting in UFAs for which a management plan has not yet been approved should be preceded by a felling inventory for the specified area (ibid.).

In northern Congo, 20–25 timber species are harvested, primarily for the export market. The five major timber species listed in Table 4 make up nearly 80% of total production and, with an additional four species (*Triplochiton scleroxylon* –ayous, *Millettia laurentii* – wengé, *Terminalia superba* – limba and *Chlorophora excelsa* –iroko), made up 90% of log production between 2006 and 2009.^a In the south, the production is more diverse and involves mostly secondary forest species, such as *Aucoumea klaineana* (okoumé) and *Gambeya africana* (longhi).

Planted forest and trees outside the forest. The total area of planted forests has been estimated at

Table 4 Commonly harvested species for industrial roundwood

Species	Notes
<i>Entandrophragma cylindricum</i> (sapelli)*	More than 40% of total production, 100% for export.
<i>Aucoumea klaineana</i> (okoumé)	About 23% of total production, exported mainly to Asia.
<i>Entandrophragma utile</i> (sipo)*	About 6%, decorative species, important for veneer.
<i>Guarea cedrata</i> (bossé)	About 4% of total production.
<i>Entandrophragma candollei</i> (kossipo)	About 3% of total production.

* Also listed in ITTO (2006).

Source: Government of Congo (2010a).

about 85 000 hectares.^a A special unit develops agroforestry plantations and enrichment planting in logged-over and degraded forests; since 1996, 12 000 hectares of enrichment plantings have been established using local hardwood species. Where follow-up treatments are carried out (e.g. in the *Congolaise Industrielle des Bois* – CIB – concession), these enrichment plantings develop well.^b Most afforestation has been established in low-fertility savannas by introducing eucalypts (e.g. in the region of Pointe Noire).

A 40 000-hectare clonal eucalypt plantation, which is planned to be extended to 60 000 hectares, is being developed by a private firm (Canadian-owned Mag-Industries) in conjunction with the construction of a woodchip factory (de Wasseige et al. 2009). There are also oil-palm and rubber plantations in southern Congo but their extent is unknown.

Forest certification. Three main concessions in northern Congo, owned by *Industrie Forestière d'Ouessou* and CIB, hold valid FSC forest management certificates over an area of 1.91 million hectares (FSC 2010). Since June 2010, the Mokabi concession of Rougier (586 000 hectares) has received a certificate of legality and is progressing towards forest management certification. Congo and the European Union signed a VPA in May 2010.

Estimate of the area of forest sustainably managed for production.

The three concession areas owned by *Industrie Forestière d'Ouessou* and CIB operating with FSC certification, and the Mokabi concession of Rougier, which currently holds a Timber Legality and Traceability Verification (TLTV) certificate, are counted here as sustainably managed (Table 5).

Timber production and trade. Total annual roundwood production is estimated at 2.55 million m³, of which 1.98 million m³ was industrial roundwood in 2009 (ITTO 2010). In 2009, nearly 80% of the entire industrial roundwood harvest was undertaken by three Malaysian-owned and three European-controlled firms.^a

Timber companies must process at least 85% of their production in the country or pay a surcharge on log exports.^a Sawnwood production was 369 000 m³ in 2009, up from 200 000 m³ in 2004 and 109 000 m³ in 2000 (ITTO 2010). Log exports increased from 209 000 m³ in 1999 to a peak of 844 000 m³ in 2004; in 2009, 769 000 m³ of logs were exported (ibid.). The volume of sawnwood exports increased from 31 000 m³ in 1994 to 283 000 m³ in 2007; in 2009, 264 000 m³ of sawnwood were exported. About 8700 m³ of veneer were exported in 2009. The cost of exporting timber is relatively high in Congo compared to other countries in the Congo Basin. Timber produced in northern Congo must be

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvest	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	18 400	8440	1300	0	1300	72	45	0
2010	15 200	11 980	8270**	1908	2494	85	45	0

* As reported in ITTO (2006).

** Includes the area managed under approved forest management plans and areas that have management plans in advanced preparation.

transported more than 1000 km by road to the port of Douala in Cameroon, and labour costs are the second-highest in the region (after Gabon; ITTO 2006).

Non-timber forest products. The commercial harvesting of NTFPs (*produits accessoires*) is regulated through special permits (in particular for firewood and charcoal). Many foods, medicinal plants and condiments are collected in closed and savanna forests, and are mainly sold domestically. Fibres such as raphia and rônier leaves (*Borassus aethiopum*) are traded with neighbouring countries. Mammals (especially antelopes), invertebrates, snails and fish are important sources of protein for forest-dwelling communities. The trade in bush meat now involves many species, including protected species such as apes and elephants in northern Congo. Hunting for bush meat has become a major problem since the opening-up of the forests to commercial logging (ITTO 2006).

Forest carbon. The total forest carbon stock was estimated by de Wasseige et al. (2009) at about 4200 MtC, of which about 3300 MtC are in closed humid forests. Gibbs et al. (2007) estimated the national forest biomass carbon stock at 3458–4739 MtC, Eggleston et al. (2006) estimated it at 5472 MtC and FAO (2010) estimated it at 3438 MtC. Congo has submitted a readiness idea note to the Forest Carbon Partnership Facility and prepared a draft readiness preparation plan. The country’s proposed REDD+ strategy includes enhancing forest-tenure security; sustainably managing forest resources; improving agricultural production systems; streamlining fuelwood production and use; and addressing extra-sectoral factors that lead to deforestation and degradation. Table 6 summarizes Congo’s forest carbon potential. The large area of intact forest suggests significant potential for the conservation of existing forest carbon stocks.

Forest for protection

Soil and water. In southern and central Congo, about 3.66 million hectares of forests are managed primarily for soil and water protection (ITTO 2006). However, no maps or specific management plans have been prepared for these forests.^a

Biological diversity. Congo is host to more than 6500 plant species, 200 mammal species, more than 600 inventoried bird species, 45 reptile species, 36 amphibian species, 103 fish species and at least 800 butterfly species.^a Seven mammals, one bird and six plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Seven plant species are listed in CITES Appendix II, including one hardwood timber species, *Pericopsis elata* (UNEP-WCMC 2011).

Protective measures in production forests. Forest management plans prescribe measures to protect water resources, biodiversity and soils. Within timber concessions, areas are set aside to protect biodiversity. In 2009, the combined area of such protected forests was about 600 500 hectares.^a

Extent of protected areas. About 3.5 million hectares, or nearly 11% of the country’s total area, has been classified as protected areas. There are three national parks: Odzala-Kokoua National Park (126 000 hectares) dating from 1935; Nouabale-Ndoki National Park (410 000 hectares), created in 1993; and the Conkouati-Douli National Park (505 000 hectares), created in 1999. These three national parks and three sanctuaries have protected-area status equivalent to IUCN categories I and II over a total area of 2.47 million hectares, of which about 2.07 million hectares is lowland evergreen broadleaved rainforest. Four wildlife reserves, two hunting reserves, one biosphere reserve and one community reserve (IUCN categories V and VI) cover a forest and savanna area of about

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
3458–4739	68	++	++	++	+	+	+++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	2860	2470	3660	380	380
2010	3650	2470**	3660	536	536‡

* As reported in ITTO (2006).

** UNEP-WCMC (2010).

‡ Comprises Odzala National Park and Nouabale-Ndoki National Park, as well as the protected areas within the certified UFAs in northern Congo.

1.2 million hectares. Of the 14 protected areas, twelve are linked by forest corridors (ITTO 2006). The Conkouati-Douli National Park faces several threats, notably from illegal logging and mining, road access, and a relative high population density around the park; there is intensive poaching and commercial bush-meat hunting.^b

Estimate of the area of forest sustainably managed for protection. The Nouabale-Ndoki National Park (410 000 hectares) is covered by a management plan that is being implemented effectively; CIB is harvesting timber in the buffer zone and implementing measures to further protect the integrity of the park. This national park is therefore considered to be under SFM. Due to its remoteness and its 80 years of existence, the Odzala National Park is also considered to be under SFM (Table 7).

Socioeconomic aspects

Economic aspects. Forestry contributes about 6% of GDP and 3% of tax income. About 15 000 people obtain their income from forestry, not counting the informal sector, in particular in fuelwood and charcoal production and local carpentry. Forestry is particularly important as an employer in northern Congo.

Livelihood values. Bush meat and the gathering of edible fruits, nuts and roots are of great importance for forest-dependent local communities, particularly Pygmies in closed forest. Leaves of *Gnetum* spp are widely used as vegetables. Fruits of *Irvingia gabonensis*, *Gambeya africana* and others are also eaten. The government's procedures for forest management plans contain provisions for the local use of NTFPs (ITTO 2006).

Social relations. In northern Congo, communities living in or near forests rely heavily on hunting for subsistence, but this is often affected by logging and particularly the presence of logging camps.

Over-hunting occurs in areas with rapid population growth caused by the opening-up of the forest frontier. Indeed, the bush-meat question and social relations between Indigenous forest-dwellers and migrants attracted by the forest industry are possibly the biggest constraints to SFM in northern Congo (ITTO 2006). Local populations often benefit from the long-term presence of forest companies, which construct roads that can be used for the transport of goods. Such companies also establish medical services and schools and, to some extent, provide services that normally are the responsibility of government (ibid.).

Summary

Congo has a large forest resource, supportive government policies and considerable technical and financial support from international development partners. There is little population pressure in its main forest area, and a growing number of concessionaires are advancing along the path to SFM. The stage therefore seems set for the forest sector to expand the area of forest under SFM, provided that issues related to Indigenous communities and the commercial over-hunting of certain mammal species can be addressed. Most progress towards high standards of forest management is occurring in the northern part of the country; a major challenge is to extend this to the forests in the south.

Key points

- Congo has an estimated PFE of 18.9 million hectares (compared with 21.3 million hectares in 2005), comprising 15.2 million hectares of production forest (compared with 18.4 million hectares in 2005), 3.65 million hectares of protection PFE (compared with 2.86 million hectares in 2005) and about 85 000 hectares of planted forests.

- Management plans exist or are at an advanced stage of development for about 8.27 million hectares of production PFE. An estimated 2.49 million hectares of the natural production PFE and an estimated 536 000 hectares of protection forests are under SFM.
- The over-hunting of bush meat within concessions, and social relations between Indigenous forest-dwellers and migrants, are possibly the biggest constraints to SFM in northern Congo.
- There is potential for carbon conservation in natural forests and sequestration in planted forests under REDD+.

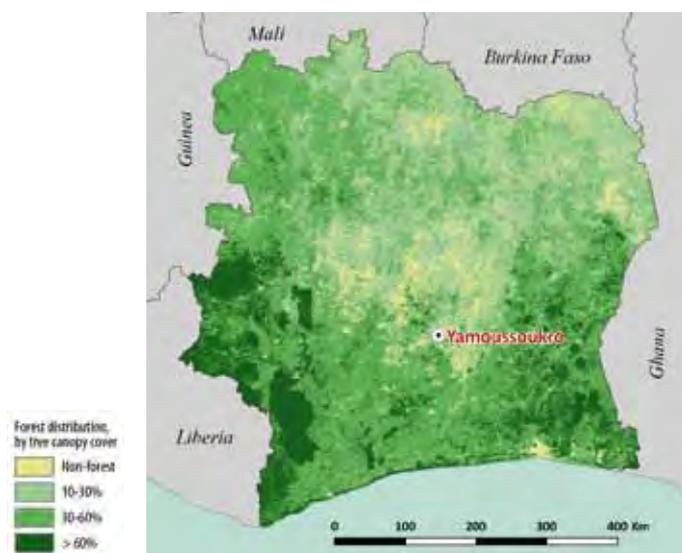
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CÔTE D'IVOIRE



Forest resources

Côte d'Ivoire, which is situated in the Gulf of Guinea, has a total land area of 32.2 million hectares and an estimated population in 2010 of 21.5 million people (United Nations Population Division 2010). It is ranked 163 out of 182 countries in UNDP's Human Development Index (UNDP 2009). The tropical moist forest belt (commonly called the *zone forestière*) extends inland from the coast for more than 250 km (to about 8° north), beyond which there is extensive savanna (*domaine soudanais*). The western part of the country is in the Guinea highlands, where the highest summits rise to more than 1500 m above sea level. With the exception of small areas of remaining primary forests (e.g. in the Taï reserve and the western mountains), forests are heavily degraded. FAO (2010a) estimated forest cover at

10.4 million hectares (32% of the land area), which is a slight increase over the estimate for 1990.

Forest types. Two main forest types can be distinguished in the south: wet evergreen, and semi-deciduous. The former is poorly stocked in commercial timber, although it contains species such as *Uapaca* spp, *Guarea cedrata* (bossé), *Tieghemella heckelii* (makoré), *Tarrietia utilis* (niangon) and *Triplochiton scleroxylon* (samba). The semi-deciduous forests, occurring in the central and northern parts of the *zone forestière*, was once rich in valuable timber species, including samba, *Mansonia altissima* (beté), *Nesogordonia papaverifera* (kotibé) and *Khaya ivorensis* (acajou). Outside a small number of effectively protected areas, most forests of both forest types are heavily degraded or are at an early stage of secondary growth.^a In the *domaine soudanais* there are some dry forests and gallery forest containing species such as *Daniella oliveri*, *Isobertinia doka* and *Azelia africana*. There are about 10 000 hectares of mangrove forests, characterized by *Rhizophora racemosa* and *Avicennia germinans* (Spalding et al. 2010).

Permanent forest estate. The PFE officially comprises the 231 classified forests (*forêts classées*) zoned for production and protection, which cover an area of 4.2 million hectares. However, only about 1.95 million hectares of these are still forested (Table 1).^a There are nearly 2.1 million hectares of forest in protected areas. Outside the PFE, in the rural forest domain (*domaine forestier rural*) there were 385 forest harvesting areas (*périmètres d'exploitation forestière* – PEFs) in 2008; 80–90% of the entire timber production of the country comes from these areas (ITTO 2008).

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	7.1–11.7	3248	3400	167	734	4301
2010	7.52–10.4**	1760[‡]	1950[†]	180	2090	4220

* As reported in ITTO (2006).

** Area of public forests and dense forests in *domaine forestier rural* estimated at 7.52 million hectares.

[‡] Calculated using the ratio of forest with greater than 60% forest cover estimated by UNEP-WCMC (2010) (16.9%) and the total natural forest area estimated by FAO (2010a).

[†] Estimated actual forested area in the *forêts classées*. The large decrease compared with 2005 is based on a 2008 assessment of the extent of forest in the *forêts classées* (Government of Côte d'Ivoire 2009).

Forest ecosystem health

Deforestation and forest degradation. According to FAO (2010b), the deforestation rate in Côte d'Ivoire was insignificant in the period 2005–10 but was 15 000 hectares per year in 2000–05. Deforestation is caused mainly by land-use change to agriculture: 7.5 million hectares of former forest land are used today for swidden agriculture, and about 3.3 million hectares of former forest land are used for the production of commercial crops such as coffee, cocoa, palm oil, rubber and pineapple.^a Timber theft and illegal logging are widespread and are the primary reasons for the degradation of natural forests in the *forêts classées* and the *domaine forestier rural* (ITTO 2006). Bushfire is common in Côte d'Ivoire's savanna and transitional forest–savanna. Fire in the *zone forestière*, mainly human-induced, affects more than 25 000 hectares annually (ITTO 2008). Table 2 summarizes forest condition; more than 90% of remaining forests in Côte d'Ivoire are secondary or degraded primary forests.^b

Vulnerability of forests to climate change. Côte d'Ivoire has prepared a detailed national report on climate change. As in other countries in West Africa, rainfall in Côte d'Ivoire depends on the monsoon system associated with the inter-tropical convergence zone. The surface temperatures in the Atlantic and Indian Oceans, as well as the El

Niño phenomenon, will be significant drivers of West Africa's future climate. The mean annual temperature in Africa is projected to increase over the next 60 years by 3–4°C (IPCC 2007). There may also be an increased frequency of heavy rainstorms and drought, which could lead to an expansion of agricultural areas to the detriment of forests and increases in migration, uncontrolled fire and conflict over access to forest land.

SFM policy framework

Forest tenure. There are two main categories of natural-forest ownership:

- Public (state-owned) forests, which are divided into two kinds of land use: the permanent forest domain (*domaine forestier permanent*), which includes the reserved forest area and protected areas; and the *domaine forestier rural*, which includes PEFs and forests reserved for agricultural purposes.
- Community forests, which are based on traditional customary rights recognized in all forest areas in the country. There are 6705 registered sacred forests (*forêts sacrées*) covering a total area of 36 435 hectares; these are under the full jurisdiction of local communities.^a Many more forests may have cultural or spiritual value but are not registered.

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	625	10	630
Area of secondary forest/degraded primary forest	3260	6110	9380
Area of degraded forest land	-	-	-

Source: Government of Côte d'Ivoire (2009) and FAO (2010a).

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	6125	-	4.2 million hectares in 231 <i>forêts classées</i> and 1.9 million hectares in 13 protected areas.
Other public entities (e.g. municipalities, villages)	-	-	
Total public	6125	-	
Owned by local communities and/or Indigenous groups	-	-	
Private owned by individuals, firms, other corporate	12	-	Privately owned forest plantations (mainly teak).

Source: Government of Côte d'Ivoire (2009).

Criteria and indicators. ITTO's C&I are used in Côte d'Ivoire as an instrument for forest management planning. The Government of Côte d'Ivoire used the ITTO C&I in its submission to ITTO for this report.^a Côte d'Ivoire finalized its set of ATO/ITTO PCI in 2006. The training of 25 Ivoirians in the use of the ATO/ITTO PCI was organized by a regional ITTO project on the promotion of SFM in Africa. The Government of Côte d'Ivoire extended this training to 30 additional senior forest officers.

Forest policy and legislation. The Forest Code (Law 65/425) dates from 1965. Since then, all major decisions on land use, forest management, the organization of the forest service and the commercialization of forest products have been made through decrees or ministerial orders (*arrêtés*), including Decree 78/231 (1978), which prescribes the management of the PFE, and Decree 94/385 (1994), which sets out forest-harvesting reforms. A process to revise the Forest Code began in 2002 with support from FAO and was finalized in 2005. Since then, a series of stakeholder workshops have been held and a process to finalize the new forest code is under way prior to its introduction to the National Assembly for adoption.^a

The main law on wildlife protection and hunting also dates from 1965 (Law 65/255). Additional elements relating to the financing and management of national parks and other protected areas are specified in Law 102/02 (2002).^a

A forest master plan (*plan directeur forestier*) was formulated in 1988 for a span of 25 years. This was evaluated in 1998 and the Framework Program on Forest Management (*Programme Cadre de Gestion des Forêts*) was developed in 1999, valid for 14 years (ITTO 2006). Systematic improvements in forest management were hindered up to 2008 by severe socio-political crises and the division of the country into two parts. After the signing of the Ouagadougou Peace Accord in 2007 the country gradually re-formulated its state policies and re-organized its institutions. The forest policy was revised in 2010 and a strategic plan for its implementation in 2010–15 approved. This plan includes, among other things, the creation of a forest development fund (*Fonds de Développement Forestier*), the continuation of the revision of the forest code, a new direction for reforestation and new prescriptions for the management of the

domaine forestière rural.^a The impact of the most recent political crisis on forest policy is unclear but is unlikely to have been positive.

Institutions involved in forests. Under Decree 06/310 (2006), the Ministry for Environment, Water and Forests (*Ministère de l'Environnement, des Eaux et Forêts* – MINEEF) is responsible for the management of the forest estate. To manage the forests of the *domaine forestière rural*, MINEEF is supported by the Directorate for Water and Forests, which has four central divisions, ten regional directorates, 54 forest offices (*cantonnements des eaux et forêts*) and 70 forest posts (*postes des eaux et forêts*). MINEEF also oversees four specialist institutions, including the Forest Development Agency (*Société de Développement des Forêts* – SODEFOR) and the National Office for National Parks and Nature Reserves (*Office Ivoirien des Parcs et Réserves Naturelles* – OIPR) for the management of protected areas.

SODEFOR was created in 1966 and is entrusted today with the management of the 231 *forêts classées* and with technical advisory functions for planted forests and social forestry. MINEEF has a staff of about 1600 people, of whom nearly 700 are employed by SODEFOR and 250 by OIPR.

In 2008, a specialized agency for forest development (*Agence Nationale de Développement des Forêts*) was created with the task of improving the management of remaining forests in the *domaine forestier rural*. Previously, forest harvesting in the *domaine forestier rural* was conducted exclusively by the private sector.

The forest industry is organized in syndicates and is quite effective in defending its interests. A number of national and international NGOs are engaged in forest conservation and village development, including reforestation and agroforestry. Civil society is not actively involved in forest management (ITTO 2006).

Status of forest management

Forest for production

Two forest management systems are employed. In production forests, the management of *forêts classées* is carried out by SODEFOR, while in the *domaine forestier rural* it is carried out by private concession-holders. In the past, timber was harvested mainly in reserved forest areas, but excessive extraction over



Ceiba pentandra logs await processing in an Ivorian plywood mill.

the past 35 years has led to their depletion. Today, nearly 90% of timber is extracted from the *domaine forestier rural* (ITTO 2008).

Until 2002 forest harvesting in the *domaine forestier rural* was based on a licence system called the PTE (*permis de transformation et d'exploitation*), which allocated areas of up to 2500 hectares to a large number of concessionaires. With a policy revision in 2004, the PTE system was abolished and replaced by a system based on PEFs. By law, a PEF is at least 25 000 hectares in size and is allocated for 15–20 years; it can be renewed if management by the concession-holder is satisfactory. Concession-holders are obliged to present a forest management plan that includes a reforestation scheme and social investments in rural communities in or adjacent to the PEF. Management plans must also include prescriptions for sustained-yield harvesting and the silvicultural treatment of harvested forests, and measures against wildfire. However, few management plans have been prepared and harvesting is still based mainly on high-grading the remaining high-value timber.^c

As of 2007, 373 PEFs had been attributed to 112 concessions, covering a total area of about 1.4 million hectares of productive forest.^a In the past ten years the average timber harvest was 1.6 million m³ per year.^a

SODEFOR prepares and implements forest management plans for the *forêts classées*. Since 2005

it has been possible for such forests to be managed by private concession-holders in partnership with SODEFOR. A total of 40 *forêts classées*, covering more than 1.2 million hectares, are so managed.^a Limited information about the quality of this management is available. Forest management plans have been or are being prepared for 89 of the 231 existing *forêts classées* (in 2002, 25 forest reserves had an approved management plan and 1.5 million hectares were being managed). The size of the units varies, the smallest (Semien) being 3381 hectares and the largest (Rapids-Grah) 315 000 hectares. Forest reserves are to be managed in perpetuity (ITTO 2006). In a process to clarify the extent of forest, shifting cultivation and commercial agricultural crops within the *forêts classées*, in 2008 SODEFOR determined that only 1.947 million hectares of such forest remained.^a

Despite the scarce forest resources, some large international timber companies of French, Italian and Lebanese origin still operate in Côte d'Ivoire. Due to the earlier log export ban and the growing scarcity of the resource, these companies have invested in downstream wood-processing. The French company, Inprobois, for example, holds seven PEFs totalling 366 000 hectares and manages *forêts classées* of 22 000 hectares in partnership with SODEFOR. The company is pursuing FSC certification for this forest, which benefits from a management plan prepared by SODEFOR. Almost all the company's production, which specializes in

plywood and veneer, is for export. Other foreign companies possess several PEFs that add up to large areas. For example, SNG has licences to 480 000 hectares of forest, CIB has licences to 628 000 hectares and SIFCI has licences to 505 000 hectares.^c

Silviculture and species selection. Silvicultural prescriptions were developed in the 1990s and have been fully applied in some *forêts classées* (e.g. Irobo, Tene and Mopri), but not yet in the entire PFE. To date, no silvicultural directives have been applied in the *domaine forestier rural*. The forests of Côte d'Ivoire contain more than 700 hardwood species, about fifty of which are commonly used. Besides those listed in Table 4, the most valuable species are *Terminalia ivorensis* (framiré), *Entandrophragma candollei* (kossipo), beté, *Entandrophragma angolense* (tiama), *Lovoa trichilioides* (dibetou), bossé, kotibé, *Pterygota macrocarpa* (koto), *Canarium schweinfurthii* (aiélé), makoré, *Pycnanthus kombo* (ilomba), *Azelia africana* (lingué), *Lophira alata* (azobé), niangon and planted teak. Côte d'Ivoire has made efforts to explore the silvicultural behaviour of and to market lesser-known species such as *Copaifera salikounda* (etimoé) and *Chrysophyllum* spp (aniégré).

Planted forest and trees outside the forest. The planted forest area has been estimated at 180 000 hectares (ITTO 2008) and 212 000 hectares^a; the latter is an estimate of forest plantations in the *forêts classées* and *domaine forestier rural*. Outside forests, the most important non-forest tree plantations are oil palm (about 160 000 hectares), rubber (70 000 hectares) and coconut (30 000 hectares). The National Reforestation Programme (*Programme National de Reboisement*), created in 2005, is the main policy instrument for promoting reforestation in the *forêts classées* and by communities.

Plantation development started in 1926 with enrichment plantings of hardwood species such as acajou, fraké, niangon, sipo and later teak, bossé and other species. By 1945 about 8000 hectares had been established. Between 1966 and 1988, 20 000 hectares of mainly teak plantations were developed and another 90 000 hectares were planted between 1990 and 2007 (ITTO 2008). Due to a requirement since 1995 that PEF-holders invest in forest plantations, most planted forests (about 70 000 hectares) are located in the *domaine forestier rural*. There is, however, insufficient control and a lack of data to assess the state and quality of these plantations.

More than 35 species have been planted in the *forêts classées*. Today the most widely planted species is teak, with a total area of about 67 000 hectares in 2007.^a Other important species are fraké, 25 800 hectares; framiré, 14 000 hectares; *Cedrela odorata*, 10 100 hectares; *Gmelina arborea*, 8000 hectares; samba, 3600 hectares; acajou, 2900 hectares; sipo, over 2200 hectares; and niangon, 7800 hectares.^a About 27 000 hectares are registered as mixed hardwood plantations. Of the estimated 60 000 hectares or more of planted forest in the *domaine forestier rural*, about 15 000 hectares have been created as community forests, often to produce firewood.

Forest certification. There is no forest certification scheme nor any certified forests in Côte d'Ivoire (e.g. FSC 2010). One company, Inprobois, is pursuing FSC certification for the management of 22 000 hectares in a *forêt classée*, in partnership with SODEFOR.

Estimate of the area of forest sustainably managed for production. In the *domaine forestier rural*, where the majority of timber is cut, there is virtually no management and the already degraded forests are being further depleted. The situation is

Table 4 Commonly harvested timber species for industrial roundwood

Species	Notes
<i>Ceiba pentandra</i> (fromager)*	Often off-reserve harvesting; more than 360 000 m ³ harvested in 2008.
<i>Triplochiton scleroxylon</i> (samba, ayous)*	White wood, also planted; 170 000 m ³ harvested in 2008.
<i>Terminalia superba</i> (fraké)*	More than 70 000 m ³ harvested in 2008.
<i>Chlorophora excelsa</i> and <i>C. regia</i> (iroko)	Nearly 70 000 m ³ harvested in 2008.
<i>Khaya ivorensis</i> and <i>K. anthotheca</i>	About 63 000 m ³ harvested in 2008.

