

# CHAPTER 15

## MONTE ALÉN-MONTS DE CRISTAL LANDSCAPE

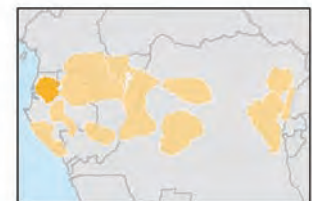
*Christopher Kernan and Patrick Mehlman*

### Land Use Planning

In the Monte Alén-Monts de Cristal Landscape (MA-MC), land use planning is beginning to exert an influence on forest and natural resource management. A landscape land use plan has been designed. In addition, land use plans for the Monte Alén National Park (PNMA), Altos de Nsork National Park (PNAN), Monts de Cristal National Park (PNMC), *Réserve Militaire Monts de Cristal* (RMMC), Bosque Nacional Guinea Ecuatorial (BNGE), Abanga River (AR), Lonmin, Rougier, and SEEF macro-zones are in various stages of being designed, adopted or implemented. The Rougier extractive zone land use plan, although a private document unavailable to the public, is fully convened, designed and being implemented on schedule.

In the Monte Alén segment of the landscape, a land use plan for PNMC is the highest priority objective of ECOFAC, which will accomplish this by contracting an external consultant to work with the PNMA planning team. ANDEGE, an Equatorial Guinean environmental NGO, leads a PNAN land use planning team that has drafted a PNAN land use plan and in 2009 will present, discuss, and revise the plan with the participation of PNAN stakeholders.

The BNGE planning team has developed management objectives and guidelines for a BNGE land use plan. The declared purpose of BNGE is to support both biodiversity conservation and viable economic opportunities for local communities using natural resources sustainably. The BNGE planning team has proposed BNGE boundaries that would protect three large forest blocks. The team will present these boundaries and the land use plan to stakeholders in a series of community meetings in 2009 and will revise both in response to their participation. The BNGE planning team will then prepare legal and technical documents needed for Equatorial Guinea's parliament and the government to create formally BNGE. As supporting sustainable economic activities will be a management focus of BNGE, CI and ANDEGE have begun organizing forest product cooperatives associated with BNGE com-



Sources: CI, UMD-CARPE, OSFAC, FORAF, IUCN, Tom Patterson US National Park Service.  
 Figure 15.1: Macro-zones in the Monte Alén-Monts de Cristal Landscape

munity forests (“Reservas de Poblados”) and working with these cooperative to develop sustainable harvesting plans.

Land use planning in the Monts de Cristal segment of the landscape is evolving and gradually bringing formal land use planning to more areas of the landscape. WCS is supporting the Gabonese government in establishing a military



**Photo 15.1:** *The main axis of the Mbé sector of Monts de Cristal National Park is formed by the Mbé River basin and its principal tributary, the Abangassa River.*

reserve in the PNMC buffer zone (RMMC). This is a new category of PA that will have distinctive land use planning objectives and guidelines. WWF is developing a CBNRM stretching from populated areas along the lower Abanga River north to the isolated forest of the Abanga's head-

## Human Activities

ANDEGE field work in the Monte Alén segment of the Landscape shows that 58.5 % of livelihood activity time requires contact with the forest (Figure 15.2).

The inhabitants of the Monte Alén segment frequently complain of crop damage from forest animals, most often mentioning elephants, gorillas, wild pig, and mandrills. A ban on hunting within protected areas, and a complete ban on hunting primates, appears to these rural people as a particular injustice. They voiced to ANDEGE a demand that an external entity provide a solution. It is evident that forest animals can destroy an individual agriculture plot, but there are no quantitative data to map or calculate the significance of these crop losses.

