

Takamanda Forest Reserve, Cameroon

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1 The region

The Republic of Cameroon extends from 2° N to 13° N latitude and between 8° 25' E and 16° 20' W longitude. The country has a total area of 475,440 km² and is bordered by Chad, Nigeria, Congo, Gabon, Equatorial Guinea and a 350-km stretch of the Atlantic Ocean coastline. Takamanda Forest Reserve (TFR) is located in the Southwest Province of Cameroon. The Reserve is part of the Guineo-Congolese forest, which encompasses approximately 2.8 million km² mostly below 600 m, except where Precambrian highlands such as the Jos Plateau of Nigeria and the Cameroon Highlands rise above 1000m (Lawson 1996). The highest point is Mount Cameroon at 4,079 m.

Rainfall in this vast forest varies from 1500 to more than 10,000 mm per year, giving rise to a variety of vegetation floristic regions (White 1983). The region contains 84% of known African primates, 68% of known African passerine birds, and 66% of known African butterflies (Groombridge and Jenkins 2000). For this reason, the Guineo-Congolese rainforest is an important focal point for conservation efforts in Africa.

The Southwest Province and adjacent portions of southeastern Nigeria are rich in biodiversity. Floristically, this area is part of the Hygrophyllous Coastal Evergreen Rainforest, which occurs along the Gulf of Biafra. This vegetation sub-unit is associated with high rainfall levels (White 1983) and is part of the Cross-Sanaga-Bioko Coastal Forest ecoregion, an area of 52,000 km² (Olson *et al.* 2001, World Wildlife Fund 2001). The ecoregion is considered an important center of plant diversity because of its probable isolation during the Pleistocene (Davis *et al.* 1994).

Protected areas in the region include Cross River National Park in Nigeria and Korup National Park in Cameroon, as well as an extensive network of forest reserves such as Ejagham and Takamanda (Figure 1).

2 Takamanda Forest Reserve

Takamanda Forest Reserve (05°59'-06°21'N: 09°11-09°30'E), covering 67,599 ha, is situated in the northernmost corner of the Southwest Province, northeast of the extensive Cross River Valley. The Reserve stretches along the eastern border of Nigeria (Figure 2), which forms the north and northwest boundaries of TFR (Gartlan 1989).

Created by decree in 1934, the area was first gazetted as part of a network of forest reserves (production forests) by the British colonial administration in what was then the British Cameroons. Akin with forest policy throughout the British Empire, TFR was initially established to protect watersheds and restrict the expansion of agricultural, but more importantly to conserve areas for future logging. As with all gazetted areas in Cameroon, the Reserve is managed on the national level by the Cameroon Government Forestry Department's Ministry of Environment and Forests (MINEF) through the Ministry's Manyu Division Office in Mamfe. The Manyu office is responsible to the Provincial Delegate in Buea.

3 Geomorphology and drainage

Much of the lowland forest area in the southern and central part of the Reserve lies between 100 and 400 m. The terrain is rolling in the lowland areas, but rises sharply to an altitude of 1,500 m in the northern part of the Reserve, where slopes are extremely steep. Small