* Also listed in ITTO (2006).

Source: Government of Côte d'Ivoire (2009).

better in the *forêts classées*, which are managed by SODEFOR, but even in forests where the necessary elements of good forest management appear to be present, law enforcement is poor and illegal logging and deforestation widespread.^c As of 2008, management plans had been prepared in 89 out of the 231 forest reserves, 26 of which, covering an area of 1.36 million hectares, had been approved. About 200 000 hectares are considered to be well managed (Table 5), comprising the *forêts classées* of Cavally, Besso, Bossematié and Haut-Sassandra.

Timber production and trade. The forest industry is composed of several hundred small processing units and there are 18 enterprises with a processing capacity of more than 10 000 m³ per year; 70% of the industry is foreign-owned (ITTO 2008). Total annual roundwood production per year in the period 2004–08 was estimated at about 21.5 million m³, of which nearly 20 million m³ was for fuelwood and charcoal.^a

Industrial log production in Côte d'Ivoire fell from 5.3 million m³ in 1977 to 3.3 million m³ in 1985, 1.9 million m³ in 2003, 1.5 million m³ in 2007 (ITTO 2008) and 1.47 million m³ in 2009 (ITTO 2010). Total sawnwood production was about 471 000 m³ in 2009, veneer production was 396 000 m³ and plywood production was 81 000 m³ (ITTO 2010). In 2009 an estimated 125 000 m³ of logs were exported, as were 252 000 m³ of sawnwood, 103 000 m³ of veneer and 11 000 m³ of plywood (ibid.). Exports went mainly to Europe (80%), the United States, Japan, the Maghreb and

neighbouring countries (ITTO 2008). Since 1994 there has been a ban on the export of logs of several high-value timber species obtained from natural forests.

Non-timber forest products. MINEEF taxes commercial collectors for the harvest of 44 NTFPs.^a Many more NTFPs are traded locally and used for subsistence. Among the most important are bamboo, *Laccosperma* spp (rattan) and *Raphia* spp (raphia palm) for basketry, furniture and housing, and the leaves and fruits of *Thaumatococcus danielli* (feuille d'attiéké) for medicinal purposes and as a sweetener.

Forest carbon. Gibbs et al. (2007) estimated the national-level forest biomass carbon stock at 750–1238 MtC, Eggleston et al. (2006) estimated it at 3355 MtC and FAO (2010a) estimated it at 1842 MtC. Despite the absence of Côte d'Ivoire in REDD+ readiness programs (e.g. the Forest Carbon Partnership Facility and UN-REDD), the country's engagement in the UNFCCC is high; it has conducted its first GHG inventory and has considerable capacity for monitoring forest-area change. The proportion of intact forests is relatively low, as well as the proportion of tree cover over 60% (an estimated 16.9% of the total forest area; UNEP-WCMC 2010). There is potential to enhance carbon stocks through forest restoration and reforestation in heavily degraded *forêts classées*. Table 6 summarizes Côte d'Ivoire's forest carbon potential.

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	3400	1870	1110	0	277	167	120	0
2010	1950	1950	1360	0	200	180	133	0

* As reported in ITTO (2006).

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
750–1238	17	+	++	+	++	++	+

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Forest for protection

Soil and water. A total area of 374 000 hectares is set aside for the protection of soil and water in the 26 *forêts classées* that are managed according to forest management plans prepared by SODEFOR.^a A number of small *forêts classées* in the vicinity of Abidjan, such as Angédédou (5600 hectares), and the National Park of Banco (3400 hectares), have specific functions in catchment protection.^a

Biological diversity. Côte d'Ivoire has a very high level of biodiversity, with over 12 000 forest-dependent species, including 1265 animal species (232 mammals, 712 birds, 134 reptiles, 76 amphibians and 111 fish) and 8200 plant species, including over 3500 tree species.^a Eighteen mammals, ten birds, twelve amphibians, two reptiles and eight plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Seven plant species are listed in CITES Appendix II, including one hardwood timber species, *Pericopsis elata* (UNEP-WCMC 2011). Thirty tree species, including iroko and acajou, are considered vulnerable.^a

Protective measures in production forests.

Timber harvesting is limited in swampy areas, on steep slopes and along streams (for the latter, a strip of between 100 m and 1 km in width, depending on the size of the stream, is excluded from harvesting). Detailed prescriptions for biodiversity conservation are applied in the 26 *forêts classées* managed by SODEFOR.

Extent of protected areas. Côte d'Ivoire has eight national parks and six nature reserves, one wildlife reserve and 17 botanic reserves. In addition, parts of 26 *forêts classées* totaling 374 000 hectares are managed for soil and water conservation. Combined, the protection PFE is estimated to be 2.09 million hectares, which is 6% of the country's

land area. Of the protection PFE, two national parks (Comoé, 1.15 million hectares; and Taï, 457 000 hectares) account for more than 60% of the area. Comoé, created in 1983, is one of the largest protected areas in West Africa. Taï, created as a *forêt classée* in 1926, was designated as a national park in 1972 and added to the list of Natural World Heritage Sites in 1982; it contains one of the last major remnants of primary tropical forest in West Africa. There are also two transboundary protected areas, one on the border with Guinea and Sierra Leone and the other in the Tano River Basin on the border with Ghana.

Estimate of the area of forest sustainably managed for protection.

Poaching and other illegal activities are thought to be a significant problem in many forested reserves^c, due largely to a lack of sufficient financial resources for field-level enforcement (ITTO 2006). About 840 000 hectares of protection PFE are covered by management plans that are being implemented effectively. This comprises forests managed for soil and water conservation in *forêts classées* administered by SODEFOR (374 000 hectares), the Taï National Park (457 000 hectares), a number of small protected areas managed primarily for water and soil conservation, and the reserve at Mount Nimba (9000 hectares). This constitutes the estimate of protection PFE under SFM shown in Table 7.

Socioeconomic aspects

Economic aspects. Until about 1985, timber was Côte d'Ivoire's third most important export by value, but the industry has declined as the forests have been logged and depleted of commercially valuable trees. In 2006 the economic contribution of the formal forest sector was estimated at 1.9% of GDP.^a The total annual value of wood production (timber and fuelwood) is estimated at US\$323 million.^{a,b} No assessment has been carried out on

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	734	734	195	345	150
2010	2090	2090	374**	840	840

* As reported in ITTO (2006).

** Technically this area is part of the production PFE because it is within *forêts classées*.

the economic value of NTFPs, carbon, water or biodiversity.

Livelihood values. Forests are important for sustaining the livelihoods of many people in Côte d'Ivoire. Edible and medicinal plants are collected in great quantities. Bush meat remains a major source of protein in rural areas, even though hunting regulations are very restrictive; the harvested volume is estimated at more than 120 tonnes per year.^a The consumption of fuelwood, including charcoal, is estimated at more than 20 million m³ per year (ITTO 2008, Government of Côte d'Ivoire 2009).

Social relations. The 1965 Forest Code, which is still in force, does not specify the direct involvement of local people in forest management, although articles 16 and 20 set forth rights for riverine populations within *forêts classées*. Nevertheless, local people may collect wood and NTFPs in all forests. Social considerations have been taken into account in various recent governmental decrees concerning forests. Relationships between concession-holders and local people are often strained. In some areas, local communities help protect *forêts classées* from encroachment and bushfire. Local cooperatives and villages also often engage in reforestation activities.

Summary

Deforestation and forest degradation are major problems in Côte d'Ivoire, and most natural forest is considered degraded or secondary. The country's 231 state-owned *forêts classées* have been over-harvested and have become depleted of timber; natural forests in the *domaine forestier rural* and planted forests are providing an increasing part of the timber supply. The level of enforcement of existing laws and decrees appears to be low in much of the PFE. Forest management plans are under preparation or have been prepared for the *forêts classées*, but few have been prepared for the *domaine forestier rural*. While the recorded area of well-managed protection forest has increased, this is most likely due to improved information rather than a general improvement in forest management. Systematic improvements in forest management have been hindered in recent years by socio-political crises and a lack of political will. Illegal logging is thought to be widespread.

Key points

- Côte d'Ivoire has an estimated PFE of 4.22 million hectares (compared with 4.30 million hectares in 2005), comprising 1.95 million hectares of natural production forest (compared with 3.40 million hectares in 2005), 2.09 million hectares of protection forest (compared with 734 000 hectares in 2005) and 180 000 hectares of planted forest (compared with 167 000 hectares in 2005).
- An estimated 200 000 hectares of the production PFE is under SFM, no forest is certified, and an estimated 840 000 hectares of protection PFE is under SFM.
- Forest administration is currently the responsibility of the Ministry for Environment, Water and Forests (MINEEF), which operates under the 1965 Forest Code and subsequent decrees. A process to revise the Forest Code has been under way for many years but has not yet resulted in a new legislative framework. The implementation capacity of MINEEF is low.
- There is a discrepancy between the standards applied in the forest reserves of the PFE and in the *domaine forestier rural*, where most harvesting takes place.
- There is conflict between communities and harvesting operators over the use of forests. Poaching and timber theft are significant problems.

Endnotes

- a Government of Côte d'Ivoire (2009).
- b ITTO estimate.
- c Personal communications with various officials of the Government of Côte d'Ivoire, 2010.

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DEMOCRATIC REPUBLIC OF THE CONGO



Forest resources

The Democratic Republic of the Congo (DRC) has a land area of 233 million hectares and, in 2010, an estimated population of 66 million people (United Nations Population Division 2010). DRC is ranked 176th out of 182 countries in UNDP’s Human Development Index (UNDP 2009). It lies entirely within the Congo Basin, with only 42 km of coastline on the Atlantic Ocean, and mostly comprises plateaux that are 600–800 m above sea level in the north and 1000–2000 m in the south. The highest peaks reach 4500 m in the Virunga volcanic massif on the border with Rwanda and exceed 5000 m in the Ruwenzori Mountains on the border with Uganda. About 77% of the country is above 1000 m above sea level. Estimates of total forest cover include 112 million hectares^a and 154 million hectares (FAO 2010a).

Forest types. Lowland evergreen and semi-deciduous forests occupy much of DRC’s central and western regions, with moist evergreen forests accounting for about one-third of the country’s forests. Submontane and montane closed forests include about 7 million hectares of montane rainforests. Swamp forests extend over about 9 million hectares of the central basin and are characterized by species such as *Guibourtia*

demeusei, *Entandrophragma palustre* and *Garcinia* spp. DRC has one of the world’s largest contiguous areas of swamp forest.

Permanently flooded swamp areas host almost monospecific stands of *Raphia* palm. The total area of dense humid forests (lowland and montane) is about 98 million hectares (forest types 1–4 in Box 1). Open forests, including miombo woodland, cover about 56 million hectares (forest types 5–6 in Box 1). They also include montane and submontane sclerophyllous forests of *Grewia* spp, *Carissa edulis* and *Euphorbia* spp, which cover the eastern part of the country.

Box 1 Forest area, by forest type, DRC

	Forest type	Area ('000 ha)	% of forest area
1	Lowland humid tropical forest (<i>forêt dense de basse altitude</i>)	83 700	54
2	Submontane forest (900–1500 m) (<i>forêt sub-montagnarde</i>)	6000	4
3	Mountain forest (>1500 m) (<i>forêt de montagne</i>)	1000	1
4	Swamp forest (<i>forêt marécageuse</i>)	8200	5
5	Forest–savanna mosaic (<i>mosaïque forêt–savane</i>)	28 600	18
6	Semi-deciduous dry forest (<i>miombo</i>)	28 000	17

Source: Based on De Wasseige et al. (2009).

Although DRC has only 42 km of coastline, the large estuary of the Congo River is lined with mangroves, covering a total area of about 193 000 hectares (Spalding et al. 2010).

Permanent forest estate. DRC does not have an officially adopted land-use plan, which impedes a proper classification of the forest estate.^a The state forest area (*domaine forestier de l’Etat*) comprises three forest-use categories:

- *Classified forests*, which are subject to legal restrictions regarding user and harvesting rights. They generally include reserves and protected areas.

- *Protected forests*, which have a less restrictive legal regime than classified forests. They include community forests, small-scale concession contracts and forest–subsistence–farming mosaics.
- *Permanent production forests*, which include previously allocated forest concessions and newly identified production forests (allocated and unallocated concessions). These forests are reserved for industrial-scale logging under an SFM regime.

Table 1 shows the estimated PFE. It comprises those permanent production forests that had valid concession agreements in 2009, and the area of classified forests. There is potential to classify much larger areas as PFE – up to 87 million hectares – mainly in the provinces of Équateur, Orientale, Bandundu and Maniema.^a However, the process needs to be harmonized with overall land-use planning in the newly decentralized governance regime.^b

Forest ecosystem health

Deforestation and forest degradation. FAO (2010b) reported the deforestation rate in DRC in the period 1990–2010 at 311 000 hectares

(0.2%) per year, similar to the rate reported by the Government of DRC for the period 2005–10 of 320 000 hectares per year.^a Deforestation and forest degradation are not distributed homogeneously over the country: deforestation hot spots occur near large cities in the savanna belt, the Basin and the Albertin Rift zone (Government of DRC 2010). Countrywide, slash-and-burn agriculture and fuelwood-harvesting are the most important drivers of deforestation. Commercial logging and mining cause forest degradation and also facilitate migration into forest areas. For example, the road network developed for commercial logging constitutes 38% of all roads in the Congo Basin (Government of DRC 2010). Table 2 indicates forest condition based on satellite image interpretation in 2008.^a

Vulnerability of forests to climate change. The Government of DRC submitted a NAPA to the UNFCCC in 2007. Subsistence rain-fed farming and non-timber forest activities support 70% of the population. Extreme weather is already the cause of regular humanitarian alerts as households have little adaptive capacity. Assuming similar changes in climate to those projected for Cameroon and Gabon, climate change will affect food production and water regimes. Forests and trees in agroforestry

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	128–135	126 200	20 500	55	27 000	47 500
2010	112–154	87 800**	22 500†,a	67^a	25 800	48 300

* As reported in ITTO (2006).

** Calculated using the ratio of forest with greater than 60% forest cover estimated by UNEP-WCMC (2010) (65.5%) and the total natural forest area estimated by FAO (2010a).

† Allocated production forest area covers 12.3 million hectares. Ten million hectares of potential production PFE remain unallocated and are still under review.^b

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	-	-	79 000
Area of degraded primary forest	-	-	17 000
Area of secondary forest	-	-	13 000
Area of degraded forest land	-	-	3000

Source: Government of DRC (2009).

systems will undoubtedly play an important role in reducing vulnerability to the negative effects of climate change.

SFM policy framework

Forest tenure. According to Law 021/1973, the state is the sole owner of land, and this is confirmed by Law 11/2002 (the 'Forest Code') (Table 3). Although the state owns the forests, the law details different procedures for its use by local people and concessionaires (de Wasseige et al. 2009). Local users may collect forest products within the framework of user rights. In protected forests they may also practice shifting cultivation, although a permit issued by the provincial governor is required to clear an area of more than two hectares (de Wasseige et al. 2009). Communities and municipalities have customary rights over the forests within their jurisdictions and are able to become long-term concession-holders of such forests. The state can also allocate forests to local communities as community forests, although there are no clear examples of this having occurred.^b

Criteria and indicators. In December 2010, DRC, with the support of WWF and ITTO, completed a process to develop PCI based on the ATO/ITTO PCI for the sustainable management of African natural tropical forests as an instrument for monitoring progress towards SFM. An ITTO C&I workshop was held in August 2010. The Government of DRC used the ITTO C&I in its submission to ITTO for this report.^a

Forest policy and legislation. The 2002 Forest Code, which succeeded colonial legislation dating from 1949, became law in August 2002. DRC's new Constitution (2006) reorganized the country's

administrative structure. Twenty-five provinces and the town of Kinshasa are provided with legal status and are able to exercise local authority. Designing forest-sector activities of national interest (e.g. forest conservation) remains the responsibility of the national government, but the design of natural resource programs, including forestry, agriculture and mining, are now the responsibility of the provinces. Given that the Forest Code was approved prior to the approval of the Constitution, the effect of the new decentralized entities, or of planned future decentralized entities (sectors and chiefdoms in the forest sector), on governance in the forest sector is unclear. The extent to which these entities are able to represent local interests will be crucial for the implementation of SFM (Government of DRC 2010).

The Forest Code describes the institutions and responsibilities regarding forest management and lays down prescriptions for national forest planning and forest management. For example, it devotes an entire chapter to forest management and another to local community rights. It alludes to the concept of community forests, but there are no procedures to put this into effect. A difficulty with the application of the Forest Code is the fact that customary rights are exercised by local people who do not know its provisions; this results in frequent conflicts between concessionaires and local stakeholders.^b

Institutions involved in forests. The Ministry of Environment, Nature Conservation and Tourism (*Ministère de l'Environnement, Conservation de la Nature et du Tourisme – MECNT*) is in charge of forests and employs about 840 people. Structural reform undertaken in 2009 reduced the number of technical services from 24 to twelve.^a They include

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	112 000	38 200	According to the 2002 Forest Code, all forests belong to the state.
Other public entities (e.g. villages, municipalities)	-	-	The law makes provision for community and municipal forests, but no data are available.
Total public	112 000	38 200	
Owned by local communities and/or Indigenous groups	-	-	
Private owned by individuals, firms, other corporate	-	8	Some small forest plantations – e.g. the CDM-funded plantation in Batéké.

Source: Government of DRC (2009).

the Directorate of Forest Management (*Direction de la Gestion Forestière*), which is responsible for monitoring forest management and harvesting, the *Direction des Inventaires et de l'Aménagement Forestier*, which is responsible for forest inventories and the formulation of management norms, and the *Direction de la Conservation de la Nature*, which is responsible for biodiversity conservation and international conventions.^a Also under the MECNT is the Congolese Institute for the Conservation of Nature (*Institut Congolais pour la Conservation de la Nature – ICCN*), which has the overall task of ensuring the protection of wildlife and flora in natural reserves and national parks; ICCN employs more than 2000 people.^a Nevertheless, the lack of trained and motivated staff to manage and regulate forests is a crucial bottleneck in building an effective institutional framework for SFM.^a

The main training institutions with forestry curricula are the University of Kisangani, *l'Institut Supérieur d'Etudes Agronomiques* (in Bengamissa) and the University of Kinshasa. There is a research institute for forest research, *l'Institut pour l'Etude et la Recherche Agronomique*, which was established in 1948. Today, several hundred NGOs and associations are involved in forest-related activities. The forest-management reform process is particularly supported by DRC's development partners, such as the European Union, a number of European states, the African Development Bank, the Global Environment Facility, the United Nations Development Programme and UNEP-WCMC. Some multinational NGOs, including Conservation International, the Wildlife Conservation Society and WWF, have also been engaged in the process, as well as in forest conservation. The National Forest and Nature Conservation Programme was launched in 2009 by a coalition of development partners, including the World Bank, to increase the capacity of government and other stakeholders to manage forests sustainably and equitably. The SGS (formerly, *Société Générale de Surveillance*) Forestry Monitoring Programme signed a five-year contract with MECNT in early 2010 to develop an integrated forest control system for monitoring and verifying logging, chain-of-custody and forest product exports.

Status of forest management

Forest for production

Being relatively accessible, the western forests have been logged heavily since colonial times. More recently, harvesting has moved into the central basin, where subsistence agriculture accompanies the opening up of forests. Farther inland, outside concession areas, forest harvesting mainly consists of the often illegal removal of trees of the most profitable species. According to the 2002 Forest Code, industrial forest concessions are awarded by tender (Article 83) or sometimes by mutual agreement (Article 86). Concessions may be allocated for 25 years and are renewable. The maximum area of a forest concession is 500 000 hectares. One requirement of the Forest Code is the preparation of forest management plans. For these, technical standards on inventories, mapping, low impact logging, silviculture and consultation, among others, have been and are being prepared through ordinances and decrees, with the technical and financial support of development partners.

In 2003 about 20 million hectares of the 22.5 million hectares of production PFE were allocated to commercial forest operations and there were plans that this area would be extended to 50 million hectares (ITTO 2006). In 2004, however, the Government of DRC issued a moratorium on new logging concessions and announced a review of the status of existing concessions in order to apply the environmental, forest management and social requirements that had been defined in the Forest Code. Between 2005 and 2009 a multi-stakeholder forest title conversion process and legal review was undertaken in order to convert old logging titles into new forest concessions. In 2009, of the initial 156 titles for which a request for conversion had been submitted to the DRC government, only 65 had been declared convertible by the Interministerial Commission, covering a total area of about 10 million hectares out of the 20 million hectares under review.^b The remaining titles were deemed illegal and subject to cancellation.^b This conversion process has set the groundwork for transparency, accountability and SFM in the DRC forest sector. Today, for the first time, complete information on logging titles is available publicly. Information on the progress, constraints, limitations and results of the entire forest titling process is also available in reports and on websites.^b

In mid 2010, 65 companies were operating with timber licences in an area of about 9.1 million hectares, the smallest concession covering 19 200 hectares and the largest 293 000 hectares.^b In 2009, 46 FMUs covering about 6.6 million hectares were preparing fully fledged management plans (de Wasseige et al. 2009). Nearly all timber exports are produced by only ten companies; two Swiss-based holdings (Danzer and North-South Timber Group) are responsible for two-thirds of production.

Silviculture and species selection. The only silvicultural prescriptions contained in the Forest Code (2002) are the determination of a minimum harvesting diameter by species, and specific requirements for certain timber species, including the preservation of seed trees. DRC's forests have an enormous diversity of tree species. The total number of commercial tree species is more than 200, of which about 25 are sold internationally. The five most important commercial timbers over the past few years are shown in Table 4. Other important species include *Chlorophora excelsa* (kambala, iroko), *Gambeya africana* (longhi), *Entandrophragma angolense* (tiama), *Entandrophragma candollei* (kossipo), *Guarea cedrata* (bossé), *Guibourtia* spp (benge), *Lovoa trichilioides* (dibetou), *Brachystegia* spp (bomanga), *Canarium schweinfurthii* (aiele), *Terminalia superba* (limba) and *Nauclea diderrichii* (bilinga).

Planted forest and trees outside the forest. Planted forests have been established to produce both timber and fuelwood and to protect land from erosion. The Government of DRC estimated the area of planted forest at 67 000 hectares, including about 8000 hectares of *Acacia auriculiformis* established in the late 1980s.^a *Terminalia superba* (limba) was once the main species used in plantations, the first of which were established in 1905. Agroforestry plantations (*taungya*) were introduced in the 1940s and are still widespread. Other species planted for industrial

wood production before the 1960s include *Ceiba pentandra*, *Bombax flammeum*, *Entandrophragma* spp, *Lovoa trichilioides*, *Eucalyptus* spp, *Grevillea robusta*, *Casuarina equisetifolia* and *Cupressus* spp. More recent plantations comprise fast-growing *Eucalyptus* and *Acacia* species. A new plantation area is being established under the Clean Development Mechanism (CDM) and under community forestry regimes. About 2500 hectares have been established under these schemes in the past three years; the objective is to establish 8000 hectares of community forest plantations by the end of 2012.^a Given the size of the country and its huge natural-forest resource, the development of planted forests is a low priority.

Forest certification. No forests have been certified in DRC (e.g. FSC 2010), but some foreign companies are undertaking baseline studies for certification. One company (SIFORCO) obtained a certificate of legality in 2007. Another company, Sodefor, recently went through an FSC pre-audit process. The Government of DRC participated in an ATO working group on an African certification scheme, and DRC is a candidate country for a VPA with the European Union.

Estimate of the area of forest sustainably managed for production. While some progress has been made towards SFM, no forest concession can yet be classified as sustainably managed. The status of three forest sites dedicated to forest research and education (totaling 284 000 hectares) and listed as sustainably managed in 2005 could not be verified in 2010 (Table 5).

Timber production and trade. Total estimated annual roundwood production is about 80 million m³ (FAO 2010a), the vast majority of it fuelwood. The timber resources of DRC are generally considered to be of low quality. Most forests are difficult to access and thus productivity is low relative to neighbouring Congo and Gabon.

Table 4 Commonly harvested species for industrial roundwood

Species	Notes
<i>Entandrophragma cylindricum</i> (sapelli)*	About 20% of total production (2006–08).
<i>Millettia laurentii</i> (wengé)*	Around 50 000 m ³ per year; about 15% of the total production.
<i>Pericopsis elata</i> (afromosia)	About 10% of total production.
<i>Entandrophragma utile</i> (sipo, lifaki)	About 10% of total production.
<i>Gossweilerodendron balsamiferum</i> (tola)*	About 8% of total production.

* Also listed in ITTO (2006).

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	20 500	15 500	1080	0	284	55	40	0
2010	22 500	9100*	6590**	0	0	67	43	2‡

* As reported in ITTO (2006).

** Management plans in advanced stage of preparation.

‡ CDM-certified (Batéké).

Average industrial timber production, produced by eleven concession-holders in the past three years, was approximately 300 000 m³ per year (up from 90 000 m³ in 2003); artisanal permits add another 25 000 m³ per year (de Wasseige et al. 2009). Timber produced by the informal sector for the local market and neighbouring countries is substantial, probably exceeding 2 million m³ per year.^b In 2009 DRC exported about 226 000 m³ of logs, compared with 101 000 m³ in 2004 (ITTO 2010). DRC produced 92 000 m³ of sawnwood in 2009 (of which 62 000 m³ were exported), up from 70 000 m³ in 2004. The European Union remains the main international timber market. The Asian market is increasing but still small.



Ayous in lowland forest, DRC.

Non-timber forest products. No statistics are kept on NTFP production and trade, with the exception of the collection of the bark of *Prunus africana*. NTFPs derived from closed forests are a cornerstone of the informal sector. Of particular importance is the production of charcoal and firewood and the collection of NTFPs for food (e.g. honey), medicinal use and as stimulants (e.g. cola).^a It is estimated that 90% of the population in DRC regularly uses one or more of the 500 medicinal plants growing in the forests of the Congo Basin.^a NTFPs are also used for construction (e.g. rattan, *Raphia* spp, *Elaeis guineensis*) and the wrapping of food (using *Fromomum* leaves). Bush meat is a major source of protein.

Forest carbon. Gibbs et al. (2007) estimated the national-level forest biomass carbon stock at 20 416–24 020 MtC, Eggleston et al. (2006) estimated it at 36 670 MtC and FAO (2010a) estimated it at 19 639 MtC. The total forest carbon stock, including all five forest carbon pools, has been estimated at 27 200–36 700 MtC (UN-REDD 2010). The REDD+ potential to 2030 has been estimated at about 20 MtCO₂e (about 5.4 MtC) for all forest-related activities (Aquino et al. 2010). The Government of DRC is actively engaged in the Forest Carbon Partnership Facility and UN-REDD processes and has benefited from ITTO assistance in this regard. In 2010 began implementing a national REDD+ strategy through a readiness preparation proposal. DRC has also been chosen by the Forest Investment Program as a pilot country for REDD+ investment. The country's REDD+ strategy includes activities with low opportunity costs, such as afforestation and reforestation, reducing demand for fuelwood, and improving subsistence farming (Aquino et al. 2010). A CDM community-based reforestation project is being implemented over an area of more

than 4000 hectares and an agreement for the sale of 2.4 MtCO₂ (0.6 MtC) over the next 30 years has been signed (Government of DRC 2010). Table 6 summarizes DRC's overall forest carbon potential.