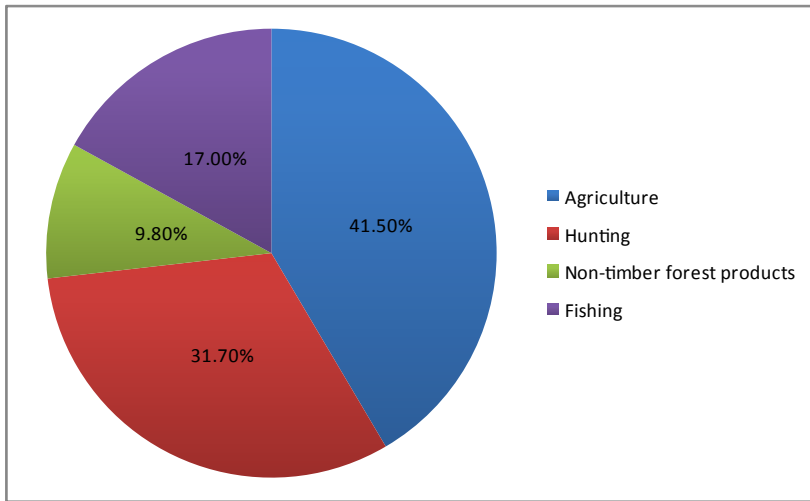
Monte Alén villagers generally understand that protected areas maintain natural resources and usually they voice support for this goal. These rural residents, however, want viable economic alternatives to recompense any restrictions on their use of the forest. Few rural livelihoods can compete with cash-paying jobs in Bata and Malabo and many villagers of working age have already moved to these urban centers. Easy travel between villages and cities on new, all-weather

waters. WCS, WWF, and MBG have been working with botanical data to define strictly protected high biodiversity micro-zones within ERZs and CBNRMs. As a result of this work, Rougier and SEEF have created several of these micro-zones within their timber ERZs.

The most problematic component of the MA-MC landscape land use planning remains a formal mechanism to coordinate land use plan design, adoption, and implementation in the two segments. So far, landscape coordination has been through landscape consortium cooperation, IUCN/CARPE focal point contacts or Gabon-Equatorial Guinea technical exchanges within COMIFAC. The land use planning team has proposed that the Comisión Nacional del Medio Ambiente (CONAMA) is the appropriate body to represent Equatorial Guinea in a formal coordination mechanism, but CONAMA cannot become functional until contradictions and conflicts in Equatorial Guinea's current laws are resolved, which will not happen soon. Equatorial Guinea and Gabon have taken their dispute about the border that runs through the MA-MC landscape to the United Nations.

roads mean that even rural residents are increasingly part of the urban economy rather than one based on direct exploitation of the forest or the soil. In Sendje, for instance, most bushmeat hunters now work in Bata, which is only 30 minutes away on paved roads.

ANDEGE has proposed boundaries for the mixed use Equatorial Guinea National Forest (BNGE) that exclude corridors along roads and urban centers (ANDEGE, 2008a). Table 15.1 provides a synopsis of the human population and timber concessions that fall within these boundaries. Population numbers rely on official records and overestimate residents. Sixteen percent of the area is in swidden agriculture or villages; the rest is heavy forest, 38 % within timber concessions. The BNGE is working to design a BNGE land use plan that balances competing land use demands for the area.



Source: Benito Mba Medja, ANDEGE, 2008.

Figure 15.2: Distribution of time spent on alternative economic activities in rural communities of the Monte Alén segment.

Table 15.1: Socio-economic characteristics of the proposed Equatorial Guinea National Forest.

Block	Area	Population	Number of villages	Km of roads	Timber concessions (area)	% forest cover
Block 1	300,000 ha	~10,000	30	215	None active	85
Block 2	138,100 ha	~7,500	15	105	Shimmer Int (47,000 ha) Shimmer Int (10,000 ha) Samage (23,000 ha)	69
Block 3	162,500 ha	~7,500	21	34	Semasa Shimmer (65,350 ha) Shimmer Mongola (39,000 ha) Chilbo (5,500 ha) Mari Luisa Chilbo (2,000 ha)	95
<b>Total</b>	<b>600,600 ha</b>	<b>~25,000</b>	<b>66</b>	<b>354</b>	<b>191,850 ha</b>	<b>84</b>

Source: ANDEGE.

