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Congo Basin Information Series: Taking Action to Manage and Conserve Forest Resources in the Congo Basin

CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

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Message to the Readers

For five years and through active partnerships, the Central African Regional Program for the Environment (CARPE) has committed itself to better understanding the challenges and solutions in sustainably managing the rich forests of the Congo Basin. The following 25 issue briefs individually and collectively represent the summary of results and lessons that were learned.

They were designed for all of you — decision-makers, Civil Service officials, NGO leaders, project managers, private sector partners, teachers, researchers, practitioners, donors — who care about the conservation of Central African forests. They were also designed to allow convenience in their use and reproduction, and flexibility in their organization to suit various audiences. Finally, this issue of the “Congo Basin Information Series” is the first in a series of collaborative efforts to take immediate action in conserving the Congo Basin forests. We hope you will enjoy reading this information!

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #1

#1 — Summary of Results and Lessons Learned from the First Phase

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This brief was written by the **Biodiversity Support Program** and the USAID **CARPE** Project management team. For additional information contact Laurent Somé, email: laurentsome@wwfus.org; David Wilkie, email: dwilkie@rcn.com; Jim Graham, email: jgraham@afr-sd.org; or Robert Solem, email: carpe@internetgabon.com.

Key Concepts

- **Environmental Governance**
  CARPE takes as a basic premise the idea that forest management in the region should reflect societal values and priorities rather than individual interests alone, and that benefits from forest use should be shared as equitably as possible. Strengthening weak civil society institutions in Central Africa, and expanding access to information about resource allocation and misuse, can serve as a counterbalance to over-centralized and unaccountable governments, and to the de facto authority over resource access and use wielded by private sector companies, who often operate in non-transparent and unsustainable ways. Small grants to Central African NGOs, individuals, and university faculty and students have proven to be an effective mechanism for building the human capital and conservation constituency that together form the foundation of effective environmental governance.
- **Protected Areas**
  Parks and reserves should remain an element of any biodiversity conservation strategy even as attention increasingly shifts toward landscape-level planning, on one hand, and toward community-based resource management, on the other. This is because protected

areas can continue to serve as a core area for ensuring the long-term persistence of ecological and evolutionary processes largely unfettered by human influence, with most forms of human use precluded or strictly limited. These core areas are especially important for conservation of (1) flora and fauna that are particularly sensitive to human presence and habitat disturbance, and (2) resources that have a low economic value but a high global intrinsic value.

- **Private Sector Engagement**
  Logging companies exercise de facto control of resource use within much of the forest outside of protected areas in Central Africa. In many cases, poor management practices and technical shortcomings cause needless damage and degradation in and around logging concessions, and also stimulate uncontrolled exploitation of resources such as bushmeat and gemstones. Preliminary results of pilot projects between conservation NGOs and timber companies have demonstrated that efforts to 'green' private sector practices through better planning, site management, and access restrictions, have considerable potential to generate significant conservation payoffs at relatively low cost, and in some cases can also provide economic benefits for concession operators. Private sector activities, in the absence of an appropriate framework and checks and balances, can have short-term, unsustainable impacts.
- **Bushmeat Crisis**
  Hunting of wildlife (defaunation) to supply meat for urban markets as well as settlements associated with logging may represent a more immediate and significant threat to forest conservation than deforestation. Loss of wildlife that are important seed predators, seed dispersers and landscape engineers will affect tree species regeneration and forest composition and productivity. Solutions to this crisis will require efforts to reduce demand in urban areas, to better enforce existing laws regulating hunting and marketing of wildlife products, and working with logging companies to ensure they provide appropriate food for employees and their families, and take effective action to curb the use of logging trucks and roads to transport hunters, firearms and bushmeat.

What Is CARPE?

The Central African Regional Program for the Environment (CARPE) is a USAID initiative to identify and test a wide range of measures to help conserve forests and biodiversity in the Congo Basin over the long run. The expanded knowledge base, and enhanced individual and institutional capacities that result from the implementation of the first 5-year phase of CARPE will serve as the foundation for a longer term (15-20 year) effort to mitigate deforestation of the tropical forests of the Congo Basin and conserve the biodiversity contained within them. In the long run, conservation of these forests will also contribute to the mitigation of potentially negative changes in regional and global climate. CARPE's efforts are focused on the countries of Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Equatorial

Guinea, Gabon, Republic of Congo, Rwanda and São Tomé e Principe. *(See Issue Brief #2 What Is CARPE?).*

CARPE Implementation Partners

Within USAID, CARPE is unique in that it is being designed and implemented by U.S.-based government and non-governmental organizations with experience in the region: Biodiversity Support Program, NASA/University of Maryland/University of Virginia, Peace Corps, U.S. Agency for International Development, U.S. Department of Agriculture/International Forestry, Wildlife Conservation Society, Innovative Resources Management, World Resources Institute, World Wildlife Fund, Conservation International, African Wildlife Foundation, IUCN, U.S. Fish and Wildlife Service. The CARPE partners constitute a pluralistic coalition of committed partners each bringing their own strengths to addressing the multiple facets of forest management in Central Africa. *(See Issue Brief #2 What Is CARPE?).*

CARPE Philosophy

CARPE's core philosophy is to facilitate the meaningful involvement of African partners and to ensure that African decision makers have access to, and the capacity to use information critical to rational forest resource management. CARPE has engaged local NGOs, individuals and government agencies in activities to evaluate threats to forest integrity and identify opportunities for minimizing resource degradation while promoting human livelihood security.