Forest for protection

Soil and water. No specific measures to promote soil and water conservation in closed forest are in place, although the 2002 Forest Code cites the need to protect, among others, springs and streams and to conserve soils. Soil and water conservation is regulated by a 1958 decree. Some small plantations have been established for erosion control in the last 30 years (ITTO 2006).

Biological diversity. DRC has great biodiversity, at both the ecosystem (e.g. according to de Wasseige et al. 2009 there are 19 ecosystem types) and species levels. Of the more than 10 500 known species of plant in DRC, at least 1337 are considered endemic (de Wasseige et al. 2009). Forest inventories suggest that tree species number more than 700, and there are an estimated 415 mammal species and 1086 bird species (ITTO 2006). Twenty-three mammals, 20 birds, 14 amphibians, one reptile, two arthropods and 17 plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Although the country is large, poaching places enormous pressure on wildlife. Bush meat is in demand in rural and urban markets. The elephant population in the forest zone (numbering about 300 000 before 1980) had been reduced to less than 50 000 by 2000 (ITTO 2006). Eight plant species are listed in CITES Appendix I and 35 in Appendix II, including the tree species *Pericopsis elata* and *Prunus africana* (UNEP-WCMC 2011).

Protective measures in production forests. Article 48 of the 2002 Forest Code prohibits logging along streams and within 50 m of riverbanks and 100 m of springs. Measures have been described in new standards for forest management planning, which

include setting aside biodiversity conservation zones within forest concessions.^b

Extent of protected areas. The national objective is to reserve 15% of the national territory (about 35 million hectares) in protected areas.^a In 2010 the country had 14 integral nature reserves (IUCN category I), 14 national parks (IUCN category II) and 22 hunting reserves (IUCN category VI), totalling about 26.3 million hectares.^a Another 30% of the land area has high protective potential or potential as biological corridors.^a

Estimate of the area of forest sustainably managed for protection. Protected areas are generally without effective control, and encroachment, hunting for trophies and bush meat, and timber theft are widespread (ITTO 2006). None of the protected areas has an officially adopted management plan^a, with the exception of the Kahuzi-Biega park (600 000 hectares), where a management plan is being finalized. This park is located in eastern DRC and is one of the last refuges of the eastern lowland gorilla. Despite management efforts, it is likely that recent fighting in DRC has moved within the boundaries of the park, causing looting and forest fire.^b A management plan also exists for the Luki Biosphere Reserve (33 000 hectares), located 120 km from the Atlantic coast. However, this reserve is under heavy human pressure. None of the protection PFE, therefore, can be classified as sustainably managed (Table 7).

Socioeconomic aspects

Economic aspects. Recently the contribution of the forest sector to GDP has been about 1.4% or US\$100 million per year.^a Officially about 15 000 people derive their income from the forest sector. However, given the very large informal sector, the overall contribution of the forest sector to the national economy is likely much higher than suggested by official figures. The forest sector

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
20 416–24 020	66	++	++	+	+	++	+++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	27 000	9320	-	-	0
2010	25 800	16 300	-	630	0

* As reported in ITTO (2006).

could become a pillar of economic development in DRC given a stable political and macroeconomic environment.^b

Livelihood values. Seventy percent of the people live in rural areas, the great majority of them on less than US\$1 per day (Aquino et al. 2010). Natural forests play a major role in the livelihoods of many people, in particular as a source of food and energy (ITTO 2006).

Social relations. The 2002 Forest Code (articles 111–113) requires that the local population be consulted before any area is awarded as a concession or given protected status. The local population also has the right to be compensated through specific arrangements with concession-holders (through a *cahier de charge*).^a However, the Code does not address local rights governing the use of forest resources. There is widespread frustration among rural communities because forest concessions generally only benefit local leaders, who often do not share the benefits with the wider community (ITTO 2006). On the other hand, in remote areas in particular, forest concessions are sometimes the only providers of primary-school education and health care, and forest roads have improved access to many remote villages (ITTO 2006).

Summary

DRC has the potential to develop its forest economy, both through a timber industry based on a sustainable resource base and through conservation. Although notable progress has been made in recent years, civil conflicts make it difficult to realize this potential. The institutional reform process is in its early stages and the legal framework – including the decentralization process – needs to be further developed and harmonized. Despite its large forest resource and considerable human resources, DRC is the smallest timber exporter in the region and the country has limited capacity to add value to its enormous forest resources. SFM has not yet been achieved on the ground, although management plans have been developed for some

forests in the production and protection PFE. DRC has become engaged in the development of a national REDD+ mechanism.

Key points

- DRC has more than 112 million hectares of closed tropical forests and a relatively low level of conversion of forest to other uses. The forest sector, however, is in disarray as the country emerges from civil conflicts. Structural and social adjustment is ongoing, with considerable effects on the development of the forest sector.
- DRC has an estimated 48.3 million hectares of PFE, comprising 22.5 million hectares of production PFE (compared with 20.5 million hectares in 2005) and 25.8 million hectares of protection PFE (compared with 27.0 million hectares in 2005). The PFE could be substantially increased once land-use planning is undertaken in the various provinces.
- None of the natural-forest production PFE is being managed sustainably, although some progress has been made in the establishment of forest management plans. Of the 9.1 million hectares of allocated forest concessions in 2010, about 6.59 million hectares have been subject to detailed forest management planning. No protection PFE is considered to be under SFM.
- Although not under formal management, large areas of DRC's forests are currently under no threat from deforestation or other significant human-induced disturbance due to their remoteness.
- The increased engagement of the international community and of civil society in the country has improved transparency and accountability and also brought knowledge and monitoring technology to the forest sector. The difficulty is translating reform proposals in the field due to a lack of capacity and an effective decentralized governance structure.

- The volume of timber harvested in DRC is only a tiny fraction of the potential sustainable yield, even accounting for likely significant levels of illegal logging.

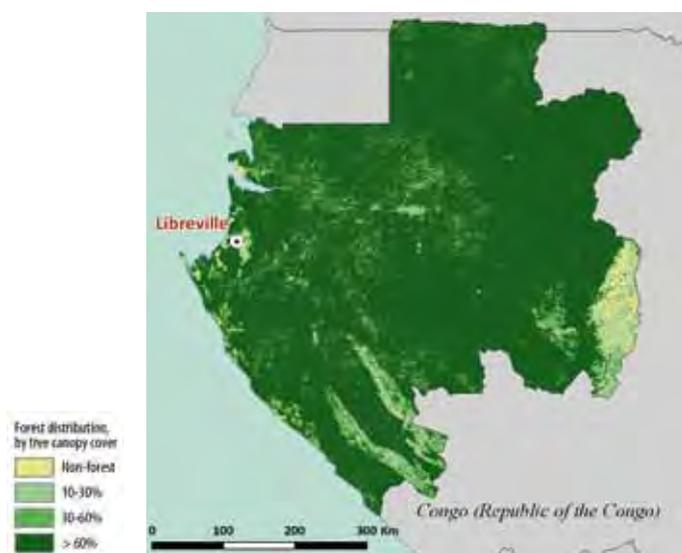
Endnotes

- a Government of DRC (2009).
- b Information derived from the report of, and discussions with participants at, a training workshop on ITTO criteria and indicators, held 15-19 August 2010, Kinshasa, attended by representatives of government, civil society and the private sector.

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GABON



Forest resources

Gabon has a land area of 26.8 million hectares and an estimated population in 2010 of 1.5 million people (United Nations Population Division 2010). It is ranked 103rd out of 182 countries in UNDP's Human Development Index (UNDP 2009). The country is in the western part of the Congo Basin and is characterized by three biogeographic regions: a coastal sedimentary basin containing forest and savanna; a medium-altitude Precambrian plateau (averaging 600 m above sea level), which covers about two-thirds of the country and is largely forested apart from savanna in the east; and almost entirely forested granite massifs in the north and south – Cristal Mountains, Mayombe and Chaillu – where altitudes range between 800 m and 1000 m. FAO (2010) estimated Gabon's total forest area at 21.7 million hectares, which is nearly 85% of the land area, and de Wasseige et al. (2009) estimated

it at about 24.6 million hectares. Gabon has an estimated 160 000 hectares of mangroves (Spalding et al. 2010).

Forest types. There are three major forest types: evergreen rainforest in the west, which has been heavily harvested, degraded and in some areas reduced to secondary forest characterized by an abundance of *Aucoumea klaineana* (okoumé) and *Dacryodes buettneri* (ozigo); the central Gabonese forest, covering most of the country, which is very similar to the closed humid forest found elsewhere in the Congo Basin and also in Liberia, with many of the same tree species (e.g. *Canarium schweinfurthii* – aiélé, *Lophira alata* – azobé, *Entandrophragma* spp, *Khaya* spp and *Triplochiton scleroxylon* – ayous); and a semi-deciduous forest type in the northeast, characterized by a predominance of Maranthaceae in the sub-layer and trees such as *Terminalia superba* (limba), *Millettia laurentii* (wengé) and ayous.

Permanent forest estate. The PFE is estimated at 13.5 million hectares (Table 1).^a

Forest ecosystem health

Deforestation and forest degradation. With a low overall population density and 60% of the population living in urban areas, there is little anthropogenic pressure on Gabon's forests. The Government of Gabon (2008) indicated an average annual deforestation rate of 0.12% (about 10 000 hectares per year) and an average degradation rate of 0.09%, based on satellite coverage between 1990 and 2000. Most of the forest estate is still composed of primary forest (Table 2). The main causes of deforestation are small-scale agriculture established

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	25.8	21 800	10 600	25	2700	13 325
2010	21.8–24.6	18 700	10 600^a	25^a	2900	13 525

* As reported in ITTO (2006).

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	-	-	20 400
Area of secondary forest and degraded primary forest	-	-	4200
Area of degraded forest land*	-	-	-

Source: ITTO estimate.

along the roadways and urban development. The main causes of forest degradation are industrial mining and illegal logging in opened-up areas.

Vulnerability of forests to climate change. Given its low population density and large forest area, Gabon is less vulnerable to climate change than many other countries in Africa. The mean annual temperature has increased by 0.6 °C since 1960, an average rate of 0.14 °C per decade. Model projections all indicate increases in the frequency of 'hot' days and nights (McSweeney et al. undated). Mean annual rainfall has decreased at an average rate of 3.8 mm per month (2.6%) per decade since 1960. All models indicate a considerable decrease in rainfall over the next 50 years (ibid.).

SFM policy framework

Forest tenure. All forest is owned by the state (Table 3). The 2001 Forest Code divides forests into two distinct categories. The first includes the production PFE managed by private concessionaires and the protection PFE managed directly by the state. The second, the non-PFE, known as the *domaine rural*, includes open-access forests for hunting, agriculture, mining and the gathering of NTFPs; sacred forests; and community protected areas (generally land and forest for which usage rights are limited to local communities). Rural communities and forest-dwellers are free to exercise

their customary rights in the *domaine rural*, provided they respect all conditions imposed by the forest administration. The production PFE is exclusively owned and administered by the state.

Criteria and indicators. Gabon finalized its own set of PCI in 2006 on the basis of the ATO/ITTO PCI for the sustainable management of African natural tropical forests. Since then Gabon has worked to develop a country-wide certification system and has harmonized its PCI with the standards set by the Program for Endorsement of Forest Certification schemes (PEFC). The orientation of the timber sector towards export markets, particularly environmentally sensitive European markets, helps to explain interest in certification.

Forest policy and legislation. Forest and wildlife management are governed by the Forest Code (Law 16/01), which was enacted in December 2001. The Code contains two major elements: SFM, and forest industry development (including the allocation of forest concessions and fiscal aspects). It also provides for the creation of community forests (Article 156). A 2008 decree (011/PR08) modified certain elements of the Forest Code, including the abolishment of the monopoly of the state-owned *Société Nationale des Bois du Gabon* (SNBG), the commercialization of okoumé and ozigo and the process for the allocation of forest permits. Other

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	13 500	13 500	Production and protection PFE.
Other public entities (e.g. municipalities, villages)	8300	0	Area owned by the state, but with extended user rights (non-PFE, <i>domaine rural</i>).
Total public	21 800	13 500	
Owned by local communities and/or Indigenous groups	-	-	Could include sacred forests, but their extent is unknown.
Private owned by individuals, firms, other corporate	-	-	Some small plantations, community or privately owned, but no data are available on their extent.

Source: Government of Gabon (2009).

important legal texts are the 1993 Environment Law (Law 16/93), the Mining Code (Law 05/2000) and the land-ownership regime, which dates back to 1963 (Law 15/63). A law approved in 2007 (Law 003/2007) governs the management of national parks.

Gabon's forest policy was adopted in May 1996. It focuses on maximizing the economic contribution of forests while ensuring a lasting resource base through the implementation of forest management programs and national capacity-building. Phase 1 of the policy (1998–2002) focused on the preparation of forest management plans and the establishment of sustainable management standards. Phase 2 (2002–10) focuses on the nationwide implementation of the plans. The initial aim to have 4 million hectares under management plans by 2010 was almost achieved; there is a further aim that 5 million hectares will be under SFM by 2025. Under the forest policy the government also plans to have a total of 200 000 hectares of private-sector and state-managed plantations by 2025.

Institutions involved in forests. The Ministry of Water and Forests (*Ministère des Eaux et Forêts* – MEF) was created in January 2011 with a mission to develop and implement the government's policy on fisheries, forests, wildlife and protected areas (excluding national parks, which are managed by a separate agency). The ministry in charge of forests has changed several times in the last three years, from the Ministry for Forest Economy, Inland Waters and Fisheries in Charge of the Environment and National Parks (*Ministère de l'Économie Forestière, des Eaux, de la Pêche, Chargé de l'Environnement et des Parc Nationales*), to the Ministry for Forest Economy, Inland Waters, Fisheries and Aquaculture (*Ministère de l'Économie Forestière, des Eaux, de la Pêche et de l'Aquaculture*), to the Ministry of Inland Waters, Forests, Environment and Sustainable Development (*Ministère des Eaux et Forêts, de l'Environnement et du Développement Durable*).

MEF has four technical directorates: the General Directorate of Forestry (*Direction Générale des Forêts*); the General Directorate for Wildlife and Protected Areas (*Direction Générale de la Faune et des Aires Protégées*); the General Directorate for Aquatic Ecosystems (*Direction Générale des Écosystèmes Aquatiques*); and the General Directorate of Forest Industries, Timber Trade and Value Addition of Forest Products (*Direction Générale des*

Industries, du Commerce du Bois et de la Valorisation des Produits Forestiers). At time of publication the Cabinet was considering a restructure of the MEF, including a possible reduction in the number of directorates to three.

The Ministry of Environment, Sustainable Development and Nature Protection, Prevention and Management of Natural Disasters (*Ministère de l'Environnement, du Développement Durable et de la Protection de la Nature, Prévention et Gestion des Calamités Naturelles*) is in charge of the development of REDD+. In 2007 the Agency for National Parks (*Agence Nationale des Parcs Nationaux* – ANPN) was created to manage protected areas under the Ministry of Tourism and National Parks.

Besides the technical agencies, a number of other actors are involved in the development of SFM, including the state timber enterprise, SNBG, which is now under MEF and which, until recently, had a monopoly over the export of logs of the two main species, okoumé and ozigo. There are five research institutions dealing with forest-related issues and one forest training institute, *Ecole Nationale des Eaux et Forêt*; the later operates under the auspices of MEF. International development partners (the European Union, the French Development Agency – *Agence Française de Développement*, and USAID) are strong supporters of Gabon's forest reform agenda, as are international environmental NGOs such as the Wildlife Conservation Society, WWF and the World Resources Institute, and national civil-society organizations such as Brainforest and *Croissance Saine*. The Government of Gabon is an active member of COMIFAC; it also has an agreement with Global Forest Watch to support the monitoring of illegal logging in the country.^a

Status of forest management

Forest for production

In the production PFE, all concessionaires must, within three years of allocation, submit a forest management plan that includes timber and wildlife management and socioeconomic studies. It must also include consultation between concessionaires, the forest administration and local people. Two types of management permits are issued:

- Forest concession under SFM (*concession forestière sous aménagement durable* – CFAD),

which has a minimum size of 50 000 hectares and a maximum size of 600 000 hectares. A CFAD must have a forest management plan and an industrialization plan and is awarded through auction.

- Associated forest permit (*permis forestier associé* – PFA), which is also awarded by auction but is reserved exclusively for Gabonese nationals. A PFA can be integrated into an existing CFAD or managed on its own as a concession. The minimum size is 15 000 hectares and the maximum size is 50 000 hectares.

Under the 2001 Forest Code, forest in the *domain rural* (non-PFE) may be set aside as community forests. Community forests should be managed for timber and NTFPs according to a simplified forest management plan developed with support from the DGF. The community must prepare supply contracts with local processing companies (de Wasseige et al. 2009). Cutting permits are also available to Gabonese nationals in the non-PFE for up to 50 trees.

The forest area open to timber harvesting has been divided into three zones. The first comprises the coastal plains and is rich in okoumé and characterized by relatively easy transport. Most of this zone has been harvested 1–3 times since the end of the 19th century (ITTO 2006). The second zone is less rich in okoumé and access is more difficult. It has now been almost completely harvested for the first time (ibid.), facilitated by the establishment of the *Transgabonais*, the railway that has granted access to a large part of the centre and east of the country. Still less okoumé is found in the forests of the third zone, where the species reaches the limits of its distribution.

There has been a significant increase in the area of forest allocated for production since 2005, including apparently outside the PFE. In March 2009, 48 concession areas were leased over a total area of 10.3 million hectares and another 212 other permits were also active over an area of about 3 million hectares.^a In 2010 an estimated 6.27 million hectares of production forests were active as industrial timber production areas^a, up from 4.55 million hectares in 2002 (ITTO 2006). In 2002 about 1.46 million hectares of forest were covered by forest management plans (ibid.) but, in March 2009, 4.14 million hectares had been inventoried and about 3.45 million hectares had fully developed



An example of limba in production forest, Gabon.

and approved management plans.^a As of 2009, ten foreign operators had the lion share of industrial concessions in Gabon – they were from Europe (France, Italy and Portugal), Asia (China, India and Malaysia) and Lebanon. World Resources Institute (2009) contains a detailed analysis of the forest concessions in Gabon.

Silviculture and species selection. Timber harvesting is selective and focuses on high-value species. At present, only 4–5 m³ is extracted, on average, per hectare. In the first and second harvesting zones this is due to previous overcutting of okoumé; in the third, high transport costs mean it is only economically viable to harvest the most valuable tree species. Table 4 shows the five most harvested species in the past few years. Ayous, *Testulea gabonensis* (izombe), *Guibourtia demeusei* (kevazingo), *Piptadeniastrum africanum* (dabéma) and *Baillonella toxiperma* (moabi) are among a number of species that are being harvested in increasingly large volumes. It is anticipated that the number of species acceptable to international markets will continue to increase from the current 20 or so to 35–40 species in coming years.^a

The gross standing volume of trees with diameter at breast height (dbh) greater than 10 cm is estimated at 250 m³ per hectare in unexploited forest and

Table 4 Commonly harvested species for industrial roundwood

Species	Notes
<i>Aucoumea klaineana</i> (okoumé)*	Average annual production of about 939 000 m ³ (2006–08).
<i>Triplochiton scleroxylon</i> (ayous)	Up to 40 000 m ³ produced annually on average (2006–08).
<i>Cyclodiscus gabunensis</i> (okan)	More than 20 000 m ³ produced annually.
<i>Distemonanthus benthamianus</i> (movingui)	Nearly 20 000 m ³ produced annually.
<i>Dacryodes buettneri</i> (ozigo)*	Production is declining, to less than 15 000 m ³ annually.

* Also listed in ITTO (2006).

Source: Government of Gabon (2009).

220 m³ per hectare in logged-over forest (ITTO 2006). The commercial standing volumes are 55 m³ per hectare and 42 m³ per hectare, respectively.

Generally, forest resources can be divided into two main categories: forests with okoumé and ozigo, which regenerate well, and forests without large amounts of those two species. In its range, okoumé is the predominant species, with an average standing volume of about 10 m³ per hectare. A specific silvicultural system is applied in okoumé forests, the *méthode okoumé*, based on favouring natural regeneration and continuous thinning until there are 80 stems per hectare with a dbh of over 70 cm. Gabonese forests regenerate well and, if management prescriptions are followed, they will maintain their productive value over several rotations (Drouineau & Nasi 1999).

While the number of hardwood species being used by industry is increasing, to a large extent the financial viability of SFM is based on the high quantity and quality of okoumé. The appropriate silvicultural management of okoumé forest is therefore important for ensuring the continued abundance of this species because it is the backbone of Gabon's forest development. There are signs, however, that silvicultural treatments are not being conducted to the full extent needed (de Wasseige et al. 2009).

Planted forest and trees outside the forest.

Planted forests cover about 25 000–30 000 hectares (Government of Gabon 2009; de Wasseige et al. 2009). The government plans to increase the area of planted state forest to 100 000 hectares and to promote the establishment of an additional 100 000 hectares of private plantations, but planting rates are presently minimal.^a Agro-industrial plantations include about 11 000 hectares of rubber and some small plots of oil palm and coconut (ITTO 2006). Reforestation and enrichment planting are generally not undertaken in logged-over forests due to the

relative ease of natural regeneration (ibid.). Existing plantations are mainly on former natural-forest sites and consist primarily of okoumé and, to a limited extent, *Terminalia superba* (limba). There are also some plantations of pines and clonal eucalypts (ibid.).

Forest certification. After more than five years of intensive work, the Gabonese Pan African Forest Certification Scheme (*Système Panafricain de Certification Forestière*) was endorsed for a period of three years by the PEFC Council in April 2009. This first-ever approved African national standard provides buyers with evidence that the timber they buy was harvested in well-managed forests. In addition to this overall national approach to forest certification, as of June 2010 six forest concessions, covering a total area of 1.874 million hectares, were certified under the FSC (some of them also had ISO 14001 and Keurhout certificates). A FLEGT process is under way in Gabon and the Government of Gabon has shown interest in developing a VPA with the European Union.^a

Estimate of the area of forest sustainably managed for production.

The entire FSC-certified forest area of 1.8 million hectares and two additional forest concessions that are in a process of forest management certification and have TLTV certificates covering an area of about 622 000 hectares (de Wasseige et al. 2009) are counted in Table 5 as under SFM.

Timber production and trade. The total standing timber volume (dbh >10 cm) is estimated at 2.60 billion m³ and the possible sustainable annual yield of potentially marketable timber species is an estimated 12–15 million m³ (ITTO 2006). An estimated 3.4 million m³ of industrial logs were harvested in 2009, similar to the 3.5 million m³ estimated to have been produced in 2004 (ITTO 2010). Note that okoumé accounted for nearly 30% of total production.

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	10 600	6923	2310	1480	1480	25	10	0
2010	10 600	10 300	3450**^a	1870	2420	25	10	0

* As reported in ITTO (2006).

** Comprising only areas with approved management plans in March 2009.

An estimated 1.87 million m³ of logs were exported in 2009, up from 1.51 million m³ in 2004; 157 000 m³ (roundwood equivalent) were exported as sawnwood in 2009, up from 124 000 m³ in 2004. The log market for okoumé and ozinga is mainly oriented towards Asia, while dark hardwood species are often exported to Europe. In 2009 Gabon was the second-largest exporter of tropical hardwood logs (after Malaysia), Central Africa's largest timber producer and the world's largest supplier of okoumé. However, the Government of Gabon issued a ban on unprocessed timber exports in January 2010 to encourage value-adding to timber products. In mid 2008, Gabon had 48 operating sawmill facilities, nine peeling units and three plywood plants with a potential annual processing capacity of about 1.7 million m³ of logs (de Wasseige et al. 2009), about half of total production.

Non-timber forest products. As in the other countries of the Congo Basin, many foodstuffs, including bush meat, roots, fruits, leaves and nuts, as well as medicinal plants and condiments, are collected in forests. They are an integral part of the subsistence of local people and some, such as the fruits of *Irvingia*, lianas of *Gnetum*, and plants and nuts of *Garcinia* species, are also marketed at the national level. Bamboo and fibres such as Marantaceae (rattan), raphia and the leaves of *Borassus aethiopum* (rônier) are important products

that are also traded regionally. Trade data on NTFPs were unavailable for this report. Charcoal-making supplies a small but efficient informal market (ITTO 2006). NTFPs are mentioned in the 2001 Forest Code and forest management plans must include information on the potential of NTFPs in concession areas.

Forest carbon. Gibbs et al. (2007) estimated the national-level forest biomass carbon stock at 3063–4114 MtC, Eggleston et al. (2006) estimated it at 4742 MtC and FAO (2010) estimated it at 2710 MtC. de Wasseige et al. (2009), taking into account all five carbon pools, estimated the forest carbon stock at about 4300 MtC. Gabon was one of the founding members of the Forest Carbon Partnership Facility and submitted a readiness idea note in 2008; by mid 2010, however, there had been no progress on a readiness preparation proposal. As laid out in Government of Gabon (2008), the government's REDD strategy includes the pursuit of sound land-use management and intensive agricultural production, including agroforestry; the strengthening of sustainably managed production forests; and the conservation of forests through effective protective-area management. The country's REDD+ potential lies particularly in the sustainable management of production and protection forests and conservation of the existing forest carbon stocks. Table 6 summarizes Gabon's forest carbon potential.

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
3063–4114	87	+	++	++	++	++	++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Forest for protection

Soil and water. No forests are set aside specifically to be managed primarily for the protection of soil and water.^a

Biological diversity. Gabon contains more than 6500 plant species, 320 mammal species and 617 bird species. Ten mammals, two birds, one reptile, three amphibians and 47 plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Seven plant species are listed in CITES Appendix II, none of which is a hardwood timber species (UNEP-WCMC 2011). Although Gabon is sparsely populated, some fauna species are under pressure in some areas due to an increasing demand for bush meat (ITTO 2006).

Protective measures in production forests. Under the 2001 Forest Code, forest management plans must include measures to protect soil, biodiversity and water resources in forest concession areas. Provisions designed to protect wildlife specify the zones where hunting is permitted and the length and dates of the hunting season. However, hunting is a major problem within and in the vicinity of forest concessions.^a

Extent of protected areas. Gabon has 13 national parks and a special presidential park, two hunting zones and wildlife reserves – most of them forested – covering about 2.9 million hectares.^a In mid 2009, four parks (Plateaux Batéké, Minkébé, Lopé and Moukalaba-Doudou) had provisional management plans.^a A National Biodiversity Observation Board was created in 2000 to support the implementation of the GEF-assisted National Strategy and Action Plan for Biodiversity (ITTO 2006). With the creation of the ANPN, the national park network has clearly been strengthened. More than 2.1 million hectares of forest are now in reserves classified in IUCN

categories I–IV, compared with 570 000 hectares in 2005. ITTO and WWF continue their joint work with the government to manage the Minkébé Forest Reserve, which together with the Minkébé National Park makes up an ITTO-supported transboundary conservation area linked to the Mengame protected area in Cameroon.

Estimate of the area of forest sustainably managed for protection. The total protection PFE under SFM is estimated at at least 1.23 million hectares (Table 7), comprising the ITTO-supported Minkébé National Park (750 000 hectares) and the Lopé National Park (484 000 hectares, part of which is savanna). These areas (which were also classified as sustainably managed in 2005) are considered to be managed and protected effectively, although poachers continue to be a threat to these and other protected areas.