Hunting remains an important human activity in the MA-MC landscape. Bushmeat is a source of nourishment for rural residents and hunting pressure influences the size and distribution of prey populations. WCS recce data suggest that hunting has influenced the distributions of large mammals. Elephants and apes were most abundant in the remote lowland forest of eastern Mont Mbé NP where signs of hunters were scarce. By contrast, northern Mont Seni NP had very few signs of apes, elephants, monkeys or ungulates, but many signs of hunters. Abandoned elephant paths in this sector suggest that elephants had been present in the recent past, but had either been hunted or had moved away. Abandoned elephant paths around the Kinguele area in southern Mont Seni NP suggest a similar effect.

The main road from Libreville to Medounou runs through the Mbé River valley between Mont de Seni and Mont de Mbé. WCS found almost no elephant signs in this area but did find many signs of hunting, especially near Song, Asseng Assala, and nearby villages. WCS found evidence that hunters from Equatorial Guinea were active in Gabon, especially in northern Seni. Most Gabonese people living along the main road, however, did not appear to hunt much further than 5 kilometers from their village.

On 27 October 2007, Equatorial Guinea issued a decree banning the killing, possession, sale, transportation, and eating of any primate species. Awareness of the ban is widespread in the Monte Alén segment. The number of primates for sale in the main bushmeat markets of Bata and Malabo has dropped to one or two animals per week since the ban.



Photo 15.2: Many forest products can be found in African markets.

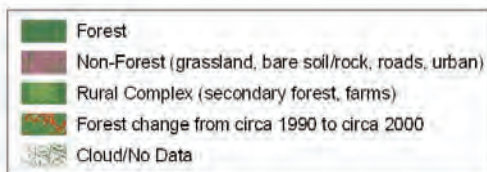
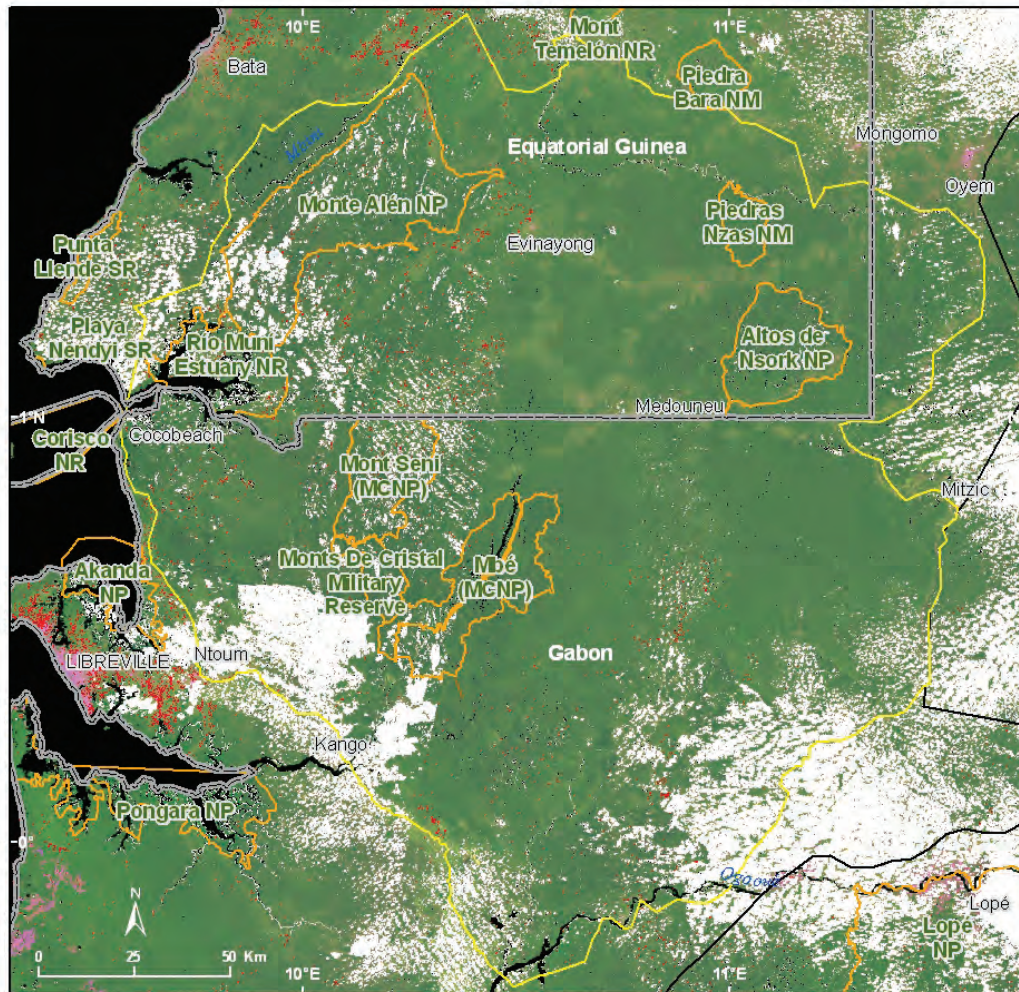
**Table 15.2a: Important agricultural products in the Monte Alén segment of Monte Alén-Monts de Cristal Landscape**