CARPE activities are designed to fill gaps in our knowledge and build on the experience of others, thus extending rather than duplicating our collective knowledge of the forests of the Central Africa. CARPE seeks to involve Central Africans in forest management pilot activities in the region and strengthen the capacity of Central African decision makers and civil society to participate in priority setting and management of the region's unique forest resources. In addition, CARPE partners are charged with disseminating lessons learned quickly and at no charge. *(See See Issue Brief #2 What Is CARPE?).*

Sources of CARPE Lessons Learned

CARPE lessons learned draw upon information developed by CARPE partners, field results from CARPE partners' pilot projects, facts extracted from prior studies, and results of studies supported outside of CARPE. In many cases, key pieces of information were known only to specialists, or had not been assessed in the broader context of regional-scale forest and biodiversity conservation. The primary added value of CARPE's investment in strengthening the knowledge base lies less in the area of unique or first-time discoveries, than in the systematic gathering of experience, information, tools and approaches which will enable the region to move toward more effective and sustainable forest management.

Regional Assessment of the Forest

Present State of the Forest

The Congo Basin contains the second largest continuous tropical rainforest in the world. Dense forests extend over 1.9 million km² of Central Africa, covering almost 50% of the landmass. The forest is home to more than 20 million people, most of whom depend on natural resources for their livelihoods. The forest also harbors the most diverse assemblage of plants and animals in Africa with about 400 mammal species, more than 1,000 different species of birds, and over 10,000 plant species of which about 3,000 are endemic to the region.

Over 50% of the forest outside of protected areas (80% in Cameroon) has now been allocated for logging concessions. Approximately 14% of the forest has been converted to agriculture, most of which is small-scale cultivation by individual households. Industrial-scale agriculture is most prevalent in the coastal zones of south western Cameroon, and, prior to the recent civil war, in the northern and eastern regions of the Democratic Republic of Congo. Protected areas cover 6% of the forest, and represent the major forest types within the region. *(See Issue Briefs #3 Rich Forests, #4 Identifying Gaps, #5 Timber Tsunami).*

Forest Trends

Current national rates of deforestation are low relative to other regions of dense forested Africa (0.02 -0.45% per year - c.f., Ivory Coast 1%, Ghana 1.3%, and Sierra Leone 0.6%). Yet, with human population expected to double in 25 years and increase by more than four-fold by 2050, forest clearing for agriculture is likely to have a significant long-term impact on forests in Central Africa. From a global perspective, the relatively low deforestation rates in the vast Congo Basin nevertheless represent a significant amount of forest loss in absolute terms.

Within the next 20 years, almost all the region's old-growth forest will have been logged at least once. And without significant progress in controlling the commercial trade in wildlife for food, we can expect that apes, other primates, and most other large mammals will be eradicated from forests close to urban centers, and possibly throughout much of the region. *(See Issue Briefs #6 Deforestation, #7 Seeing the Future).*

Diverse Values of Forest Resources

The forests of Central Africa are important for their economic values (timber, non-timber forest products, bushmeat, and agricultural nutrients), ecological values (plant and animal biodiversity, ecosystem services), subsistence value (80% of forest residents depend directly on forest resource use for their livelihoods), and cultural values (the forest plays an important role in many forest societies' belief systems). If every patch of forest could simultaneously provide for all these needs then managing the forest would not be a challenge. Unfortunately, many forms of forest use tend to be incompatible with other uses. Very often decisions about forest access and resource exploitation may favor some uses and preclude or undermine others that would generate different goods and services.

For example, a forested landscape planted with coffee to generate income for families and national governments may no longer be a forest filled with food or medicines that can be harvested for local use or for sale; a forest where wildlife are hunted for meat generates food and income for families today, but may jeopardize future families' likelihood of capturing the same values; and a forest set aside as a national park will no longer be accessible to loggers to harvest and sell the trees and to provide a source of employment. Sustainable forest management is, therefore, an iterative process of compromise that must reconcile competing forest uses, and must be responsive, over time, to changes in values ascribed to the forest by individuals and their political and corporate representatives. *(See Issue Briefs #8 Forest Disappeared, #9 Forest Estate, #10 NTFP).*

Forest Governance at the End of the 20th Century

Although decentralization is becoming an important trend in much of Africa, this process is fairly recent in the Congo Basin, and political power remains largely in the hands of the urban elite and powerful government officials. The principle of subsidiarity suggests that political and administrative responsibility for resource management is best vested in those decision-making levels closest to the resource. Yet, the legal framework for decentralization (or deconcentration) of forest management in this region is poorly understood, and there is little political commitment to reforms that will provide civil society with more power and citizens with greater equity in the benefits from commercial forest use. At present, the region's capacity for political advocacy and forest governance reform remains weak, but is growing as citizens gain access to improved telecommunications and global information, and as civil society gains experience and confidence.

Several African-based regional forest management initiatives have been launched (CEFDHAC Brazzaville Process, Yaoundé Summit Process, and the African Timber Organization). Though these are promising, all need continued political, financial and technical support to be able to fulfill their potential for improving forest governance in one of the world's poorest and least stable regions. *(See Issue Brief #11 Forest Governance).*

Monitoring the State of the Forest

Monitoring the changing state of the forest is essential for understanding the consequences of forest use and management decisions and for adapting conservation and development interventions to changing conditions. Monitoring is needed across a range of spatial scales as well as over time. For example, it is important to track deforestation rates at a regional scale, to monitor the extent of logging and logging company environmental performance at both national and corporate scales, and to assess changes in wildlife populations and human welfare at the local or site scale. At present, few public and private sector and civil society institutions are able to generate the environmental data that is needed to guide forest management, and existing methods need to increase accuracy and reduce costs.