Socioeconomic aspects

Economic aspects. National resource use, including oil extraction, timber harvesting and mining, is the cornerstone of Gabon's economy (de Wasseige et al. 2009). Oil alone generates 42% of GDP, followed by timber (about 6% of GDP^a). The forest sector is the primary employer in the private sector with about 13 000 employees, not counting the informal sector.^a The forest service itself employs about 600 officers and support staff.^a

Livelihood values. Forests are the main source of subsistence for Indigenous peoples living in the forests of Gabon. The law stipulates that local people have free access to all forests as long as they possess appropriate customary rights and do not jeopardize the sustainability of the forest products they collect. Industrial forest management requires the consent of the local population.^a Bush meat and edible fruits such as aiéle, leaves of *Gnetum* species, and nuts and roots (igname) are of great importance for forest-dependent local communities, particularly

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I–IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	2700	570	0	491	1090
2010	2900	2191**	0	1230[‡]	1230[†]

* As reported in ITTO (2006).

** UNEP-WCMC (2010).

‡ Provisional management plans.

† Pertains to the same two national parks considered under SFM in 2005, but new data (World Resources Institute 2009) suggest a slightly larger park area.

Pygmies. Bush-meat availability may be threatened locally because of over-hunting.

Social relations. The community forests allowed under the 2001 Forest Code replace the former ‘family logging’ rights. The Forest Code specifies that there should be a zone around each production forest to accommodate the customary rights of surrounding communities. While a memorandum (*lettre de politique*) of forest policy published by the government in May 2004 indicated an intention to increase the future role of local users in community forest management, little progress has been made in the last five years to introduce community forest management.

Summary

Undeniable progress has been made in Gabon towards SFM. The government continues to improve its legal and institutional framework to regulate and monitor production forests and to effectively manage protected areas. The 2001 Forest Code is complemented by additional regulations and field-based actions, including an improved forest monitoring system. Principles, criteria and indicators have been formulated and adapted to the conditions in Gabon and voluntary forest-management certification is well-developed. Forestry will remain one of the pillars of Gabon’s economic and social development. Based on clear policy measures from the government, the private sector is a major driver of industrial forest development and the export of semi-finished forest products. The government has introduced a system to institutionalize community forestry as a way of meeting local needs for timber and other forest products, although this system is yet to be implemented. The country is engaged in REDD+ processes, and it has a low deforestation rate. Problems remain, mainly in governance; for example, there is little civil advocacy and few participatory processes in the forest sector.

Key points

- Gabon has a large forest resource with a relatively low risk of conversion to other uses.
- Gabon has an estimated PFE of 13.5 million hectares (compared with 13.3 million hectares in 2005), comprising 10.6 million hectares of natural production forest (the same as in 2005), 2.90 million hectares of protection forest (compared with 2.70 million hectares in 2005) and 25 000 hectares of planted forest (the same as in 2005).
- An estimated 2.42 million hectares of the natural production PFE is under SFM, including 1.87 million hectares of certified forest. An estimated 1.23 million hectares of protection PFE is under SFM.
- Forest management plans are fully developed in 3.45 million hectares of forest in concessions and were under preparation for another 6 million hectares of forest in concessions. High standards for concession management have been developed on paper, but still need to be fully introduced on the ground.
- Gabon has the largest area of certified natural forests in Africa.
- The new national park network has great potential and an increased focus will need to be given to developing and implementing long-term management plans.
- Community forests may be created in the *domain rural*, but their development has been insignificant to date.
- Management for bush meat and other NTFPs is still largely uncontrolled, even though these issues must be addressed in forest management plans.

Endnote

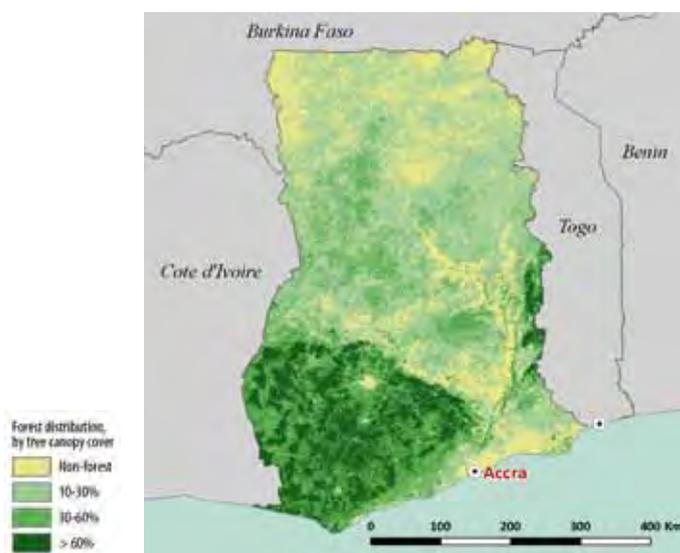
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GHANA



Forest resources

Ghana is located on the west coast of Africa, bordered by Togo in the east, Côte d'Ivoire in the west, Burkina Faso in the north and the Atlantic Ocean in the south. It has a land area of 23.9 million hectares and in 2010 it had an estimated population of 24.3 million people (United Nations Population Division 2010). The country is ranked 152nd out of 182 countries in UNDP's Human Development Index (UNDP 2009).

Ecologically Ghana is divided into a high-forest zone in the south, accounting for about one-third of the land area (8 million hectares), a savanna zone (14.7 million hectares), mostly in the north, and a transition zone (1.1 million hectares). FAO (2010) estimated that Ghana had 4.68 million hectares of

natural forest in 2010, which is about 20% of the land area. Spalding et al. (2010) estimated the total area of (mostly degraded) mangroves at 13 700 hectares.

Forest types. The high forest zone is divided into nine forest types: wet evergreen; moist evergreen; moist semi-deciduous (southeast); moist semi-deciduous (northwest); dry semi-deciduous (inner zone); dry semi-deciduous fire zone; upland evergreen; southern marginal; and southern outlier.^a The semi-deciduous and evergreen forests constitute the main timber-producing areas. The main species in the semi-deciduous forests are *Triplochiton scleroxylon* (wawa), *Mansonia altissima* (mansonia), *Nesogordonia papaverifera* (danta) and *Khaya ivorensis* (mahogany); in the evergreen forests the main species are *Guarea cedrata* (guarea), *Tieghemella heckelii* (makore), *Tarrietia utilis* (niangon) and *Uapaca* spp (assam) (ITTO 2006). Box 1 shows Ghana's vegetation zones.

Permanent forest estate. Ghana's forests are divided into forest reserves and 'off-reserve' areas: of the 266 forest (production) reserves, 216 occur in the high-forest, timber-producing zone, and the remainder occur in the savanna. Forest reserves were originally established by the state to promote ecological stability while seeking to guarantee the flow of goods and services for socioeconomic development (Bird et al. 2006).

Ghana's PFE is estimated at 1.43 million hectares, which is the area of forest in forest reserves plus the area of planted forests and the area of forest in protected areas (Table 1). The total is 170 000 hectares less than that reported in 2005.

Table 1 Permanent forest estate

Reporting year	Estimated total natural forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	2.72–6.34	1634	1150	97	353	1600
2010	4.68	838**	774^a	164[‡]	396^a	1334

* As reported in ITTO (2006).

** Calculated using the ratio of forest with greater than 60% forest cover estimated by UNEP-WCMC (2010) (18%) and the estimated total natural forest area.

‡ FAO (2010) estimated the total planted forest estate at 260 000 hectares.

The area of protection PFE reported for 2010 is about 43 000 hectares more than the figure reported in 2005. With recent activities to revise and write new management plans for globally significant biodiversity areas (see below), some areas that were previously not demarcated or measured have now been demarcated, which might explain some of the increase.^b

Forest ecosystem health

Deforestation and forest degradation. The condition of Ghana's forests has been in decline for many years, particularly since the 1970s. Many forest reserves are heavily encroached and degraded, and the off-reserve stocks are being rapidly depleted. Immediate drivers include forest industry over-capacity; policy/market failures in the timber sector; burgeoning populations in both rural and urban areas; increasing local demand for agricultural and wood products; high demand for wood and forest products on the international market; heavy dependence on charcoal and woodfuel for rural and urban energy; and limited technological development in farming systems and continued reliance on cyclical slash-and-burn methods to maintain soil fertility (Forestry Commission 2010).

Deforestation in Ghana usually commences with the degradation of well-stocked forests by excessive (often illegal) logging, slash-and-burn agriculture, mining and quarrying, and fuelwood collection. Degraded forests are then often completely deforested by wildfire, illegal occupation and/or land-use changes. These destructive forces are influenced by population pressure and poverty and also by infrastructure and economic development programs. Road construction near or within forest reserves facilitates encroachment. Internal migration to the western forests for cash-crop cultivation accounts for the high rate of degradation in those forests. An estimated 395 000 hectares of primary forest remain in Ghana, but no estimates were available of the area of degraded primary forest, secondary forest or degraded forest land (Table 2). Almost

all forests have suffered depletion, creating eroded hillsides in some cases and destroying genetic diversity in others (ITTO 2006). FAO (2010) reported a change in natural forest area of 677 000 hectares between 2005 and 2010, an annual average loss of 135 000 hectares. An estimated 66 500 hectares of wet evergreen, moist evergreen and moist semi-deciduous forest (in the southwest) in the PFE were formally converted to agriculture in the most recent five-year reporting period.^a

Forest fires affect an estimated 500 000 hectares of forest per year, the majority (80%) of which are unplanned (FAO 2010). Excessive logging can make the forests more vulnerable to fire by causing the accumulation of residues, which become readily flammable when dry. Illegal forest activities, including the use of portable chainsaw mills, are widespread in the high-forest zone, particularly in off-reserve areas. The invasion of woody weeds affects an estimated 50 000 hectares.

Vulnerability of forests to climate change.

According to McSweeney et al. (undated), the average annual temperature in Ghana has increased by 1.0 °C since 1960, an average rate of 0.21 °C per decade; daily temperature data indicate that the frequency of 'hot' days has also increased significantly. The mean annual temperature is projected to increase by 1–3 °C by 2060 and by 1.5–5.2 °C by 2090. Rainfall trends are difficult to identify; rainfall was high in the 1960s but decreased to particularly low levels in the late 1970s and early 1980s, resulting in an overall decreasing trend (ibid.). According to the second communication to the UNFCCC (in preparation), two sectors are particularly vulnerable to the effects of climate change in Ghana: health, due to an increase in tropical diseases; and land management, due to reduced crop production, including cocoa and root crops, decreasing soil fertility and moisture, particularly in savanna areas, decreased freshwater availability, biodiversity loss, and coastal erosion. In the forest zone, a species' shift is occurring through a process of competitive

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	395 ^a	0	395
Area of degraded primary forest	-	-	-
Area of secondary forest	-	-	4285 ^a
Area of degraded forest land	-	-	-

displacement, which, with increased warming, deforestation and degradation, could be dramatic (Dixon et al. 1996).

SFM policy framework

Forest tenure. Land-tenure systems vary significantly from area to area in Ghana, with major regional differences between the north and south and between the Akan and related peoples of south and southwest Ghana and the neighbouring Ewe-speaking populations in the southeast. The territories of the Akan people largely coincide with the high-forest zone. Nearly all their land is under some form of ownership, and most lands in the Akan areas are under the authority of the chieftaincy (the 'stool'). This is a titular authority, conferring the right to tribute and, in appropriate instances, a share of land-based revenues. It is not a full proprietary interest (Government of Ghana 2008). Such lands may be managed directly by the stool, or by sub-chiefs and other 'captains' who, either by themselves or via their ancestors, have obtained a claim over particular blocks of land within their natal chieftaincies (ibid.). Some areas, including forest reserves, have been acquired by the government, though ultimately 'owned' by the chieftaincy; these are referred to as 'vested lands'.

Thus, in Ghana, forests are owned by communities vested in traditional authorities, held in trust for them by the state, and logged by private contractors; traditionally owned forest lands are known variously as 'stool land' or 'skin land'. However, both Government of Ghana (2010) and FAO (2010) report that forests are entirely in public ownership (Table 3), since they are 'held in trust' by the state. Ownership arrangements are also reflected in the Timber Resource Management Act,

1997, the 1998 Timber Resources Management Regulations, and the Forestry Commission Act, 1999 (Act 571). The Timber Resource Management (Amendment) Act, 2002 (Act 617), also recognizes private tree ownership rights.

Criteria and indicators. The Government of Ghana (2010) used the ITTO C&I in its submission to ITTO for this report. In September 2010, with the support of a regional ATO/ITTO project, Ghana finalized the harmonization process of its SFM standards according to the ATO/ITTO PCI for the sustainable management of African natural tropical forests. The ITTO C&I and the ATO/ITTO PCI are incorporated in the Forestry Commission's various forest-management manuals and guidelines, providing a cornerstone for natural forest management.

Forest policy and legislation. The first forest policy was established in 1947; this was revised in line with Ghana's 1992 Constitution and approved in 1994 as the Forest and Wildlife Policy. No significant changes have been made to forest laws, policies or regulations since the last report. However, the government is in a consultative process to review the Forest and Wildlife Policy and the 1996 Forestry Development Master Plan (which spans 1996–2020).

Two laws have been enacted recently by Parliament with potential implications for forests. These are the:

- Minerals and Mining Act, 2006 (Act 703), which may have a bearing on national objectives for forests and on the control of illegal activities in forests.
- Lands Commission Act, 2008 (Act 767), which established the Lands Commission to integrate,

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	0	0	
Other public entities (e.g. municipalities, villages)	4680	1430	Forests are owned by communities vested in traditional authorities, held in trust for them by the state. They may be logged by private contractors.
Total public	4680	1430	
Owned by local communities and/or Indigenous groups	0	0	
Privately owned by individuals, firms, other corporate	0	0	

Source: Government of Ghana (2010), FAO (2010).

subject to the Constitution, the operations of public-service land institutions under the Commission in order to secure effective and efficient land administration and to provide for related matters. This Act may have implications for national forest objectives, forest tenure and property rights, and the control of illegal activities in forests.

The Government of Ghana listed 28 forest-related acts and decrees and 24 forest-related regulations, some of which overlap, duplicate or contradict.^a The fines for breaches of forest-related laws and regulations have not been reviewed for many years and are outdated. A single, consolidated forest law would be desirable, and the governance and control system needs to be reformed to improve its efficiency and effectiveness. There is a need for enabling legislation to provide for the voluntary establishment of dedicated off-reserve forests and to promote private-sector plantations.^a

Institutions involved in forests. The main institution in charge of forests is the Ministry of Lands and Forestry (MLF) supported by the Forestry Commission, which was established in 1980, and the Forestry Commission divisions of Forest Services, Wildlife, Timber Industry Development, Wood Industries Training Centre and Resource Management Support Centre. The Forestry Commission, which employs about 550 professional and technical forestry personnel, is responsible for coordinating, implementing and enforcing policies, laws and regulations for the development, management and regulation of the use of forest and wildlife resources.^a

The main institutions involved in forestry research are the Forestry Research Institute of Ghana (FORIG) under the Ministry of Environment, Science and Technology; the Renewable Natural Resources Institute of Ghana; and the University of Ghana. FORIG employs about 90 people.^a Overall, an estimated 3576 people were employed in public forest-related institutions in 2008, 51 of whom had university degrees, including 19 with doctorates (FAO 2010).

Community participation in forestry is being facilitated through community forest committees: the Forestry Commission aims to create 100 such committees.^a Active NGOs include Friends of the Earth Ghana (15 employees), the Ghana Association for the Conservation of Nature

(three employees), Green Earth (19 employees), and Tropenbos International (twelve employees).^a The Timber and Wood Workers Union of the Trade Union Congress of Ghana is also an important stakeholder. However, there are often problems of coordination between the trade union, NGOs and government forestry agencies (ITTO 2006).

Status of forest management

Forest for production

The 1994 Forests and Wildlife Policy abolished the existing concession system and replaced it with a new system intended to promote efficiency, transparency and accountability. Under the system there are two types of permits: competitive bidding and administrative permits.

- *Competitive bidding:* the allocation of forest resources through competitive-price bidding for timber rights is a fundamental feature of the 1994 Forest and Wildlife Policy, which calls for the “award of timber rights on the basis of competitive bidding and periodic audit of forest utilization operations to ensure compliance with forest management specifications and environmental protection standards”. The regulations governing competitive bidding for timber rights in the form of timber utilization contracts (TUCs) are outlined in the Timber Resource Management Act, 1997 (Act 547), as well as the accompanying Timber Resources Management Regulations (1998; LI 1649). Competitive bidding is mandatory in the awarding of all timber rights in the form of TUCs on both reserve and off-reserve areas. Under the competitive bidding framework, the allocation of TUCs is made on the basis of public bidding for rights to harvest timber in each area on the basis of an annual timber rights fee. TUCs for forest reserves have a term of 40 years, while TUCs for other lands have a term of five years.

All applications for the granting of timber rights are evaluated by the Timber Rights Evaluation Committee (TREC) to determine those entities that are pre-qualified for the granting of timber rights. All TUCs require parliamentary ratification and timber rights acquired under a TUC cannot be transferred without the written consent of the minister. All applications for such transfer should be evaluated by TREC.

- *Administrative permits*: there are two types of administrative permit
 - *Timber utilization permits*: timber may be allocated through timber utilization permits (TUPs; LI 1649). Based on an application by a district assembly, town committee, any rural community group or an NGO and subject to such conditions as the Forestry Commission may determine, the Forestry Commission may issue a TUP exclusively for harvesting a specified number of trees in an area of land not subject to a TUC. Any timber harvested or converted to lumber under a TUP may be used only for social or community purposes and may not be sold or exchanged. Thus, any timber harvested for commercial purposes that was allocated under a TUP does not qualify as legal timber.
 - *Salvage felling permits*: permits may be issued for the salvage of trees from an area of land undergoing development such as road construction, the expansion of human settlement or the cultivation of farms. No such permit is issued in respect of land under a TUC. Salvage felling permits are subject to corruption and other forms of abuse: since timber from TUPs cannot be distinguished from other timber in the commercial market, a major challenge is to prevent timber harvested under TUPs from entering the commercial market.⁴

Timber harvesting is used as both a silvicultural and a management tool. National forest inventories were undertaken in forest reserves in 1985–1992 and 2002, and the data from these have been used for, among other things, setting the AAC. Forest protection strategies have been incorporated and described in the 1995 Manual of Procedures for Stock Survey and Yield Allocation and backed by the 1998 Logging Manual.

The Manual of Procedures for Stock Survey and Yield Allocation documents the steps to be taken and operations to be carried out to ensure that trees in production forest reserves are felled on a sustained-yield basis. The Logging Manual prescribes the code of timber-harvesting practice and technology that all holders of timber utilization rights are required to adhere to. The manual is



Fuelwood-gathering in western Ghana.

written primarily to guide timber contractors on planning and operational aspects of timber harvesting and provides basic information for a code of good working practice. To ensure that harvesting meets the required forest management standards, the following criteria have been set:

- Each TUC area in a forest reserve should have a harvesting schedule.
- Permanently and temporarily protected areas as well as conversion and research areas should be excluded from the schedule.
- The period of the schedule should be 40 years.
- The duration of each felling coupe should not exceed five years.
- Each five-year coupe should be allocated one-eighth ($\pm 10\%$) of the area of all compartments in the TUC area.
- The harvesting schedule should be practical.

A compartment is not released for logging if it does not appear in the harvesting schedule.

The Forest Services Division of the Forestry Commission is responsible for supervising and monitoring TUCs. The Division's district forest manager and regional staff are responsible for ensuring that contractors follow the guidelines of the Logging Manual and fully adhere to the timber operational specifications and the social responsibility agreement specified in contracts. In particular the field staff must ensure that compartment plans are followed, that the conditions for forest protection are adhered to, and that payments are made in accordance with contract agreements.

The Forestry Commission also uses the 1998 Manual of Procedures for Forest Resource Management Planning in the High-forest Zone, under which logging plans are prepared by the contractor and the forest reserves are divided into compartments of 128 hectares each (1600 m x 800 m). The 2002 Law on Timber Resource Auctioning establishes that timber rights will be awarded by tender. The Forestry Commission allocates the volumes to be harvested annually based on an 'interim yield formula', which depends on the size of the TUC. One hundred percent of the boundaries of forest reserves have been demarcated.^a

A national AAC of 500 000 m³ has been set for forest reserves using results of inventories and a harvesting rotation of 40 years. This AAC is applied to 64 economic species, grouped in accordance with their level of harvesting in relation to their total stocks: 18 Scarlet Star species, comprising the main traditional commercial timbers now under threat of economic extinction, where the level of cut is greater than 200% of the sustainable level; 16 Red Star species, for which the level of cut is 50–200% the level considered to be sustainable and which will eventually become economically extinct without a major reduction in harvest; and 30 Pink Star species, some of which are being exploited but not at a rate to cause concern – i.e. less than 50% of the sustainable cut.^a

The estimated total AAC of 683 100 m³ (comprising 115 900 m³ of Scarlet Star species, 208 700 m³ of Red Star species and 358 500 m³ of Pink Star species – see Table 4) was rounded down to 500 000 m³ because many Pink Star species are currently regarded as unsaleable. The AAC has been set at 1.5 million m³ for off-reserve forests, giving a total national AAC of 2 million m³.^a

The AAC in forest reserves (500 000 m³) has been criticized as being unsustainable, partly because "the timber industry has failed to heed repeated warnings to shift exploitation from [traditional, high-value] species to lesser-used species" (Bird et al. 2006). Outside the forest reserves, the annual production of timber by illegal chainsaw milling is reported to be as high as 2.5 million m³, five times the total AAC in the formal sector (Marfo 2010).

In the past, forest management plans have not been very successful in protecting the forest from degradation and over-exploitation. In line with new thinking about forest management, new

management plans are being prepared. Twenty-one plans have been developed covering an area of just over 400 000 hectares of the PFE, and their implementation was scheduled to begin in January 2010. If the implementation of these initial 21 plans is successful, a second phase will involve the development of plans for the remaining production forest reserves. The introduction of low impact logging techniques is under consideration. Constraints to SFM encountered in the past include inadequate funding; institutional weaknesses; a lack of adequate equipment; the poor implementation of management plans; increasing demand for forest resource use, sometimes resulting in conflicts; and encroachment and unapproved harvesting.^a

A range of measures has been put in place to help reduce the impact of fire, including wildfire management plans, the establishment of a green fire belt, incentive schemes for fighting fires (volunteer schemes), education and awareness creation, and arrests and prosecutions. Such measures have helped to reduce the incidence of wildfire in some fire-prone communities.^a

The management of many forest reserves is thought to be quite good. In others, however, inadequate control of TUCs has allowed over-harvesting. Repeated re-entries take place depending on demand for logs, often facilitated through salvage permits. There is inadequate surveillance to safeguard the integrity and ensure the security of the PFE. There are also inadequacies in survey records, maps and boundary maintenance (ITTO 2006).

The formal timber industry has traditionally concentrated on exports. Domestic supplies, therefore, are supplemented by illegal logging: according to one estimate, 84% of domestic timber (about 497 000 m³) is supplied by illegal chainsaw milling operations, and an additional 260 000 m³ of timber from such operations is exported to neighbouring countries (Marfo 2010). Most of the logs are obtained from off-reserve sources (including in concessions, at the expense of concession-holders), although there is anecdotal evidence that forest reserves are increasingly being raided (ibid.).

Measures have been put in place to reduce illegal forest activities, including the formation of a military task force, which patrols the forest; increased arrests and prosecutions; a ban on the sale of chainsaw lumber; and the development of a

VPA with the European Union (see below). Such measures have enhanced the Forestry Commission's capacity to control legal and illegal forest activities.^a

Another potential measure is a new timber-tracking system, which is currently being piloted. This system is designed to monitor the movement of timber from standing trees in forests (including in forest reserves, off-reserve forests, and timber plantations) to processing facilities, or from point-of-import to processing facility, and to local sales outlets or export facilities. The system will enable the tracking of individual logs and consignments of processed products, and will include product labelling, physical inspections and documentary checks. It will have four main components:

- The identification and tagging of individual products or consignments using bar-coded labels or radio frequency identification devices (usually known as RFIDs).
- The incorporation of these tag numbers onto the statutory forms used for declarations, inspections and other relevant records and reports.
- The use of electronic technology for data collection and transmission.
- The development of a database to receive, analyse and report all wood production and movement.

The system will provide the full traceability of timber from both the PFE and the non-PFE and certify the origin and legal and regulatory compliance of all timber products. Initially the scope will be limited to information on forest and timber operations and will include:

- log production
- log movements from forest to mill
- mill inputs and outputs
- processed timber production and transport
- processed timber exports
- log and processed timber imports.

Silviculture and species selection. The silvicultural system used in natural forests is a polycyclic selection felling system using a cutting cycle of 40 years. The AAC in the natural forests is decided on the basis of stock surveys and size limits prescribed

for the different commercial species by the Forest Services Division of the Forestry Commission. Only 20% of the trees above the diameter limit are to be harvested (around three trees per hectare), with the rest retained for the next entry in 40 years. Post-logging silvicultural operations are also prescribed to promote growth and sustainability.

There are many hardwood timber species, but the more commercially valuable are becoming scarce. Table 4 shows the three groupings of species, and the harvesting volumes in each.

Planted forest and trees outside the forest.

The National Forest Plantation Development Programme, which was launched in early 2010, aims to encourage the development of a sustainable forest resource base that will satisfy future demand for industrial timber and enhance environmental quality. The program is being implemented under three main strategies. The first of these, the modified *taungya* system, involves the establishment of plantations by the Forest Services Division in partnership with farmers. The Forest Services Division provides technical direction and demarcates degraded forest reserve lands and supplies pegs and seedlings, while the farmers provide all the labour involved in site-clearing, pegging, planting, maintenance and fire protection. Farmers are permitted to cultivate their food crops, which are inter-planted with tree crops. In addition to the food crops they harvest, farmers earn a 40% share of the returns on investment. The government also receives a 40% share and the landowner and community earn a 15% and 5% share, respectively.

The second strategy uses hired labour and contract supervisors to establish industrial plantations. Plantation workers are hired and paid a monthly allowance to establish and maintain plantations, while plantation supervisors are given one-year renewable contract employment to supervise and offer technical direction. The Forestry Commission's Plantation Department exercises general oversight and monitors field activities to ensure compliance with quality standards for plantation establishment. This strategy is employed by the Government Plantation Development Programme, which is funded through the Highly Indebted Poor Countries initiative. The plantations developed under this scheme are owned by government and those landowners who are entitled to royalty payments.

Table 4 Commonly harvested species for industrial roundwood

Species grouping	Notes
Scarlet Star*	An estimated 115 900 m ³ are harvested each year in forest reserves, and 100 185 m ³ are harvested off-reserve.
Red Star**	An estimated 208 700 m ³ are harvested each year in forest reserves, and 41 778 m ³ are harvested off-reserve.
Pink Star‡	An estimated 358 500 m ³ are harvested each year in forest reserves, and 360 916 m ³ are harvested off-reserve.

