

16. Sangha Tri-National Landscape

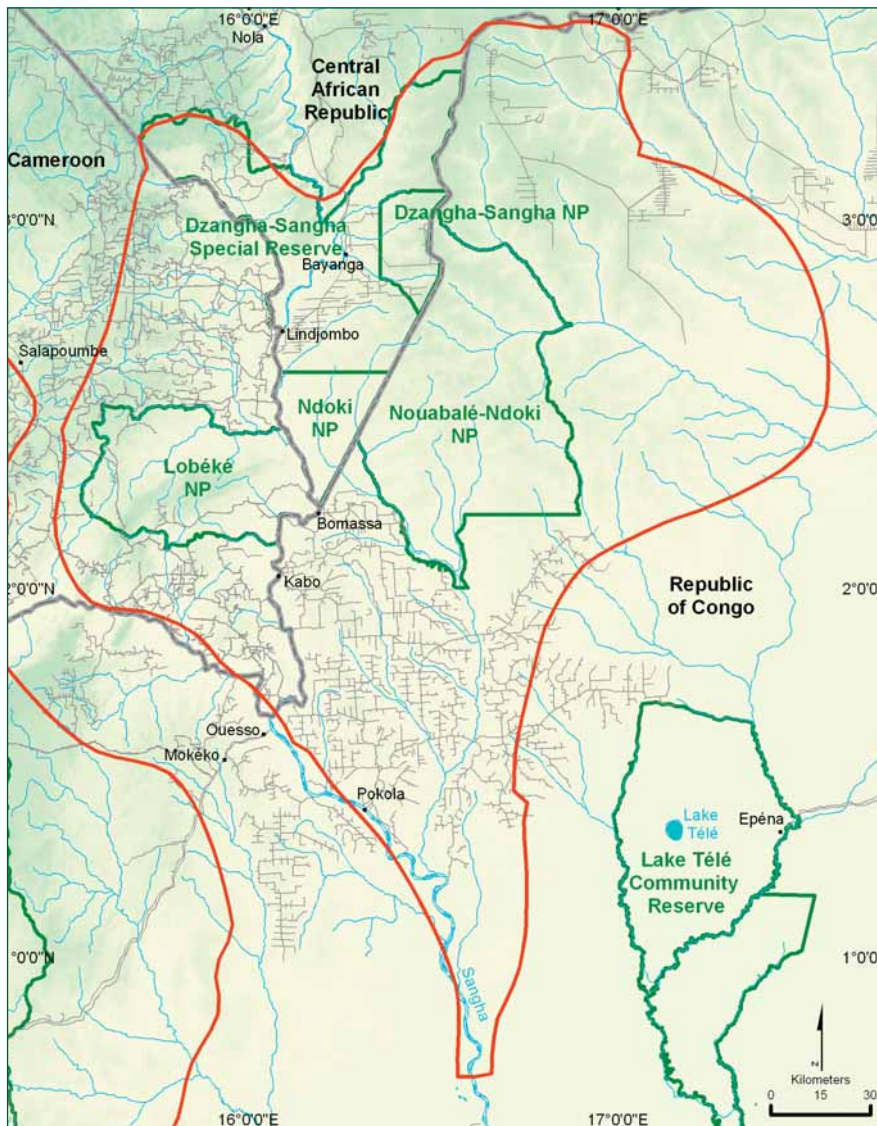


Figure 16.1. Map of Sangha Tri-National Landscape (Sources: Atlas of Cameroon GFW/WRI, CARPE, JRC, SRTM, WCS-Congo, WCS-Gabon, WWF-Jengi).

The Landscape in brief

Coordinates: 3°32'12"N – 0°40'29"N; 15°28'26"E – 17°34'8"E

Area: 36,236 km²

Elevation: 330-700 m

Land ecoregions: Northwest Congolese forests ecoregion

Aquatic ecoregion: Sangha ecoregion

Protected areas: Nouabalé-Ndoki National Park, 419,000 ha, 1993, Republic of Congo

Lobéké National Park, 43,000 ha, 2001, Cameroon

Dzanga-Ndoki National Park, 125,100 ha, 1990, Central African Republic

Dzanga-Sangha Special Reserve, 310,100 ha, 1990, Central African Republic

Location and area

The Sangha Tri-national Landscape is spread over three countries: Cameroon, the Central African Republic (CAR) and the Republic of Congo (Figure 16.1). The Congolese section of the Landscape extends over the administrative departments of Sangha and Likouala. It covers 21,470 km² and includes Nouabalé-Ndoki National Park (PNNN) plus five forest management units (UFAs) which cover an overall area of 17,280 km² and form the buffer zone of the national park. In the north, the area is delimited by the UFA of Mokabi; in the south by the UFAs of Pokola and Toukoulaka; in the east by the UFA of Loundoungou and in the west by that of Kabo. In the west, Nouabalé-Ndoki National Park borders on Dzanga-Ndoki National Park and Dzanga-Sangha Special Reserve in CAR. The CAR section covers 4,644 km² and includes Dzanga-Ndoki National Park and Dzanga-Sangha Special Reserve. The Cameroonian section is centered on Lobéké National Park.

Physical environment

Relief and altitude

The entire Landscape is located on plateaus broken up by alluvial plains. The altitude varies between 330 and 600 m in the Republic of Congo, but it reaches nearly 700 m in CAR.