Though monitoring can be an essential component of effective resource management, it is a wasted investment if it does not lead to changes in government, corporate and individual practices. Consequently, monitoring will be most effective when driven by government, corporate and civil society demand for environmental information, and when this information is acted upon in a transparent and effective way, and coupled with advocacy. *(See Issue Briefs #12 Management Watchdogs, #13 Remote Sensing, #14 Monitoring & Evaluation).*

Future Forest State - A Look at the Forest in 2050

The results of a spatial simulation model suggest that by 2050, given present trends, forest cover will decline by over 40%, and few large blocks of intact forest will remain. During this period, over half of Central Africa's forest biomass will be released into the atmosphere as carbon dioxide. While this is equivalent to about 1.6 years of global carbon emissions, an amount insignificant relative to that contributed by fossil fuel burning worldwide, the loss of forest

cover, habitat, and biomass from Congo Basin ecosystems would have potentially devastating local and regional consequences. *(See Issue Briefs #7 Seeing the Future, #8 Forest Disappeared, #13 Remote Sensing).*

Forest and Society

At present the power to determine what forest resources are used by whom, for what purposes, over what time frame is unequally distributed. As a result, forest resource-use conflicts are common, the benefits accrued from forest resource use are not equitable, and forest resources are often mined to satisfy short-term interests of the few and to the long-term detriment of the many.

Forest and State

Forest conservation in the Congo Basin will only happen if it has constituencies for change in three sectors of the nation state: the public and private sectors, and civil society. Central African countries tend to be politically centralized yet inefficiently administered, and economically weak. The concentration of authority over the management of most of the forest estate in the hands of a few powerful politicians and private sector actors results in considerable inequity in the distribution of benefits derived from forest resource use, ignores the resource-use concerns of the majority, encourages people to flout unpopular and illegitimate forest use laws, and promotes unsustainable forest resource use. Effective, efficient and equitable forest management that contributes to broad based development in the Congo Basin must be governed by mechanisms

that assure inputs from a broad range of societal actors and promotes a system of institutional checks and balances, and separation of powers.

Moreover, Central African governments mainly derive revenues from the extraction and sale of natural resources to international buyers, paying little attention to the domestic economy. This has several impacts: economies remain dependent on world commodity markets, which are often volatile; there is minimal domestic transformation or value-added from resource exploitation; and there is little incentive for diversification and specialization within the domestic economy. In addition, the absence of a system of taxation of citizens and local businesses, tends to divorce government policy and decision making from the citizenry, and gives little incentive to grow the national economy, and widen public participation in economic development. As this system provides government services as gifts of the state rather than administrative responsibilities financed by the citizenry, accountable and representative government has been extremely slow in developing across the region. Lastly, strong executive powers and absence of civil-suit provisions help to perpetuate the absence of transparency and abuse of authority, and undermine citizen participation in forest use decisions and oversight. *(See Issue Briefs #11 Forest Governance, #15 Policy Reform, #16 World Bank, #17 Keep Out).*

Information and Civil Society

Forest use information is not gathered systematically nor made public. But more access to information does not necessarily mean that resources will be managed for the benefit of the majority. However, lack of information almost assures that forest resources will not be used equitably. Civil society organizations are critical to law enforcement in the north, and could play the same role in Central Africa, but are presently extremely weak and not supported by legislation. For these reasons, recent examples of increased demand for public accountability, and tentative government moves toward decentralization and transparency in forest management, represent extremely important steps that need to be consolidated and extended. *(See Issue Briefs #5 Timber Tsunami, #12 Management Watchdogs).*

Greening the Private Sector

Private sector enterprises, primarily logging and mining companies, are often both de jure and de facto regulators of resource use over the majority of the forest estate in Central Africa. In Cameroon, logging concessions cover 80% of the forest outside of protected areas. Loggers are in the business of making money, not in conserving wildlife, and their present business practices typically reflect this. The process of logging builds roads into once isolated forests, providing access to commercial hunters who supply bushmeat to meet growing urban demand. Salaried employees and their extended families who live in logging company camps within or bordering concessions also constitute a significant local source of demand for bushmeat. The expansion of commercial hunting of wildlife for meat facilitated by logging now risks the loss of most large bodied mammals from forests outside of protected areas. Early results from pilot projects to co-manage wildlife within logging concessions are demonstrating effective collaboration between the private sector and conservation NGOs, with the potential for reducing the impact of timber exploitation on wildlife. This suggests that efforts to ‘green’ private sector practices have the

potential to generate significant conservation benefits. *(See Issue Briefs #15 Policy Reform, #18 Sustainable Timber, #19 Private Sector).*

Forest and Resource Use

The relatively high demand for, and economic value of, forest resources in the absence of effective mechanisms for regulating access to, and use of, forest resources has lead to unsustainable use of many forest products throughout much of Central Africa.

Sustainable Forest Use

Most uses of the forest undermine, or preclude, other uses (e.g., logging and tourism are largely incompatible). At small scales (<100 ha), over short time frames, no single forest management system can be expected to generate all possible tangible and intangible benefits simultaneously within the same block of forest. At larger scales over longer time frames, multiple forest units can be managed differently, and in combination generate the full range of benefits desired by all stakeholders. Sustainable forest management that captures all forest values therefore requires recognition that different forest uses can best coexist when these values are explicitly and transparently negotiated between potential rival interests, and when planning takes place within a

landscape large enough to permit multiple uses. Deciding what blocks of forest to use in what way, over what time period, to benefit whom, is a sociopolitical process, the results of which will be determined by how power is shared or concentrated within and among nations. *(See Issue Briefs #3 Rich Forests, #9 Forest Estate).*

Agriculture

Traditional agricultural practices throughout the forest zone of Central Africa are derived from an ancient system that relied on abandoning a field after one or two years of cultivation, leaving it to reestablish forest cover, regenerate soil nutrients, and deplete the weed seed bank. This system works well when enough land is available to leave abandoned fields in forest fallow for 10-15 years. When land becomes scarce and farmers do not have access to agricultural inputs to increase yields per unit area (e.g., inorganic or organic fertilizers), fallow periods are reduced, soil fertility does not recover, weeds become a severe problem, and crop production declines. Eventually soils become so exhausted that crops no longer grow and fallow forest regeneration takes decades rather than years.