- * *Scarlet-star species comprise the main traditional timbers now under imminent threat of extinction: Albizia ferruginea, Aningeria altissima/robusta (also listed in ITTO 2006), Daniella ogea/thurifera, Entandrophragma angolense, E. cylindricum, E. utile, Guibourtia ehie, Khaya anthotheca/grandifolia, Khaya ivorensis, Milicia excels/regia, Nauclea diderrichii, Pericopsis elata, Pterygota macrocarpa and Tieghemella heckelii.*
- ** *Red-star species comprise other traditional timbers for which current rates of exploitation present a significant danger of extinction: Afzelia africana/bellea, Canarium schweinfurthii, Distemonanthus benthamianus, Rhodognaphalon/Bombax brevicuspe, Antiaris toxicaria, Antrocaryon micraster, Ceiba pentandra (also listed in ITTO 2006), Chrysophyllum spp, Entandrophragma candollei, Guarea spp, Heritiera utilis, Lophira alata, Lovaia trichilioides, Mansonia altissima, Piptadenisatrum africanum and Terminalia ivorensis,*
- ‡ *Pink-star species comprise the following lesser-used species: Albizia adianthifolia, Anopyxis klaineana, Berlinia spp, Cynometra anatanana, Erythrophleum sauaveolens, Hallea spp/Mitragyna spp, Holoptelea grandis, Lannea welwitschii, Petersianthus macrocarpus, Strombosia glaucescens, Trichilia tessmannii, Albizia zygia, Alstonia boonei, Amphimas perocarpoides, Berlinia confusa, Celtis midbraedii/zenkeri, Coryanthe pachyceras, Cylicodiscus gabonensis, Dialium aubrevillei, Klaindoxa gabonensis, Mammea africana, Morus mesozygia, Ongokea gore, Parinari excelsa, Parkia bicolor, Pycnanthus angolensis, Rhodognaphalon/Bombax buonopozense, Ricinodendron heudelotii, Sterculia rhinopetala, Terminalia superba (also listed in ITTO 2006), Trilepisium madagascariense and Triplochiton scleroxylon (also listed in ITTO 2006).*

Source: Government of Ghana (2010).

The third strategy involves the release of degraded forest reserve lands by the Forestry Commission to private entities after vetting and endorsing their reforestation and business plans. The operations of these private developers are then monitored through periodic field visits by the Plantation Department to ensure compliance with the approved reforestation plans. The private investor earns 90% of the total proceeds from the plantation while the Forestry Commission, landowner and community earn 2%, 6% and 2%, respectively.

The estimated area of planted forest in 2010 was about 260 000 hectares (FAO 2010). Ghana began planting *Tectona grandis* (teak) in the Volta region in 1875, and teak is the most dominant species in today's plantation estate. Teak yields average 8–10 m³ per hectare per year on a 25-year cycle, and there is a ready demand for teak timber, both in domestic and export markets. The indigenous species planted are mainly *Mansonia altissima*, *Terminalia superba*, *T. ivorensis*, *Entandrophragma angolense*, *Khaya ivorensis*, *Ceiba pentandra*, *Heritiera utilis* and *Triplochiton scleroxylon*. Other than teak, the exotic species are predominantly *Cedrela odorata* and *Eucalyptus camaldulensis*.^b

A total of 68 558 hectares of plantation were established in the period 2005–08.^b As of the end of 2008, 9095 hectares of plantation were covered

by management plans and a further 15 031 hectares were confirmed to be covered by reforestation plans. For the remaining areas, a validated figure could not be readily obtained.^b

Forest certification. Ghana has been engaged in the development of forest certification for more than a decade. There is interest in developing a national scheme partly because FSC-accredited certification bodies, using their generic standards, have been unable to certify significant areas of forests in Ghana because existing TUPs and contracts might be in conflict with recent laws. Another reason is that management plans written by the Forestry Commission are at various stages of consultation (i.e. drafts) and are unapproved (Purbawiyatna & Simula 2008). As of February 2011 a small area of teak plantation and about 150 000 hectares of natural forest was certified by the FSC (FSC 2011).

Estimate of the area of forest sustainably managed for production. On the basis of information supplied by the Government of Ghana, FAO (2010) reported that 1.38 million hectares of forest was under sustainable management. ITTO (2006) estimated that 270 000 hectares of natural forest was being managed in a manner consistent with sustainability, including the operation of Samartex, a Ghana company with FSC

controlled-wood certification for 150 308 hectares of natural forest in Samreboi. Controlled-wood certification certifies that the wood supply does not include wood that is illegally harvested; harvested in violation of traditional and civil rights; harvested in forest management units in which high conservation values are threatened by management activities; harvested in areas in which forests are being converted to plantations or non-forest use; or harvested from forests in which genetically modified trees are planted. This area, and the area contained in the Bobiri Forest Reserve, are included in the estimated area of forest under SFM presented in Table 5.

Timber production and trade. Total industrial roundwood production in 2009 was 1.32 million m³, little changed from the 1.37 million m³ recorded in 2004 (ITTO 2011). Sawnwood production was 532 000 m³ in 2009, compared with 490 000 m³ in 2004 and 454 000 m³ in 1999. About 191 000 m³ of plywood was produced in 2009, compared with 140 000 m³ in 2004 and 75 000 m³ in 1999; 274 000 m³ of veneer was produced in 2009, compared with 301 000 m³ in 2004 and 150 000 m³ in 1999 (ITTO 2011). The estimated export value of primary timber products was US\$207 million in 2009, comprising logs (US\$17.3 million – presumably teak and other plantation logs), sawnwood (US\$70.0 million), veneer (US\$63.4 million) and plywood (US\$56.0 million) (ITTO 2011).

The export of round and square logs (other than plantation teak) has been banned since 1997 and levies imposed on exports of air-dried timber of nine important species. In 2008 Ghana reported exports of 191 000 m³ of sawnwood (including 20 700 m³ to the United States, 18 700 m³ to Germany, and 13 800 m³ to Italy) and 69 700 m³

of veneer (including 21 400 m³ to the United States and 9450 m³ to Italy) (ITTO 2010). In that year it exported 8220 m³ of teak logs to India; the total export volume of teak logs was 87 100 m³ but the destination of most of these was unreported (ibid.).

Non-timber forest products. An estimated 380 000 tonnes of bush meat are consumed annually, mainly from forests, at an estimated value of about US\$350 million.^a Animal and plant products used in traditional medicine and cultural practices have an estimated value of about US\$13 million.^a Over 600 000 women in northern Ghana collect about 130 000 tonnes of nuts yearly, about 40% of which is exported. This contributes about US\$30 million annually to the national economy (Osei-Tutu et al. 2010).

Efforts are being made to market, internationally, at least two Ghanaian NTFPs: thaumatin, a sweetener from seeds of *Thaumatococcus danielli*, which is reputed to be easy to cultivate under plantation trees; and novella, an oil/margarine from seeds of *Allanblackia parviflora*. A small-scale processing facility for thaumatin production is being established; the value of exports of this product in 2004 was reportedly \$430 million (Okeke 2009). The contribution of ecotourism, including in forests, to Ghanaian GDP is 12%.^a

Forest carbon. Ghana is developing a comprehensive low-carbon growth plan that will address climate change as part of a national and sectoral development strategy and set REDD+ in a wider development context (Anon. 2010). Estimates of national-level forest biomass carbon stocks vary from 381 MtC (FAO 2010) to 610–890 MtC (Gibbs et al. 2007), to 2100 MtC (Eggleston et al. 2006). There is no recent estimate of the net emissions of GHGs caused by deforestation and

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	1150	1035	1150	0	270	97	97	0
2010	774	1124**	774*,a	150	155†	164	24	1.8

* As reported in ITTO (2006).

** Assumed to be the area classified as 'production' in FAO (2010).

† Total area under 'old' management plans. Recently, new forest management plans have been developed for 408 000 hectares of the PFE and are in the early stages of implementation.

‡ Comprising the certified forest area and the Bobiri Forest Reserve, where a management plan and a TUC operational plan are being implemented effectively.^b

degradation; estimates made in 1994 suggest that 40% of the country's emissions may come from deforestation (Government of Ghana 2008). Ghana is actively engaged in the Forest Carbon Partnership Facility and is developing a national REDD+ strategy. It has also been chosen as a pilot country of the Forest Investment Program for up-scaled REDD+ investment. The initial REDD+ strategy comprises two broad and overlapping thematic areas:

- Timber policy and supply – approaches will focus on traditional timber-sector operations, processes, policies and laws and on the potential for broadening public participation.
- Wider aspects of forest policy, including agroforestry and other carbon-conserving activities.

Table 6 summarizes Ghana's overall forest-based carbon capture and storage potential.

Forest for protection

Soil and water. The Government of Ghana (2010) reported that the country's entire protection PFE (350 000 hectares) is managed exclusively for the protection of soil and water.

Biological diversity. At least 674 tree species, 225 mammal species, 728 bird species, 340 butterfly species, 221 amphibian species, 157 fish species and four reptile species are found in forests.^a Twelve mammals, six birds, two reptiles, eleven amphibians, one arthropod and nine plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). One plant species is listed in CITES Appendix I and 18 are listed in Appendix II (UNEP-WCMC 2011).

Protective measures in production forests.

About 100 000 hectares of the production PFE are considered environmentally sensitive (i.e. on steep slopes or erodible soils, or in streamside buffers).^a Measures exist to minimize damage in such areas: for example, no logging operation is permitted within buffer strips (25 m on either side of streams, and 50 m either side of rivers). No felling into buffer strips is permitted, and any tree or debris that falls within watercourses must be removed.

Extent of protected areas. The estimated area of protection PFE is 396 000 hectares. The Government of Ghana (2010) reported 31 protected areas in IUCN categories I and II covering a total area of 1.10 million hectares, most of which is (non-forest) grass savanna, as well as 7000 hectares in IUCN categories III and IV and 3.69 million hectares in IUCN category V. According to UNEP-WCMC (2010), 973 000 hectares of forest are in protected areas conforming to IUCN protected-area categories I–IV (including about 97 000 hectares of closed-canopy forest). The large difference between this and the estimated protection PFE may be caused partly by the inclusion, in the UNEP-WCMC estimate, of areas of savanna not included in the estimate of the protection PFE.

A national biodiversity strategy has been formulated that seeks to ensure the development and implementation of a well-coordinated biodiversity policy for the *in situ* and *ex situ* conservation of the nation's biological resources. The document contains a strategic framework for biodiversity conservation and management in Ghana. In addition, management plans for 30 'globally significant biodiversity areas' covering 230 000 hectares have been developed (including through flora and fauna surveys) and are being implemented.^a

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% intact forest/tree canopy cover > 60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
610–890	18	++	++	++	++	++	+++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	353	174	-	-	108
2010	396	174**	353	230[‡]	230

* As reported in ITTO (2006).

** In the absence of reliable updated information, the 2005 estimate is repeated here.

‡ For globally significant biodiversity areas.

Estimate of the area of forest sustainably managed for protection. Table 7 shows the estimated area of protection PFE under SFM.

Socioeconomic aspects

Economic aspects. Forests accounted for 6% of GDP in 2004 (US\$520 million), and exports of timber products were worth an estimated US\$186 million in 2008.^a The formal forest sector employs about 120 000 people, including about 50 000 in the wood-products industry. About 70 companies are involved in timber harvesting, 70 are involved in primary processing, 127 are involved in secondary processing, and 1650 are involved in tertiary processing.^a According to Mayers et al. (2008) about 30 000 small-scale carpenter firms employ an estimated 200 000 people, and there are about 5000 woodcarvers and 1500 canoe carvers. Chainsaw milling, although illegal, provides jobs for about 130 000 Ghanaians and livelihood support for about 650 000 people (Marfo 2010); 5000–6000 people are estimated to be employed in the bush-meat industry.^a The extent of overlap in these various estimates is unclear.

The VPA between Ghana and the European Union, which was signed in November 2009, could have significant economic repercussions for Ghana. An assessment of its potential impact on forest governance and economics by Mayers et al. (2008) compared a business-as-usual scenario with a 'legitimate-timber' scenario (such as might occur under the VPA) and a 'sector-reform' scenario. The main components of the legitimate-timber scenario were a national legality standard; chain-of-custody system (timber-tracking); a verification-of-legality system (licensing by a new timber-validation entity); the piloting of the legal assurance system; and independent monitoring. The sector-reform scenario would involve a broader set of fiscal, regulatory, trade and tenure improvements. The assessment predicted that, under the legitimate-

timber scenario, the national timber harvest would drop by about 20% by 2012 and still further (more than 50% compared to the present level) by 2020, although this would still be above the sustainable level predicted under the sector-reform scenario. The first VPA-licensed products were anticipated in December 2010.

Livelihood values. An estimated 2 million people depend on forests for subsistence uses and traditional and customary lifestyles.^a Forest-adjacent communities undertake a wide range of forest-related activities, including fuelwood and charcoal production, wood-carving, canoe-carving, rattan production and chewstick-gathering.

Social relations. The Constitution provides for the sharing of royalties between government and traditional owners as follows: 40% to stools and 60% to the state in reserve forests; and 60% to stools and 40% to the state in off-reserve forests. Social-responsibility agreements are reached between TUC-holders and the communities where timber extraction takes place for the provision of agreed social services and amenities; a process of consultation is also undertaken.

The following benefit-sharing arrangement for the modified *taungya* system and commercial plantation developers is in place: farmers and the Forestry Commission should each receive 40% of benefits accruing based on their inputs; landowners should receive 15% (comprising traditional authorities 7% and tribal landowners 8%); and forest-adjacent communities should receive 5%.

Summary

A number of factors is driving the depletion of Ghana's forests, particularly off-reserve forests but also forest reserves. Forest-related laws are sometimes contradictory or overlapping. Nevertheless, steps are being taken to increase community participation in forest management. Ghana has a strong Forestry Commission, a long

history of forest management, and capacity for forest research. The forest industries are a large employer, much of it in the informal sector. The Forestry Commission has an established approach to forest management in forest reserves and has set an annual allowable cut of 500 000 m³, which has been criticized as unsustainable. Outside forest reserves there is little control of harvesting and the annual production is reportedly much higher than the allowable cut in forest reserves. A range of measures has been put in place to reduce the incidence of wildfire, and these appear to have been at least partially effective. Measures have been put in place to reduce illegal logging (which is reportedly high), including a timber-tracking system. A national forest plantation development program has been launched with the aim of developing a sustainable forest resource base. Ghana has been chosen as a pilot country for up-scaled REDD+ investment through the Forest Investment Program.

Key points

- The PFE is an estimated 1.33 million hectares (down from 1.6 million hectares in 2005), comprising 774 000 hectares of natural-forest production PFE (down from 1.15 million hectares in 2005), 396 000 hectares of protection PFE (up from 353 000 hectares in 2005) and 164 000 hectares of plantations (up from 97 000 hectares in 2005).
- At least 155 000 hectares of natural-forest production PFE are under SFM, down from about 270 000 hectares in 2005; an estimated 230 000 hectares of protection PFE are so managed, up from 108 000 hectares in 2005.
- There are manuals for production, management and planning, which set out the obligations of logging contractors.
- Ghana is strongly engaged in REDD+.
- As many as 800 000 people may be employed in forest industries, including an estimated 650 000 in the informal sector.

Endnotes

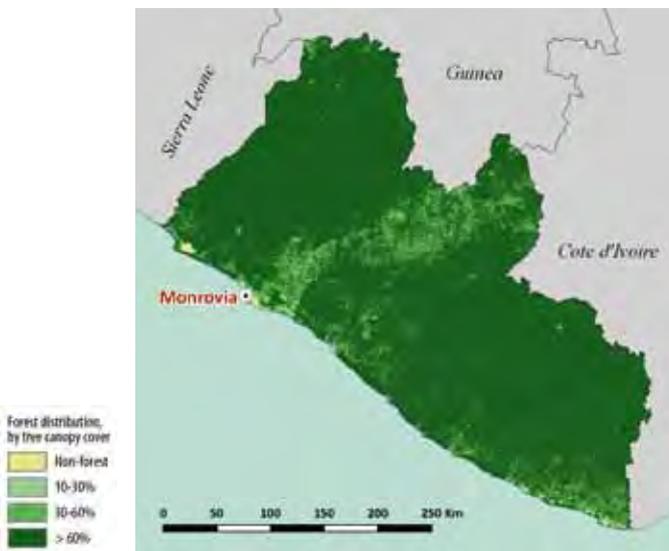
- a Government of Ghana (2010).
- b Personal communications with officials in the Government of Ghana, 2010.

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LIBERIA



Forest resources

Liberia has a land area of 11.1 million hectares and an estimated population in 2010 of 4.1 million people (United Nations Population Division 2010). The country is ranked 169th out of 182 countries in UNDP's Human Development Index (UNDP 2009). It is bounded by Sierra Leone to the west, Côte d'Ivoire to the east, Guinea to the north and the Atlantic Ocean to the south. FAO (2010) estimated Liberia's total forest area at 4.329 million hectares, which is 39% of the total land area. A 2004 analysis of GIS and satellite image data estimated that Liberia had 4.39 million hectares of forest.^a Liberia has large areas of secondary forests on abandoned agricultural land (J. Blaser, pers. comm., 2010).

Forest types. The three main categories of vegetation cover in Liberia are mangrove swamps and beaches along the coast; wooded hills and semi-deciduous shrublands in the middle belt; and dense tropical forests and plateaux in the interior. The bulk of the forest is concentrated in two large blocks: evergreen lowland forests in the southeast, and the semi-deciduous mountain forests in the northwest. There are ten national forests and two national parks. Counties that have significant forested land are Gbarpolu, Grand Gedeh, Rivercess Sinoe and River Gee.^a

Characteristic species of the moist evergreen forests are *Lophira alata*, *Heritiera utilis* and

Sacoglottis gabonensis, while Meliaceae (one of the most important timber families in West Africa) is represented by only two species: *Lovoa trichilioides* and *Guarea cedrata* (bossé). The semi-deciduous forests cover the northern half of the country and contain a higher representation of Meliaceae, the characteristic species being *Nesogordonia papaverifera* (danta) and *Aningeria robusta*. Common shade-intolerant species are *Albizia* spp, *Fagara* spp, *Terminalia* spp and *Pycnanthus angolensis*. Liberia has an estimated 10 900 hectares of mangroves, concentrated around coastal lagoons and along estuaries; *Rhizophora racemosa* is the dominant mangrove species, along with *Avicennia germinans* and *Acrostichum aureum* (Spalding et al. 2010).

Permanent forest estate. The natural PFE is estimated at 2.72 million hectares, comprising 1.7 million hectares of production forest (consisting of 1.36 million hectares in ten 'national' forests¹ and 340 000 million hectares in other forests, such as state forests and also forests that are under the control of traditional authorities) and 194 000 hectares of protection PFE, which comprises the 180 000-hectare Sapo National Park and the 13 600-hectare East Nimba Strict Nature Reserve (Table 1).

Forest ecosystem health

Deforestation and forest degradation. A study of remote sensing data indicates that deforestation increased from 0.2% in 1986–2000 to 0.35% in 2000–2006 (Government of Liberia 2008). Shearman (2009), however, suggested that this might be a substantial underestimate due to methodological problems and that recent deforestation could have been as high as 1%. Almost all clearing is in the form of numerous small (<10 hectare) clearings around towns and along roads near towns for shifting cultivation and conversion to single-crop plantations. The country's long-running civil conflicts, which forced

¹ Officially Liberia has eleven national forests. The 'Small Gbe' in Nimba County is partially degraded from encroachment by farmers and has been classified in land-use suitability studies as a salvage area, which effectively means that its merchantable timber can be removed without the need to fulfil the requirements of SFM. Therefore, this national forest has not been included in the PFE (W. Topor, pers. comm., 2010).

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	3.48–5.66	4124	1310	-	101	1411
2010	4.33–9.60	2420^a	1700	9.7	194^{**}	1904

* As reported in ITTO (2006).

** An expansion of the protected-area estate has been proposed, to a total of 1.02 million hectares.

Source: Blaser (2008), ITTO estimate, FAO (2010), UNEP-WCMC (2010).

many people to leave the countryside and move to the capital and elsewhere, was one reason why deforestation rates were low historically compared to elsewhere in the region. Now that peace has been restored, there is a general return of the population to rural areas, assisted by the repair of infrastructure such as road and bridges. These factors, coupled with expanding global markets for tropical agricultural products, biofuels and timber, are exerting pressure on forests and, without preventative measures, the deforestation rate is likely to increase (Government of Liberia 2008).

In addition to subsistence farming, a significant cause of forest degradation is chainsaw logging and associated pit-sawing, as well as other forms of uncontrolled logging. In the absence of sawmills, pit-sawing is a major source of timber supply for reconstruction. Blackett et al. (2009) identified two problems affecting the sustainability of remnant forests: over-harvesting per hectare, and the lack of post-logging management. Chainsaw logging occurs in all counties at distances of up to 5 km from roads – four-fifths of production forests are now within 3 km of a road (ITTO 2005). Other threats include conversion to small-scale agriculture (especially dry rice cultivation), and illegal alluvial mining for gold and diamonds, which can damage rivers, streams and soils. As with deforestation, these threats are increasing as internally displaced people return to the hinterland from urban centres.

In 2004 Liberia had an estimated 2.42 million hectares of closed dense forest.^a The open dense forest (forest logged in the ten years or so prior to 2004) was estimated at 1.02 million hectares, while there were 0.95 million hectares of forest that had been subject to extensive use by local people and were in varying states of degradation, from moderate to severe (Table 2). An additional 1.28 million hectares of forest was classified as mixed agriculture and forest.^a None of the forest in agricultural landscapes (i.e. 0.95 million hectares + 1.28 million hectares) is included in the estimate of total forest area given above, mainly because of its highly fragmented nature, although it may constitute an important resource at the local level. FAO (2010) estimated that Liberia had only 175 000 hectares of primary forest.

Vulnerability of forests to climate change.

The south of Liberia has an equatorial climate, with rainfall exceeding 5000 mm. The northern regions are strongly influenced by the West African monsoon, with a severe wet season between May and November. The rainy season is heavily influenced by the Inter-Tropical Convergence Zone. Mean annual temperature in Liberia increased by 0.8 °C between 1960 and 2006, an average of 0.18 °C per decade (McSweeney et al. undated). Mean annual rainfall has decreased since the early 1960s, but it is difficult to determine whether this is part of a long-term trend. Variations are associated

Table 2 Forest condition

	PFE	Non-PFE	Total ('000 ha)
	'000 ha		
Area of primary forest*	-	-	2420
Area of degraded primary forest**	-	-	1010
Area of secondary forest	-	-	-
Area of degraded forest land	-	-	950

* Closed dense forest, 2004.

** Open dense forest (forest logged in the ten years prior to 2004).

Source: Government of Liberia (2010).

with the El Niño–Southern Oscillation, which irregularly brings drier conditions to West Africa (ibid.). Mean annual temperature is projected to increase by 0.9–2.6 °C by 2060 and by 1.4–4.7 °C by 2090 (ibid.). In 2007 Liberia prepared a NAPA to respond to the country’s urgent and immediate needs to adapt to climate change. The NAPA states that agriculture, forestry, fisheries, wetlands and public health are of immediate concern. However, the potential impacts of climate change on Liberian agriculture and forestry are largely unknown. Liberia’s 2008 Food and Agricultural Policy establishes the monitoring of climate change and the provision of support for climate-change adaptation in agriculture and forestry as key action areas (Government of Liberia 2011).

SFM policy framework

Forest tenure. According to the National Forest Reform Law, 2006, “All forest resources in Liberia ... are held in trust by the Republic for the benefit of the people” (Table 3). Although the term land ownership is in common use in the country, it is not possible, in a strict sense, to own the land itself. Rather, it is the right to *use* land, or the resources on it, that can be owned by an individual or group.

Land ownership rights are held under three tenure systems: the customary land-tenure system; the Anglo-American system of land tenure, also known as the deed system; and the land registration system (Blaser 2008). Communal land is designated for the exclusive use of local communities for purposes other than logging. Customary rights over such land are not recognized automatically; they must have been documented previously. The only private forest resources are those that have been developed through artificial regeneration on privately owned

land. An ITTO diagnostic mission in 2005 (ITTO 2005) reported that the traditional land and resource rights of the majority rural population have been systematically ignored and undermined by a small elite throughout Liberia’s 150-year history. Nevertheless, the Liberian Constitution and specific laws, such as the National Environmental Protection Act (2002), note the rights of rural people.

The right to control the exploitation of natural resources such as timber and diamonds has been treated in the past as a prize of political office, especially under presidents Doe (1980–90) and Taylor (1997–2003). Armed factions also controlled territory to exploit natural resources, which helped to drive the conflicts of 1990–96 and 2000–03. Communities claim land that has been designated as national forest and there are also apparent conflicts over some large and long-term rights, such as those held by the Liberian Agricultural Company. The real extent of these conflicts, claims and challenges to ownership is unclear (Blaser 2008).

The most pressing issue affecting all land use in Liberia is the lack of legal clarity over property ownership and use rights. Security of land tenure in today’s Liberia is weak or non-existent and its restoration is essential to the development of Liberia’s economy and democracy. Rights of access to and use of natural resources, including land, minerals, forests and water, are shrouded in a state of tenure insecurity, vague and ambiguous legislation, conflicting and competing tenure arrangements, and constant and persistent clashes of customary and statutory rights (Government of Liberia 2008). There is scope under the National Forest Reform Law for community and private

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE
	'000 ha	
State ownership (national, state or provincial government)	4330	2720
Other public entities (e.g. municipalities, villages)	0	0
Total public	4330	2720
Owned by local communities and/or Indigenous groups	0	0
Privately owned by individuals, firms, other corporate	0	0

Source: Government of Liberia (2010).

ownership, but all forests remain public pending the resolution of the land ownership issue (FAO 2010).

Criteria and indicators. With the support of the ATO/ITTO regional project, Liberia's ATO/ITTO PCI for SFM scheme was completed in January 2010. These PCI were formulated by a technical committee selected and mandated through a national working group and the draft document was vetted at a high-level national workshop attended by a range of stakeholders.^a A field test was conducted and its results were validated during a multi-stakeholder workshop. Training on the use of the Liberia ATO/ITTO PCI was also organized, although more is needed because of the low human-resource capacity of Liberia's forest sector. Liberia's submission to ITTO for this report was not in the ITTO C&I reporting format.

Forest policy and legislation. Before 2004, timber revenues and profits were controlled and manipulated by former president Charles Taylor to tighten his grip on the country. Existing logging concessions were taken from their previous owners and given to Taylor cronies (for example, Taylor's brother ran the Forest Development Authority – FDA). Revenues were diverted to buy arms and to acquire personal assets. Combatants were employed by logging companies and used to quell local opposition. Wildlife was hunted intensively (Blaser 2008).

In July 2003, the United Nations Security Council (2003) imposed sanctions on exports from Liberia – including timber exports – to restrict the flow of arms and to weaken the Taylor regime. Sawmills, plywood mills and all other forest products' industry infrastructure were destroyed by looters. Some companies lost millions of dollars in investment.

After eviction of the Taylor government and a move to a transitional government, free elections were held in November 2005 and a new government headed by Ellen Johnson Sirleaf was elected. Since then, rapid progress has been made in the forest sector, driven initially by the National Forest Monitoring Committee with assistance from the Liberia Forest Initiative, a multi-donor support mechanism. Based on this collaboration, the FDA is undertaking profound reforms. A new forest law, the National Forestry Reform Law, was approved by Parliament and enacted in October 2006. In the same month the United Nations Security Council

lifted its timber export sanctions, allowing the country to redevelop its commercial forest sector.

