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#4 — Filling Conservation Gaps in Central Africa: Conserving What, Where, How, and at What Cost?

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Key Concepts

- Protected areas in Central Africa presently contain significant populations of almost all large mammals characteristic of the region, yet their persistence is influenced by land-use practices bordering these areas.

- The present protected area network fails to conserve some plant, reptile, bird, and amphibian species with restricted ranges.
- National demand for protected areas is unlikely to increase significantly, and drive the supply much above the present level of 6% of the terrestrial landscape, which is insufficient to ensure the persistence of the full range of biodiversity in Central Africa.
- Biodiversity conservation costs per hectare increase as the size of areas decreases, and as the level of resource use pressure increases.
- Landscapes managed primarily for economic reasons, where biodiversity conservation is of secondary importance will seldom, if ever, contain the diversity and biomass of species found within protected areas, where biodiversity conservation is the primary land use.
- Biodiversity conservation in Central Africa may be successfully achieved by combining (1) full protection of the majority of species and habitats within a limited number of large protected areas distant from human land-use pressures, with (2) reduced impact or conservation friendly land uses within economic landscapes that border or lie between protected areas.

What Do Central Africa's Parks Protect?

Like protected areas in many countries of the world, Central Africa's national parks and reserves were created in a largely ad hoc fashion to protect charismatic species and habitats. Protected areas in the Congo Basin were frequently established either to protect a particular species (e.g., gorilla, okapi, white rhino, bonobo, sea turtle) or habitat type (e.g., Mount Cameroon, Conkouati, Gamba), or because a biologically rich landscape was relatively intact and under little pressure from human land use (Nouabale-Ndoki, Minkebe).

Many parks and reserves in Central Africa exceed 400,000 hectares and are vast relative to protected areas in other nations. This confers great advantages for conservation of biological diversity. Large protected areas assure a greater likelihood of conserving viable populations of all species and maintaining ecological processes that are essential to these ecosystems. They are also critical for conserving large-bodied and wide-ranging species that would otherwise compete directly with humans for land and resources. Yet, mere size does not ensure that as a network the parks and reserves contain an assemblage of species and habitats that fully represents the region's biological diversity.

Evidence shows unequivocally that parks and reserves typically have greater wildlife numbers and less forest disturbance and resource degradation than do areas dominated by people and economic land uses. This is true despite the fact that few protected areas in Central Africa presently receive the level of investment necessary to unequivocally ensure the long-term persistence of all species within their borders. This is not surprising, as all consumptive uses of

natural resources result in changes in the resource base, and most uses of the forest undermine, or preclude, other uses (e.g., logging and tourism are largely incompatible). Thus, landscapes managed primarily for economic reasons where biodiversity conservation is of secondary importance will seldom, if ever, contain the diversity and abundance of species and ecological processes found within protected areas, where biodiversity conservation is the primary land-use objective.

Identifying Biodiversity Conservation Gaps

To help ensure that the full range of plants, animals, habitats and ecological functions that characterize Central Africa's biodiversity are conserved for future generations, governments and conservation organizations have conducted several analyses to identify conservation gaps and set priorities to fill these gaps. All have adopted a rather similar approach: (1) divide the region into broad vegetation types (e.g., ecoregions) based on the assumption that soils, topography, and rainfall pattern primarily determine plant species composition, and that this in turn determines animal species diversity; (2) use expert opinion to characterize areas within each ecoregion of greatest biological importance (i.e., those that exhibit high species richness and endemism, that constitute keystone habitats or support distinct ecological or evolutionary phenomena); and (3) rank these areas according to their likely persistence (i.e., size, intactness and level of threat).

Ranking areas of biological significance for individual and multiple taxa assumes that experts know something about the area, have regional rather than localized knowledge, and are familiar with more than one taxon. For Central Africa few of these criteria are met. The region remains little-known: it covers an area over half the size of the United States, first became known to science when Stanley traversed the region between 1874-77, and remains relatively inaccessible with a road and rail infrastructure less than 1/30th the density of that in France.

In fact, expert knowledge of the biological diversity of Central Africa is sparse and poorly distributed. It is spatially skewed toward protected areas, the western coastal zones, and along roads and rivers, leaving a vast gulf of ignorance in the Likouala region of Congo and in much of DRC. Expert knowledge is largely derived from individuals who have worked on one taxon at one site only. Finally, much knowledge is outdated, based on 30- to 60-year-old museum collections that may not reflect present distributions of species given human land use in the intervening years.