Plantation agriculture, introduced during the colonial era, causes forest clearing on a more systematic scale, with crops such as rubber, oil palm, cacao and coffee accounting for significant areas converted from natural forest in modern times. In some places (oil palm in the Democratic Republic of Congo, cacao in Equatorial Guinea), economic mismanagement had led to the near collapse of this sector, and many former plantations have reverted to some form of secondary regrowth. But in Cameroon, economic crisis has stimulated many unemployed urban workers to return to rural areas to earn a living from cacao or coffee cultivation in the forest zone. Several countries in the region are now pursuing privatization of failing parastatal companies holding

large tracts of land, which could also have consequences for land use and forest management. *(See Issue Brief #6 Deforestation).*

Non-Timber Forest Products

Non-timber forest products (NTFPs) are important to household consumption in many areas. Promotion of these products is sometimes seen as a way to discourage logging and agricultural clearing. Recent research confirms that NTFPs provide sources of food, medicines, and income to many households in Central Africa, yet these studies also show that the magnitude of NTFP contribution to local and national economies is typically small relative to agriculture. In Cameroon, agriculture's contribution to GNP is nine times that of NTFPs. But where forest has already been logged at least once, NTFPs are often more valuable than timber.

For poor families, NTFPs are an essential dietary and economic safety net, and are also a valued but minor component of the diets of wealthier households. Transportation costs largely determine whether agricultural crops or NTFPs are the most important source of rural household income, because the former can be produced consistently in large quantities but have a low value-to-weight ratio, whereas the latter typically have a higher value-to-weight ratio but are available less consistently and in relatively small quantities.

As NTFPs increase in value there is a trend toward overharvesting of wild resources, on-farm production, and exclusion of resource users by resource managers. Of the 20 most economically valuable NTFPs in Central Africa, 11 are unsustainably harvested and 12 are now cultivated. This trend suggests that few, if any, commercially valuable NTFPs can be harvested sustainably from the wild, given present resource access, ownership laws and enforcement capacity. Though on-farm and regulated wild production of NTFPs is a realistic option for raising household income levels and welfare security, marketing of NTFPs alone is unlikely to result in natural forest conservation. *(See Issue Brief #10 NTFP).*

Commercial Logging

Logging is a mainstay of Central African national economies, generating U.S. $60 million in taxes in 1997-98 in Cameroon and U.S. $31 million in Gabon. Logging also generates jobs and provides education and health services to rural communities often neglected by national governments. Over 50% of forests in Central Africa outside of protected areas have been allocated to logging companies. European companies have dominated the logging sector thanks to greater capitalization and longstanding political influence of former colonial governments. In recent years large Asian firms and smaller ones based in the Middle East have begun to play a larger role in the region. This is beginning to change the political and economic dynamics of the timber sector, and could complicate efforts to pressure logging companies to improve their practices through publicity campaigns and boycotts in Europe.

Present logging practices across the region are not sustainable, because logging concession leases are typically 30 years or less, while the average age of harvested trees often exceeds 400 years. Logging in Central Africa is essentially taking a once-off gift of nature as the trees that are being harvested took 300-1,000 years to reach their present size and it is unlikely that loggers will ever see trees of that size and age again. Moreover, the technical standards of most concession operations is very low by international standards. Until recently, no logging firm in the region employed a professionally trained forester, and much needless damage was done due to poorly sited skidder trails, high loss rates of felled trees, harvesting of species and stem sizes outside permitted limits, and disturbance of steep slopes and streambeds.

Weak enforcement and implementation of forestry legislation result in rampant illegal logging, significant loss of revenue for local and national economies, and unnecessary environmental impacts. Absence of government transparency and accountability means that logging legislation is poorly respected and hard to enforce. In Cameroon, in 1992-93, only 4% of violations were brought to trial and fines levied, while one out of five citations against logging companies was

dropped by the courts after the intervention of an influential person. *(See Issue Briefs #5 Timber Tsunami, #18 Sustainable Timber, #19 Private Sector).*

Community Conservation of Forest Resources

At present strong executive powers, absence of civil-suit provisions, and the de facto regulatory authority of the private sector over much of the forest estate undermine citizen participation in decisions that influence who has access to how much of what forest resource over what time period. As a result, forest resource use decisions often only benefit a few national or international actors, and do little to improve the welfare of the majority of Central Africa citizens.

Community mobilization initiatives such as participatory mapping and increased access to environmental information, help to empower civil society, which may in turn strengthen public demand for transparency and equity in forest resource decisions. Greater democracy in forest resource use decision making will help ensure that minority practices do not undermine majority interests. However, community control over land and resources does not by itself reduce forest degradation or deforestation. Thus, though building civil society institutions is critical to counterbalancing the power of the public and private sectors, it is important to maintain appropriate roles for national-level policies and decision making, to ensure that local self interest does not undermine the interests of society in general. *(See Issue Briefs #11 Forest Governance, #17 Keep Out, #20 Mobilizing Communities).*

Forest and Biodiversity Conservation

Some conservationists argue for creating more — and larger — protected areas in Central Africa. Yet few protected areas in Central Africa presently receive the level of investment necessary to ensure their long-term persistence.

In practical terms, substantially increasing the area within national parks and reserves is unlikely. To fill conservation gaps left by the present protected area network, conservation-compatible land uses are being proposed in landscapes bordering and between protected areas; i.e. land uses that permit significant conservation benefits in addition to desired economic returns. This landscape approach to biodiversity conservation is based on the realization that economic imperatives of poor nations and households make biodiversity conservation difficult unless investments are also made to minimize the overall environmental impacts of forest resource use as a whole, while providing for local and national commercial and subsistence needs.

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, and can help to reconcile the often competing interests of resource use and resource conservation.

Protected Areas

Protected areas support more diverse and abundant populations of wildlife and have less forest degradation than areas dominated by people and managed primarily for economic reasons. Parks and reserves also raise local community and government awareness of conservation values, and provide a source of national pride and international recognition.

Yet, most parks and reserves in Central Africa are inadequately staffed and financed, and often conflict with, and are seldom responsive to, local community interests. As a result almost all protected areas are at risk of gradual degradation from unregulated land use and resource extraction.