The National Forestry Reform Law provides for four principal commercial forest exploitation contracts and permits:

- Forest management contracts (FMCs): contracts for the management of forest areas between 50 000 and 400 000 hectares in size.
- Timber sales contracts (TSCs): contracts for the management of forest areas of 5000 hectares or less for a period of no longer than three years.
- Forest use permits: for non-timber forest uses (e.g. tourism and the harvesting of NTFPs).
- Private use permits: to regulate commercial activities on private land.

The Government of Liberia has adopted a new conceptual approach to the development of the forest sector, referred to in the Liberian forest policy (adopted in 2006) as the principles of the three Cs – commercial, conservation and community forestry. The policy aims to conserve and sustainably manage all forest areas so that they continue to produce a complete range of goods and services for the benefit of all Liberians and contribute to national poverty alleviation, while maintaining environmental agreements and conventions. Nevertheless, the policy has been criticized for lacking a clear strategy for reforestation and afforestation, NTFPs and value-added, and a failure to address the issue of illegal chain-saw operators (Blaser 2008).

The four strategies for implementing Liberia's forest policy – as spelt out in the National Forest Management Strategy of 2007 – are:

- *Strategy for commercial forestry:* this focuses on improving forest concession management, reforestation and forest plantation development and the modernization of the wood-processing industry.
- *Strategy for community forestry:* this strategy acknowledges the need for the greater involvement of local people in all aspects of the forest sector and pays special attention to the potential for forests to contribute more to local people and communities. It focuses on the production of bush meat, woodfuel and other NTFPs, as well as the management of forests by local communities to meet differing objectives. However, the dissociation of forest-use rights

from land ownership in the National Forest Reform Law makes the implementation of community forest management by local people a contentious issue.

- *Strategy for forest conservation:* this includes the management of specific sites of high conservation value and the integration of conservation objectives with all aspects of forest management. The strategy focuses on wildlife and protected-area management, the management of wetlands and mangroves, and the development of ecotourism and nature tourism.
- *Cross-cutting activities:* to support the above strategies, cross-cutting activities are to be implemented to strengthen the overall framework for the development of the forest sector. These include activities on issues related to land tenure, ownership and land-use planning; public administration (including financial management); research, information, education and training; and legislation and law enforcement.

The Community Reform Law was enacted in October 2009 and the National Wildlife Conservation and Protected Area Management Law is awaiting ratification (Government of Liberia 2011). The extended delay before enactment of the latter has fostered a perception that Liberia's 3Cs have differing priorities, with 'commercial' as the big C. This notion has been reinforced by maps that apparently confuse the relative areas of forest suitable for commercial, conservation and community uses (Government of Liberia 2011). A forest suitability study undertaken as part of the National Forest Management Strategy initially identified 3.41 million, 1.14 million and 0.05 million hectares of forest suitable as 'multiple sustainable use' areas, protected areas and pilot community forests, respectively. It also stated that multiple sustainable-use areas may be managed either by commercial firms or through community forest management, with at least 1.09 million hectares of forest suitable for community forest management (Government of Liberia 2011).

The Environmental Protection Act, which became law in 2003, is designed to enhance and manage Liberia's environment and natural resources. The Environmental Protection Agency, created under the Act, is to provide an inter-ministerial

mechanism for addressing and coordinating responses to Liberia's environmental problems. It should also establish a policy framework for environmental issues (including forest management, nature conservation and environmental impact), but this has not yet been done.

The Public Procurement and Concession Act (2005) establishes the rules for the acquisition and disposal of government assets, requires national and international competitive bidding for all timber concessions, and sets standards for pre-qualifying prospective timber concession-holders. Other laws that are being formulated include the Wildlife Law and the Community Rights Law.

Under the National Forest Reform Law the FDA has promulgated ten core regulations to ensure that the country's forests are managed in a way that is consistent with SFM and other requirements. They are 101: Public Participation; 102: Forest Land Use Planning; 103: Prequalification; 104: Tender, Award and Administration; 105: Pre-felling Operations; 106: Benefit Sharing; 107: Forest Fees; 108: Chain of Custody; 109: Penalties; and 110: Rights of Private Land Holder.

The Community Rights Law with Respect to Forest Lands, which was approved in October 2009, aims to empower communities to "fully engage in the sustainable management of the forests of Liberia, by creating a legal framework that defines and supports community rights in the management and use of forest resources". Among other things it defines the rights and responsibilities of communities to own, manage, use and benefit from forest resources. Forest lands ranging from 5001 and 49 999 hectares may be designated as community forest land. Communities have the right to enter into commercial agreements with logging companies to log community forest lands, subject to a range of conditions, and have the right to 55% of the revenues generated.

Draft Guidelines for Forest Management Planning have been developed to help forest managers and staff of companies that have been allocated FMCs, TSCs or other commercial permits, as well as staff at the FDA and other government agencies, to prepare and approve (respectively) forest-management and timber-harvesting plans. The planning requirements for harvesting forests under the various contractual arrangements differ in both the types of plans to be submitted and also the

level of detail. Notwithstanding these differences, however, the guidelines are designed to ensure that all logging companies conduct harvest activities in a way that meets SFM standards.

This is the first set of guidelines for forest management planning prepared in the country. It is designed to be read in conjunction with the Liberian Code of Forest Harvesting Practices, the objectives of which are to:

- Provide forest operators with guidelines and standards for improved forest harvesting practices that improve standards of logging/utilization and reduce environmental impacts, and so contribute to the conservation of forests through their wise use.
- Promote the health and safety of forest workers.
- Provide a framework for effective control of timber harvesting with predetermined guidelines and benchmarks.

In 2007 the Government of Liberia entered into an agreement with SGS to develop a chain-of-custody system for Liberia's forest sector for the tracking and verification of round logs. The tracking system, known as LiberFor, is claimed to be the world's most advanced nationwide verification system in place to monitor wood products and associated revenues (Pichet et al. 2009). Data are collected through physical inspections, documentary control and (eventually) legality audits and registered on a web-based information system. The implementation of the system faces several challenges, however, including a lack of capacity among forest stakeholders and a legacy of weak governance, which still impacts on forest management practices (ibid.).

The Government of Liberia signed a VPA with the European Union in April 2009, committing it to develop and implement a legality assurance system to ensure that all timber products specified in the VPA are produced legally.

Institutions involved in forests. An Act of Parliament in 1976 established the FDA as the body responsible for forestry in Liberia and also recognized the importance of forests as a key renewable natural resource. Amendments to this Act in 1988, 2000 and 2003 sought to strengthen the FDA's ability to manage and protect forests. The FDA is the agent through which policy is

implemented, including forest management plans. However, the FDA has limited human resources – in 2008 it had about 300 staff. More personnel will be required if the 3C approach is to be adopted and as more TSCs and FMCs are awarded. The FDA regional and district offices were destroyed during the civil conflicts. The FDA is struggling to renovate about one unit per region to accommodate regional offices, including supportive logistics (Blaser 2008). Integrating the 3C concept is challenging for the FDA, particularly at the FMU and regional levels.

Liberia has two professional forestry education institutions, both of which are inadequate and their curricula are outdated. The main facilities at the College of Agriculture and Forestry, University of Liberia, including dormitories and accommodation for teaching and support staff, are damaged and have not been renovated or refurbished. The college has been a pipeline of foresters to the FDA, offering a bachelor's degree, but the forestry program is understaffed, underfunded and there is a limited number of advanced degree-holders (Blaser 2008).

The Forestry Training Institute (recently renamed the Anthony Sayeh Forestry Training Institute) is the only institution for training middle-level forestry technicians in 60% practical and 40% theoretical forestry. During the civil conflicts the school facilities were looted and the structure de-roofed. The school resumed operations in 2008 and work is ongoing, including through an ITTO-funded project, to restore its training services.

Status of forest management

Forest for production

In the late 1990s more than 30 companies held logging concessions covering 40% of the national territory. The Oriental Timber Corporation alone was logging some 1.6 million hectares both within the PFE and outside it. During the reform process, however, all existing concession agreements were cancelled. With the cessation of formal logging, most of the forest industrial infrastructure was either destroyed or left idle to rust and decay. Skilled workers as well as professional foresters have been unable to exercise their skills for many years, and many either passed away or reached retirement age.

Nevertheless, FDA staff, private operators and newly developed civil-society organizations and their personnel have worked hard to develop a positive sense of entrepreneurship in the sector, which now has the potential to become an engine of development in Liberia (Blaser 2008). With the lifting of United Nations sanctions in 2006 the FDA set about developing new concessions and allocating them.

Under the National Forest Reform Law, FMCs must meet all of the following requirements:

- The land involved must be identified as a potential concession in the national forest management strategy in effect at the time the concession is offered.
- The land involved must not include private land.
- The contract must require the holder to perform actions necessary for sound, long-term forest management, including inventories, preparation of management plans, and annual operations plans.
- The contract must require the holder to prepare all environmental impact assessments required under the laws governing environmental protection.
- The contract must require the holder to submit a business plan to the FDA and to demonstrate to the FDA's satisfaction that the holder has the technical and financial capacity to manage the forest sustainably.
- The contract must require the holder to establish a social agreement with local forest-dependent communities, approved by the FDA, that defines those communities' benefits and access rights.
- The contract must require the holder to pay the government the fee that the holder bid in the concession process, in addition to any other applicable taxes and fees.
- The basic term of the contract must approximate the length of a forest rotation on the land based on a sustainable yield of timber products, although the contract may be terminated sooner.
- The land area subject to the contract must be at least 50 000 hectares and no more than 400 000 hectares.

- The size of annual coupes must allow the holder to harvest every suitable area once during the term of the contract.
- No holder can fell trees before the felling effective date.
- No holder can fell trees unless they possess a valid annual harvesting certificate.
- The FDA will issue an annual harvesting certificate to a holder only after all the following conditions have been met for the year:
 - The holder has an approved annual operations plan.
 - The holder has an approved forest management plan that covers the specific area to be harvested.
 - The holder has met the previous logging season annual audit requirements.

FMCs will comprise 90% of the areas allocated, with only 4% of the area subject to harvesting in any one year. Harvesting will be selective and designed to encourage the rapid growth of remaining stock. The design of FMCs includes set-aside areas (slopes, sacred areas, watercourses, etc) amounting to about 20% of the area, which will be excluded from logging. In aggregate, this area is about one-third of the total designated protected areas of Liberia (Government of Liberia 2008).

The requirements for TSCs (for areas of forest no larger than 5000 hectares) are less stringent than for FMCs, but an approved annual operations plan and a valid annual harvesting certificate are required.

It is difficult to assess the sustainable potential of Liberia's forests because there has been no forest inventory for 40 years and records of logged-over areas and volumes extracted in the last 20 years are incomplete and unreliable. Growth and yield dynamics are not well known and there are no permanent sampling plots or research on growth and replenishment rates (Blaser 2008). As of July 2009, seven forest management concessions had been formally designated over an area of about 1 million hectares, and three awarded under FMCs, but logging had yet to commence. Shearman (2009) recalculated harvestable volumes over the 1 million hectares designated for forest management concessions and concluded that the actual volume would be in the range of 25–50% of the volume

calculated by the FDA and, moreover, that the 25-year felling cycle was too short to be sustainable.

It has been suggested that up to 500 000 hectares of community forest land, designated and recognized under the Community Rights Law, might be managed as carbon concessions in which commercial forestry operations would take place according to raised logging standards (Government of Liberia 2011).

Silviculture and species selection. There is a lack of silvicultural knowledge about Liberia's forests, and much of the documentation of research programs in the 1970s and 80s has been lost (FDA 2006). Neither the National Forest Reform Law, the national forest policy, nor the guidelines for forest management planning specify a silvicultural approach; rather, the silvicultural system to be employed is to be specified in each forest management plan. FMCs are issued for a period of 25 years, implying a felling cycle of the same duration; the bid document issued by the FDA for Forest Management Contract Area 'K' (which has a gross forest area of 267 000 hectares), for example, specifies a felling cycle of 25 years. The Liberian Code of Forest Harvesting Practices specifies cutting limits for a number of species based on dbh, as well as a range of post-harvesting requirements.

No recent information was available on the most commonly harvested species; Table 4, therefore, shows the species listed in ITTO (2006).

Planted forest and trees outside the forest.

The area of planted forest is about 9700 hectares, comprising mainly *Gmelina arborea*, *Tectonia grandis*, *Eucalyptus* spp, *Pinus* spp and a number of hardwood species. There are also important rubber estates over several thousand hectares on agricultural land, which are generally in poor condition (Blaser 2008). There are large areas of oil-palm plantations, most of which are not currently managed. The

current condition and stocking of most existing plantations is unknown.

Forest certification. No Liberian forests are certified (e.g. FSC 2010) and there has been no move to develop policies in this direction.

Estimate of the area of forest sustainably managed for production. At present, no forest can be considered to be managed sustainably (Table 5).

Timber production and trade. Total industrial roundwood production in Liberia was estimated at 360 000 m³ in 2009, compared with 280 000 m³ in 2004 and 766 000 m³ in 2002, and sawnwood production was estimated at 80 000 m³ (ITTO 2011). In 2009 the estimated value of exports of logs and sawnwood was US\$1.18 million, up from US\$295 000 in 2008 and only about US\$11 000 in 2007 (ibid.).

Liberia has four sea ports, all of which were damaged during the civil conflicts. The National Port Authority has fully renovated the port at Monrovia, and Mittal Steel is about to renovate the Buchanan port. The other two ports (Harper and Greenville) both need considerable investment if they are to facilitate timber exports (Blaser 2008).

Non-timber forest products. Fruits, roots, mushrooms, leaves, honey, snails and bush meat are all harvested from forests and used as food by local communities. Bush meat – harvested both legally (but unsustainably) and illegally – accounts for up to 80% of meat consumption in Liberia (Blaser 2008). The most commonly hunted species are antelope, deer and monkey. Gums, resins, medicinal plants and cola nuts (*Cola* spp) are marketed locally and serve as sources of income. An estimated 98% of Liberia's energy needs are met by fuelwood and charcoal.

Forest carbon. Gibbs et al. (2007) estimated Liberia's national forest biomass carbon stock at 506–707 MtC; Eggleston et al. (2006) estimated

Table 4 Commonly harvested species for industrial hardwood

Species	Notes
<i>Lophira alata</i> (ekki)	Largest quantity harvested; regenerates well in forests.
<i>Ceiba pentandra</i> (ghe)	From open areas; for veneer and plywood.
<i>Hallea ciliata</i> (abura)	General-purpose timber; from swampy areas.
<i>Entandrophragma candollei</i> (kossipo)	Used for flooring and furniture-making; difficult to regenerate.
<i>Gilbertiodendron preussii</i> (limbali)	Used for heavy carpentry and shipbuilding, etc; difficult to regenerate.

Source: ITTO (2006).

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	1310	1310	0	0	0	-	0	0
2010	1700	1000	265**	0	0	9.7	0	0

* As reported in ITTO (2006).

** FAO (2010).

it at 1302 MtC and FAO (2010) at 585 MtC. The large tracts of land that became overgrown by bush and secondary forests during the civil conflicts are not counted in these estimates. Liberia has created a climate-change and REDD working group within the FDA. The FDA submitted a project idea note to the Forest Carbon Partnership Facility in 2008 and a readiness preparation proposal in March 2011. It is collaborating with Conservation International and the World Bank to develop a REDD+ strategy for the country. This is hindered, however, by the country's limited human-resource capacity in policy and research institutions and in civil society. Table 6 summarizes Liberia's forest carbon potential. Liberia has significant intact forest and potential for conserving existing carbon stocks through avoided deforestation.

Forest for protection

Soil and water. No areas have been designated as primarily for soil and water conservation.

Biological diversity. Biologically, Liberia is exceptionally diverse, with high rates of endemism. The country's forests serve as a sanctuary for almost half of the remaining forest in the Upper Guinean Forest Hotspot (one of 34 hotspots worldwide that represent areas with 75% of the planet's most threatened species). Liberia's forests are home to at least 2900 flowering plants, 240 timber species, 150 mammals, 620 birds and 125 reptiles and amphibians. Some of the well-known species, whose conservation depends to some extent on

Liberian habitat, include *Pan troglodytes* (western chimpanzee), *Ptilocolobus badius* (red colobus monkey), *Cercopithecus diana diana* (diana monkey), *Hexaprotodron liberienses* (pygmy hippopotamus) and *Loxodonta africana cyclotis* (forest elephant). Fifteen mammals, ten birds, one reptile, four amphibians, one fish, eight arthropods and three plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). One plant species (*Cyathea camerooniana*, a tree fern) is listed in CITES Appendix II (UNEP-WCMC 2011).

Protective measures in production forests. The Liberian Code of Forest Harvesting Practices prescribes a number of exclusion areas: protected areas; protected animal species habitat; areas susceptible to degradation (such as steep slopes); watercourses; and cultural and customary tenure areas. No trees may be felled within such exclusion areas or their buffer zones, and no machines may access them (except at designated watercourse crossings). The Code prescribes a number of other protective measures in production forests, such as directional felling, wildlife management within concession areas, and waste management.

Extent of protected areas. There are two main protected areas in Liberia: Sapo National Park (180 000 hectares) in the southeast and the East Nimba Strict Nature Reserve (13 600 hectares), which is less than 2% of the country's land area. Fauna and Flora International, other NGOs and the Government of Liberia developed a five-year 'action

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% total forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
506–707	88	++	+	+	+	++	++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

plan' for Sapo National Park in 2005. Although not strictly a management plan, this constitutes the extent of protection PFE under management plans shown in Table 7.

The Government of Liberia through the FDA has identified the Gola National Forest (Gbarpolu County), Wonegizi National Forest (Lofa County) and Lake Piso Basin (Grand Cape Mount and Bomi counties) as areas to be upgraded and incorporated into the national protected forest areas network.^a Consultative meetings with the citizens of Grand Cape Mount and Bomi counties about the creation of Lake Piso Multiple Use Protected Area are under way. Lake Piso, as well as the Mesurado and Marshall wetlands, have been declared as Ramsar sites (Spalding et al. 2010). Initial meetings have been held on the creation of a transboundary peace park that will coordinate the management of the Gola forests on both sides of the border between Liberia and Sierra Leone (Blaser 2008), and the park was launched by the presidents of the two countries in May 2009 (Gasana 2010).

A four-year GEF project titled Consolidation of Liberia's Protected Area Network was launched in May 2008. Managed by the FDA, it will assist with the development of a comprehensive approach to an expanded protected-areas network.

Estimate of the area of forest sustainably managed for protection. No protection PFE is considered to be under SFM (Table 7).

Socioeconomic aspects

Economic aspects. Long in tatters, the Liberian economy has started to grow. GDP grew by 2.6% in 2004 to 5.3% in 2005, 7.8% in 2006 and 9.5% in 2007. Nevertheless, poverty remains widespread: for example, 58% of households headed by professionals fall below the United Nations-designated poverty line of US\$1 per day.^a



The Forestry Training Institute, now the Anthony Sayeh Forestry Training Institute, in Monrovia, Liberia.

The government's poverty reduction strategy (PRS) is predicated on, among other things, exploiting Liberia's rich natural resource base (Government of Liberia undated). It predicted that forestry would be one of the main components of rural economic growth in the PRS period (April 2008–June 2011), contributing 14–15% of real GDP. Forestry production was projected to grow substantially by 2011 to more than 1.3 million m³, but this seems overly optimistic given that by late in 2009 logging had not recommenced. The predicted growth was based on the progressive reintroduction of commercial logging in all regions, and secondary and higher processing of logs was expected to become a significant source of value-adding and jobs from 2009 onwards.

In addition to the formal sector, informal forest-based activities play a vital role in the livelihoods of many Liberian citizens. Fuelwood and charcoal production employ numerous people and remain, by far, the most important energy sources in the country. Similarly, the harvesting and sale of bush meat and NTFPs make a significant contribution to local income and employment while providing a major share of protein in the average diet.

Livelihood values. About one-third of the population lives in forested areas and depends

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I-IV	Allocated for soil and water	Protected areas with management plans	Sustainably managed
2005*	101	101	0	0	0
2010	194	97**	0	180	0

* As reported in ITTO (2006).

** UNEP-WCMC (2010).

on forests for housing and furniture materials, a variety of foods and traditional medicines, healthy watersheds for fish, clean water and soil, micro-climate stabilization and some cash income. Rural communities were particularly dependent on forests for subsistence during the recent civil strife. Thousands of people make their living from the provision of charcoal and fuelwood to urban centres (ITTO 2005). The traditional ‘Sande’ (females) and ‘Poro’ (male) (secret) societies that are of significant importance to rural communities conduct their rituals in certain groves and rivers within isolated forest areas.^a

Social relations. Until recently, local and traditional forest use and ownership rights had not been recognized in Liberia. Under the Johnson Sirleaf government, however, community involvement in forestry has become a major goal. The National Forestry Reform Law specifies the rights and responsibilities of communities with respect to the ownership and use of forest resources, and the Community Rights Law with Respect to Forest Lands further sets out those rights and responsibilities and specifies that forest lands 5001–49 999 hectares in size may be designated as community forest land that communities can use to generate revenue, including by logging. Although its stated objective is to empower local communities to fully engage in the sustainable management of Liberia’s forests, it has been criticized for weakening controls on the allocation and management of logging concessions (Global Witness 2009).

The government conducted intensive forest management outreach over several months prior to the final drafting of the National Forest Reform Law in 2006. The various regulations based on that law require public communication through radio and newsprint media, as well as consultation in affected communities. In practical terms, this means that communities in or around proposed timber concessions or protected areas must be fully consulted in an environmental and social impact assessment (Government of Liberia 2008). A similar process has been used recently to validate draft proposals for an expanded network of protected areas.

Summary

Deforestation appears to have increased in Liberia since the end of the civil conflicts as people return to rural areas. In addition to subsistence farming, a significant cause of forest degradation is chainsaw logging and associated pit-sawing, as well as other forms of uncontrolled logging. The Government of Liberia has adopted a new conceptual approach to the development of the forest sector, referred to as the principles of the three Cs – commercial, conservation and community forestry, and there is a new Community Rights Law with Respect to Forest Lands. Draft guidelines for forest management planning, and a log-tracking system, have been developed. As of July 2009, seven forest management concessions had been formally designated over an area of about 1 million hectares, but logging had yet to commence. Nevertheless, forest production is projected to grow substantially in the next few years as commercial logging is reintroduced.

Key points

- Liberia’s PFE covers an estimated 1.90 million hectares (compared with 1.41 million hectares in 2005), comprising 1.70 million hectares of natural-forest production PFE (compared with 1.31 million hectares in 2005) and 194 000 hectares of protection PFE (compared with 101 000 hectares in 2005).
- None of the PFE is currently considered to be under SFM. The existing protection PFE comprises about 4.5% of the lower estimate of total forest area.
- An embargo on the export of timber imposed by the United Nations Security Council in 2003 was lifted in October 2006.
- Liberia has a new forest policy and a new forest law (the National Forestry Reform Law) and is in the process of developing national-level PCI for SFM.
- Little is known about the potential impacts of climate change on Liberian forests. Liberia has significant intact forest and therefore potential for conserving existing carbon stocks through avoided deforestation.

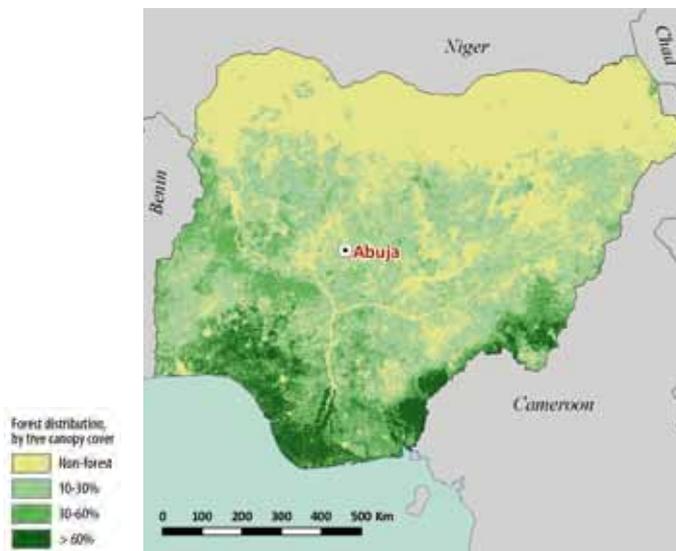
Endnote

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NIGERIA



Forest resources

Nigeria has a land area of 92.4 million hectares. It is Africa's most populous country, with an estimated population in 2010 of 158 million people, up from 141 million in 2005 (United Nations Population Division 2010). Nigeria is ranked 158th out of 182 countries in UNDP's Human Development Index (UNDP 2009). The climate is humid in the south and drier to the north. A large proportion of the country sits on a plateau, which is divided into three parts by the Niger River and its main tributary, the Benue. Mountain ranges, including some peaks above 2000 m, occur along the central and northern borders with Cameroon. There are two major vegetation zones: the forest zone, which occurs in a belt 50–250 km wide adjacent to the Atlantic coast; and a savanna zone to the north, which can be subdivided into the Guinea, Sudan and Sahel zones.

Based on a linear extrapolation of surveys from 1977 and 1994, FAO (2010) estimated forest cover in 2010 at 9.04 million hectares. Only a small part of this forest is lowland rainforest: even in the late 1990s it was estimated that only 1.19 million hectares of lowland rainforest remained in the country, only about 288 000 hectares of which was in official forest reserves.^b

Forest types. Nigeria's forest types comprise open tree savanna, mangrove and coastal forest, fresh water swamp and lowland wet forest. The

latter type (also called 'high forest') is divided into lowland rainforest in the south and mixed deciduous forest to the north. These forest types, although heavily degraded, are the main remaining sources of hardwood timber; there is an estimated 3.94 million hectares of lowland rainforest.^a Meliaceae and Leguminosae species such as *Khaya ivorensis* (Lagos mahogany), *Entandrophragma* spp, *Lovoa trichilioides* (cedar) and *Gosweilerodendron balsamiferum* (agba) are characteristic of the rainforest area, whereas Sterculiaceae, Ulmaceae and Moraceae species such as *Nesogordonia papaverifera* (otutu), *Triplochiton scleroxylon* (obeche), *Celtis* spp and *Chlorophora excelsa* (iroko) characterize semi-deciduous forests. The transitional area on the northern fringes of the forest zone has been heavily degraded by human activity and is now characterized by fire-tolerant savanna species such as *Parkia* spp, *Daniellia oliveri*, *Azzeria africana*, *Ceiba pentrandra* and *Butyrospermum paradoxum* (shea butter tree), some of which yield valuable products. Riparian (gallery) forests are the only closed forest in the savanna zone, characterized by species such as *Mitragyna ciliate*, *Lophira lancolata*, *Terminalia glaucescens* and *Uapaca* spp.

Nigeria has the largest extent of mangroves in Africa, with more than 730 000 hectares (Spalding et al. 2010). The largest areas are around the Niger delta, where they are found up to 40 km inland. The Niger delta constitutes one of the world's largest contiguous blocks of mangrove forest (ibid.).

Some of Nigeria's forests are so heavily degraded that secondary forest succession is impeded. *Elaeis guineensis* (oil palm) regenerates naturally in many degraded areas of the high-forest zone. Important secondary forest species in degraded forest and in unmanaged rubber and *Gmelina* plantations are *Trema guineensis*, *Pentaclethra macrophylla*, *Musanga cecropioides* and *Anthocleista* spp (ITTO 2006).