Hydrology

The Landscape contains the headwaters of four major rivers that drain the north of the Congo River. Those of the Mabale, the Likouala and the Ndoki rivers are in PNNN; that of the Ibenga River is located in the UFA of Mokabi.

Climate

The average annual precipitation is on the order of 1,450 to 1,600 mm. The dry season lasts an average of two to three months and is centered on January-February. August is the rainiest month.

Vegetation

The Landscape essentially includes: semi-caducifoliated terra firma forests (Figure 16.2) rich in *Terminalia superba* (limba), Sterculiaceae, in particular *Triplochyton scleroxylon* (ayous), and Ulmaceae; forests with a monodominance of *Gilbertiodendron dewevrei*; forests of Marantaceae; mixed swamp forests; riparian forests of *Uapaca heudelotii*; and raffia palm groves. These forests are punctuated with grassy clearings and bais (Figure 16.3), as well as lakes, rivers and streams. In the areas that have been logged, rattan forests are growing.

In the Congolese section more than 1,700 species have been inventoried. Among the trees several species appear on the IUCN Red List: *Austranella congolensis*, *Pericopsis elata* (afroformosa), *Diospyros crassiflora* (ebony) and *Swartzia fistuloides* (pao rosa or African tulip wood). In addition, all the species of the genera *Entandrophragma* and *Khaya* that have been logged are considered vulnerable, as are other commercial species: *Aningeria altissima* (anigre), *Mansonia altissima*, *Pausinystalia macroveras* (tsanya) and *Gambeya pulpuchra* (longhi). PNNN is a sanctuary for all these species, but the surrounding concessions must also be managed in an intelligent way in order not to lose these important resources.

Fauna

Mammals

In the CAR sector, 105 species of land mammals have been identified (Blom, 2001), in particular: the African forest elephant *Loxodonta africana cyclotis*; sixteen species of primates, among them the gorilla *Gorilla gorilla*, the chimpanzee *Pan troglodytes* and at least six small nocturnal species; fourteen species of ungulates, including the bongo antelope *Tragelaphus euryceros* (a species that is declining rapidly in Central Africa and is very rare in East Africa); and fourteen species of carnivores, including the leopard *Panthera pardus* and the spotted neck otter *Lutra maculicollis*. The hippopotamus *Hippopotamus amphibius* still has a significant population along the Sangha River.

Birds

The avifauna includes 428 species in the Congolese section, 379 in the CAR section and 350 in the Cameroonian section. A significant population of the Dja River warbler *Bradypterus grandis*, a species endemic to the marshes of

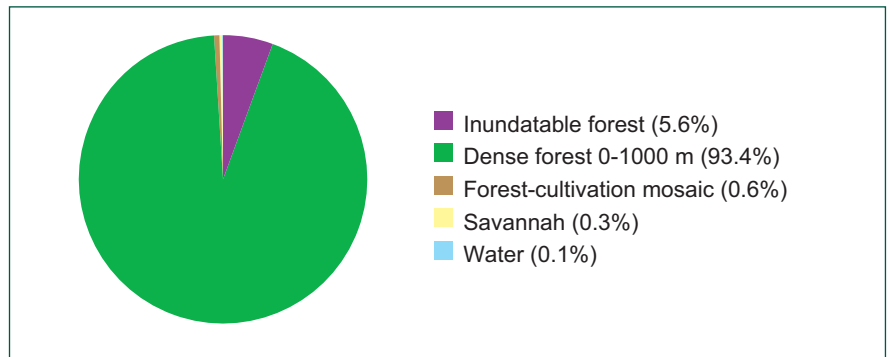


Figure 16.2. Main vegetation types (JRC).

Rhynchospora of Lower-Guinea, exists in Lobéké National Park; this species is also known in the marshes of PNNN. An as of yet undescribed species of night jar *Caprimulgus sp.* has been found in Lobéké National Park and PNNN. A new species of Turdidae, *Stiphrornis sanghae*, was described in 1999 in Dzanga-Sangha and has not yet been found elsewhere.

Herpetofauna

Species of reptiles found in this Landscape are typical for the region and include the Nile crocodile *Crocodylus niloticus*, the slender-snouted crocodile *Crocodylus cataphractus*, the dwarf crocodile *Osteolaemus tetraspis* (an endangered species), the Nile monitor lizard *Varanus ornatus*, the softshell turtle *Trionyx triunguis*, the African rock python *Python sebae*, the royal python *Python regius*, the coiled Gabon viper *Bitis gabonica* and the green mamba *Dendroaspis jamesoni*.

Figure 16.3. An elephant bai.



Ichthyofauna

The ichthyofauna is still insufficiently known, although it is very important for local populations. In the Cameroonian portion of the Sangha Basin, more than 200 species of fish have been identified, and the whole basin has nearly 300 identified species (Thieme *et al.*, 2005). The Sangha is a very dynamic environment because of silting and seasonal fluctuations that influence reproduction, the feeding regime and the distribution of the fish. Among the most remarkable families in the areas of the flooded or floodplain forests are the Alestiidae with *Hydrocynus goliath*, the Aplocheilidae, the Cichlidae with the genus *Tilapia*, the Claroteidae with the genus *Auchenoglanis*, the Cyprinidae with the genera *Labeo* and *Barbus*, the Mochokidae with the genus *Synodontis*, the Malapteruridae with the electric catfish *Malapterurus sp.* and the Schilbeidae.