Given that protected areas are seldom self-financing, and are more typically a drain on national and local economies, their long term management and the persistence of the plants and animals that they contain is predicated on long-term international financing and stronger national commitment to managing parks primarily for the conservation of biodiversity. *(See Issue Briefs #3 Rich Forests, #4 Identifying Gaps, #21 Sustainable Financing).*

Conservation in Times of Conflict

Over the last decade civil wars and military conflicts have rent the social, institutional and administrative fabric of many nations in Central Africa, and in some cases several times. Yet, even with this appalling level of political and economic upheaval protected areas have been effective where NGOs and donors have maintained a presence and financial support during periods of strife. This has been particularly true when local communities have been advocates for, or at least not antagonists to, the park or reserve.

Experience in managing protected areas during internal or international conflicts has shown that leadership training of junior staff helps them to assume key roles left by senior staff who are targets of aggression and thus, necessarily, must withdraw from the area. Existing local community networks could be mobilized more effectively to help secure the protected status of the park or reserve. And in the aftermath of civil conflict, helping relief agencies to avoid or minimize the environmental impacts of their efforts will reap significant conservation payoffs. *(See Issue Brief #22 Civil Instability).*

Bushmeat Crisis

Though habitat loss is often cited as the primary cause of wildlife extinction, commercial bushmeat hunting is now the most immediate threat to wildlife conservation in Central Africa, with more than one million metric tons of wildlife consumed by rural and urban families each year. This unsustainable offtake is now resulting in the local extinction of apes, primates and other large-bodied mammals in forests close to urban centers of demand. Apes and primates are particularly susceptible to over-hunting as they reproduce slowly.

Though wildlife has been hunted for food ever since humans first evolved, only recently has bushmeat become an important source of income in Central Africa. A hunter can make $300-$1,000 per year—more than the average household income for the region, and comparable to the salaries of those responsible for controlling the bushmeat trade. Bushmeat is often the primary

source of meat for poor consumers, as it is typically the cheapest meat in rural and urban markets. Yet bushmeat is also a luxury item for the urban rich, who eat bushmeat during special days to retain their links to the village. As consumers are price-sensitive, solutions to the bushmeat crisis should focus on increasing the price of bushmeat through law enforcement and taxation, and reducing the price of alternative sources of meat and protein, perhaps including livestock production in nearby peri-urban areas. Measures to reduce restrictions on imports of meat should also be examined.

Logging companies are complicit in the commercial trade in bushmeat. Road construction associated with selective logging dramatically increases hunter access to isolated sectors of the forest, and decreases the cost of transporting bushmeat to urban markets, effectively increasing the supply of bushmeat and the profitability of the trade. Moreover, per capita bushmeat consumption is highest in logging concessions because company workers can afford to buy more meat than poorer unemployed families, they have the money to purchase guns and ammunition, they have motorized access to the forest to hunt, and logging companies often encourage hunting rather than providing their workers with food. Working with logging companies to curb their role in the commercial bushmeat trade has proven possible in several pilot co-management projects between conservation NGOs and timber companies and should be expanded. *(See Issue Brief #23 Bushmeat Crisis).*

Conservation Financing

The global heritage value of tropical forest plants and animals rarely, if ever, exceeds the short-term exploitation value of these resources. Thus, there is often little local or national incentive to set aside areas to conserve plant and animal species for perpetuity. Moreover, biodiversity conservation rarely pays for itself in full. Rather, it results in both direct management costs and indirect opportunity costs to local and national economies. Tourism, research, safari hunting and even a 10% national income tax are unlikely to cover a significant portion of protected area costs. As a result, more sustainable financing mechanisms are needed both to cover the recurring management costs of maintaining protected areas, and to compensate local and national economies for the opportunity costs of conserving globally significant plants and animals. *(See Issue Brief #21 Sustainable Financing).*

Green Conditionality

Experience from the World Bank financed forest sector reform program in Cameroon has shown that loan conditionality can empower latent constituencies for reform, deal set-backs to those with a vested interest in business as usual, and raise the profile of the forest sector on the development agenda. However, loan conditionality is poorly suited to ensuring the long-term institutional reforms necessary for effective policy implementation. As a result, donors need to link loans not only to sectoral reform, but to broader institutional and legal reforms. *(See Issue Briefs #15 Policy Reform, #18 Sustainable Timber, #19 Private Sector).*

Carbon Trading

Under the Kyoto Protocol, signed in December 1997, 38 industrialized countries and the European Union committed themselves to reducing their greenhouse gas emissions by 2008-12 to a level 5.2% less than the 1990 level. To achieve this goal, the Protocol established legally

binding emission reduction targets for industrialized countries, and two flexible mechanisms: emission trading within and among the industrialized countries, and the Clean Development Mechanism (CDM).

It may be more cost-effective to make offsetting investments in developing countries than to reduce emissions in industrialized countries, where the costs of retrofitting existing plants and upgrading existing technology is higher. The CDM, if ratified, may offer the countries of Central Africa an opportunity to take advantage of their forest resources to provide carbon sequestration opportunities (plantations on degraded forest lands) and emission reduction (reduced impact logging) projects to industrialized countries, at prices below the cost of emission mitigation efforts in industrial economies. If such forestry projects were linked to lasting improvements in the performance of public forest administrations, such approaches could be a positive force for change in forest management in Central Africa. However, governments need to be empowered to participate in international negotiations and must be willing to be held accountable for carbon trading contracts with verifiable results. The perceived risks of carbon-trading in forestry might be offset by adapting financial mechanisms used in stock trading (put options). *(See Issue Brief #24 Carbon Offset).*

Conclusion

Achievements

This first 5-year phase of CARPE has maintained U.S. environmental dialogue in a region of global interest with little direct USAID mission presence. CARPE's U.S.-based partners have succeeded in collaborating with a series of national partners across the region on a wide spectrum of forest management topics, resulting in the preparation of a compendium of environmental briefing sheets for a wide range of users. CARPE activities have stimulated NGO interest and participation in regional issues through targeted small grants, and have fostered public and private sector and civil society awareness of environmental governance concerns, issues and leverage points. CARPE has also taken a leadership position in the region by mandating its partners to make freely available all environmental information generated during the program, and advocating that donors, governments and NGOs do likewise.

