12. Monte Alén-Monts de Cristal Landscape

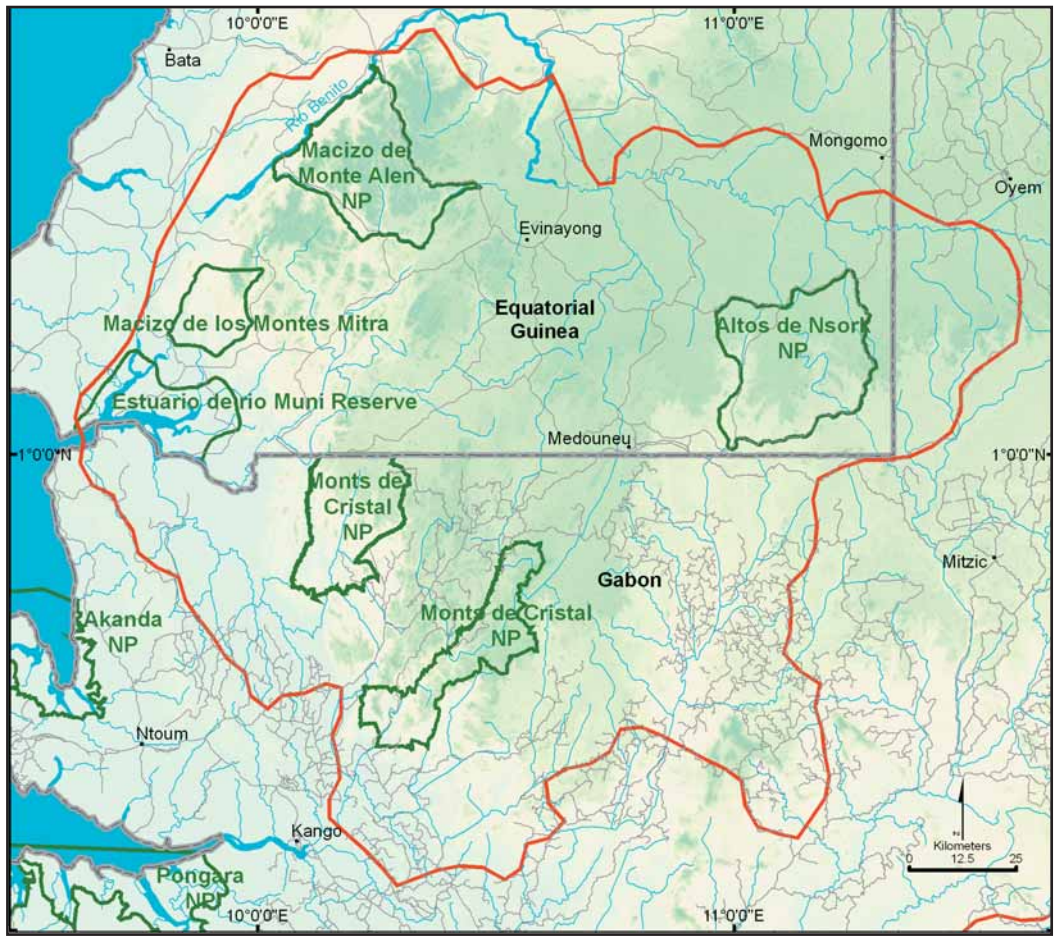


Figure 12.1. Map of Monte Alén-Monts de Cristal Landscape (Sources: CARPE, JRC, SRTM, WCS-Gabon).