Humans in the Landscape

Density and distribution

In the Landscape as a whole, the density of human populations is estimated at 0.7 inhabitants/km², but this varies from one section to the next.

In CAR, the human population is estimated at 5,977 inhabitants in the protected areas of Dzanga Sangha, with an average density of 1.2 inhabitants/km². These inhabitants are distributed along the Bayanga-Lindjombo-Bomandjokou and Bayanga-Yobé axes in the interior of Dzanga Sangha Special Reserve. The urban and industrial area of Bayanga houses 60% of this population. In the north of the Salo reserve, there is another major site for industrial logging (Ngonda-Ngbalet, 1995).

In the Congolese section the density averages 1.5 inhabitants/km² (Mavah, 2005). Around PNNN, the indigenous Bangombe and Bambendzele traditionally led a semi-nomadic hunter-gatherer life, but in the last 30 years permanent villages have been established along the Sangha and in proximity to the logging bases of Kabo and Pokola. In the UFA of Mokabi, it appears that immigration and growth of the human population have increased significantly since the beginning of logging in 2000-2001 by Rougier. The concession of Pokola, currently assigned to CIB, has the largest population center in the region with 13,417 inhabitants, representing the greatest potential impact on the national park and its environs. CIB has strongly developed the

infrastructure of Pokola, which has considerably improved the quality of life of the employees and of the community in general. Between 1999 and 2003, the growth rate of the population in Pokola was 11% per year, primarily due to immigration associated with job opportunities and the standard of living (Moukassa and Mavah, 2003). Other centers in the CIB concession are Kabo (2,600 inhabitants), the forest camp of Ndoki I (949 inhabitants), Ndoki II (1,000 inhabitants) and smaller villages along the Sangha and in the region of Kabounga (Mavah and Auzel, 2004). In this region, however, there has been a decrease in populations due to emigration toward the large population centers of Pokola and Kabo (Paget and Desmet, 2003).

Ethnic groups

In CAR, the ethnic groups originating in the region are the BaAka Pygmies, a hunter-gatherer people, and Sangha-Sangha, a fishing people. The other groups, such as the Ngoudi, Mpiemou and Bogongo are from the region of Sangha Mbaere. Foreign populations include the Gbaya, Banda, Nzakara, Nzande and Kaba, who come from other regions of CAR, as well as Chadians, Cameroonians and Mauritians. The Pygmy populations constitute around 30% of the total human population of the reserve.

In the Congolese section, Pokola is home to nearly fifty different ethnic groups which co-habitate; 32% of the groups are indigenous to the region (Mavah, 2005). The principal ethnic groups in the villages are Pomo, Yasua, Ngondi and Sangha-Sangha. The semi-nomadic groups of Bambendzele represent 32% of the population. In Kabo, more than thirty ethnic groups are present, and more than 70% of the population are originally from the department of Sangha. The semi-nomadic communities of Bangombe and Bambendzele constitute 15% of the population. In the Loundougou region 45% of the population is made up of semi-nomadic Bambendzele, 25% of Bomitaba, 25% of Bondongo and 5% of Kaka, all concentrated along the Motaba River, and with more than 95% of them originating in the department of Likouala (Mavah, 2005). Of the lands of Kabounga in the UFA of Toukoulaka, 61% are inhabited by Bomitaba and 39% by semi-nomadic Bambendzele.

Social organization

In the Congolese portion of the Landscape, the villages are organized geographically, as op-

posed to politically, because of the forced re-grouping that they suffered during the colonial era. However, the villagers gather together according to the ethnolinguistic groups present: Pomo, Ngondi, Yasua or Bomassa. The organization connected with lineage membership has a tendency to give way to ethnolinguistic organization because of the rural exodus toward the urban centers and the establishment of logging. Inter-ethnic marriages have contributed to the merging of several ethnic groups. Semi-nomadic communities and the villagers form only one economic and social unit, most of the time using the same forest spaces and sharing forest and agricultural products. In the semi-nomadic communities, social organization connected with clan membership is still observed.

In the Republic of Congo, there are two kinds of chiefs within the local populations:

- the village chief, who represents the government and is often chosen for the influence that he has on the other villagers
- the customary chief and/or clan chief, who represents the ancestors and is chosen through a ritual

None of these chiefs have a great deal of influence on the population, except in the case of semi-nomads and the heads of clans. The societies are generally acephalous and the chiefs vary from one activity to another or from one rite to another.

Activities

In CAR, the principal human activities taking place in the interior of the Landscape are logging, mining, hunting, fishing, agriculture, livestock breeding, gathering, conservation, tourism and trade (Table 16.1).

In the Republic of Congo, the principal sources of income for the local populations include industrial logging, services for employees of the logging companies, hunting, fishing and agriculture. Fishing is mostly practiced in the dry season, hunting in the rainy season—legally, hunting is prohibited in the dry season. Rifles and metal cables, which are illegal, are used most often for hunting. Traditional nets and snares made of plant fibers are no longer used except sporadically by the semi-nomads. Activities are divided: the men hunt and fish, while the women do the gathering, take care of the household, and occasionally fish in the streams.

Table 16.1. Main activities in the human population in the Central African Republic of the Sangha Tri-national landscape.