Agricultural product	Unit	Purchase price/unit (\$)	Primary destinations	Date	Data collection	Sources
Yucca	Bundle	0.88	Bata, Evinayong, Nsork, local markets in EG, local markets in Gabon	Mar-June 2008	Interviews with village residents producers	ANDEGE, 2008b
Banana	Hand (20)	6.25	Bata, Evinayong, Nsork, local markets in EG, local markets in Gabon	Mar-June 2008	Interviews with village residents producers	ANDEGE, 2008b
Malamba	Liter	0.50	Bata, Evinayong, Nsork, local markets in EG, local markets in Gabon	Mar-June 2008	Interviews with village residents producers	ANDEGE, 2008b

**Table 15.2b: Bushmeat trade in the Monte Alén segment of Monte Alén-Monts de Cristal Landscape**

Bushmeat species	Unit	Purchase price/unit (\$)	Primary destinations	Date	Data collection	Sources
Brush tailed porcupine ( <i>Atherurus africanus</i> )	Whole	2.50	Malabo, Bata, and Ebibeyin	Nov 2007-Mar 2008	Interviews in the villages of Sendje I, Mitom, Emangos, Ncoho, Mitong and Kuma; Market surveys of bushmeat for sale in Malabo, Bata, and Ebibeyin	ANDEGE, 2008c
Blue duiker ( <i>Cephalophus monticola</i> )	Whole	17.50	Malabo, Bata, and Ebibeyin	Nov 2007-Mar 2008	Interviews in the villages of Sendje I, Mitom, Emangos, Ncoho, Mitong and Kuma; Market surveys of bushmeat for sale in Malabo, Bata, and Ebibeyin	ANDEGE, 2008c
Emin's pouched rat ( <i>Cricetomys emini</i> )	Whole	10.00	Malabo, Bata, and Ebibeyin	Nov 2007-Mar 2008	Interviews in the villages of Sendje I, Mitom, Emangos, Ncoho, Mitong and Kuma; Market surveys of bushmeat for sale in Malabo, Bata, and Ebibeyin	ANDEGE, 2008c

## Forest Cover



Sources: SDSU, UMD-CARPE, NASA, SRTM, IUCN, FORAF

Figure 15.3: Composite Landsat satellite image of the Monte Alén-Monts de Cristal Landscape

Table 15.3: Forest cover and forest loss in the Monte Alén-Monts de Cristal Landscape from 1990 to 2000

Landscape area	Forest area			Forest loss			
	1990 (km <sup>2</sup> )	2000 (km <sup>2</sup> )	2005 (km <sup>2</sup> )	1990-2000 (km <sup>2</sup> )	1990-2000 (%)	2000-2005 (km <sup>2</sup> )	2000-2005 (%)
26,606	26,229	26,101	N/A	128	0.49	N/A	N/A

Forest cover and forest cover loss are derived from Landsat and MODIS satellite data.

Sources: SDSU, UMD-CARPE, NASA.