The Landscape in brief

Coordinates: 1°53'35"N – 0°5'38"N; 9°37'2"E – 11°36'3"E
Area: 26,747 km²
Elevation: 300-1,250 m
Terrestrial ecoregion: Atlantic Congolese forests ecoregion
Aquatic ecoregions: Central West equatorial coastal ecoregion
Southwest equatorial coastal ecoregion
Protected areas:
Monte Alén National Park, 200,000 ha, 1988/2000, Equatorial Guinea
Altos de Nsork National Park, 40,000 ha, 2000, Equatorial Guinea
Monts de Cristal National Park, 120,000 ha, 2002, Gabon
Rio Muni Estuary Reserve, 70,000 ha, 2000, Equatorial Guinea
Piedra Nzas Natural Monument, 19,000 ha, 2000, Equatorial Guinea

Location and area

The Monte Alén-Monts de Cristal Landscape covers the south and southeast of Equatorial Guinea and the northwest of Gabon (Figure 12.1). It has an area of approximately 26,747 km², of which about half is located in Equatorial Guinea and half in Gabon. In Equatorial Guinea, it includes the Monte Alén and Altos de Nsork national parks, as well as the Rio Muni Estuary Reserve and the Piedra Nzas Natural Monument. In Gabon, it comprises the two sections of Monts de Cristal National Park.

Physical environment

Relief and altitude

The Landscape occupies a rugged area of plateaus and mountain chains mainly situated at an altitude of 300 m to 650 m to the northeast of the coastal sedimentary basin of Gabon (Figure 12.2). In Equatorial Guinea, the highest peak is formed by Monte Mitra, which rises to 1,250 m and is

the culminating point of the Niefang chain which runs from the southwest to the northeast. Monte Alén is slightly lower. To the east of this chain is a peneplain with a smoother relief at an average altitude of 650 m and with a landscape studded with granite inselbergs such as that of Piedra Nzas (700 m). In Gabon, the relief forms alignments running from the northeast to the southwest. The highest point is Mont Mbilan (800 m).

Geology and soils

The vast majority of rocks in the Landscape are Archean. In Gabon, the 3.2 billion years old non-differentiated gneisses are dominant, but there are also formations of amphibolites, aged 2.9-3.2 billion years, and ultramafic intrusions, 2.7-2.8 billion years old. In Equatorial Guinea and the Medouneu region, the dominant rocks are calco-alkaline granite aged 2.9 billion years.

Hydrology

In Equatorial Guinea, the Landscape is drained by the Mitemele, Laña and Wele rivers, which run to the estuaries of Rio Muni and Rio Mbini, two very important features of the coastal marine ecosystems in the Gulf of Guinea. These estuaries contain the coral reefs of the islands of Corisco and Elobey. The south of the Landscape includes humid areas that form the heads of the Komo River, which empties into the Gabon Estuary. In Gabon, the Landscape is drained by four watercourses that flow towards the southeast. The Mbé and the Komo form part of the basin of the Gabon Estuary. The Adouré and the Noya turn west and then northwest before ending in the Muni Estuary.

Climate

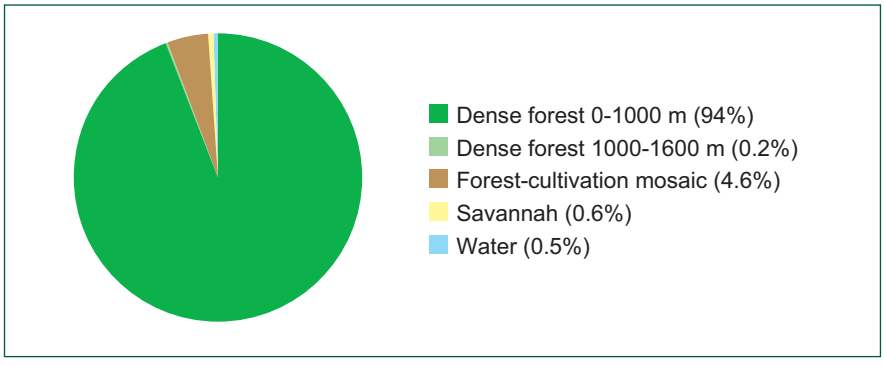
Across the Landscape, annual rainfall varies between 2,000 mm in the east to 2,800 mm in the west. There is a dry season of three months that runs from July to September, but its effects are considerably attenuated by the fact that a good part of the Landscape is then shrouded in low clouds. Not only does the whole region have high rainfall, but the humid winds from the Atlantic and the clouds that drift into the western flank of the mountains maintain a high level of humidity, especially in the dry season when the clouds are very low. These special conditions existed during the glacial eras. They were perhaps even more marked at that time due to the fact that the surface temperatures in the Gulf of Guinea were lower and stratiform clouds were more frequent. The mountains in this Landscape have thus been able to maintain large forest formations and represent a forest refuge.