Activity	Percentage
Fishing	20
Logging	17
Agriculture	16
Collecting NTFP	13
Public services	11
Hunting	7
Other activities	16

Land use

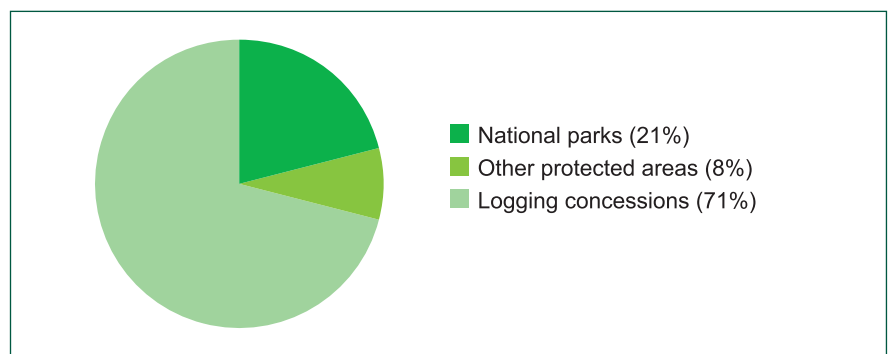
In CAR, Dzanga-Sangha Special Reserve represents 69% of the protected areas while the national park accounts for 27%. In the reserve, 70% of the land is allocated to hunting safaris and 83% to logging. The two activities therefore partly overlap. The community area for hunting covers around 14.6% and it is the only area where traditional hunting and gathering are authorized. The 'pre-park' area is a buffer zone that surrounds the two sectors of the national park over a width of 2 km.

In the Congolese section, PNNN covers 20% of the Landscape. The logging concessions, including areas reserved for the management of fauna by village communities and based on the traditional hunting lands, cover 80% of the Landscape (Figure 16.4).

Infrastructure

- In the Republic of Congo, the roads, all maintained by CIB, are in good condition.
- There are no bridges, but CIB and IFO manage a ferry on the Sangha and soon will do the

Figure 16.4. Main land use types.



same on the Motaba River to allow access to the Loundoungou-Ibendja concession to the northeast of PNNN.

- Three private primary schools built and subsidized by WCS are established near PNNN; in the concessions, there are relatively well-equipped primary and secondary schools subsidized by CIB.
- Pharmacies have been built, financed and supplied by WCS in the villages near the national park; there is a good hospital in Pokola and one is under construction by the CIB in Kabo.
- Portable telephones reach Pokola and will soon reach Kabo.

Logging

In CAR, logging began in the Dzanga-Sangha region around 1972, with the establishment of the Yugoslavian company Slovenia Bois (SB). This led to a rapid increase in the population of Bayanga. Following financial difficulties, activities were stopped in 1986. The company Sangha Bois took over in 1988, but due to a failure to respect commitments vis-à-vis the State it was closed in 1990. In 1992, this concession was bought out by a French group, *Sylvicole de Bayanga*, which operated between 1993 and 1997. In 1999, the *Société de bois de Bayanga* (SBB) restarted logging activities in the reserve over an area of 186,900 ha. These activities ended in December 2005. The *Société d'exploitation forestière de Sangha Mbaéré* (Sesam) has had a logging concession in the northwest of the reserve since 1991 and its logging permit covers 88,800 ha in the special reserve. Thanks to financing from the French Development Fund (CFD), it has established another industrial site in Salo in the north of the reserve, but logging activities have currently been stopped. Around 265,800 ha, that is 83% of the reserve, are being logged industrially and the loss of forest cover due to industrial logging is estimated at 2,500 ha/year.

In the Republic of Congo, the logging concessions of Kabo, Loundoungou and Pokola/Toukoulaka were assigned to CIB, which has been actively logging the concession of Pokola since 1962. The Kabo concession has been worked since the 1970s, initially by the company Bois Sangha, and the Loundoungou concession has never been logged. CIB acquired the rights to these two concessions in 1997. The concession of Mokabi, which borders PNNN to the north, was allocated to Rougier in 1999.

In 1999, cooperative work was initiated be-

tween WCS, the Congolese government, CIB and the local communities in order to promote responsible management of the fauna and the forest resources in the Kabo-Pokola-Toukoulaka-Loundoungou area that surrounds PNNN. The activities are focused on education, raising awareness about conservation, the development of alternative activities, community management of the fauna, protection of the fauna, socioeconomic studies, ecological research, monitoring and improving the exploitation of the forest. CIB is now drawing up overall development plans for its concessions, taking into account the conservation of biodiversity and the development of socioeconomic objectives.