**Table 15.4: Vegetation cover and vegetation loss in Río Muni, Equatorial Guinea in 1997**

Vegetation type	Original area (ha)	1997 area (ha)	Percentage of original area	Percentage of 1997 area
Lowland moist forest	2,397,662	347,832	92.16	13.37
Degraded lowland moist forest		1,250,000	0.00	48.05
Montane forest	200,538	91,068	7.71	3.50
Degraded montane forest		20,600	0.00	0.79
Secondary forest		546,200	0.00	20.99
Heath and grassland	3,500	3,500	0.13	0.13
Cultivation/settlement		342,500	0.00	13.16
<b>Total</b>	<b>2,601,700</b>	<b>2,601,700</b>	<b>100</b>	<b>100</b>

Source: CUREF

A field verified analysis of forest cover change based on recent, satellite imagery has not been completed for the landscape but Figure 15.3 and table 15.3 show forest cover and loss based on satellite imagery from circa 1990 to 2000. The estimates in table 15.4 are based on a forest ecosystem classification developed by CUREF (*Conservación y Utilización Racional de Recursos Forestales*) and land use maps of the continental part of Equatorial Guinea (Río Muni) derived from a 2001 field-verified interpretation of a 1997 Landsat image.

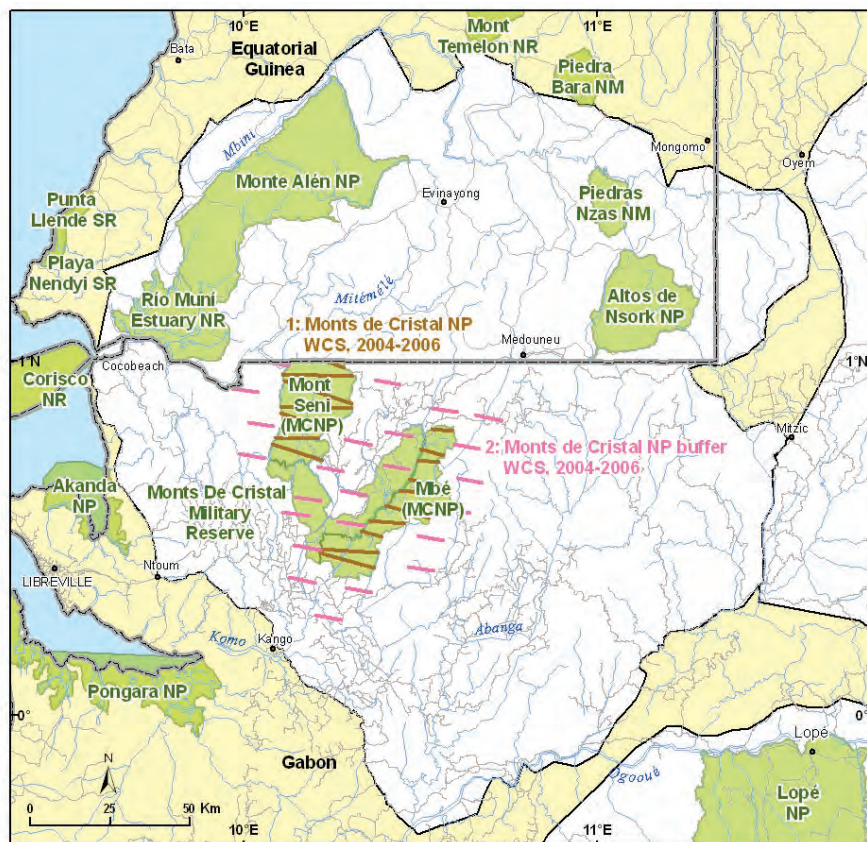
Table 15.4 includes areas in Equatorial Guinea outside of the MA-MC landscape that are much more heavily deforested than within the Monte Alén segment. The Monts de Cristal segment of the landscape is also less deforested than the Río Muni average. With economic changes occurring in Equatorial Guinea, the rural population is decreasing and forest area may have increased since 1997. The same trend of rural depopulation and forest regrowth may be occurring in the Monts de Cristal segment.