Forest management and governance have changed in Central Africa. Though the change is not yet dramatic and other factors have played a role, CARPE has been a key catalyst for greater transparency and accountability, better management approaches, increasing access to environmental information, and improved coordination.

Key Gaps Remaining

Several key gaps in knowledge and capacity remain in Central Africa that militate against effective forest management. The future role of agriculture in determining the fate of the forest is poorly understood, particularly because we know little about how rural family farmers respond to changes in market access, commodity prices and off-farm labor availability. As most residents of

Central Africa rarely have the opportunity to attend more than a few years of primary school, the drag on economic development that results from widespread illiteracy and innumeracy, and lack of technical skills associated with quality higher education, will have long-term consequences for the environment. This area has had little attention to date from environmental organizations, including CARPE.

Regional integration and cooperation is important to reduce the risk of international conflicts and to improve transboundary natural resource management. Regional harmonization of logging policies, customs regulations and tariffs might do much to promote intra-regional trade and economic growth. However, none of the numerous regional initiatives since independence in the 1960s has achieved significant gains in promoting regional integration or development. Such regional cooperation probably requires: (1) real political will, (2) comparable levels of development and intra-regional trade, and (3) available, affordable and reliable forms of communication which remain scarce in Central Africa. Though promoting regional integration is important, it is unclear what donors could do, given present funding levels, to significantly reduce these constraints, especially in the absence of strong commitment and leadership from within the region.

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 Principe.

Web site:
http://carpe.umd.edu

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #2

#2 — What Is CARPE? The Central African Regional Program for the Environment

This brief was written by the **Biodiversity Support Program**. For additional information contact David Wilkie, email: dwilkie@rcn.com; Laurent Somé, email: laurentsome@wwfus.org.

Key Concepts

- Supporting institutions and individuals that seek to reconcile conflicting uses of the forests of Central Africa is critical to ensuring that present and future stakeholders, both within and outside the region, are able to share equitably in the benefits that accrue from the forest.
- Empowering local communities to participate in civil society institutions and providing local government with the powers and resources to manage forest resources are critical to counter-balancing the centralized powers of the public and private sectors and a key to sustainable management of the forest estate.
- Given the importance of the logging sector as a forest land-use in Central African nations, it is critical to identify and promote policies to maximize revenues generated from logging while minimizing adverse environmental and sociocultural impacts.
- Making environmental information freely available to the public sector and civil society will remove a barrier to sustainable resource management in Central Africa.
- Given the pace of socioeconomic change in the region, it is critical to ensure that, during the slow but progressive development of processes for equitable land-use decision making, options to capture future values of the forest are not foreclosed.

What is CARPE?

The Central African Regional Program for the Environment (CARPE) is a USAID-supported initiative to identify and help establish the conditions and practices required to reduce deforestation and biodiversity loss in the Congo Basin. The expanded knowledge base and enhanced individual and institutional capacity that result from the implementation of the first phase of CARPE will serve as the essential foundation for a longer-term (15-20 years) effort to sustainably manage forest resources, thus conserving the region's biodiversity and averting potentially negative changes in regional and global climate. Project activities are focused on Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Republic of Congo, Rwanda, and São Tomé e Principe.

Within USAID, CARPE is unique in that it is being designed and implemented by U.S.-based government and nongovernmental organizations, all with experience in the region. These organizations are African Wildlife Foundation, Biodiversity Support Program, Conservation International, Innovative Resources Management, NASA, University of Maryland, United States Forest Service, United States Fish and Wildlife Service, United States Peace Corps, University of Virginia, Wildlife Conservation Society, World Resources Institute, and World Wildlife Fund. The Biodiversity Support Program, a USAID-funded analysis and strategic planning program, has played a lead role in CARPE design and implementation.

CARPE's core philosophy is to facilitate the meaningful involvement of African partners and to ensure that African decision makers have access to, and the capacity to use, information critical to rational forest resource management. CARPE has engaged local NGOs, individuals, and government agencies in activities to evaluate threats to forest integrity and identify opportunities for minimizing resource degradation while promoting human livelihood security.

Early in the process, a field office in Libreville, Gabon, and later Focal Point offices in Yaoundé, Cameroon, and Kinshasa, DRC, were set up to ensure effective communication among U.S.-based and Congo Basin partners, to help coordinate CARPE activities within the region, and to take the lead on implementing selected capacity-building activities.

What Is the CARPE Perspective on Forest Management?

The forests of Central Africa are valuable to the residents of the region and to the entire world for many reasons. If a given area of forest could simultaneously generate all such values, then managing the forest would not be a challenge. Unfortunately, a land-use that captures one value tends to undermine or preclude land-uses that would capture other values. For example, a forested landscape converted to coffee to generate income for families and national governments may no longer be a forest filled with food or medicines that can be harvested for local use or for

sale. A forest where wildlife are hunted for meat generates food and income for families today, but may jeopardize the chances of future families from capturing the same values. A forest set aside as a national park is no longer accessible to loggers to harvest and sell the trees and to provide a source of employment.

"Deciding what areas of forest to use to generate which values, for whom, over what time frame is a complex sociopolitical process and one that is evolving in Central Africa."

Deciding what areas of forest to use to generate which values, for whom, over what time frame is a complex sociopolitical process and one that is evolving in Central Africa. Over the first five years of the project, CARPE has become eminently aware that the forests of the region have multiple values, that land-uses to capture these values often conflict with one another, and that the sociopolitical processes to reconcile these conflicts have yet to become fully established in the region.