Reasons for the identification of the Landscape

- (1) The Landscape contains vast extents of intact forests of different types, a rare phenomenon in the world, and its ecological integrity is remarkable. It provides habitats for some of the largest intact communities of large mammals in Africa. It is particularly important for forest elephants and great apes. The presence of baies, environments very much sought after by many mammals and birds, is an essential asset.
- (2) The forests of the Landscape have been recognized as critical for conservation in Africa (Monza, 1996) and as one of the priority areas for the conservation of forests in the northwest Congolese forests ecoregion (Kamdem Toham *et al.*, 2006).
- (3) There are major opportunities for conservation: the protected areas cover 21.5% of the whole landscape (752,000 ha) and cross-border cooperation agreements were signed in 2000 by the three countries involved, with a view to improve conservation of the protected areas.
- (4) Conservation of the protected areas could be strengthened by sustainable management of the buffer zones in two of the three countries.¹

Conservation

History

In CAR, after the signing of agreements between the government and WWF in 1988, the Ministry in charge of forests initiated, in collaboration with WWF, the Dzanga-Sangha Project in 1988. Law no. 90.017 of 29 December 1990 clas-

¹ In the Republic of Congo and Cameroon, WCS and WWF are providing technical assistance to CIB and the company Decolvenaere in order to promote sustainable management of the fauna. In 2004, CIB requested FSC certification for its concessions, three of which directly border on PNNN. Other companies also seem to want to move towards sustainable logging.

sified 125,100 ha as a national park (category II of the IUCN) and law no. 90.018 of 29 December 1990 classified Dzanga-Sangha Special Reserve of around 335,900 ha for multiple use (category VI of the IUCN).

In the Republic of Congo, WCS signed an agreement with the Congolese government in 1991 to supply technical support for the creation and management of a national park through the Nouabalé-Ndoki Project. PNNN was consequently created in 1993. In 2003, the management plan for the park was officially adopted and the Goulougo triangle was included in the protected area. This area, previously included in the concession of Kabo, has a remarkable and intact biodiversity due to its isolation and its inaccessibility between the Ndoki and Goulougo rivers.

In Cameroon, Lobéké National Park was classified in 2001.

The cross-border dialogue between the conservation bodies operating in PNNN, the area of Lobéké and the Dzanga-Sangha complex began in 1996. In December 2000, the three countries involved signed a cross-border cooperation agreement. Certain cross-border activities in the form of patrols on the rivers and borders began in 2001 and have made it possible to reduce commercial hunting on the Sangha. The partners have been coordinating their efforts by focusing on the problems of cross-border conservation, specifically as concerns the application of laws, research, monitoring and the institutional framework.

Players

(1) Governmental players

Management of the protected areas is under the direction of the Ministries of Water and Forests in the three countries.

(2) NGOs

In CAR the Ministry is supported by WWF and GTZ-LUSO; in the Republic of Congo, by WCS; in Cameroon by WWF and GTZ. In CAR, WCS has also been carrying out research on forest elephants for the last 15 years.

(3) Private companies

The main logging companies are CIB and Rougier in the Congolese section, Decolvenaere in Cameroon and SBB in CAR. However, SSB was liquidated at the end of 2005. Hunting tourism is organized in CAR by three companies: Aouk Sangha Safari, National Safari and Safaria.

Direct threats

(1) Commercial hunting

Commercial hunting represents the primary threat for wildlife throughout the Landscape, but most notably in Cameroon and CAR. The animal populations in the concessions are subject to growing pressure because of the opening up of the forests by logging roads and the increase in the human populations.

(2) Ivory hunting

The pressure on the elephants from hunting for their ivory is substantial in the southern part of the concession of Pokola, and incursions by ivory hunters along the northern edge of PNNN from the CAR are becoming more and more frequent.

(3) Hunting by villagers

With the increase in the human populations in Kabo and Pokola, Republic of Congo, the pressure on animal populations is increasing greatly. Practiced in zones that are already emptied of game, it cannot be sustained. Responsible management of the hunting pressure is essential to bring this type of hunting back down to a sustainable level.

(4) Industrial logging

The primary threat posed by industrial logging is the opening up of the forests to hunters. Logging companies, however, are currently felling a larger and larger number of species and it is foreseeable that the loss of canopy is going to become a problem in certain regions. The poor planning of roads and tracks is also causing major unnecessary damage to the canopy. Non-sustainable logging of certain species will eventually change the composition of the forest around PNNN. The disturbance of the clearings and the bias by logging presents certain threats to the wildlife that depends on these habitats for their nutritive resources.

(5) Traditional mining

Diamond mining is a threat in the north of the special reserve in CAR (Ngakeu *et al.*, 2002).

Indirect threats

(1) Lack of information

The information necessary for management and planning is lacking. The ecological needs of endangered species, such as the forest elephant, the gorilla and the chimpanzee, are poorly known.

It is therefore very difficult to evaluate the direct impacts of industrial logging on these species and improve measures for conserving biodiversity.

(2) *Lack of capacity*

Capacity and support for conservation are weak. The governments of the three countries would have to increase their capacities enormously before being able to set up effective protection and management of the Landscape. Staff members have to be identified, trained and monitored.

(3) *Lack of resources*

Alternative resources for proteins and monetary income do ease pressure on wildlife. The logging companies therefore absolutely must facilitate the supply of alternative proteins in logging camps and towns.

(4) *Poor standards of institutions*

Policies and support in the areas of wildlife management and forest management are insufficiently developed. These aspects must be developed both for community logging and for industrial logging in order to control access, commercial hunting and immigration following logging activities. Wildlife management, the planning of land use at the Landscape level, the problems concerning indigenous peoples and conservation in areas adjacent to national parks have to be incorporated into the laws concerning the long term management of the forests. Guidelines must be developed for national and international policies for conservation and management in tropical forest areas supporting multiple uses.