Permanent forest estate. In the 1960s the government set aside an area of 9.7 million hectares, about 10% of the country, as forest reserves. These were distributed over 445 sites, 75% of which were in the savanna and 25% of which were in the high forest. The total area available for harvesting in forest reserves in the seven 'productive' states (Cross River, Edo, Ekiti, Ogun, Ondo, Osun

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	9.7–13.5	4456	2720	375	1010	4105
2010	9.04	958**	2720[‡]	382[†]	2540[§]	5622

* As reported in ITTO (2006).

** Calculated using the ratio of forest with greater than 60% forest cover estimated by UNEP-WCMC (2010) (10.6%) and the total natural forest area as estimated by FAO (2010).

‡ Updated information was unavailable. Therefore, the estimate of ITTO (2006) is used here.

† FAO (2010).

§ UNEP-WCMC (2010).

and Oyo) is 3.92 million hectares^a; it is unclear, however, how much forest remains in these areas. More than 60% of the initial forest reserve area had been lost by 2000 due to agricultural encroachment, illegal logging, planned agricultural development and urbanization. No new data on the production PFE was available for this report. The estimate of protection PFE in Table 1 is taken from UNEP-WCMC (2010), which is similar to the estimate by FAO (2010). It indicates an increase since 2005 (which was based on an estimate by UNEP-WCMC in 2004), but this is most likely due to differences in assessment method rather than a real increase.

Forest ecosystem health

Deforestation and forest degradation. While it is apparent that Nigeria's forests have been declining in both extent and condition, no reliable data are available on the extent of forest loss or degradation. The change in forest area reported by FAO (2010) was calculated using a linear extrapolation of data from 1977 and 1994. By this method it was determined that the forest area declined from 13.1 million hectares in 2000 to 11.1 million hectares in 2005 and to 9.04 million hectares in 2010. On the basis of the data presented in FAO (2010), Nigeria lost 21% of its forest cover between 1990 and

2005, compared with the world average for that period of 3.3%.

FAO (2010) also reported that the area of primary forest declined from 326 000 hectares in 2005 to zero in 2010 (Table 2). There are likely to be small areas of intact forest, however. For example, owing to its rugged terrain, most of the Afi forest reserve (about 8500 hectares) in Cross River State is still primary forest.^a The main direct causes of deforestation and forest degradation are oil and gas exploitation in the coastal forests and shifting cultivation, fuelwood-gathering, charcoal-making, illegal logging and urbanization.

Vulnerability of forests to climate change.

The mean annual temperature in Nigeria has increased by about 0.2 °C over the past three decades (McSweeney et al. undated). Mean annual rainfall has decreased since the early 1960s, but it is difficult to determine whether this is part of a long-term trend. It is projected that the annual temperature will increase by 0.9–2.5 °C by the 2060s (ibid.), with warming most rapid in the northern, drier part of the country (Federal Ministry of Environment 2003). Since the forest area has been reduced dramatically in the past 50 years and most of the remaining forests are degraded, the ecosystem services performed by forests are greatly diminished.

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	0	0	0
Area of degraded primary forest	-	-	-
Area of secondary forest	-	-	8660*
Area of degraded forest land	-	-	-

* 'Naturally regenerated forest'.

Source: FAO (2010).

Nigeria's climate-change strategy includes a focus on forests and trees as an effective adaptation measure (Government of Nigeria 2010a). Forest-related actions include avoiding unregulated forest exploitation; the implementation of a national afforestation program using appropriate tree species to protect watersheds; and the development of agroforestry and organic farming as a means to help people to adapt to changing climatic conditions. The Ministry of Environment identified the biggest obstacles to climate-change adaptation as a lack of awareness and knowledge about the impacts of climate change.

SFM policy framework

Forest tenure. Forests are state-owned (Table 3). Forest reserves, which cover around three-quarters of the forest area, are held in trust for the people. Their management and control is vested in state governments, although dual ownership of natural forests by local and state governments still exists in the northern states. Thus, local governments are responsible for communal forest areas, state governments are in control of forest reserves, game reserves and sanctuaries, and national parks are under the control of the federal government.^a

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE
	'000 ha	
State ownership (national, state or provincial government)	9040	5622
Other public entities (e.g. municipalities, villages)	0	0
Total public	9040	5622
Owned by local communities and/or Indigenous groups	0	0
Privately owned by individuals, firms, other corporate	0	0

Source: Based on the estimate of total forest cover and total PFE shown in Table 1.

Individuals or private organizations may occupy land on leases (usually 99 years), but only that which the occupier puts on the land belongs to the occupier. The government may withdraw authority to occupy land at any time, with appropriate compensation paid (FAO 2010). Tree tenure rights in communal areas are ascribed to the person who planted the tree or the person who uses the land on which the tree lies.^b

A total of 16 states (Abia, Akwa Ibom, Anambra, Cross River, Delta, Edo, Enugu, Ebonyi, Imo, Lagos, Ogun, Ondo, Ekiti, Osun, River and Bayelsa) contain high forests and have special forest laws to administer their tenure (ITTO 2006).

Criteria and indicators. Nigeria is a member of the ATO and, since 2001, of ITTO. The C&I frameworks of these two organizations are therefore available for uptake in Nigeria. With the support of the ATO/ITTO regional project, the Government of Nigeria finalized, in May 2010, the development of a national version of the ATO/ITTO PCI for the sustainable management of the country's natural forests, and conducted training in their use. The Government of Nigeria used the ITTO C&I in its submission to ITTO for this report.^a

Forest policy and legislation. Nigeria has had forestry and natural-resource conservation laws since the first half of the 20th century. The first Forestry Act was enacted in 1937, which established a forest reserve system under the state governments. A more comprehensive forest law was enacted in 1956 – the Law for the Preservation and Control of Forests in Eastern Nigeria. This gives the designated minister responsibility for the protection, control and management of forest reserves and protected areas and the power to de-reserve forests (i.e. re-classify them for other uses). Some states have enacted specific regulations to monitor and control the reserves, but the apparent high rate of deforestation suggests that overall control has not been effective.

Nigeria's national agricultural policy, adopted in 1988, set forth a national policy on forest management and the sustainable use of forest resources. The goal was to achieve self-sufficiency in all aspects of forest production. Major goals included the expansion of the forest estate and its management for sustained yield, the promotion of forest regeneration at rates higher than harvesting, the protection of forest resources from fire and grazing, and the development of forest industry. To achieve these objectives, it aimed to expand the forest estate from 10% to 20%. Nevertheless, de-reservation and deforestation expanded over the life of the policy (ITTO 2006).

A 2002 participatory review of the 1988 policy led to the approval (in 2006) of a new national forest policy, the first to stand alone and not be subsumed within the policy of another sector. A forest law that

has been in preparation for several years to provide legal backing to the new policy is yet to be passed, however (in August 2010 it was before the Federal Ministry of Justice before going to the National Assembly for approval).^a The policy review took into account changes in the present state of the forest sector in Nigeria and also addressed emergent global issues. The overall objective of the new policy is “to achieve sustainable forest management that would ensure sustainable increase in economic, social and environmental benefits from forests and trees for the present and future generation including the poor and vulnerable groups”.^a

An analysis of the new policy^b showed that it has some major points of departure from the old policy that could strengthen sustainable forest use and environmental protection. Unlike the old policy, the new policy focuses on creating the necessary environment to ensure the longer-term sustainability of forest resources. For example, it mandates the preparation and implementation of scientific forest management plans; stresses the importance of developing community-based forest protection and management; and urges the federal and state governments to increase revenue by valuing forest products at their true market value and tightening the control of harvest operations. It recommends special funding arrangements to support research and development and the expansion of the forest estate.

A comprehensive national land-use policy is under development. Among other things it contains an action plan for forestry and wildlife habitat development.

The four-year (2000–03) National Forestry Development Programme, which aimed to establish forest plantations through community participation, was approved for implementation by the National Executive Council. Due to the unavailability of funds, however, implementation was stalled and the program was extended to the next four years (2003–07). The extent to which it was implemented in that period is unclear.

Programs dealing with environmental management have been in constant flux, with negative consequences. For example, the federal Ministry of Environment (2001) stated that efforts to combat desertification “have been adversely affected by frequent shifts in policy by government. Such

policy shifts have been observed to be dictated by the country’s economic fortune or misfortune”.

Institutions involved in forests. The forest sector is administered at the federal, state and local government levels. Responsibilities, authority and resources are shared among these levels according to the 1999 Constitution, which gives control over the development of natural resources to local governments and the states. However, there is a lack of clarity in the respective mandates of the responsible bodies (there are 36 state forest departments and 774 local councils), which leads to inefficiencies.

The Federal Department of Forestry (FDF), created in 1970, is currently under the Ministry of Environment; it has no authority over forest management and is mainly responsible for international treaties and for providing policy guidelines to state forest authorities. The National Forestry Development Committee is responsible for formulating national forest policy and technical forest management guidelines. In order to facilitate field operations the FDF fosters forest and environmental development through six divisions: Forestry Management; Forest Resource Survey; Forest Resources Utilization; Agroforestry; Support Services and Extension; and Environmental Conservation. The Forestry Research Institute of Nigeria has a mandate for research and education on forestry and the use of forest products.

The University of Ibadan, the University of Agriculture and the Federal University of Technology, Akure provide training for forestry professionals.^a In 2008, 180 students (12% of them women) graduated with forest-related masters degrees, 400 students (12% women) graduated with forest-related bachelor degrees, and 560 students (12% women) graduated with forest technician certificates or diplomas (FAO 2010).

Forest-sector development has been hindered by a lack of funds and frequent policy changes, despite (or perhaps partly because of) the extensive bureaucracy involved in overseeing the sector (ITTO 2006).

Direct investment and reinvestment in forest management, administration, research and human resource development in 2009 by the federal government, sub-national governments, private sources and international governmental

sources were estimated at US\$19.2 million, US\$9.24 million, US\$800 000 and US\$650 000, respectively.^a In 2008 an estimated 13 100 people were employed in public forest institutions, including at the state level, 5320 of whom had university degrees or equivalent and 9% of whom were women (FAO 2010). An estimated 180 professional staff and 250 technical staff are employed in forestry in the federal government.^a

Several NGOs provide inputs to the management of forest resources. Notable among these are the Nigerian Conservation Foundation, the Nigerian Environmental Study and Action Team, Savannah Conservation Nigeria, the Forestry Association of Nigeria and local initiatives such as the Ekuri Initiative in Cross River state.

Status of forest management

Forest for production

According to FAO (2010), the available information on Nigeria's forests "is either obsolete or based on extrapolation from very old data. Nigeria falls short of the basic standard of acquiring regular and up to date data on the forest resources".

While many forest reserves were intensively managed in the past for timber production, a significant number has also been almost completely deforested while retaining the designation, leading to the apparent contradiction of non-forested forest reserves (ITTO 2006).

There are generally three types of logging operation in Nigeria:

- Small-scale operations that use chainsaw mills (accounting for more than half of the log volume taken from forests). Fees for this type of logging are usually assessed on a stumpage basis.
- Medium-sized operations that are usually an integral part of a medium-to-large industrial organization. This type of logging is usually organized by concessionaires and annual production generally amounts to 10 000–20 000 m³ per operation.
- Larger operations, also conducted by concessionaires, generally producing about 60 000 m³ per year.^b

According to Sanwo (2005), 70% of the total timber extracted in high-forest states in Nigeria

is stolen, with no records kept. The state forest departments have been unable to adequately protect the forest estate from encroachment.

The state allocation of timber resources has, since the 1970s, systematically moved away from long-term tenures to short-term (1–3 year) concessions. This prompted an exodus of large and sometimes foreign-owned concessionaires and now concessions are largely in the hands of small concessionaires. In off-reserve areas, communities have rights to trees and negotiate freely with timber operators for the sale of trees. Forest planning is minimal. Timber resources are generally allocated by discretion. In some states (e.g. Ondo and Edo), a committee screens applicants and forwards a list of registered concessionaires who meet statutory requirements to the commissioner for his final decision. In Ogun State, the allocation is administered directly by the commissioner. These allocations are not based on sound technical considerations but rather on political patronage.^b

An exception to how the state forest services are organized is in Cross River state, which is the only state to have established a forestry commission instead of a department within the ministries of agriculture or environment. The Cross River Forestry Commission is headed by a board comprising representatives of various stakeholders. Its most important difference compared to forest departments is its (semi-) financial autonomy. Due to a revision of state laws, the Forestry Commission is able to directly access part of the revenue generated from forests with which to manage its programs.^b

Silviculture and species selection. Initially, the forest resources in the high-forest zone were managed for timber production on a felling cycle of 100 years, with a specified minimum diameter limit for various species of 60–90 cm (FDF 1996). Forests in the southern and south-central regions were sub-divided into numbered mile-square compartments managed on the basis of working plans prepared by the FDF. In response to harvesting pressures, the felling cycle for natural forests was reduced to 50 years and has since been further lowered. Natural regeneration of the harvested forests was stimulated by the Tropical Shelterwood System (TSS). By the mid 1960s, 200 000 hectares in the western region of Nigeria was managed under the TSS. Owing to the low

Table 4 Commonly harvested species for industrial roundwood

Species	Notes
<i>Mansonia altissima</i> (ofun)	From southern deciduous forests.
<i>Tectona grandis</i> (teak)	Plantation timber.
<i>Terminalia superba</i> (afara)	Rare as large trees but regenerating in secondary forests.
<i>Entandrophragma candollei</i> (omu)	From natural forests, increasingly rare.
<i>Triplochiton scleroxylon</i> (obeche)	Timber from natural forests and agroforestry plantations.

Source: ITTO (2006).

growth rates of the natural forest, the TSS was abandoned in the early 1970s in favour of artificial regeneration under the *taungya* system. The early *taungya* plantations led to subsequent major plantation schemes in the high-forest zone (ITTO 2006).

More than 300 tree species have been identified as possible timber species; about 40 were reportedly being harvested on a significant scale in 2005 (ITTO 2006). In addition to the five species listed in Table 4 and *Gmelina arborea* from planted forests, *Entandrophragma cylindricum* (sapele), *Gossweilerodendron balsamiferum* (agba), *Chlorophora excelsa* (iroko), *Terminalia ivorensis* (edo), *Brachystegia* spp and *Lophira alata* (ekki) are common species harvested for timber (ITTO 2006), although recent information was unavailable for this report.

Planted forest and trees outside the forest. The estimated planted forest area of 382 000 hectares in 2010 (FAO 2010) was thought to comprise at least 168 000 hectares of *Gmelina arborea* and teak. Other planted hardwood species include *Terminalia ivorensis*, *Nauclea diderrichii*, *Triplochiton scleroxylon*, acacias and eucalypts, and about 10 000 hectares of various pines (Okonofua 2005). However, the estimate by FAO (2010) is based on a linear extrapolation of past establishment rates.

Many of the planted forest areas are being harvested today, but few of them are adequately managed for long-term production (ITTO 2006).

The Presidential Initiative on Afforestation for Economic and Environmental Sustainability was launched in 2008 with a focus on promoting indigenous forest species and an overall target of expanding national forest cover by 25% in ten years. To finance afforestation the government recently directed that 60% of the Ecological Fund¹

should be used for the massive afforestation of the country as a sign of a firm commitment to the attainment of sustainable forest development in Nigeria. Towards this end, the first tranche of 5 billion naira has been released to the Ecological Fund Office for the first phase of the program for upgrading forest nurseries and raising 1 million tree seedlings in each of Nigeria's 37 states for planting in the 2011 planting season.³ In addition, about 400 hectares of new plantations have been established in degraded forest reserves in ten states in the last two years.^a

Forest certification. No Nigerian forest has so far been certified (e.g. FSC 2010), and no certification initiative in the country has been reported.

Estimate of the area of forest sustainably managed for production. The Government of Nigeria (2010) reported that 3.45 million hectares of production forest were under management plans (an area significantly greater than the total production PFE), on the basis of reports from state forestry departments, but the status of these management plans is unclear, and no data for this parameter are shown in Table 5. A lack of detailed information makes it difficult to estimate the area of forest under active management and to assess the quality of that management. The only area of forest for which available information suggests a sustainable regime is the Ekuri community forest in Cross River state.

Timber production and trade. The total fuelwood production in 2005 was estimated at 70.4 million m³ (FAO 2010). Nigeria's total production of industrial roundwood was estimated at 7.10 million m³ in 2009, although this figure is repeated from previous years and its accuracy is unclear (ITTO 2011). On the other hand, the Government of Nigeria (2010) reported an average annual sawnwood harvest of 7.52 million m³ in the PFE and 1.98 million m³ in other forest. An estimated 2.0 million m³ of sawnwood, 56 000 m³ of

¹ The Ecological Fund was established in 1981 by the Government of Nigeria to address the serious ecological problems facing the nation.

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	2720	1060	650	0	-	375	175	0
2010	2720	1060**	- †	0	33†	382	-	0

* As reported in ITTO (2006).

** As reported in ITTO (2006). No new data were available for the present report.

† Government of Nigeria (2010) reported that 3.45 million hectares were under management plans, but the extent to which these are operational is unclear.

‡ The Ekuri community forest in Cross River state.

plywood and 1000 m³ of veneer were produced, and about 64 000 m³ of logs and 163 000 m³ of sawnwood were exported (ibid.).

The Nigerian industrial forest sector comprises about 2000 sawmills of various sizes, ten plywood mills, two functional paper mills, eight safety-match factories and four particleboard mills. The sector is producing at 30–40% of installed capacity. The rate of recovery in the sawmilling sector is lower than 40%, partly because of the use of obsolete machines designed for the conversion of large-diameter logs. Most sawmill owners are unable to replace their machines with more modern equipment suited to the changing nature of the resource. The forest fees and tariffs levied on standing timber or cut logs are very low. Combined with a protectionist policy (i.e. a log export ban), this reduces timber prices and so contributes to inefficiency and waste in the logging and industrial processes – they may be profitable while being totally inefficient.^b

In 2009 the total value of exports of primary industrial wood products was US\$28.2 million (up from US\$22.8 million in 2004 but down from US\$53.9 million in 2002) and the total value of imports was US\$11.4 million (up from US\$800 000 in 2004 and US\$1.76 million in 2002) (ITTO 2011).

Non-timber forest products. Marketed NTFPs include *Acacia senegal* (gum arabic), rattan and fibres such as *Raphia* spp, *Garcinia afzelii* (chewsticks), and sheabutter from nuts of *Vitellaria paradoxa* (syn. *Butyrospermum parkii*). Many NTFPs are locally traded and consumed by rural communities, including leaves (eg *Abura* spp), fruit, bark, nuts, honey, mushrooms, resins, canes and medicinal plants such as *Garcinia* spp. Bush meat is perhaps the most important NTFP, providing a source of protein for rural people in isolated

high-forest areas and in the savanna zone. Plants that provide edible products are *Irvingia gabonensis*; *Spondias mombin* and *Dacryodes edulis*; *Gnetum africanum* leaves as vegetables; the seeds of *Parkia biglobosa* (dawa-dawa); and the nuts of *Cola* spp. Fruits of oil palm and *Raphia* spp are used widely for palm wine. No national data are available on the volume or value of the harvest of any of these products.

As forests become increasingly degraded, competition for NTFPs becomes fiercer and market failures and the absence of clear property rights result in the non-management of those resources (FAO 2001). Ecological services provided by the forest include protection from erosion, floods and desertification, the regulation of stream flow, wildlife habitat, the protection of biodiversity, carbon sequestration, and microclimatic benefits, among others. These ecological services have not been evaluated and are rarely considered in policy decisions.^b

Forest carbon. Gibbs et al (2007) estimated the national-level forest biomass carbon stock at 1278–1805 MtC, Eggleston et al. (2006) estimated it at 3952 MtC and FAO (2010) estimated it at 1085 MtC. Due to past deforestation, Nigeria has relatively limited potential for avoiding deforestation. On the other hand it has considerable potential to sequester carbon through forest restoration (Table 6). In 2010 Nigeria established the Nigerian Climate Change Commission within the federal Ministry for the Environment. The Commission will address issues related to environmental pollution, erosion, deforestation, desertification and climate change and has prepared a national climate-change policy and legislation. REDD+ is a key concern in Nigeria's climate-change negotiation strategy at the UNFCCC. In mid 2010 Nigeria was granted observer status

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
1278–1805	11	++	+++	+	+	++	++

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

at UN-REDD. The Nigeria REDD+ readiness program was submitted to the UN-REDD Policy Board in March 2011. It focuses on Cross River State, which contains about 50% of the remaining rainforests in Nigeria and is rich in biodiversity.

Forest for protection

Soil and water. An estimated 57 300 hectares of forest are managed primarily for the protection of soil and water.^a No further information on measures to conserve soil and water was available for this report.

Biological diversity. Twenty mammals, seven birds, twelve amphibians, one reptile, ten arthropods and 68 plants found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). Two plant species are listed in CITES Appendix I and 25 in Appendix II (UNEP-WCMC 2011).

Protective measures in production forests.

The principal constraints on conservation in the production PFE are poaching, over-harvesting, illegal burning, grazing and deforestation. Few protective measures are undertaken in forest reserves (ITTO 2006).

Extent of protected areas. The federal government controls Nigeria's eight national parks through the National Parks Service. Nature conservation laws include the Wild Animals Preservation Act (1916) consequently modified and adopted by the states), the Endangered Species Decree (1985) and the Land Use Act (1976). According to UNEP-WCMC (2010), 2.54 million hectares of forest are in IUCN protected area categories I–IV; while this is likely an over-estimate, in the absence of other data it is used in this report to represent the area of the protection PFE.

The first national park, Kainji Lake, was established in 1973; the Chad Basin, Cross River, Gashaka-Gumti, Old Oyo and Yankari national parks in

1993; and the Kamuku and Okomu national parks in 1999. Five of these national parks are located close to borders with neighbouring countries, suggesting potential for transboundary conservation. The Cross River National Park, for example, borders Cameroon's Korup National Park. A transboundary conservation initiative in the region could help to address illegal logging, and unsustainable hunting and NTFP extraction, all of which are prevalent in the area (Eniang et al. 2010). A successful challenge by the Government of Cameroon in the International Court over the location of the border has also led to the unauthorized shifting of boundary markers by local people (ibid.).

Some national parks have been degraded by logging, grazing, burning and the hunting and smuggling of primates, all of which are illegal within park boundaries.

The NGO Pro-Natura International (Nigeria) recently announced a project in collaboration with the Nigerian Conservation Foundation and several donors in the Omo-Oluwa-Shasha Forest in southwestern Nigeria with the aim of protecting the forest from further degradation. Project activities include capacity-building, an investigation into alternative livelihood approaches, and the development of a REDD+ initiative (Pro-Natura International 2011).

Estimate of the area of forest sustainably managed for protection. Given the lack of clear information on what is happening in the field, the generally widespread problems of degradation, illegal logging, poaching and encroachment, and the lack of data on management plans and their implementation, no area of protection PFE is considered to be under SFM (Table 7).



A forest-dependent family near Abeokuta, Nigeria.

Socioeconomic aspects

Economic aspects. Although forests are important for domestic energy, food and medical supplies, these are not fully reflected in formal national accounts. Officially, the forest sector contributed 2.5% to Nigeria's GDP in 2008 and 3% (US\$692 million) in 2009.^a

A major problem facing Nigerian forestry is inadequate funding. In 1993 the federal government urged state governments to pay 10% of forestry revenues into a trust fund for forest management, but only a few state governments have implemented this proposal. The setting and collection of forest revenues is at the discretion of state governments and sometimes local communities, so there are large variations, by region, in the fees charged (ITTO 2006).

Livelihood values. Forest products, particularly NTFPs, support the subsistence of local communities: an estimated 48 million people depend significantly on forest resources for their livelihoods. Sustainable rural-based programs to stabilize ecosystems and diversify products in order to meet the continuing needs and livelihoods of forest-dependent communities are being carried out in some states as pilot projects, although no information on these is available.^a

Social relations. The sharing of benefits from forest activities between state governments and local communities varies from state to state. State governments are supposed to share a percentage of any revenues collected from forest activities outside forest reserves (on average 25–40% of revenues in the savanna and 30–35% in the closed forest) with local communities, but this is often

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I–IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	1010	1010	-	-	-
2010	2540	2536**	-	-	-

* As reported in ITTO (2006).

** UNEP-WCMC (2010).

not done in practice (ITTO 2006). Nevertheless, in many FMUs communities have used royalty payments to develop, renovate and upgrade basic local infrastructure such as schools, health centres, roads and markets, and also to provide training on alternative livelihood options such as bee-keeping, snail-rearing, livestock, tree-crop nursery raising, and improved crop husbandry for cash crops such as cocoa and oil palm.^a

The continuing decline and degradation of forest resources in Nigeria suggest that the relationship between local communities and forest administrations is not conducive to forest conservation and SFM in most of the high-forest states of Nigeria (ITTO 2006). Community-based forest management is pursued in only one state, Cross River.^a

Summary

One of the obstacles to SFM identified in 2005 was the lack of reliable forest data. There appears to have been little improvement in this regard since then; even estimates of forest cover are derived using deforestation rates that are up to two decades old. It is unclear how much forest remains in what was set aside in the 1960s by government as forest reserves. A new forest policy with several positive features was approved in 2006, but the law to implement the policy is yet to be passed. Despite the apparently poor and worsening state of Nigeria's forests, an estimated 48 million people depend significantly on them for their livelihoods. Chainsaw milling accounts for more than half the log volume harvested. Illegal logging is reportedly high. State forest administrations are generally severely under-resourced, although the Cross River Forestry Commission has direct access to part of the revenue generated from forests with which to finance its programs. Since 2008 a national afforestation program has been under way with an ambitious target for expanding national forest cover. Nigeria has a relatively limited potential for avoiding deforestation. On the other hand it has considerable potential to sequester carbon through afforestation and forest restoration.

Key points

- Nigeria has an estimated PFE of 5.62 million hectares (compared with 4.10 million hectares in 2005), comprising 2.72 million hectares of

natural production forest (the same as estimated for 2005), 2.54 million hectares of protection forest (compared with 1.01 million hectares in 2005), and 382 000 hectares of planted forest (compared with 375 000 hectares in 2005).

- Data are generally weak. Increases in estimates of the PFE are most likely due to differences in assessment method rather than real increases. A forest reserve system to be managed by state governments was created in 1937, but the extent to which forest reserves are still forested is unclear.
- An estimated 33 000 hectares of the production PFE is under SFM. No forest is certified, and no part of the protection PFE is under SFM.
- A new national forest policy was approved in 2006. The Presidential Initiative on Afforestation was launched in 2008, and funds were made available to encourage afforestation.
- The wood-processing industry is characterized by outdated technology, poor recovery and inefficiency.
- There is a lack of awareness in Nigeria about the potential impacts of climate change, including with respect to forests. Nigeria has considerable potential for carbon capture and storage through forest restoration and afforestation, if forest governance can be improved.