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**Photo 15.3:** The spatial distribution of the liana *Duparquetsia orchidacea* (family of leguminous plants) is limited to the wettest forests around the Gulf of Guinea. It is a very old species that differentiated before the separation of major sub-families like papilionoidea, mimosoideae and cesalpinoideae.

## Large Mammal and Human Impact Monitoring



Sources: CI, WCS, UMD-CARPE, OSFAC, FORAF

**Figure 15.4:** Biological surveys conducted in the Monte Alén-Monts de Cristal Landscape

**Table 15.5: Biological survey results from the Monte Alén-Monts de Cristal Landscape**

Survey	Site name	Survey date	Lead organization(s)	Total km of recces	Elephant presence	Elephant dung pile encounter rate	Ape presence	Ape nest group encounter rate	Human sign
1	Monts de Cristal NP, Gabon	Dec 2004-Jan 2006	WCS	222	Yes	2.97/km	Yes	0.45/km	0.54/km
2	Monts de Cristal NP, Gabon	Dec 2004-Jan 2006	WCS	185	Yes	3.56/km	Yes	0.53/km	0.95/km

Source: *Aba'a Nseme, 2006.*

WCS completed 407 km of recces surveys in PNMC and its buffer zones (including part of the Kougouleu-Medouneu-Mbe (KMM) CBNRM) from December 2004-January 2006. Field workers recorded and georeferenced all signs of humans and large wildlife. Overall, the encounter rates for signs of large mammals or hunters were not statistically significant between the parks and their buffer zone. Mont de Mbé NP, however, had significantly more ape nests, elephant paths and duiker dung than Mont de Seni NP.

Elsewhere in the landscape, the MA-MC consortium has informally surveyed knowledgeable biologists, local community members, and hunters on the status of the MA-MC indicator species in the landscape.

Elephant densities in the Niefang range are known to be some of the highest in Central Africa

## Special Interest

Missouri Botanical Garden (MBG) research has discovered traces of climatic change in the Monte Alén-Monts de Cristal Landscape's remarkable botanical richness and has used this information to recommend changes in the design of the landscape's system of protected areas.

The area of African wet forest has expanded and contracted several times. Today's natural extent is less fragmented and larger in area than it was several times during the Holocene and Pleistocene, but smaller in area than occurred 8,000 years ago.

These climatic cycles have greatly influenced MA-MC's patterns of plant richness and endemism. As wet forest disappeared, many plant species retreated to semi-isolated ecological islands of wet climate, conditions that also favored speciation. When the climate turned wet again, these refugia were the centers of forest expansion. Conversely, when wet forest expanded, dry vegetation

(Smithsonian Institution, undated). Elephants are present in much of the Monts de Cristal segment with several areas of high density in remote forests, for instance, the Rougier ERZ and the Abanga Forest Block. But there are also areas where elephants are rare perhaps due to hunting pressure or the disturbance of human presence. Local people report gorillas and chimpanzees present in all of the landscape's less accessible forest with gorillas more common than chimpanzees. Recent visits to falls of the Río Wele documented healthy populations of Goliath frogs; reports of populations on the lower Ntem are several years old. In the last year Guineans have reported manatee in the Estuario Río Muní, Río Mbini, and Río Campo. WWF has documented manatee in the Abanga River.

species retreated to their own climatic refugia and expanded from these in drought phases.

The MA-MC landscape includes both types of refugia. A large area of climatically stable forest (CSF) never completely lost its wet forest. Inselbergs were refugia for drought-adapted species.

Global warming and economic development are now re-fragmenting and reducing the area of wet forests. CSF is again becoming critical for the regional survival of wet forest species. Inselbergs are potential centers of dry-adapted vegetation expansion. MBG has pointed out that mapping and protecting the integrity of CSF and inselbergs in the landscape is a long-term climate change strategy for the landscape. MBG has been detecting the locations of CSF embedded in the landscape's general forest matrix through careful floristic mapping.