State of the vegetation

A large part of the forests that cover the banks of the Sangha seem to have been inhabited between the years 2,300 and 900 BP, when they were transformed into palm groves of *Elaeis*. After the region was abandoned by these populations, they were covered by forests of *Entandrophragma*. However, industrial logging has once again affected a large part of these forests by opening up their canopy. The majority of the forests in the center of Lobéké National Park and all the forests of PNNN have never been logged.

State of the fauna

In CAR, the data gathered by the MIKE program in 2005 showed a clear reduction in the populations of large mammals and a contraction of the distribution area. Key species like the ele-

phant, the chimpanzee and the gorilla are concentrated in the interior of Dzanga-Ndoki National Park² (Box 16.1).

In the Republic of Congo, populations of large mammals are still largely intact (Table 16.2). In the south of PNNN, in the concessions of Kabo, Pokola and Toukoulaka, animal populations are stable and in good health as a result of proper management. These concessions contain habitat for elephants and bongo antelope. The protection of these habitats is essential to allow the population of bongo antelope to recover from the epidemic caused by the *Stomoxys* flies in 1997. The concession of Mokabi, however, has lost a large part of its fauna since the beginning of activities in 2001. Human immigration and uncontrolled hunting have considerably reduced populations of elephants in the north of the concession (Box 16.1). Large populations of mammals nonetheless remain in the south of the concession bordering PNNN.

Tourism

In CAR, the concessions of the three hunting safari companies that are operating in the Landscape cover a large part of the special reserve and overlap with the logging concessions over an area of 225,400 ha. In terms of ecotourism, a reception center and a tourist hotel, Doli Lodge, have been developed. Around 820 tourists visited the site in 2004. The tourist activities available include: elephant viewing in the bai of Dzanga; primate watching (gorillas and mangabeys); participation in hunting, using snares and traps; the traditional dance of the BaAka; a trip on the Sangha; and collecting raffia palm wine.

In the Republic of Congo, the development of ecotourism expanded considerably in 2005 with the construction of new accommodation infrastructure in PNNN and the organization of cross-border excursions.

Management and governance in the field of renewable natural resources

(1) *At the Landscape level*

The TNS cooperation agreement created four cross-border management structures:

- the Tri-National Supervision and Arbitration Committee (CTSA) at the ministerial level
- the Tri-National Scientific Committee (CST)
- the Tri-National Monitoring Committee (CTS) at the level of the provincial administrations, which includes representatives from the agencies funding and/or executing pro-

² In Dzanga-Ndoki National Park the average density is 0.6 elephants/km², thanks to protection efforts carried out by the Dzanga-Sangha Project. In the Dzanga-Sangha Special Reserve, the density is reduced to 0.09 elephants/km². For the entire complex of protected areas, the population of gorillas is between 1,794 to 4,063 weaned individuals; the population of elephants is between 671 to 1,124 individuals.

grams, as well as the conservators or national directors of each site

- the Tri-National Planning and Execution Committee (CTPE) at the level of the sites, made up of conservators, project managers and associated technical assistants

The CTPE is the main administrative body of the Sangha Tri-national and the most active committee with meetings twice a year. It is responsible for monitoring all of the activities and problems that occur in the Landscape and planning future actions. It is the principal means of communication on the state of the Landscape to all the parties concerned, through periodic reports. Since it includes all the players in the Landscape, this committee has shown that it is very effective in identifying and carrying out activities, especially those relating to combating poaching.

The development of a land use plan at the Landscape level is well advanced. A working meeting was held in 2005 and a preliminary document has been prepared. The document brings together all available information relating to national development plans and land use plans in order to sum up the current and future focal points for development and overall strategies for the Landscape.

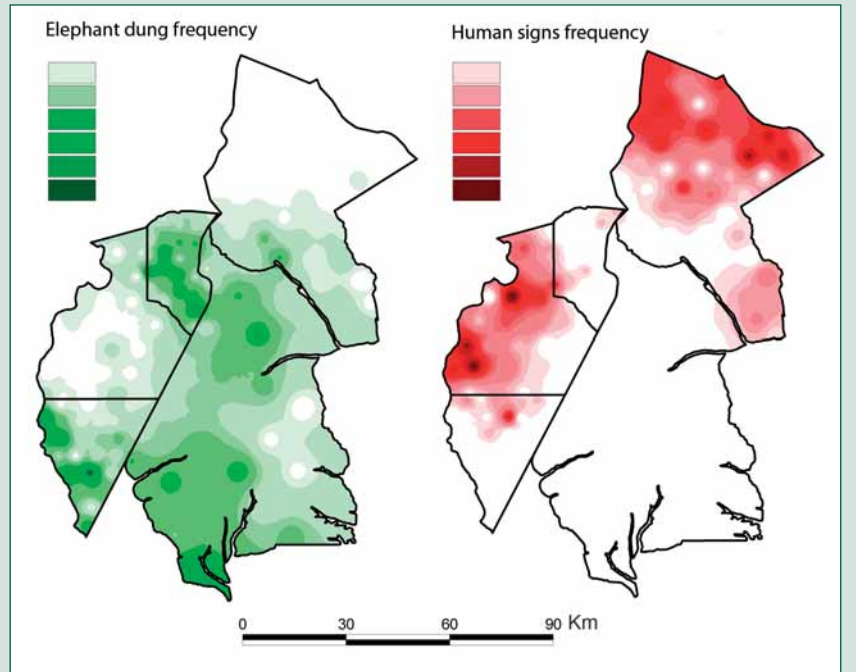
In the Congolese section, mobile guard patrols and fixed surveillance posts on the access roads have been maintained over the entire extent of the Congolese section of the Landscape, in the national park as well as in the concessions. Consequently, elephant poaching in PNNN has remained nil. Bi-national patrols have been organized every six months, with agents from the Republic of Congo and CAR.