Figure 12.2. Mountains in the Tchimbélé region.

Vegetation

The dominant vegetation is terra firma forest (Figure 12.3) of which 15-18%, in Gabon at least, has been modified by agriculture. Near the estuaries of the Rio Muni and the Komo, there are stretches of swamp forest (<1%) and an abandoned plantation of 500 ha of okoume can be found just to the south of the Seni section of the Monts de Cristal National Park. These forests are a part of the Atlantic coast forests and the caesalpiniaceous forests, which form more or less parallel chains along the coast of the Gulf of Guinea. The domi-

Figure 12.3. Main vegetation types (Source: JRC).



nant tree families are Burseraceae, Euphorbiaceae and Leguminosae-Caesalpinioideae. Above 650 m, the forest formations show submontane influences and, on high peaks or slopes exposed to the clouds of the Atlantic, there are cloud forests recognizable by their abundant epiphytes. The inselbergs also have a very particular vegetation, with meadows of *Afrotrilepis pilosa* and thickets very rich in epiphytes.

As part of an ancient Pleistocene refuge, the forests have maintained a very high level of species richness and numerous endemic species. The flora includes over 3,000 species of which a hundred or so are endemic to the Atlantic coastal region of Lower Guinea. The montane species found in Equatorial Guinea include *Podocarpus spp*. On the inselbergs, *Elaeophorbia grandifolia* and *Polyscias aequatoguineensis* have been found. In the Gabonese section, there are some species with a very limited distribution, particularly *Bikinia durandii*, a Caesalpinioideae, and *Marquesia excelsa*, the only Dipterocarpaceae in Africa, which is endemic to Gabon.

Recent studies suggest that the forests of the Monts de Cristal constitute the richest forest formations in Central Africa, from the point of view of both alpha and beta diversity, and the second richest in the world following a site in Ecuador[1]. In addition, the 'hot spots' are not the same for different groups or families of plants. Among the families that are exceptionally well represented are Acanthaceae, Melastomataceae, Balsaminaceae, Orchidaceae (Figure 12.4) and Begoniaceae (Figure 12.5). The forests of Monte Mitra are also exceptionally rich with an average of 107 plant species with a stem of over 1cm in diameter, per hectare.

Fauna

Mammals

The forests in the Landscape contain most of the mammals typically found in the forests of western Central Africa, notably the forest elephant *Loxodonta africana cyclotis*, the buffalo *Syncerus caffer*, the giant pangolin *Manis gigantea*, the water chevrotain *Hyemoschus aquaticus*, six species of duiker, de gorilla *Gorilla gorilla*, the chimpanzee *Pan troglodytes*, the mandrill *Mandrillus sphinx*, the black colobus *Colobus satanas*, the Ogooué talapoin monkey *Miopithecus ogoouensis*, the leopard *Panthera pardus* and the golden cat *Felis aurata*. The aardvark *Orycteropus afer* has also been reported. In the lower parts of Equatorial Guinea, the white-collared mangabey *Cercocebus torquatus* and the hippopotamus *Hippopotamus amphibious* have been found. It is important to mention that on the fringe of the Landscape – but still within the same forest block – manatees (*Trichechus senegalensis*) live in the Komo and Abanga rivers (comm. ENEF-WWF).