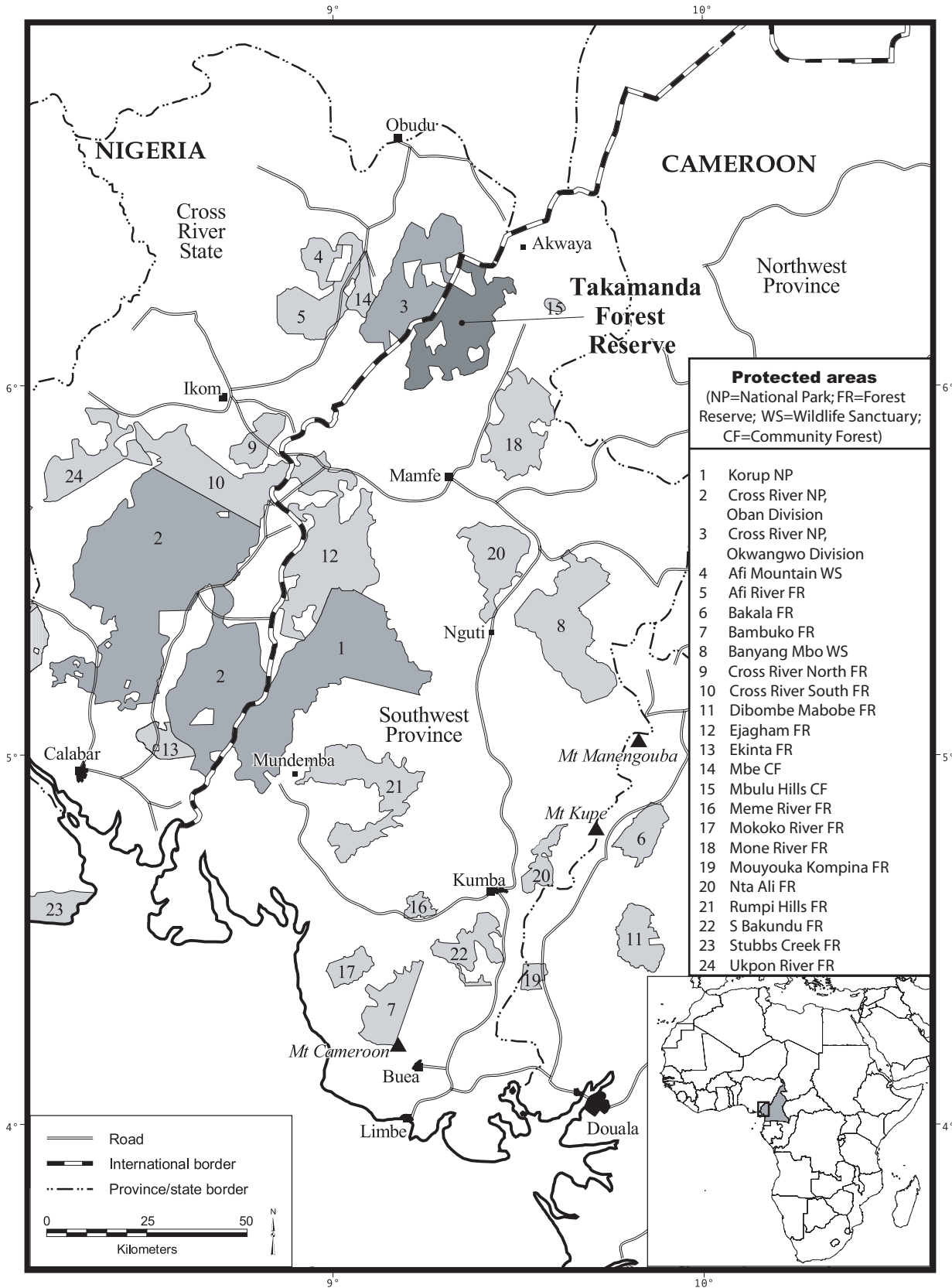


Figure 1. Southwest Province of Cameroon and the associated protected areas.