(2) *In the protected areas*

In CAR, in order to harmonize human activities in the protected areas of Dzanga-Sangha and possibly improve the use of renewable natural resources, the complex of Dzanga-Sangha has been organized according to a zoning plan, which implements the legal texts in force³. The two sectors of the national park are designated as conservation areas, excluding every activity other than those connected with tourism and research, and are surrounded by a buffer zone. Dzanga-Sangha Special Reserve is classified as a peripheral zone with multiple uses, where anthropogenic activities are authorized under certain conditions and in areas specifically planned for logging, sport hunting, traditional hunting, agriculture or fishing. In the interior of the special reserve there is a community hunting area where the traditional ac-

Box 16.1. Elephants and humans in the Sangha Tri-National Landscape

During the MIKE program, inventories were undertaken by WCS and WWF in the Sangha Tri-national Landscape. These have demonstrated that indices of human presence and indices of elephant presence are inversely co-related. Elephant distribution and human distribution are totally in opposition.



tivities of local populations are permitted (camping, hunting, fishing and gathering) and hunting for non-native residents who hold a hunting permit is also allowed.

The activities developed by the Dzanga-Sangha Project in the protected areas include:

- action to combat poaching, promote ecological monitoring, continue the habituation of primates, and the formation and maintenance of local infrastructures
- support for the management of forest harvesting
- self-promotion of local initiatives and micro-projects
- elimination of illiteracy and provision of pre-schools for Pygmies
- ecotourism and environmental communication

The local arbitration committee of the Dzanga-Sangha Project is tasked with serving as an interface between the local population and the

³ In CAR, the management of renewable natural resources is governed by the forest code of 1991, which expresses the need to conserve biological resources and confirms the customary rights of the populations while taking into account the status of the ecosystems and the interests of future generations, and the wildlife protection code, which regulates hunting and also recognizes the traditional right of usage of animal resources by the local residents of the forest ecosystems.

Table 16.2. Present situation as concerns wildlife and human presence in the Sangha Tri-national Landscape in the Republic of Congo.

Species	Density per km ² [Confidence interval] (Rate of encounter / signs per km)					
	Logging concession					National Park
	CIB				Rougier	
	Kabo UFA	Pokola UFA	Loundougou UFA	Toukoulaka UFA	Mokabi UFA	Nouabalé-Ndoki National Park (PNNN)
Gorilla (nests)	1.36 [1.05; 1.75] (1.05)	2.15 [1.51; 3.06] (1.00)	0.56 [0.04; 8.23] (0.42)	2.25 [1.60; 3.17] (1.17)	(1.4)*	(1.88)*
Chimpanzee (nests)	0.29 [0.24; 0.35] (0.67)	0.35 [0.28; 0.43] (0.88)	0.03 [0.11; 0.78] (0.86)	0.44 [0.35; 0.57] (1.21)	(0.43)*	(0.12)*
Great ape (indeterminate species)	-	-	-	-	(3.9)*	(6.2)*
Elephant (droppings)	1.23 [1.03; 1.48] (1.50)	1.06 [0.83; 1.35] (1.06)	0.39 [0.12; 1.31] (0.69)	0.23 [0.15; 0.34] (0.48)	0.30 [0; 0.6] (1.85)	1.40 [0.6; 2.2] (8.45)
Buffalo (signs)	(0.11)	(0.07)	(0.01)	(0.02)	-	-
Bongo antelope (signs)	(0.06)	(0.04)	(0.02)	(0.02)	-	-
Bushpig (droppings)	(0.01)	(0.08)	(0.04)	(0.04)	-	-
Forest hog (droppings)	(0.02)	(0.00)	(0.00)	(0.00)	-	-
<i>Monticola</i> Duiker (droppings)	(0.11)	(0.57)	(0.81)	(0.10)	-	-
Medium-sized duiker (droppings)	(1.38)	(3.54)	(2.40)	(1.89)	-	-
Yellow-backed duiker <i>silvicultor</i> (droppings)	(0.77)	(1.61)	(1.11)	(1.75)	-	-
Human (casings)	(0.18)	(0.21)	(0.01)	(0.06)	(0.15)	(0)
Transect Effort (km)	777	1181	889	610	46	25
Monitoring year	2001-2002	2002-2003	2002	2002-2003	2003-2004	2003-2004
Source	(Poulsen <i>et al.</i> , 2005)	(Poulsen <i>et al.</i> , 2005)	(Poulsen <i>et al.</i> , 2005)	(Poulsen <i>et al.</i> , 2005)	(Boudjan and Makoumbou, 2004)	(Boudjan and Makoumbou, 2004)

* an analysis of data concerning the great apes is under way

Dzanga-Sangha Project, particularly in regards to the management of disputed issues concerning access to renewable natural resources and dividing up the benefits resulting from their development (taxes from the exploitation of resources and income from tourism)⁴. Access to biodiversity resources for hunting and gathering is unrestricted in the authorized areas of the special reserve, but it is strictly prohibited in the two sectors of the national park. The ancestral practices of hunting

(rituals at the beginning of the hunting year) have been abandoned except by the BaAka⁵.

