

Transnational Ecological Monitoring of the Sangha Basin: Natural Science Perspectives

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ABSTRACT

This paper concerns monitoring the contiguous tropical forest biome that spans six central African countries (Cameroon, Equatorial Guinea, Gabon, Congo, Central African Republic, and the Democratic Republic of Congo). The author offers a general overview of biological characteristics of central African forests, introducing a starting point from which to analyze regional approaches to biological monitoring, conservation, and sustainable development. He suggests that, in order for management of natural systems to be effective in the region, it is vital to take into consideration the interests of local communities who live in this diverse and dynamic central African forest.

Because of its stable meteorological conditions throughout the year, the world's most diverse natural ecosystems are located within the tropical region. I refer primarily to that strip of moist tropical forest extending along the equator from the Americas through Africa to Asia. Despite its relatively narrow breadth, this global tropical forest ecosystem is believed to host 50-60% of plant and animal species living on earth.

Unfortunately, this tropical forest ecosystem has been seriously damaged and fragmented throughout its range. The world's second largest contiguous bloc is found in Africa, and covers approximately 2.8 million km² stretching from the Gulf of Guinea through the low-lying interior of the African continent to the mountains of the Rift Valley. Contained within its rough biogeographic boundaries are southern Cameroon, Equatorial Guinea, Gabon, Congo, Central African Republic (CAR), and the Democratic Republic of Congo (DRC).

The six African countries that share this tropical forest biome face similar problems and have the potential, together, to achieve unique solutions. By coordinating their efforts, these countries could establish regional priorities and manage this large forest reserve in a sustainable manner.

For many years, African government agencies and other international organizations interested in the conservation of biodiversity in the region have considered the delineation of protected areas to be the most effective means for protecting natural resources. The establishment of protected areas seems the only way to save some of the most fragile and threatened ecosystems (mountain forest ecosystems, for example) in the central African region. However, recent experience throughout the Congo River basin has demonstrated that conservation, when undertaken as isolated, uncoordinated projects, has serious limitations.

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Over the past two decades, governmental agencies and NGOs have come to acknowledge the need for increased participation by local communities in managing and protecting biological resources. Stakeholders and conservation organizations realize that unless the active participation of local resource users is secured, the goal of conserving biodiversity in the region will never be achieved.

Thus it is essential to understand not only natural processes within central African forests, but also to understand the needs and cultures of local resource users and to incorporate these human requirements into management techniques. It is important to bear in mind that the attitude of people toward natural resources is often dictated by their living conditions and customs. This intersection of people and the forest ecosystem is where natural science and social science come together; at this junction natural and social science are thus equally important for the design and implementation of strategies and techniques aimed at the conservation and sustainable use of natural resources.

For a better understanding of some of the complex factors facing forest conservation, I will now provide a general overview of what is known about the forests of central Africa, addressing the major threats to this important biome, and the potential for the conservation of biodiversity in the region.

GENERAL BACKGROUND

The fundamental feature shaping western and central African biological processes is the serial distribution of climate zones, each corresponding to a vegetation type with distinct structures and dynamics. An associated factor influencing the dynamics of the moist tropical forest of central Africa is the inverted distribution of seasons on either side of the equator; the transition between seasonal regimes spans a geographical band of less than 50 km, where the northern and southern hemispheres articulate. This interstitial region between southern Cameroon, northern Gabon, and Congo serves as a climatological mirror: when it is the dry season in Cameroon, the contemporaneous season in northern Gabon and Congo is the wet season. This seasonal inversion has a direct effect on the biological cycles of plant and animal communities, and thus plays an important role as determinant of the timing and direction of movements of animal populations in the region.

In addition to the particularities of climate in the forested region of central Africa, montane forests also offer unique biological systems and pose challenges for conservation of biological resources. Mountain forests in western Cameroon and northeastern Democratic Republic of Congo (DRC) are well known as richly biodiverse

regions of Africa. Detailed analysis of the distribution of plant and animal species between the two mountain forest ecosystems has indicated that the two sectors share an important number of species which are absent from extensive areas of lowland forests separating the two regions (Moreau 1963, 1966; Hamilton 1976, 1982; Schnell 1977; Bernardi 1979; White 1981). If we consider the distribution of plant species, it has been estimated that about 57% of species typical of tropical montane ecosystems are common to the mountain forests of western Cameroon and northeastern DRC (Hall 1993).

The concentration of such a large number of endemic species, coupled with the high proportion of species and subspecies common to the two regions, strongly suggests that the mountain forests are older than the surrounding lowland forests and have served as refuge to a good number of species in the past. Moreau's (1966) hypothesis that there existed a continuum between the forests of western Cameroon and northeastern DRC is derived from the actual distribution of species between the two regions. Moreau hypothesized that, during the Pleistocene era, the mountain forest ecosystem extended to a lower altitude than it does today, thus replacing the lowland forest ecosystem of the Congo River basin. The lowland forest was then very fragmented, reduced merely to small, isolated patches in scattered locations from southwestern Cameroon and northwestern Gabon to northeastern DRC.

The area of today's moist lowland forest of central Africa is the outcome of the recolonization process that started toward the end of the Quaternary era, resulting from a warming climatological trend. The tropical moist forest continues to expand in some sectors of the forest-savanna zone, particularly along the southern slope of the Adamawa plateau in Cameroon. The theory of evolution of tropical forest cover in central Africa is consistent with the demarcation of two biogeographic zones in the region: the upper Guinean zone and the Congo River basin zone. The contact area between these two zones coincides with the Sanaga River in southern Cameroon (Amiet 1987).