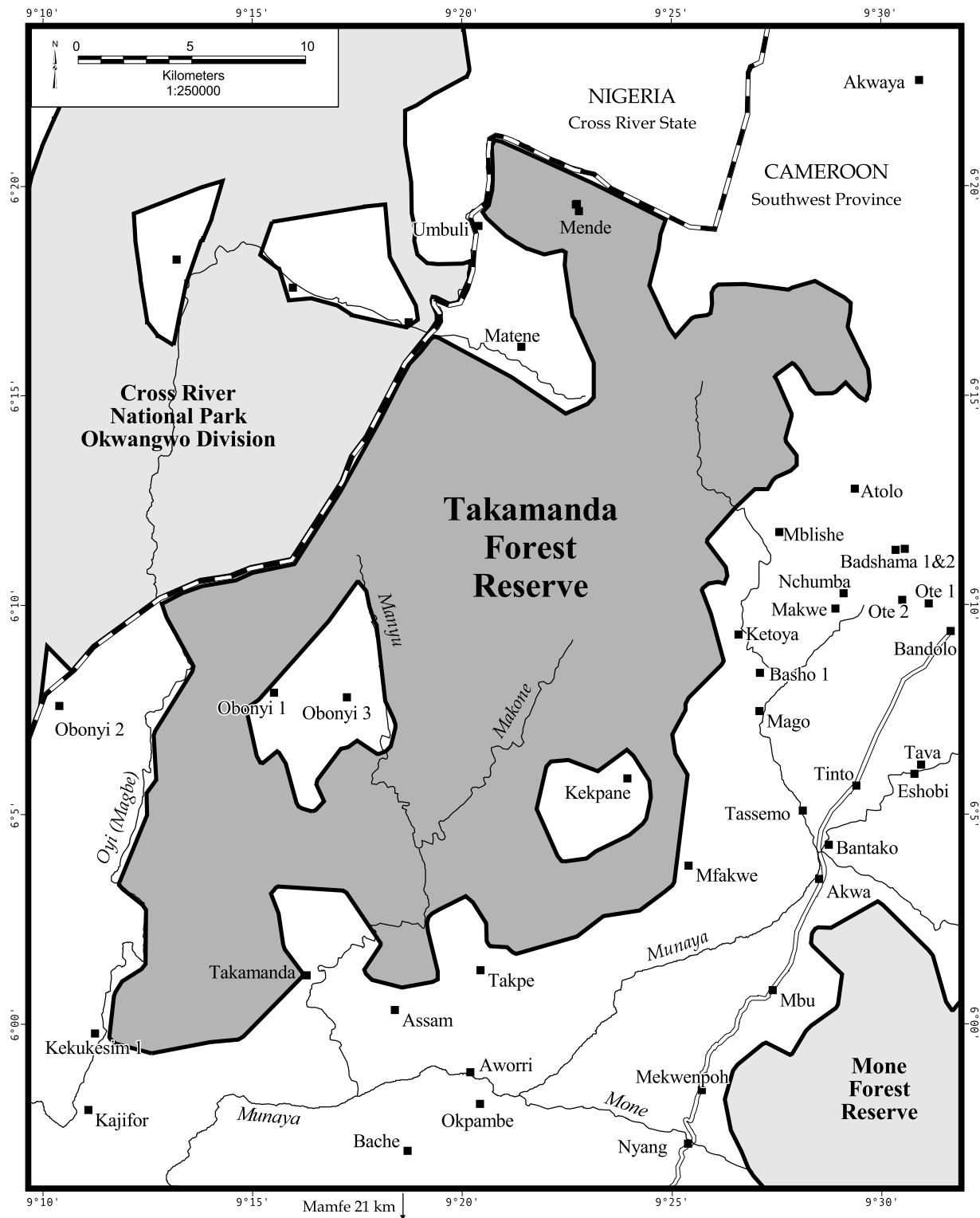


Figure 2. Takamanda Forest Reserve and nearby villages.