(3) In the logging areas

In the Republic of Congo, CIB announced in November 2004 that it was setting aside large areas in the concession of Kabo as a part of FSC certification. Two areas cover more than 14,000 ha and are in the Bomassa triangle. They constitute a major addition to the network of protected areas in the Landscape by connecting the national parks of CAR and the Republic of Congo. In October 2005, CIB also presented its first development plan, which included measures for implementing sustainable practices that reduce environmental and social impacts.

Community projects were initiated by WCS in the four concessions of CIB through the formalization of management committees and the organization of a workshop to define a participatory process in the development of regulations concerning hunting, fishing and the harvesting of non-timber forest products in community areas.

Logging in the Bomassa triangle (concession of Kabo) was authorized for the next four years by the government, with the condition that this area would receive the status of a protected area in the future. Certain standards have been adopted by CIB and MEFE, with the support of WCS, in order to reduce the impact of logging and to provide surveillance of hunting in this sensitive area of the Landscape.

(4) In the rural areas

With the considerable increase in human populations connected to the development of industrial logging, conservation at the community level has become an increasingly important strategy in the Landscape. As part of an evaluation of the possible sustainable sources of proteins that could serve as an alternative to bushmeat, a tri-national project aimed at developing systems for managing fish was created and will be implemented in 2006.

The village chiefs and the local administrative authorities have become key players. They are consulted at times of decision making in regards to strategies for sustainable development and conservation. They are also tasked with managing the repercussions arising from the exploitation of biodiversity resources: 40% of the revenue from taxes on logging and 40% of the taxes on ecotourism are set aside for rural development organizations. However, there is a lack of capacity regarding the management of this revenue and a program for strengthening capacity in this area is essential.

The success of actions taken to combat poaching has led to an increase in the elephant population and elephants are found near the villages increasingly frequently. This phenomenon has caused an increase in crop damage. Experimental measures aimed at driving the elephants away from the fields using strong peppers (pili-pili) have been tried in Zimbabwe and are currently under way in the village of Bomassa, close to PNNN. These measures could be applied on a larger scale.

Monitoring renewable natural resources and their management

(1) Training

National and tri-national training programs in ecological and socioeconomic monitoring were continued in 2005:

- A training course in methods for monitoring bais was provided to national researchers of the three countries by a senior researcher at Dzanga-Sangha in CAR.
- An annual training course in methods of monitoring and research was given to national researchers in PNNN.
- A training course in GIS was given at both the tri-national and national levels.

(2) Ecological monitoring

The GIS databases have been updated and new remote sensing methods have been introduced. In the Congolese section, a program of ecological monitoring at the Landscape level has been designed and finalized. It will be implemented in 2006. This program covers 2.8 million hectares under improved development and will offer an effective tool for the evaluation of strategies for management in regards to conservation objectives in the different land use zones. Standardized methods are used throughout the Landscape and the three protected areas are within the framework of national and regional programs, such as MIKE.

In addition to monitoring at the Landscape level, there are also specific monitoring actions that focus on particular species or habitats, such as bais:

- In the Republic of Congo, a long term study of gorilla populations and their demography has been under way at the bais of Mbeli since 1995.
- A study of the eco-ethology of the chimpanzee has been underway in the Goualougo triangle in PNNN since 1999; it targets the impact of logging on this species.

- Studies of the impact of logging and hunting are also under way in the buffer zone of the national park.
- Monitoring of the bais frequented by elephants should make for a better understanding of the use of the environment by this species and its population structures; it is also meant to provide information on poaching.

In CAR, monitoring patrols in 2004 and 2005 made it possible to evaluate the frequentation of the bais⁶ at a time when poaching around the salt marshes was diminishing and the poaching network in the area was being weakened. In 2005, the monthly rates of frequentation by elephants were higher than for 2004 and numerous species were seen more often than before⁷.

(3) Monitoring wildlife health

Monitoring wildlife health was extended to the entire Landscape and focused on the development of a means of surveillance aimed at the rapid detection of epidemics such as Ebola.

⁴ At the village level, the chiefs of groups that have authority over natural resources delegate their power to the village chiefs who are in a position to rule on disagreements and disputes. They are often chosen from the founding family of the village. Currently, within the framework of the participatory management of renewable natural resources, they are often consulted by projects at times of major decisions relating to zoning and other issues concerning access to the resources.

⁵ The ritual of the beginning of the hunting year still exists among the BaAka Pygmies who follow the tradition of the Djengi personified by the patriarch of the village.

⁶ Of a total of 3,500 patrols carried out in 2004, 11% were done in the north of the Dzanga sector of the national park, a sensitive area for poaching, 36.2% around the principal bais of Dzanga, Mongambe and Hokou and 1.6% in the Ndoki sector of the national park. On average there were 1.7 patrols a day in the whole of the protected areas of Dzanga-Sangha.

⁷ These species include: the sitatunga, the forest buffalo, the bongo antelope, the forest hog, the bushpig, the black and white colobus monke, white-cheeked mangabey and the greater white-nosed monkey (Turkalo, 2005).