Birds

There is no comprehensive list of birds for the Landscape, but 267 species have been recorded in Monte Alén National Park and 340 in the Monts de Cristal region. Among the species endemic to Lower Guinea are the Cameroonian picatharte *Picathartes oreas*, Verreaux's Batis *Batis minima*, the forest swallow *Hirundo fuliginosa* and Rachel's malimbe *Malimbus racheliae*. In the Equatorial Guinea section, three montane species have been found that have not yet been observed in the Gabonese section: the pink-footed puffback *Dryoscopus angolensis*, the grey cuckooshrike *Coracina caesia* and the black-capped woodland warbler *Phylloscopus herberti* (Fishpool & Evans, 2001).

Herpetofauna

The reptiles are still poorly known, but their fauna appears rich and representative of the forests of the region. It includes the forest crocodile *Osteolaemus tetraspis*, the false gavial *Crocodylus cataphractus*, the forest tortoise *Kinixys erosa*, the ornate monitor *Varanus ornatus* and the African python *Python sebae*. In the Gabonese section, 48 species have been counted so far, but the total number of species is probably around 65 (Pauwels, pers. comm.).

As concerns amphibians in Gabon, species have been found that are associated with forest waterfalls; several of these species were only known from western Cameroon and one is a new species for science. In the Equatorial Guinea section, three threatened species have been found: *Bufo superciliaris*, the largest toad in Africa, *Conraua goliath*, the largest frog in the world, and *Trichobatrachus robustus*, a hairy frog.

Invertebrates

The invertebrate fauna is very poorly known, but preliminary prospecting in Gabon has revealed butterfly species that were considered endemic to western Cameroon, particularly *Cymothoe haimodi* and species with localized distributions, like *Euphaedra limbourgi*, *E. brevis*, *E. dargei*, *E. dargeana*, *E. adolfifrederickii*, *Euriphene minkoi*,

[1] On five sample plots of 1 ha, an average of 97 woody species with a diameter of over 10 cm were recorded; the richest sites in Cameroon have between 73 and 93 woody species (Thomas, 2004).

Euryphura euthalioides and *Euryphura nobilis* (G. Vande weghe, in prep.).

Humans in the Landscape

Density and distribution

The average population density is 16-18 inhabitants/km² in Equatorial Guinea and 0.6 inhabitants/km² in Gabon. In Gabon, the populations are concentrated along the Medouneu road and in the departmental capital where some 3,000 inhabitants reside. Cocobeach and Kango are situated just outside the Landscape and Libreville is less than 100 km away. These population centers are major destinations for bushmeat from the west and south of the Landscape. In Equatorial Guinea, the recent development of petroleum extraction has instigated large-scale migration to the towns of Bata and Malabo, as well as Evinayong (10,000 inhabitants), which is situated within the Landscape. Despite the significant urbanization of populations, immigrants to urban areas maintain contact with the rural areas and there are still important economic, family and cultural links between new urban populations and rural populations. In some remote areas, whole villages have been abandoned and fields recolonized by the forest.

Ethnic groups

The dominant ethnic group in the mountain areas of the Landscape is the Fang group. Ndowe live in the coastal basin in Equatorial Guinea and small populations of Beyele Pygmies remain in the Altos de Nsork region.

Activities

In both Gabon and Equatorial Guinea, human populations depend on subsistence agriculture and hunting. Cultivation is itinerant and is usually established in old secondary forests or abandoned coffee plantations. Any surplus of agricultural products is sold along the roadsides or, less frequently, transported to towns. In the Gabonese section of the Landscape, there are 40-50 professional hunters, ten of whom are elephant hunters. In Medouneu, 400-500 people are employed by the government. In the periphery of the Landscape, commercial hunting for bushmeat is a very important activity along the Ndjolé-Lalara road (recently tarred).

Land use

Forest concessions cover 65% of the Landscape, protected areas 18% (27% in Equatorial Guinea), and crops 3% (Figure 12.6). In Gabon, two hydroelectric dams have been constructed in the Mbé Valley to supply Libreville, the capital of the country.