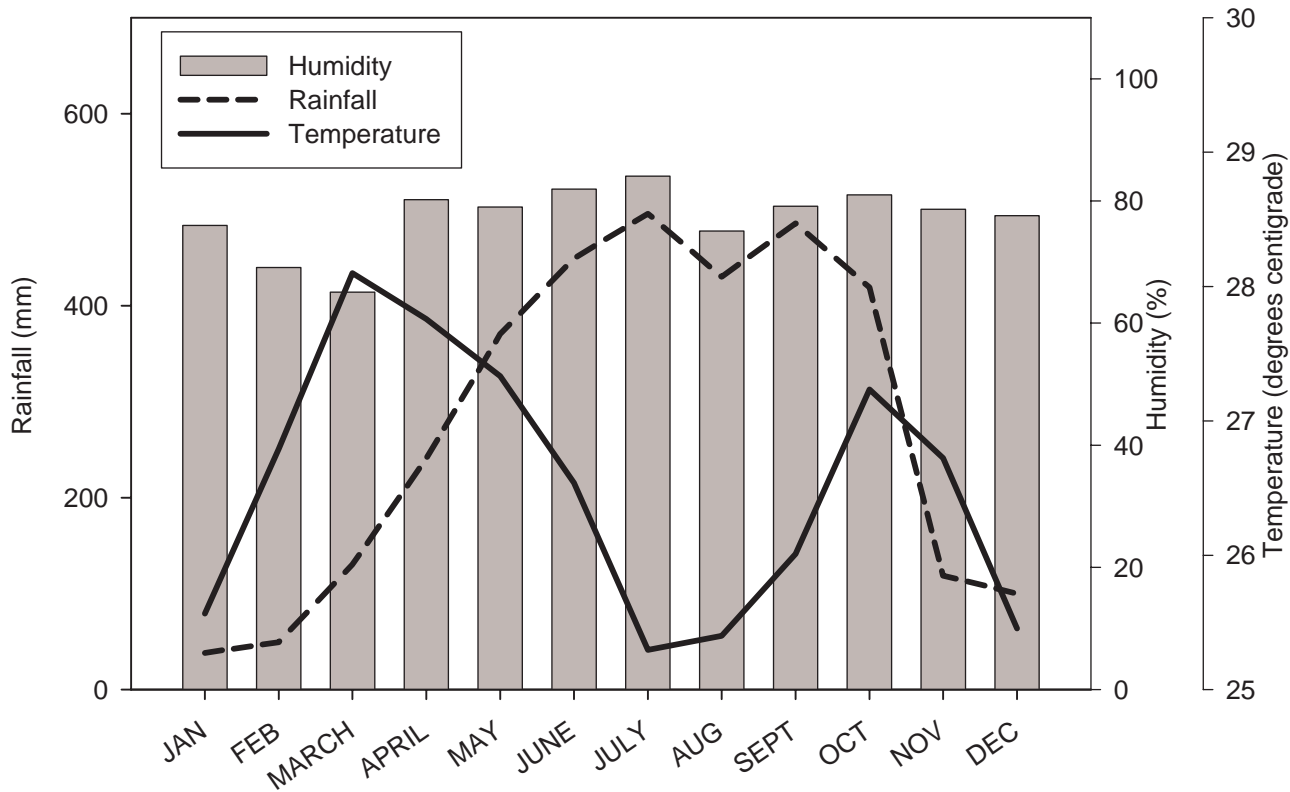


Figure 3. Climatic data for Besong-Abang to the south of Takamanda Forest Reserve, Cameroon

hills, up to 725 m in elevation, lie to the north of the Obonyi villages along the border with Nigeria. The hills separating the villages of Kekpane and Basho are similar in elevation, rising to between 600 and 700 m.

A basement complex of granite, gneisses, schist, and quartzites underlies the region, giving to shallow sedimentary soils (ENPLAN 1974). Marine sediment deposition occurred during the Precambrian, resulting in ferrite derived from crystalline rock and large areas of alluvial soil toward the southern end of the reserve.

The Cross River and its numerous headwater tributaries form the main water system in the region. The general direction of the drainage pattern is from north to south, with two major rivers, the Makone and Magbe, flowing through the Reserve. (The Magbe is called the Oyi on the Nigerian side of the border.) The Makone drains the Matene Highlands and runs southwest through the Reserve to meet the Munaya River. The Magbe flows

from Matene through Nigeria and curves back into Takamanda; it represents a portion of the Reserve's western boundary and eventually drains into the Mamfe River.

4 Climate and temperature

The Takamanda area lacks accurate climatological data, which undoubtedly vary due to the elevational gradient that occurs within the reserve. In general, the region has two distinct seasons with most rainfall occurring from April to November, peaking in July and August with a second peak in September (Figure 3). The total annual rainfall is probably similar to that of the Nigerian side of the border in the Okwangwo region—up to 4,500 mm per year (World Wildlife Fund 1990). From November to April, the climate is mainly dry; some months, usually January and February, may receive no rain at all. The mean annual temperature is about 27° C. Normally, it is cooler in the rainy season than in the dry season.

5 Settlement and culture

Three enclaved villages, Kekpane, Obonyi I, and Obonyi III, lie in the Reserve. Five more villages are located along the Reserve's boundary, and there are additional outlying villages. Letouzey (1985) estimated the human population of Takamanda to be between 6 and 12 individuals per km². A more recent survey calculated that the 43 villages within and around TFR, including 12 villages on the Nigerian side of the border, contain 15,707 people (Schmidt-Soltau *et al.* 2001).

The dominant tribe within the area is Anyang, and the main spoken language is Denya. The majority of villagers, especially those located close to the Nigerian border, also speak or understand the closely-related Boki language, which is spoken on the Nigerian side of the border. Because of ethnic ties, people in Takamanda communities appear to have long-standing affinity with nearby Nigerian villagers.