Consequently, CARPE is focusing its efforts on (1) seeking ways to nurture this nascent and evolving process for rationalizing and legitimizing conflicting uses of the forest and (2) helping to ensure that, during this evolving process, the full range of forest use options are kept open.

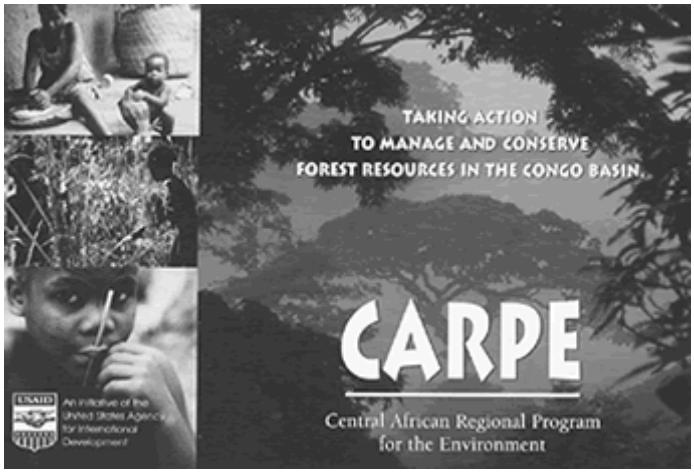
Next Steps

The next steps for CARPE focus on environmental governance, community-level natural resource management, logging sector environmental performance, and protected area management.

Environmental Governance

Concentration of forest management in the hands of a national urban elite and a few logging companies, neither of which are accountable to the citizenry, has resulted in considerable inequity in benefit sharing from forest resource exploitation, low compliance with forest management laws, and unsustainable forest use. Furthermore, strong executive powers and absence of civil-suit provisions undermine citizen participation in forest use decisions and oversight.

Building and maintaining support of local and national public sector and civil society institutions that seek to reconcile forest use conflicts are critical to the long-term conservation of the forests of Central Africa. Moreover, empowering rural households to participate in civil society groups and coalitions will help counter-balance the power of the public and private sectors and help leverage more transparent, representative, and accountable systems for allocating and regulating forest resource uses in Central Africa. To that end, CARPE will continue its support of the CEFDHAC process, Yaoundé Head of State Summit Process, Global Forest Watch, NGO and resource manager capacity building, and community-based forest management.



A widely disseminated brochure on CARPE gives readers a good overview of the program's goals and activities. More information is readily available at the CARPE Web site at http://carpe.umd.edu.

Community-Level Resource Management

Some level of community involvement is necessary for any resource management initiative, particularly when the resources are important to local economies and when state law enforcement capacity is weak. Though community-based conservation has been seen to be effective in other parts of Africa and the world, empowering local communities to demand greater legal participation in management of the forest estate is still in its infancy in Central Africa. CARPE will continue to facilitate participatory action research to help determine the range of forest resource management roles and responsibilities that communities can assume, that would make more equitable their share of forest benefits and relieve pressure on government to regulate resource use across the whole forest estate. Helping rural households build and participate in civil society groups and coalitions concerned with leveraging more transparent, representative, and accountable systems for allocating and regulating forest resource uses is a necessary step to more sustainable management of the forest estate in Central Africa.

Logging Sector Environmental Performance

Logging is, and over the next 20 years will continue to be, the most significant source of forest-based revenue throughout most of Central Africa. Moreover, logging companies are the de facto managers of most of the remaining relatively intact blocks of forest outside of protected areas; they have a key role to play in ensuring that logging practices do not unnecessarily impact the quality and abundance of forest resources. Given the importance of the logging sector in the region as both a source of local and national income and as a primary agent of forest degradation or conservation, CARPE will continue to test and document the economic and environmental impacts of logging sector policy reforms in the region, explore ways to encourage logging companies to adopt reduced-impact logging practices that address wildlife conservation within concessions, complete and test a Geographic Information System (GIS) model of logging

revenues based on forest inventory, road quality, and log price data in Cameroon, and undertake NGO training on concession performance monitoring.

Protected Area Management

The value placed on forests in Central Africa by the majority of local, national, and international interest groups is an economic value and land uses that capture that value typically if not always undermine the biodiversity conservation values preferred by the minority. Until effective and equitable forest governance mechanisms are in place in Central Africa, short-term economic values of the forest are likely to take precedence over longer-term, more intangible values. As the majority favors economic land-uses that reduce biodiversity, it is not surprising that the land set aside for less-desired intangible values is small relative to that “zoned” for economic use. As a result, biodiversity is at risk both because areas “zoned” are too small and land uses in economic zones undermine conservation.

Protected areas are critical for biodiversity conservation. Parks and reserves provide large mammals with safe havens without which they would be in direct competition with humans for space and resources — a fight they would undoubtedly lose. Plant and animal species that are threatened elsewhere by commercial exploitation, or by conversion of habitat to other land uses such as agriculture, are ensured, within protected areas, of a place to grow, reproduce, and evolve. In Central Africa, like other regions of the world, as populations grow and economies expand, wild habitats will progressively be converted to anthropogenic land uses. Protected areas will increasingly become the principal bastions of forest resource conservation, because only within protected areas is biodiversity conservation the primary land use.

To ensure that short-term expediency does not foreclose options to capture future values of the forest it is essential to maintain investment in a network of protected areas that contain viable assemblages of forest plants and animals representative of the region. To that end, CARPE will continue to help ensure that reservoirs of forest plants and animals are maintained and to promote land-use practices in zones around and between these reservoirs and across national borders that minimize adverse environmental and social impacts.

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CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #3

#3 — Rich Forests, Poor Countries: Adapting Forest Conservation to Economic Realities

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This brief was written by **CIFOR** and **USAID**. For additional information contact Jeffrey A. Sayer, email: j.sayer@cgiar.org; J. F. Swartzendruber, email: fswartzendru@afr-sd.org; Robert Nasi, email: r.nasi@cgiar.org; Bruce A. Byers, email: bbyers@igc.org.