Logging

In Gabon, most of the Landscape is covered by forest concessions and 'family felling rights'. Logging began in the 1970s and old maps show a dense network of logging roads, most of which are no longer useable because they have been overtaken by the forest and the bridges have collapsed. At present, logging takes place in the south and east of the Mbé sector. Very recently, it has also begun in the northeast. However, the most intense logging used to be in the west of this sector, but it stopped in 2004 because it was no longer profitable. Logging continues in the lower regions in the south of the Seni sector. The concessions are worked by French, Asian and Franco-Gabonese companies (NBG, TLP, Afrique Verte, SGG, SEEF, Rougier, BSG).

In Equatorial Guinea, timber was the main source of foreign exchange before oil was discovered in 1995. The volume harvested rose from 50,000 m³ in 1980 to 790,000 m³ in 1999, although maximum sustainable production had been officially estimated at 400,000 m³ and legal small-scale production was set at 450,000 m³. The main species harvested was okoume and 85% of production was exported as logs to Asia. With oil revenue, the pressure on the forest eased, but unregulated and unsupervised logging continues. Companies are taxed on the basis of the logs arriving at the port of export; consequently, companies have no interest in reducing the impact of their logging and the government is deprived of revenue that could finance monitoring. Most of the Landscape outside of the protected areas is divided up into concessions, but many are inactive. Recently, the President of the Republic ordered the creation of a permanent national forest domain of 500,000-600,000 ha where logging would be supervised. This measure could ensure the interconnectivity of the protected areas.

Figure 12.4. Among the Orchidaceae, the genus Polystachya is particularly well diversified.

Figure 12.5. Among the Begoniaceae are many land plants as well as epiphytes.

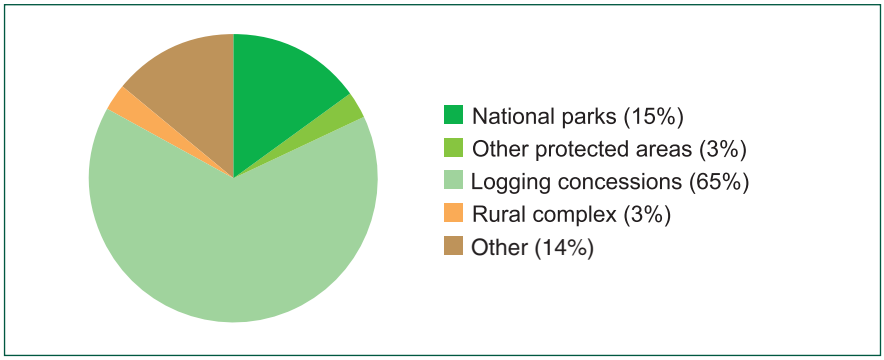


Figure 12.6. Main land use types.

Reasons for the identification of the Landscape

(1) This Landscape was chosen for its extraordinary biodiversity, linked to the climatic conditions, and because it contains an ancient Pleistocene refuge.

(2) The Equatorial Guinea section was considered important for bird conservation (Fishpool & Evans, 2001).

(3) The human population density is relatively low, especially in Gabon.

(4) The forests are still fairly well conserved.

Conservation

History

In Equatorial Guinea, Monte Alén National Park was created in 1988 and benefited from the support of the ECOFAC program which began in 1992. In 1997, a forest law was passed providing for the creation of a vast network of protected areas. In March 2000, following the Yaoundé Declaration and the CUREF program proposals, 13 protected areas were created, four of them in the Landscape: Monte Alén National Park, Altos de Nsork National Park, Piedra Nzas National Monument and Rio Muni Nature Reserve. The CUREF program ended in 2002 and its activities were handed over to the *Instituto de Desarrollo Forestal* (INDEFOR), created to manage the country's forests and protected areas. The ECOFAC program was suspended in 2004 and is set to resume in 2007. Very recently, following a COMIFAC meeting, the national forest domain was created and a good part of it lies within the Landscape. The aim of the forest domain is to 'let the forests rest' after a recent phase of intense logging. However, the creation of this forest domain has not yet been approved by Parliament.