During gazettement of the Reserve, local populations were granted traditional rights to use the forest for their subsistence-based livelihoods. They also have legal right of passage through TFR, and the main travel route is the basis of a strong cross-border trading pattern. Agriculture, hunting, fishing, and the gathering of non-timber forest products are widespread throughout the Reserve (Mdahli *et al.* this volume, Sunderland *et al.* this volume). The main agricultural activities are subsistence farming for maize, plantain, banana, yams, and cassava. Cultivation of these annual crops often extends for some distance from the villages and has resulted in the removal of virtually all the trees in the immediate vicinity of settlements. Further from the villages, less extensive cultivation occurs, notably for oil palm, which is a major export from the Takamanda area. In anticipation of improved road access, cash crops—primarily cocoa and coffee—have recently been introduced to the area.

6 Flora and fauna

Despite identification of the area as a priority for conservation (Gartlan 1989), biodiversity in the

Takamanda region was not well known until relatively recently. Early expeditions concentrated on large mammals, particularly gorillas (Sanderson 1940, March 1957, Critchley 1968 Struhsaker, 1967, Thomas 1988, Sunderland-Groves *et al.* this volume). A more comprehensive study of TFR provides significantly more information on the unique fauna of the area (Groves and Maisels 1999, Groves 2002). It is now known that the Reserve and the neighboring Okwangwo region in Nigeria are important areas for many large mammals, including an isolated population of the Cross River gorilla (*Gorilla gorilla diehli*) and the Nigerian chimpanzee (*Pan troglodytes vellerosus*), drill (*Mandrillus leucophaeus*), and Preuss's Guenon (*Cercopithecus preussi*). As well, the forest elephant (*Loxodonta africana cyclotis*) and buffalo (*Syncerus caffer nanus*) are local denizens.

The wider biodiversity of the area, including the vegetation, remained unstudied, although it was speculated that because of the transition from lowland forest to montane savanna, the area would be particularly diverse for all biological taxa (Gartlan 1989). Letouzey (1985) and ONADEF (n.d.) mapped vegetation in the Reserve and the surrounding area as part of a national vegetation survey, providing two broad classification categories. Those studies were based on aerial photographs, however, ground-truthing was not conducted. Subsequent work by Thomas (1988) and Etuge (1998) elicited more details within the wide categories of Letouzey and ONADEF. Still, until the present work (see Sunderland *et al.* this volume), knowledge of TFR vegetation was inadequate.

The present study provides for the first time a comprehensive overview of biodiversity in the Takamanda area using analytical techniques developed by the Smithsonian Institution's Monitoring and Assessment of Biodiversity Program (SI/MAB) within the context of an adaptive management approach for conducting assessments and monitoring of biodiversity. The work was modeled in part on SI/MAB projects in other regions of the world, including Peru and Gabon (Comiskey *et al.* 2000, Dallmeier *et al.* 2002).

7 Conservation issues at Takamanda Forest Reserve

In the past, Takamanda and the surrounding area had largely been protected, more by default than by design, because of its inaccessibility. However, recent human activities such as a logging concession granted in 1995 outside the Reserve and the development of a road from Mamfe to Akwaya (ongoing) have enabled easier access to the area. Subsequently, the export of non-timber forest products, including bushmeat, has increased. With enhanced access, future logging and agricultural expansion, either by the local population or through government concessions, have become major concerns. Without official elevation of the protected status of the Reserve, the forest is open to such activities.

The major threat facing fauna in the Reserve is hunting. Local people have had hunting rights, using traditional methods, since the area was gazetted in 1934, but they were prohibited from using firearms. Thus, most hunting in bygone years was for subsistence. Today, smaller mammals such as duikers are killed through wire traps or snares, while larger mammals, including apes, primates, elephants, and buffalos, are killed with rifles or locally made shotguns (“dane” guns). Almost all hunters in the area own a gun, and with few other options for alternative employment, hunting to provide bushmeat for trade (income) is now common. Meat is consumed locally and exported to Mamfe and Bamenda in Cameroon and across the border to Nigeria in large quantities. As a result, many mammal populations are being depleted at an alarming rate.