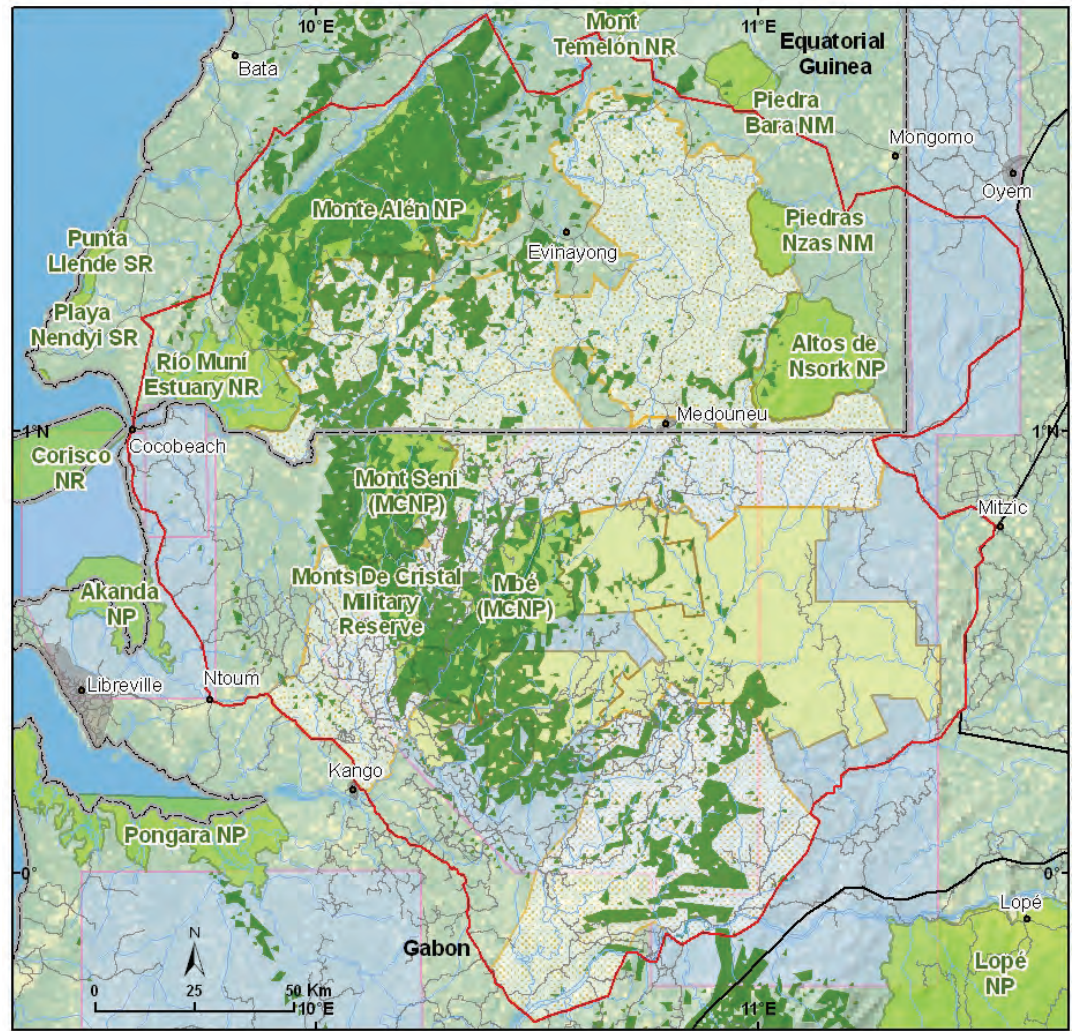


**Photo 15.4: To the north-east of Monts de Cristal there are many inselbergs, clusters of granite rock that formed about 2.5 billion years ago.**



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*Photo 15.5: The understory abounds with small streams that originate from steep slopes.*



Sources: MBG, CI, UMD-CARPE, OSFAC, IUCN, Tom Patterson US National Park Service.  
 Figure 15.5: Climatically stable forest in the Monte Alén-Monts de Cristal Landscape