Endnotes

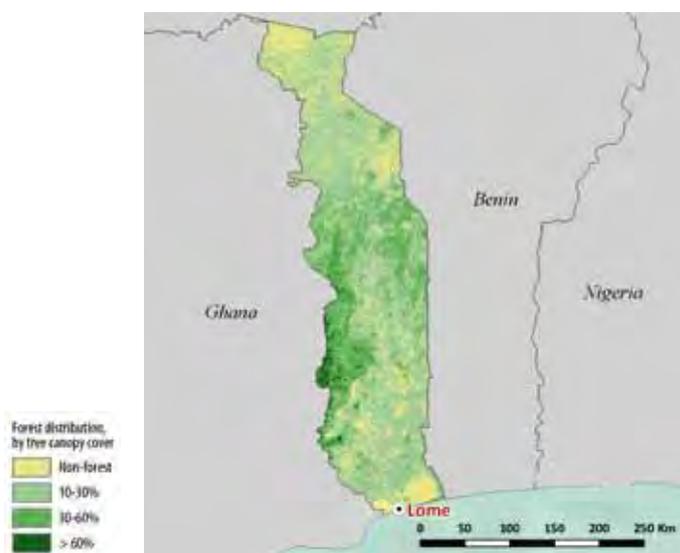
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TOGO



Forest resources

Togo lies north of the Gulf of Guinea in West Africa. It has a land area of 5.68 million hectares and an estimated population in 2010 of 6.8 million people (United Nations Population Division 2010). Togo is ranked 159rd out of 182 countries in UNDP's Human Development Index (UNDP 2009). The country is characterized by a narrow east–west extension of between 50 and 150 km and a longer length from north to south of about 600 km. There is an extensive inland plateau, rising from 60 m to 450 m in altitude towards the north and the Atakorian Mountains in the west. The highest peak (Mount Agou) reaches an altitude of 986 m. There is little forest in Togo. FAO (2010a) estimated the forest area at 486 000 hectares in 2000 and 386 000 hectares in 2005 and extrapolated the forest area to 287 000 hectares in 2010. The Government of Togo estimated the extent of open forests and planted forests at 511 000 hectares in 2009^a; in addition there are about 1.18 million hectares classified as bush and tree savanna.^a Togo also has an estimated 11 000 hectares of mangroves.

Forest types. Originally only about 17% of Togo was forested.^a The country has lost nearly 50% of its forests since 1990, mainly to subsistence agriculture. Apart from fragments of closed semi-deciduous forests and degraded semi-deciduous forests in the southwest (which

cover less than 120 000 hectares), there are only a few small islands of dry forests (*forêts denses sèches*) in southern and central Togo (less than 30 000 hectares) and gallery forests along watercourses.^a The majority of the forest is in a forest–savanna mosaic (about 320 000 hectares), which extends from the Guinean vegetation zone into the Sudanian vegetation zone. On the plateau, dense savanna forests are characterized by *Ceiba pentandra*, *Daniellia oliveri* and *Butyrospermum paradoxum*. Further north, *Khaya senegalensis* and *Prosopis africana* predominate, along with the palm *Borassus aethiopum*. There are stands of semi-deciduous closed forest in the mountains (about 40 000 hectares), with *Antiaris africana* and *Chlorophora excelsa* among the most typical species. Togo has only about 50 km of coastline, which is mostly sandy with some lagoonal waters where mangroves are rare. In total, Togo has less than 1000 hectares of mangroves, which occur in small patches near the border with Benin (Spalding et al. 2010).

Permanent forest estate. No distinction is made in Togo between production PFE and protection PFE; harvesting is undertaken in all areas, even in officially protected areas (ITTO 2008). Togo's PFE consists of 83 forest areas, including 71 classified forests (*forêts classées*, estimated at 217 000 hectares), two national parks (357 000 hectares) and ten wildlife reserves (218 000 hectares). Of the total theoretical PFE of 792 000 hectares, large areas are either very open forests or deforested. About one-third of the PFE is estimated to be completely without forest cover and the remaining area consists of heavily degraded and secondary forests and human-induced savanna dominated by *Ceiba pentandra*.^a UNEP-WCMC (2010) estimated the forested protected area (with 30% and more crown cover) at 368 000 hectares; this estimate is used in Table 1.

Forest ecosystem health

Deforestation and forest degradation. Because of its small forest area and the continuing pressures on it, Togo has one of the world's highest rates of deforestation, losing an estimated 5.75% (20 000 hectares) of its forest estate per year (FAO 2010b).

Table 1 Permanent forest estate

Reporting year	Estimated total forest area, range (million ha)	Total closed natural forest ('000 ha)	PFE ('000 hectares)			
			Production		Protection	Total
			Natural	Planted		
2005*	0.5-1.09	368	41	14	313	368
2010	0.5-1.68**	287	0	15†	368	383

* As reported in ITTO (2006).

** The higher figure includes an estimated area of 1.179 million hectares of bush and tree savanna.

† FAO (2010a). In addition to state-owned plantations there are an estimated 21 000 hectares of privately owned plantations, which are not considered to be part of the PFE (ITTO 2008).

Most of the deforestation appears to be occurring in wetter areas, where forests are important for watershed protection. The major threats to the scarce remaining dense forests include uncontrolled fire (the main cause of deforestation in non-PFE forest), excessive fuelwood harvesting, shifting cultivation, and illegal cutting of the few remaining commercial tree species. In addition, in the past 35 years the frontier of cotton plantations (in particular in the southern zone around the forest of Abdoulaye and in the western Tchilla-Monota forest area) has advanced at the expense of forest. There is no primary forest left in Togo (Table 2). More than one-third of the forest in forest reserves has been converted to agricultural uses.

Vulnerability of forests to climate change.

Togo's climate varies from humid tropical to tropical savanna. Togo finalized its NAPA in September 2009, according to which climate change is projected to increase average monthly temperatures by 1–1.25 °C on a south–north gradient. These warmer temperatures are projected to be accompanied by a drying trend, which would have a major impact on various economic sectors. The main climate-related risks identified in Togo are flooding, drought, altered distribution of rain, late rains, violent winds and coastal erosion. Across the country, climate change could increase the incidence of drought, wildfire and flooding. The most vulnerable ecosystems are coastal ecosystems, agricultural ecosystems and some of the remaining

natural forest areas (Government of Togo 2009a). Uncontrolled forest fires already occur regularly in the latter stages of the dry seasons and cause additional damage to degraded forest areas.

SFM policy framework

Forest tenure. According to the 2008 Forest Code, there are three types of forest tenure: the public forest domain (*domaine forestier de l'Etat*), which includes forest reserves; the collective forest domain (*domaine forestier des collectivités territoriales*) and private forest (*domaine forestier des particuliers*) (Table 3). Closed forests and dense tree savanna are generally part of the public forest domain. In all forest reserves, user rights exist for local communities (as per the colonial forest code of 1938, articles 12–18, and reconfirmed by the 2008 Forest Code).

The new collective forest domain comprises those forest lands that have been legally classified as such. Communes, prefectures and regions have territorial authorities (*collectivités territoriales*), which have legal status and financial independence under Law 98/006 (amended in 2001). They have responsibilities in the management of state lands and on environmental issues. Communes and prefectures generally have a keen interest in the management of forest reserves.

Villages adjacent to forest reserves generally have a village development committee (*comité villageois*

Table 2 Forest condition

	PFE	Non-PFE	Total
	'000 ha		
Area of primary forest	0	0	0
Area of secondary forest and degraded primary forest	287	-	287
Area of degraded forest land*	- *	407**	407

* Most of the former forest land has been converted to agriculture and is now considered as such.^a

** Degraded since 1990 (derived from FAO 2010a); most of this land is now productive agricultural land.

Source: Government of Togo (2010).

de développement – CVD), which attempts to ensure that local interests are accommodated in the use of forest reserves and is responsible for the management of committed forests. Outside the reserves, all trees and plantations belong to local communities and private citizens, with little control from the state (ITTO 2006). Such off-reserve forests provide most of the forest products sold locally.^a

Criteria and indicators. Togo participated in the C&I processes of ITTO, Dry-zone Africa and ATO/ITTO, but no adequate C&I framework for SFM has yet been developed for local conditions. No strategic plan or actions are foreseen beyond securing forest reserves from further conversion and encroachment. The Government of Togo used the ITTO C&I in its submission to ITTO for this report^a, and a national validation meeting of the C&I report was convened in March 2010.

Forest policy and legislation. Until 2008, forest use was regulated by the 1938 forest code and the 1988 environmental code. A new forest code was approved by parliament in June 2008 (Law 2008/009), as was a new law on the environment (Law 2008/005). The 2008 Forest Code addresses issues of participation, SFM, ecological security and the role of the forest industry in the framework of sustainable development. It specifies the definition of the national forest domain; rules for classifying and declassifying forests and for forest management planning; and the institutionalization of local management through the creation of CVDs.^a Although CVDs have been assigned management authority over forests, overall responsibility for natural resource management has mostly remained with the central Ministry for Environment and Natural Resources (*Ministère de l'Environnement et des Ressources Forestières* – MERF).

The national environmental policy of 1998, completed in 2001 as the National Environmental Action Plan (*Plan National d'Action pour l'Environnement* – PNAE), is the most important policy framework for forests. A project to develop a specific forest policy, initiated in 2000, was never concluded. In December 2009, the Declaration of a National Forest Policy was submitted to the government for approval. This declaration canvasses a participatory approach to forest management and greater decentralized responsibility in managing forests; the division of tasks between local stakeholders and the state; the principles of sustainably managing forest resources; the valorisation of biodiversity; the recognition of the role of forests in climate change; and the organization of the forest sector. The new forest policy was to be prepared through a consultative approach in 2010. In December 2009 the Government of Togo approved a declaration on a national policy for land-use management (*Politique Nationale d'Aménagement du Territoire*) that encompasses environmental management, rural economic development and social integration. The forest policy will need to be consistent with this recently initiated policy process.

Institutions involved in forests. MERF was reorganized in 2008 (under Decree 2008/090PR) to create a central service and decentralized units, coordinated by a Secretary General.^a The central service comprises three general directorates: Environment; Forest Resources; and Common Programmes. The Office for Forest Development and Harvesting (*Office de Développement et d'Exploitation des Forêts* – ODEF), which was attached to MERF, was also reorganized and is due to be changed from an 'office' to a

Table 3 Forest area, by tenure

Ownership category	Total area	Of which PFE	Notes
	'000 ha		
State ownership (national, state or provincial government)	-	-	<i>Domaine forestier de l'Etat</i> (not clear in extent).
Other public entities (e.g. municipalities, villages)	-	-	<i>Domaine forestier des collectivités territoriales</i> (not clear in extent).
Total public	-	369	The distribution of forest between the two categories <i>domaine forestier de l'Etat</i> and <i>domaine forestier des collectivités territoriales</i> needs to be clarified.
Owned by local communities and/or Indigenous groups	281		
Privately owned by individuals, firms, other corporate		27	<i>domaine forestier des particuliers</i> ; includes privately owned forest plantations (mainly teak) and other areas.

Source: Government of Togo (2010).

semi-governmental organization supervised by a board. Nevertheless, by mid 2010, none of the legally decided changes had been installed and the former organization (as described in ITTO 2006) was still functional.^a ODEF is responsible for the management of forest reserves, forestry extension, harvesting and reforestation.^a Following the 2008 institutional reform, four new organizations have been created with a mandate attached to MERF: the National Forest Development Fund (*Fonds National de Développement Forestier*); the National Agency for the Management of the Environment (*Agence Nationale de Gestion de l'Environnement*); the National Fund for the Environment (*Fonds National de l'Environnement*); and the National Commission for Sustainable Development (*Commission Nationale du Développement Durable*). In 2010 MERF employed 1213 staff, substantially more than in 2005 (937 people); 550 have specialized functions in the management of forest resources, 20 have university degrees and 73 are high-level technicians.^a

The University of Lomé and the Togo Agricultural Research Institute (*Institut Togolais de Recherche Agronomique*) have mandates in forest-based research. The country's only forestry training institute, *Institut National de Formation Agricole*, in Tové, was closed between 1990 and 2004 but restarted in 2006 to train agricultural technicians with specialization in forestry. A post-graduate course in natural resource management is planned to start in 2011 at the Agricultural University (*Ecole Supérieure d'Agronomie*).

No major international NGO works in forest-related areas in Togo, but a considerable number of civil-society and national NGOs are engaged in local forest development, generally organized in regional federations. Three groupings have some influence on forest development: the *Consortium des ONG en matière d'Environnement au Togo* (COMET), a consortium of NGOs dealing with the environment; ROSCTOCC, a Togolese network of civil-society organizations concerned with climate change; and REBIOTOG, a network concerned with biodiversity (ITTO 2008). There has been a general trend towards wider public participation in the management of forests. Communities and NGOs are often involved in protecting forests, such as from fire (through *brigades de feux de brousse*).

Status of forest management

Forest for production

The rural population traditionally depends on forests and trees for fuelwood, fodder, timber and other forest products. This heavy dependence generates great pressure on forests. Most of the 71 remaining forest reserves are heavily degraded and are deforested to a great extent.

For more than 20 years, no long-term concession contract (*permis de coupe conventionnée*) has been allocated because there are no commercially exploitable forests left in Togo. Today, timber-harvesting rights are assigned (through cutting permits – *permis de coupe spéciale*) to individuals and collectives for small-scale timber harvesting or the cutting of single trees. There are no forest management prescriptions (e.g. pre-inventory of diameter limits) for this type of timber harvesting (*cahier de charges*); harvesting is based simply on the availability of sizeable trees in a given area. Thus, even official timber operations are done with complete informality (ITTO 2008). The only obligation of a timber operator is to pay a forest tax (which for the time being is not centralized) and to submit to passive control by the forest service. Such a procedure is convenient to the operator, who does not need to follow rules and is thus able to maximize profits. It is also open to misuse and risks the development of a petty corruption system among officials. Conflicts arise where local communities exercise their traditional land rights. Should this system continue, the scarce remaining timber resources are likely to be completely depleted within a short time.

Silviculture and species selection. Timber harvesting takes place in some forest reserves, in savanna and in planted forests; trees outside forests are also harvested. Silvicultural rules do not exist to manage natural production forest. A large array of species is used for timber, but no data are available about the volume harvested. Besides those listed in Table 4, the most commonly harvested timber and fuelwood species from degraded and secondary forests are *Azelia africana*, *Albizia* spp., *A. zygia*, *Alstonia congensis*, *Anogeissus leiocarpus*, *Ceiba pentandra*, *Cola cordifolia*, *Daniellia oliveri*, *Dichostachys glomerata*, *Dialium guineense*, *Harungana paniculata*, *Isobertinia doka*, *Lophira alata*, *Macaranga spinosa*, *Malacantha alnifolia*, *Parkia biglobosa*, *Prosopis Africana*, *Pterocarpus*

Table 4 Commonly harvested species for industrial roundwood

Species	Notes
<i>Tectona grandis</i> (teak)*	From planted forests; annual production about 40 000 m ³ , including state forests and private plantations.
<i>Khaya grandifolia</i> (acajou)*, <i>Pterocarpus</i> spp, <i>Pterocarpus erinaceus</i> (véne), <i>Chlorophora excelsa</i> (iroko)*, <i>Antiaris africana</i> (ako)*, <i>Triplochiton scleroxylon</i> (ayous)*	20–30 additional species are also harvested in natural forests and savanna. The harvest volume is unknown. One species (<i>Pterocarpus erinaceus</i>) is currently exported by a Chinese trader with an indicative volume of about 3500 m ³ per year. ^a

* Also listed in ITTO (2006).

Source: Government of Togo (2010).

erinaceus, *Pycnanthus angolensis*, *Terminalia superba*, *Trichilia africana* and *Uapaca heudelotii*.

The most important commercial tree species is *Tectona grandis* (teak) from planted forests and roadside plantings. Teak was introduced in 1910 and has become well adapted to the country; it is known commercially as ‘Togo teak’. The species regenerates naturally in Togo and is used widely in agroforestry plantations, as street trees and in commercial planted forests. ODEF has developed a silvicultural system to induce natural regeneration and this is practised in some of the older teak stands.

Planted forest and trees outside the forest.

Planting new forests and trees is possibly the only way for Togo to address some of its biggest environmental problems, such as deteriorating watersheds and freshwater supply, climate change, and increasing shortages of fuelwood, timber and NTFPs. Nonetheless, the development of new plantations is hampered by a lack of knowledge, a shortage of funds and a high level of insecurity with respect to land tenure and the use and frequency of forest fire. Between 1970 and 2009, about 38 000 hectares of forest plantations were created, including 24 000 hectares outside the PFE by individuals and private firms (ITTO 2008). The main planted species is teak (estimated at more than 18 000 hectares). The planned planting rate of teak is 300 hectares per year, mainly on agricultural land using the *taungya* system (ITTO 2006). This

planting rate is generally considered inadequate to meet the timber needs of the country; a rate of 2000 hectares per year of industrial plantations would be needed to meet domestic requirements for construction timber alone (ITTO 2006).

Forest certification. There is no certified forest in Togo (e.g. FSC 2010). Both state and private teak plantations have potential for certification, but most of the harvested timber is exported to markets where there is little demand for certified timber.

Estimate of the area of forest sustainably managed for production. About 7000 hectares of teak and eucalypt plantations (state and privately owned) have some sort of management and harvesting plan (Government of Togo 2010, ITTO 2008). As there is no production PFE and harvesting occurs in all kinds of forests, including protected areas, no forest can be considered to be under SFM (Table 5).

Timber production and trade. Total roundwood production was estimated at 6 million m³ in 2008 (FAO 2010a). In 2009 Togo produced about 123 000 m³ of industrial roundwood (ITTO 2010), predominantly teak – the public sector alone produced about 27 000 m³ of teak per year between 2006 and 2008.^a Log production has fluctuated in the last decade, declining from 314 000 m³ in 1999 to 65 000 m³ in 2004 before recovering slightly (ITTO 2010). No data are available on the volume of timber harvested by the informal sector (ITTO 2008).

Table 5 Management of the production PFE ('000 hectares)

Reporting year	Natural					Planted		
	Total	Available for harvesting	With management plans	Certified	Sustainably managed	Total	With management plans	Certified
2005*	41	41	5.5	0	5.5	14	1.2	0
2010	0	0	0	0	0	15	7	0

* As reported in ITTO (2006).



Five-year-old private teak plantations in Togo in a *taungya* system.

Nearly all of Togo's wood exports are in the form of logs. An estimated 95 000 m³ were exported in 2009, up from only about 12 000 m³ in 2004. The major export species was teak, but 3500 m³ of *Pterocarpus* were also recorded.^a The main export destinations are in Asia, including India, Pakistan and China.^a Timber products from neighbouring countries (mainly Ghana) are traded in the Togo market but are also exported from the free port of Lomé. Trees harvested in the savanna, including teak, limba, ayous, ceiba and cola, are providing an increasing share of the raw materials for local sawmills (ITTO 2006). There are more than 200 depots for construction wood, many of them of an informal nature.^a Commercial fuelwood and charcoal production is estimated about 2 million m³ per year (ITTO 2006).

Non-timber forest products. Forest fragments harbour a variety of plants that are used in daily living or as a supplemental source of income.

Fruits, roots and medicinal plants are collected but are no longer available in the required quantities or qualities. The three spices mostly used in Togo are the seeds of *Monodora myristica* (false nutmeg) and the fruits of *Piper guineense* (African pepper) and *Xylopia aethiopica* (Guinean pepper); each has commercial value in Togo (Kokou et al. 2005). Bush meat is the most important NTFP in forest reserves. Another considerable source of income, although illegal, is the collection of wild reptiles for export. At least 18 reptile species are produced in animal farms for export, in particular *Python regius* (royal python) but also chameleons (*Chamaeleo gracilis*, and *C. senegalensis*), big lizards (*Varanus niloticus* and *V. exanthematicus*) and turtles (e.g. *Kinixys belliana*, *K. erosa* and *K. homeana*).

Forest carbon. Togo has one of the lowest national forest carbon stocks in sub-Saharan Africa. Gibbs et al. (2007) estimated the total forest biomass carbon stock at 145–252 MtC and Eggleston et al. (2006) estimated it at 510 MtC. Togo has not participated in any of the forest carbon initiatives in REDD+ or in afforestation and reforestation projects through the CDM. In March 2011, however, the country began preparing a REDD+ strategy with the support of the ITTO Thematic Programme on Reducing Deforestation and Forest Degradation and Enhancing Environmental Services (REDDES). Togo has considerable potential for the enhancement of carbon sinks through reforestation and agroforestry activities and increased efficiency in the use of forest biofuels. Togo participates actively in the UNFCCC climate-change adaptation program. The Government of Togo (2009a) listed forests as an important adaptation measure in its national reporting to the UNFCCC. Table 6 summarizes Togo's current forest carbon potential.

Forest for protection

Soil and water. While soil and water protection is a major objective of forest management in Togo,

Table 6 Forest carbon potential

Biomass forest carbon (MtC)	% forest with canopy cover >60%	Deforestation/ degradation potential to 2030	Enhancement of carbon sink capacity to 2030	Forest area change monitoring capacity	Forest/ GHG inventory capacity	Importance of forest fire/ biomass burning	Engagement in international REDD+ processes
145–252	2	+	++	+	+	+++	+

+++ high; ++ medium; + low; estimate of national forest carbon based on Gibbs et al. (2007); estimate of % total forest with canopy cover >60% based on UNEP-WCMC (2010).

no forest is set aside primarily for the protection of soil and water.^a An estimated 5700 hectares of protection plantations was established between 2000 and 2007 in forest reserves (e.g. Kara – 362 hectares; Namon – 413 hectares; Asrama – 338 hectares; and Avétnou – 1100 hectares), the objectives of which expressly include the protection of soil and water resources.^a

Biological diversity. Togo contains considerable biological diversity due largely to its ecological diversity (ranging from savannas in the north to humid tropical forests in the southwest). There are at least 3085 plant species, 228 mammal species, 708 bird species, 156 reptile species and 42 amphibian species (Government of Togo 2009b). Mammals that once occurred in Togo but have largely or entirely disappeared include the chimpanzee, the red-bellied monkey, the Diana monkey, the African lion and the wild dog (ibid.). Six mammals, two amphibians and one arthropod found in forests are listed as critically endangered, endangered or vulnerable on the IUCN red list of threatened species (IUCN 2011). One plant species is listed in CITES Appendix I and three are listed in Appendix II (UNEP-WCMC 2011).

Protective measures in production forests.

Provisions are made in the 2008 Forest Code to prohibit logging on slopes susceptible to erosion as well as for the protection of streams, springs and watersheds. None of these measures is implemented effectively, however.

Extent of protected areas. Estimates of Togo's protection PFE are highly uncertain because none of the protected areas is effectively delineated or the demarcation is no longer recognizable^a; moreover, it is unclear how much of these areas are still forested. According to UNEP-WCMC (2010), 368 000 hectares of forest are in protected areas conforming to IUCN protected-area categories I–IV, and this figure is used as a proxy for the protection PFE. The main problems of protected-area management

Box 1 Bird-watching in Togo

In Togo, small forest areas, such as the classified forest of Missahoe and the adjacent classified forest of Damétui, may have surprising assets. The Missahoe–Damétui forest, for example, is a heavily degraded semi-deciduous forest dominated by *Antiaris africana* and *Chlorophora excelsa*. It only covers an area of about 5000 hectares, yet it is catalogued by Bird Watch International as an excellent spot for bird-watching.

Source: www.birdlife.org/index.html.

in Togo is the encroachment of parks by the local population, in particular for subsistence agriculture; fuelwood cutting and poaching; and the lack of means for participatory management planning with local stakeholders. Togo's fourth assessment report to the CBD on its biodiversity (Government of Togo 2009b) estimated that at least 125 000 hectares of officially protected areas are encroached.

Estimate of the area of forest sustainably managed for protection.

In general, insufficient data were available for an estimate to be made on the area of protection PFE under SFM. Missahoe, the site of a former ITTO project area, is also supported by Birdwatch International and IUCN Netherlands. It constitutes the only forest area known to be under management consistent with sustainability, as shown in Table 7. Nevertheless, the community in this area needs further support in its efforts to maintain the integrity of their forest.

Socioeconomic aspects

Economic aspects. The contribution of the forest sector to GDP was about 3.5% annually in the period 2006–08^a, although this estimate does not account for informal activities (especially related to wood energy). Since 2000 there has been modest

Table 7 Management of the protection PFE ('000 hectares)

Reporting year	Protection PFE	Attributed to IUCN categories I–IV	Allocated for soil and water	With management plans	Sustainably managed
2005*	313	61	200	-	-
2010	368	368	200	5	5**

* As reported in ITTO (2006).

** Missahoe and the adjacent Damétui classified forest (see Box 1). But there is a need to further support the community in its efforts to maintain the integrity of the heavily degraded forest.

Box 2 Sacred forests

A special role for biodiversity conservation can be attributed to sacred forests, in particular in the human-populated region of southeast of Togo (see also Kokou et al. 2005). Sacred forests are scattered throughout the semi-deciduous forest fragments and range in size from less of one hectare to tens of hectares. Inventories have shown that these forests are a last refuge of many tree and fauna species. They are considered an important part of the heritage in the riparian villages, as they are sometimes useful catchment areas for rivers and provide NTFPs. With the decreasing social and economic cohesion, however, sacred forests are increasingly under threat.

private investment in teak plantations on private land. The formal private enterprise employs about 1000 salaried full-time and part-time workers. It is estimated that forestry provides about 90 000 jobs in the informal sector, 77% of them for women and children, many in commercial fuelwood collection and charcoal-making (ITTO 2006).

Livelihood values. The few existing forests are often considered by rural people as the only available reserves of land. Therefore they are heavily encroached upon and claimed for subsistence production. Forest reserves provide an important source of protein for people living in rural areas. Forests are also a place of ritual and spiritual significance for many ethnic groups.

Social relations. The participation of local stakeholders in forest decision-making and management is not well-developed. Where a functional working relationship exists (e.g. in Missahoe through a number of projects), effective partnerships between local population and the forest authorities can be established.

Summary

Togo faces numerous environmental challenges, including a growing population, poverty, and an imbalance between the consumption of resources and the rate of restoration. Forest-sector plans and programs give little consideration to the environmental and social dimensions of management. The most visible signs of

environmental deterioration are deforestation and degradation; desertification; soil erosion in all forms and all ecological zones; the sedimentation of lakes and waterways; the salinization of the coastal sedimentary basin; a generalized drop in water quality; a loss of soil fertility; and biofuel shortages. The main difficulty in protecting and managing forests in Togo is the heavy pressure on them from an impoverished rural population. The Ministry for Environment and Natural Resources is in charge of forests but capacity is low. This affects many forestry operations through, for example, the failure to secure the integrity of classified forests and forest protected areas and the inability to enforce forest laws and regulations. Progress is slow in forest restoration and reforestation.

Key points

- Togo has an estimated PFE of 383 000 hectares (compared with 368 000 hectares in 2005), comprising 15 000 hectares of state-owned forest plantations (compared with 14 000 in 2005) and 368 000 hectares of protection forest (compared with 313 000 hectares in 2005).
- There is no natural-forest production PFE and therefore no natural-forest production PFE under SFM. An estimated 5000 hectares of protection PFE (an area also used for production) is sustainably managed.
- There is no regulated forest industry in Togo. Timber and fuelwood harvesting is occurring in all forests, irrespective of their legal status.
- Togo has the highest relative forest loss in Africa. The main direct threats to forest resources are uncontrolled fire; excessive harvesting for fuelwood; agricultural encroachment; illegal cutting; and poaching and hunting.
- A process is ongoing to reclassify forest reserves and protected areas and to develop collaborative forms of management.
- The Government of Togo adopted a new forest policy in 2008 and is developing a wider forest and environmental policy that aims to increase the participation of local people in forest and natural resource management. Support by the international community would greatly assist in the implementation of this forest-reform process.

Endnotes

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