One of the most important conservation species in Takamanda is the gorilla. Recently, scientists concluded that the gorillas from this region are geographically and morphologically distinct from other gorillas (Sarmiento and Oates 2000), and they are now recognized as the fourth gorilla sub-species—the Cross River gorilla—and classified as critically endangered (IUCN 2000). Groves *et al.* (this volume) estimated in 2002 that there were approximately 180 Cross River gorillas remaining in TFR and the adjacent forest areas of Mone Forest

Reserve and Mbulu, with a total overall population in Cameroon and Nigeria of only about 270 weaned individuals. This total density is considerably less than that of the better known mountain gorilla (*Gorilla gorilla beringei*). In the past, the main threat to survival of the gorilla was hunting. But since 1998, when biological studies began in Takamanda, hunting of apes all but ceased through local community hunting bans. Now by far the greatest threat facing the Cross River gorilla is continued habitat fragmentation. Presently, the Cross River gorillas are restricted to highland areas where the terrain is difficult to access and hunting pressure is thus lower. The gorillas appear to be unwilling or unable to cross large tracts of lowland forest to interact with other groups. The road from Mamfe to Akwaya, under construction, will almost certainly have an effect on any current gorilla movements between Takamanda Forest Reserve and adjacent Mbulu forest, thereby increasing the isolation of Cross River gorilla groups. If lowland forest corridors cannot be secured and if gorillas are deterred from using lowland corridors to reach gorilla groups in other highland sites, inbreeding and loss of genetic variation may imperil these isolated groups.

The forests of Takamanda are also important for a great diversity of birds as recognized by Birdlife International when it designated the Reserve an Important Bird Area. Surveys by Languy and Motombe (this volume) registered 309 species, bringing the total count for TFR to 313 species. Of these, nine species are classified threatened, one endangered, and two vulnerable within IUCN categories. Sixteen additional bird species have restricted ranges—their total world range is less than 50,000 km². Two species are new records for Cameroon, while an additional 20 species extend their range within the country (Languy and Motombe this volume).

Reptile diversity is equally impressive. The present study described 81 species in TFR, or about 30% of Cameroon’s total (LeBreton *et al.* this volume). An additional three undescribed species were collected during recent visits, and several endemics and regional endemics as well as endangered species have been registered.

Butterflies (111 species, O’Kah this volume) and dragonflies (67 species, Vick this volume) have high levels of diversity. Both groups are important indicators of forest change. Likewise, 54 species of fish were registered, many of which provide an important protein source to local communities (Mdaihli *et al.* this volume).

Flora also proves to be extremely rich with more than 950 species of plants registered over the course of the present surveys. Of these, 351 species were trees with diameters greater than 10 cm (Sunderland *et al.* this volume). All species were registered in the biodiversity plots in the Reserve that will be the basis of long-term monitoring of Takamanda’s forest at different elevations.

8 About the Takamanda Project

The Takamanda Project arose from a general interest in the area expressed by numerous government agencies and non-governmental organizations that have been conducting biodiversity assessments in Cameroon and neighboring Nigeria. Large mammal studies focusing on the Cross River gorilla in the Akwaya area, supported by World Wildlife Fund (WWF) and the Wildlife Conservation Society (WCS), were initiated in late 1997 and are continuing. In early 2000, the Smithsonian Institution conducted a training course (“Biodiversity Assessment and Monitoring for Adaptive Management”) in Mundemba, Cameroon, where participants expressed their desire to conduct biodiversity assessments in Takamanda Forest Reserve. Follow-up activities led to the current project. The authors of the various chapters coordinated field teams in the Reserve. Primary objectives follow.

- Identify key habitats using cartographic information and remote sensing.
- Describe forest structure, composition, and diversity.
- Determine the current conditions (species composition, frequency of encounters, population densities) of key taxonomic groups, including large mammals, birds, reptiles, and selected arthropods.
- Gather and understand indigenous knowledge on the species and their uses.

- Evaluate fisheries activities.
- Develop land-use change maps.

This volume presents the findings of the surveys, which were conducted by numerous researchers and agencies. It provides an important first step in documenting the impressive biodiversity of an area that has high conservation priority in Cameroon. Our goal is to provide a solid foundation for future conservation and management of Takamanda Forest Reserve and the species that call it their home.

Acknowledgments

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