Variance in the intensity of sampling and the spatial distribution of information has led to an interesting phenomenon as experts delineate areas of biological significance across the region: the size of biologically significant areas appears to be inversely related to level of knowledge and confidence in the quality of the information about a given area (i.e., the biggest areas are typically the least well surveyed). We are left with an imprecise, partial picture of a rich, unique region of the world.



The persistence of the protected areas in Central Africa is influenced by land-use practices bordering or within areas.

Is the Present Protected Area Network Sufficient?

Though imperfect, these gap analysis exercises have provided best guesses of how biodiversity is distributed across the basin, and where biologically important areas lie in and outside of protected areas and warrant current conservation investment. Results suggest that the present protected area network does contain the full range of large mammals characteristic of the region. However, though many protected areas are large, land-use practices in bordering areas often threaten species that roam outside of the park or reserve during certain periods of the year or during dispersal periods of their life cycles. Moreover, the present network fails to conserve some plant, reptile, bird, and amphibian species with restricted ranges, particularly those found only in relatively small isolated forest patches within areas dominated by human land uses in Central Africa.

Despite recognition of gaps, it is unlikely that protected area coverage will increase significantly in Central Africa. Setting aside areas of forest solely for biodiversity conservation results in both direct management costs and indirect opportunity costs to local and national economies. It is unlikely, therefore, that poor families and nations in Central Africa will be interested in substantially expanding the area designated as national parks and reserves. When forest resource exploitation is a significant source of household subsistence, employment and national tax revenue for nations in Central Africa, it is not surprising that most of the forest is designated for economic uses. Yet, given limited wealth and constituencies for biodiversity conservation, Central African protected area coverage is, surprisingly, not atypical. Global demand for protected areas is fairly constant across nations, with most countries devoting only 5-10% of their terrestrial landscapes to supply biodiversity conservation benefits from parks and reserves, attributing the rest of the landscape zoned for resource extraction and land-cover conversion.

Landscape and Transboundary Resource Management

Some conservationists argue for creating more - and larger - protected areas in Central Africa. Yet, substantially increasing the area within national parks and reserves is unlikely given present demand for biodiversity conservation as a primary land use. In addition to any possible gains in the protected area network, then, how are unprotected species and habitats to be conserved? To fill conservation gaps left by the present protected area network, most organizations are advocating conservation-compatible land uses in landscapes bordering and between protected areas; i.e. land uses that allow for significant conservation benefits in addition to desired economic returns.

Landscape management is a process for harmonizing resource use policies and practices within regions divided by international frontiers or by national property or land-use zoning boundaries. Transboundary natural resources management is advocated within the conservation and development community as a way to promote land use policies and practices “on one side of a border that do not adversely impact ecosystem function and resilience, species composition and persistence, and economic revenues and human welfare on the other.

The scale at which transboundary cooperation and landscape management occurs can vary depending on the objectives and the available political and financial resources. At its simplest, management of natural resources is coordinated between management authorities across borders (e.g., logging concessions managers work with neighboring national park staff to minimize adverse impacts of their respective resource management practices). More politically complex and with much higher transaction costs are attempts to harmonize national and international environmental and land-use policies and legislation, to promote conservation-friendly natural resource use practices across political, land-use and property boundaries.

As lands set aside for economic uses dominate the landscape, attempts to ‘green’ natural resource use practices within lived-in landscapes have the potential to generate significant conservation payoffs. Yet, it is important to remember that lived-in landscapes are typically less biologically diverse with fewer species and habitats, than are even inadequately managed protected areas.

Can We Afford to Conserve Biodiversity in Central Africa?