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THREATS TO NATURAL RESOURCES

The major threats to the conservation of biodiversity in the Sangha region are deforestation and the overexploitation of wildlife, mainly through poaching and other illegal forms of hunting. Deforestation and habitat destruction are widely understood to be the consequences of logging, for both industrial and local exploitation, and forest clearing for agricultural production. Unlike in other sectors of west and central Africa, deforestation for swidden agriculture does not appear to be a major threat to natural ecosystems in

most of the Congo River basin, mainly because of the low human population density throughout these forests.

In examining the impact of hunting on the depletion of mammal species in the forests of the Congo River basin, it is crucial to differentiate among poaching, trophy hunting and “subsistence” hunting. Poachers and trophy hunters are, in general, well-organized and equipped “professional hunters,” who are looking for specific targets such as elephant, leopard, bongo, and gorilla. Poachers are not members of the local communities of the forests where they hunt, and often enjoy some (illicit) protection at very high levels of government administration. The capture of certain forest animals such as the African Gray Parrot and the crocodile python is extremely lucrative; these animals are overexploited to meet the demand on international markets. “Subsistence” hunters are members of forest communities, who hunt to feed their families and also participate in the regional bushmeat market. Their target species are small to medium-size mammals, the majority of which are ungulates and primates. In general these hunters are equipped with spears, locally made guns, and metal wire that they use to prepare traps.

Although there is an important distinction between poachers or trophy hunters and “subsistence” hunters, both of these types of hunting threaten the conservation of biodiversity in the region. Poachers target rare as well as ubiquitous species; hunting techniques of poachers result in large scale wastage, as carcasses often spoil in the wire snares before local hunters can remove the meat from the forest for consumption or barter in the villages.

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PROSPECTS FOR THE LONG-TERM CONSERVATION OF BIODIVERSITY IN THE CONGO BASIN

Measures are currently being designed and implemented to secure long-term protection of key areas for the conservation of biodiversity, such as the watershed of the upper Sangha River. Because of the extensive regional and complex nature of the forest biome of the Congo River basin, only a network of well-connected protected areas is likely to guarantee the long-term conservation of the rich biodiversity characteristic of this biome.

The need for a network of protected areas is strongly supported by the circular distribution of seasons between the various sectors of the region. The inverted distribution of the seasons among the microhabitats of central African forests in the Congo River basin has a direct impact on the biological cycles of plant and animal communities. Rotation of seasons plays an important role in determining the timing and direction of animal movement and migration throughout the region.

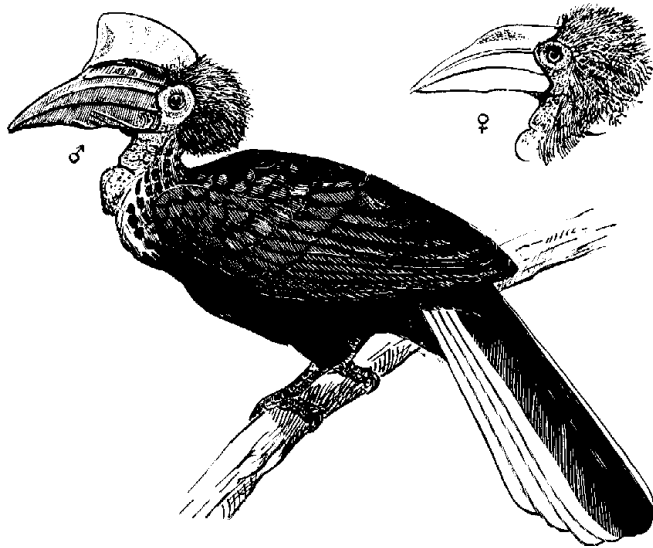


Figure 1 Black-casqued hornbill. *Ceratogymna elata*. *Les oiseaux de l'ouest Africain II*. P.L. Dekeyser et J.H. Derivot. Université de Dakar. 1967.

The process of climate-driven migration is well-documented for some species. For example, the seasonal movement of the Black-casqued Hornbill between the Dja forest, the coastal forest of Cameroon, and the forest of northern Gabon has been thoroughly studied by a team of biologists and ornithologists from San Francisco State University over the past four years. The migratory patterns of large forest mammals is not yet clear, but the somewhat cyclical appearance of elephant herds on village farms suggests a similar seasonal movement of elephant populations between the different regions of the forest biome in the Congo River basin.

This movement of wildlife appears to be correlated with the phenology of plant communities (Smith *et al.* 1996). Birds and mammals are known to be excellent vectors for seed dispersal, hence contributing greatly to the natural regeneration of the forest cover. This natural regeneration potential for the forest ecosystem will be affected if the movement of wildlife between various sectors of the biome is affected by external factors. Such external factors might include artificial barriers generated by habitat destruction or the extermination of some key animal species. These observations underscore the need for and the importance of a well-designed global or regional monitoring system to be put in place for the Congo basin. Nature ignores political barriers.

Given the serious social, economic, and political contemporary situations in the Sangha region, it is evident that unless the active participation of local resource-users is secured, the goal of conserv-

ing biodiversity in the region will never be achieved. Collaboration of local resource users can only be effective if their needs and aspirations are taken into consideration. Local people must be integrated at all levels of planning, design, implementation, and management for the development of measures for the conservation and sustainable use of natural resources.

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