In Gabon, the value of the region was recognized by conservation botanists well before it was added to the list of priority conservation sites by the IUCN in 1990. The creation of Monts de Cristal National Park in 2002 was a result of this recognition. It is composed of two blocks of 600 km² (Seni sector and Mbé sector) that cover 10% of the surface area of the Landscape in Gabon.

Players

In Gabon:

- CNPN, MEFEPPN, WCS and WWF are the principal conservation players.
- The Smithsonian Institution, the Missouri Botanical Garden, the University of Wageningen and the national herbarium (CENAREST) are engaged in research.
- The Gabonese Water and Energy Company (SEEG) runs the hydroelectric dams.
- The main industrial logging companies are: NBG, TLP, Afrique Verte, SGG, SEEF, Rougier, and BSG.

In Equatorial Guinea:

- INDEFOR, the University of Acalá, the Missouri Botanical Garden, Imperial College, the University of Wageningen, Boston College and the Smithsonian Institution are involved in research.

Direct threats

(1) Hunting and bushmeat trade

In both Equatorial Guinea and Gabon, hunting for bushmeat represents the main threat to biodiversity. In Equatorial Guinea, the consumption of bushmeat has risen considerably in the last few years. This increase is the result of an increase in the purchasing power of the urban populations following the development of oil extraction. Regulations are not observed and even protected animals are openly sold in the markets.

(2) Ivory trade

In Gabon, elephant hunters continue to operate, but they are as equally concerned with elephant meat as ivory. As in many other regions of Central Africa, they are supported by local elites.

(3) Industrial logging

In Equatorial Guinea, despite a recent slowdown, logging continues to be unsustainable and there is ongoing degradation. In Gabon, there is pressure to restart logging in the buffer zones of national parks due to the fact that laws and

regulations on the management of these areas do not yet exist. However, small companies operating in the Landscape, with the exception of SEEF, are not in a position to practice reduced-impact sustainable management. Chinese and Malaysian companies, in particular, operate in a destructive manner[2]. Unlike other companies, they harvest timber of lower value and leave behind highly impoverished forests. In general, industrial logging causes much more damage in mountainous areas than on flat ground. Submontane forests and cloud forests are more sensitive to any opening-up of their canopy; the penetration of light into the undergrowth transforms the microclimate, which may become unsuitable for very sensitive plants, such as begonias.

(4) Small-scale mining

In a few places in the Gabonese part of the Landscape there are gold panners who disturb streams, aggravate erosion, intensify sedimentation and spend a lot of time hunting.

(5) Industrial mining

It is also possible that in the southern part of the Landscape platinum mining may start over a strip of 85 km, of which 75 km are in the Mbé sector of Monts de Cristal National Park or in the 5 km buffer zone. Initial prospecting has already been carried out and more advanced prospecting will take place over the next few years to determine the economic feasibility of this mining activity. If the results are positive, partial declassification of the national park could be forseen, with compensatory classification of other forests with the same area. In this scenario, the richest forests of Central Africa would be 'replaced' by poorer forests. Logging could also have adverse effects on the hydrological system in the region and could impact hydroelectric supplies of electricity to Libreville by affecting the operation of turbines and increasing erosion and sedimentation in dams.

Indirect threats

(1) Weak institutions

In Equatorial Guinea, INDEFOR has little influence within the government, including within its own Ministry, and does not have the financial means to carry out its tasks. Consequently, the concessions are not monitored, the guards responsible for supervising the protected areas are ineffective and laws are ignored because of a lack of professionally qualified personnel. The few existing personnel have little training, remain isolated and are poorly paid.

(2) Ad hoc development

In Equatorial Guinea, the government has started repairing and extending the road system, while logging companies are constructing their own roads. The number of vehicles has risen substantially. These activities enormously increase accessibility to the forests and facilitate poaching.