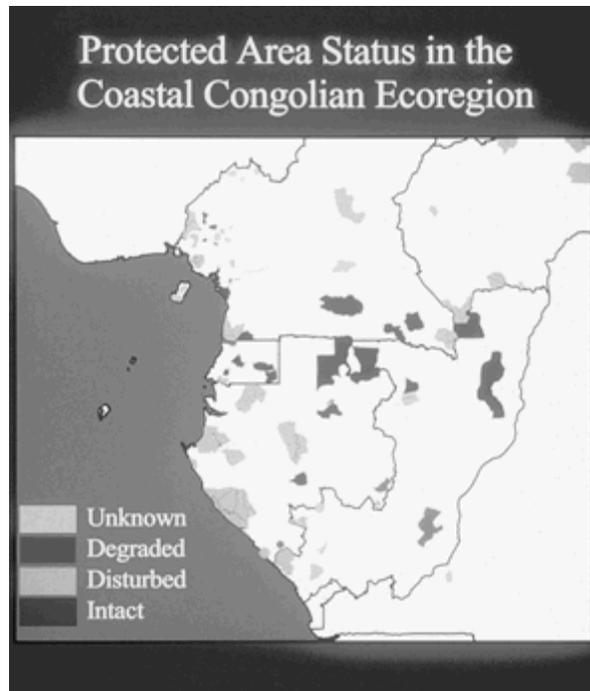
At present, governments and donors spend approximately \$10 million/year on biodiversity conservation in Central Africa. Fully funding the staff and infrastructure needed to ensure the long-term persistence of species within the present protected area network in Central Africa would cost three times that. The costs of biodiversity conservation are an increasing function of the level of pressure on natural resources, which in turn are related to the surface-area to edge ratio of a given conservation area, proximity to roads and population centers, and the price of

forest goods. Using a formula developed by Africa Resources Trust for protected areas in Southern Africa paying for conservation within 5 parks of 500,000 hectares each, would require a total of approximately 350 staff, an annual investment of \$4 million (\$137/km²), and an initial capital expenditure of \$20 million. In contrast, a network of 500 much smaller parks covering the same total area, would require 10 times the staff, an annual investment of \$68 million (\$2,721/km²), and almost \$318 million in start-up costs. A network of many small conservation areas will always cost more to manage than will a few large parks, though the latter may not effectively represent the full range of biodiversity within a region.

The costs of biodiversity conservation outside of protected areas is much harder to estimate as rarely if ever has it been quantified. Globally, spending on protected areas amounts to approximately 0.2% of national budgets. It might, therefore, be fair to assume that demand for biodiversity conservation is such that users of the landscape outside of protected areas are willing to pay or forego 0.2% of the revenue they generate to minimize the adverse environmental impacts of land-use practices and conserve species and habitats on their land. In Cameroon, dense forest covers approximately 200,000 km², logging concessions occupy 80% of forests outside of protected areas, and agriculture 14% of the forest landscape. Based on the relative contribution of the logging and agricultural sectors to GNP in Cameroon, and the area of forest occupied by each land use, estimated costs to reduce environmental impacts in lived-in landscapes in Cameroon would be \$8/km² in logging concessions, and \$95/km² in agroecosystems. Total costs for conservation friendly land uses in forests outside of protected areas in Cameroon might be \$1.3 million/year in logging concessions, and \$2.7 million/year in agroecosystems. Assuming a similar cost structure across Central Africa, total costs for promoting more biodiversity friendly resource use practices outside of protected areas might exceed \$40 million/year.



Biodiversity conservation in Central Africa, to be successful, will include conservation-friendly land use within economic landscapes bordering or lying between protected areas.



National demand for protected areas is unlikely to increase significantly and drive the supply much above the present level.

What's To Be Done?

Conserving the greater possible range of biodiversity characteristic of Central Africa will require investment in both a network of protected areas, and efforts to minimize adverse environmental impacts of economic land uses in the majority of forests that lie outside these protected areas. The estimated annual cost of this landscape approach to conservation in Central Africa is likely to exceed \$70 million, or \$17/km² each year. This is remarkably inexpensive when compared to the \$1200/km² per year spent on management of national parks alone in the United States. Despite a clear rationale that investment at this level is a good buy for conservation, there has been to date no demonstration of an adequate willingness to pay these costs. National governments pay only a small fraction of necessary costs. Funding must, therefore, be augmented by those who use or appreciate these forests. There are indications that industrial users of the forest are beginning to accept some financial responsibility for their conservation. International financial support, from global citizens and their governments that value tropical forests and wildlife, will still be necessary to adequately cover the costs for conservation of this wild, biodiverse region of the world.

For More Information

Technical Reports

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CARPE...What Is It?

Central African Regional Program for the Environment (CARPE)

Launched in 1995, the *Central African Regional Program for the Environment (CARPE)* engages African NGOs, research and educational organizations, private-sector consultants, and government agencies in evaluating threats to forest integrity in the Congo Basin and in identifying opportunities to sustainably manage the region's vast forests for the benefit of Africans and the world. CARPE's members are helping to provide African decision makers with the information they will need to make well-informed choices about forest use in the future. BSP has assumed the role of "air traffic controller" for CARPE's African partners. Participating countries include Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Republic of Congo, Rwanda, and São Tomé e Príncipe.

Web site:

<http://carpe.umd.edu>

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