State of the vegetation

There is little concrete data suitable for evaluating and quantifing the impacts of human activities on forests. However, in general, the forests are a mosaic of degraded and intact formations, where intact formations are protected by their inaccessibility. The national parks of Monte Alén, Altos de Nsork and Monts de Cristal still have considerable expanses of primary forests. In Equatorial Guinea, the composition of the forests in the coastal basin has been modified by the excessive logging of okoume, but these changes are not irreversible and these forests can still recover a good portion of their biodiversity. The forests in the interior of the country have been minimally logged and those in Altos de Nsork National Park are intact.

State of the fauna

No species in the Landscape has been eliminated locally, but population densities are very low, especially in Gabon. Recent inventories show that the northern block of Monts de Cristal National Park is particularly 'empty' of large fauna[3]. The Mbé sector of Monts de Cristal National Park is nevertheless part of a large area of forest stretching as far as Ndjolé, Mitzic and Medouneu. The interior of the Abanga forests (15,000 km^2) contains high densities of large mammals and most notably elephants (SEEF, CFAD Haut-Abanga de Rougier). The elephants move between the forests of the Tridom and the forests of Abanga.

[2] These companies often work on very steep slopes where they carve out roads and cause serious erosion.

[3] Inventories to be completed later with a report in preparation.

Financing of conservation

In Equatorial Guinea and Gabon, only one protected area is certain of financing in the short term (<2 years).

Environmental education and capacity building

In Gabon, WCS runs an environmental program in villages on the periphery of Lopé National Park that includes actions targeted at schoolchildren and informal meetings for adults. An apiculture project and a vegetable garden for children have been launched to promote the sustainable management of natural resources on communal land.

Management and governance in the field of renewable natural resources

(1) At the Landscape level

In Equatorial Guinea, the CUREF project (European Commission) has developed a land pre-classification map covering an area of about 20,000 km^2, which has yet to be validated by the government.

(2) In protected areas

Throughout the Landscape, with the exception of Monte Alén National Park, management of protected areas is still in its early stages. In Gabon, Monts de Cristal National Park is managed by CNPN with the support of WCS. All the protected areas have legally defined limits.

(3) In the extractive zones

In Gabon, the forests outside the village sectors are the responsibility of the Ministry of the Forest Economy. In the eastern and southern part of the Abanga forests, WWF is working in collaboration with the Ministry of Forest Economy and with loggers to improve the management of fauna in this forest network; a cooperative agreement is being prepared between the Ministry, Rougier Gabon and WWF. This agreement centers on the conservation of fauna in the Rougier CFAD of 'Haut-Abanga' (288,626 ha). Socioeconomic surveys have been carried out along the Medouneu-Sam, Lalara-Ndjolé and Ndjolé-Bifoun-Oyan axis. A network of old forest tracks in the Oyan-Bifoun-Ndjolé area provides access to poachers.

(4) In rural areas

No actions have been initiated.

Monitoring of natural resources

In Gabon, basic demographic, socioeconomic, resource use, human pressure, and biological data were collected in 2004 and 2005. These efforts involved national and international institutions and covered almost the entire Landscape. An exhaustive report is being drawn up to support management and local and regional monitoring activities. These surveys were an initial reconnaissance exercise to assess the prevailing conditions and in no case constitute exhaustive inventories. A more comprehensive monitoring program will be proposed on the basis of the data obtained and will be used to measure changes over the course of time. Unfortunately, such monitoring is expensive and budgetary constraints make it impossible in the near future.

To monitor forest dynamics, five one hectare plots were identified and all woody species with a diameter of over 1 cm or 10 cm were recorded. This work was made possible through collaboration between the national herbarium of Gabon, the Smithsonian Institution and the Missouri Botanical Garden (Thomas, 2004).

In Equatorial Guinea, capacities are being developed through a promising collaboration between INDEFOR, IUBioma (the national biodiversity institute), the University of Acalá, the Missouri Botanical Garden, Imperial College and Conservation International. IUBioma and INDEFOR are developing a national research and monitoring plan which will include the Landscape.