Related Issue Briefs

#4 Identifying Gaps

#8 Forest Disappeared

#9 Forest Estate

#11 Forest Governance

Key Concepts

- A strategy for forest and biodiversity conservation in the Congo Basin now being promoted by many conservation organizations is to maintain and expand the number of large parks in remote areas of pristine forest. But in many poor countries the effectiveness and conservation impact of the conventional parks model is questionable.
- Forests in many parts of the Congo Basin will come under much greater pressures from a

combination of increasing population and demand for economic development over the next several decades, and the big, remote, pristine parks model of conservation may not be socially, politically, and economically sustainable.

- Over-hunting, often associated with logging, is the most serious threat to many larger mammals in much of the Congo Basin. Controlling this over-hunting will require a combination of measures to reduce urban demand for bushmeat and tighter supervision of logging sites, rather than additional protected areas.
- An alternative model for conservation in the Congo Basin would involve three general types of conservation areas in a multiple-use mosaic: a relatively small number of elite, globally significant sites; a representative network of smaller protected areas spread more broadly throughout the landscape, with a relatively high density of sites in more populated areas; and a much larger area under multiple-use (IUCN Category VI) management.
- The urgent needs of human development will be better reconciled with the urgent needs of conservation through such a three-pronged strategy than through exclusive focus on big, remote, pristine parks, and it will be much easier to generate the political will needed for sustaining such a strategy.
- Governance structures and management institutions required for multiple-use landscape conservation are much different than those developed for conventional protected area conservation, involving much greater decentralization and devolution of decision-making to the local level, while still protecting the interests of stakeholders at the national and global levels.

Big, Remote, Pristine Parks: The Current Model for Conservation

Many conservation programs appear to be driven by the perception that there are still vast areas of pristine wilderness in the tropics, but that these are now being rapidly eroded by human settlement and economic development. Much of the investment in conservation in the Congo Basin has been channeled toward large, remote areas in which most forms of human use can be minimized. The assumption underlying this emphasis is that human presence is incompatible with the maintenance of high levels of biological diversity. The emphasis on large, remote parks has important implications for conservation, and serious thought must be given to whether this is a sound strategy. Some conservationists argue that important elements of biodiversity are also found in highly threatened habitats in less-remote, populated regions, and that by ignoring such sites we risk substantial loss of biodiversity.

Many conservationists are now calling for increased international investment in parks and other strict protected areas, and global targets have been proposed– for instance, to protect 10% of all forests. Some biologists have argued that even this optimistic target would be far too low to

conserve most species, and that a goal of 50% of tropical forest under strict protection should be the goal. New protected areas are being proposed in the Congo Basin, and national leaders are being asked to support ambitious targets for expanding the percentage of land under protection. Some have called for expanding protected-area management to the landscape or ecosystem scale, which is a positive development because it recognizes the need to place biodiversity conservation in a larger spatial context, but simply increasing the area and number of parks may not be an effective strategy.

Problems with the Current Model

In the Congo Basin, very large areas of species-rich forests exist in countries that are among the world's poorest. Decision makers and ordinary people in these countries are far more concerned about meeting short-term local and national needs than about the long-term value of global biodiversity. Many investments in biodiversity and forest conservation in these countries have tended to ignore this reality. Given present economic realities, it is hard to see how such investments can be sustained unless much greater emphasis is given to reconciling conservation objectives with economic needs. Conventional conservation approaches based on a strictly protected park model often antagonize local people and provide few compensating benefits, despite occasional efforts to direct development investments toward neighboring communities.

Unlike landscapes where agriculture, mining, and logging are the principal land uses, protected areas do not generate significant revenues for Central African countries, and seldom are self-supporting anywhere in the world. The costs of these lost opportunities can have a severe impact on both local and national economies. In Central Africa, for example, the opportunity costs of not logging in protected areas amount to millions of dollars per year.

One of the most severe threats to many larger mammals in the region is uncontrolled hunting in and around logging concessions to supply bushmeat for concession laborers and urban markets. Better management and supervision of logging sites and long-term efforts to reduce urban demand for bushmeat are both needed to mitigate this critical threat to biodiversity. Establishing new parks in remote locations will not address either of these requirements.

In the Congo Basin, reconciling local and national needs of human development with global concerns for biodiversity conservation is a challenge.

The long-term political, social, and economic sustainability of the big, remote, pristine parks model is questionable. The Congo Basin is often thought of as a region of vast frontier forests, yet recent forest modeling studies suggest that over the next 30 years many forest areas in the region will come under much greater pressure from a combination of economic development and increasing population. Given present trends, some large tracts of forest will remain more or less intact, but much of the region's forested area is almost certain to undergo a transformation from old-growth forest to degraded or secondary forest, or to agriculture.

An emerging body of evidence suggests that the assumption that tropical forests are pristine is questionable. Instead, tropical forests have been occupied and managed to some degree by people for millennia, and their present structure and species diversity are often, in part, a product of long-term human-forest interactions. Low levels of human use and disturbance may help maintain species diversity. While traditional use is not necessarily consistent with conserving all species, very considerable levels of biodiversity can be maintained under certain forms of human use; on the other hand, the conservation benefits of strict protection have sometimes been disappointing.

Not all species of plants and animals are equally threatened by, or tolerant of, human use. Some species thrive in human-dominated landscapes, whereas others quickly disappear as human occupation and use of a landscape increases. Thus, though the genetic, species and ecosystem diversity of anthropogenic landscapes tends to be much lower per unit area than that typically found in even inadequately managed protected areas, not all species are equally at risk within such landscapes.

Parks Have Had Less Conservation Impact than Hoped

Throughout the tropical world, substantial investments have been made in forest conservation, yet several recent studies have concluded that international efforts to conserve the biodiversity of tropical forests are yielding disappointing outcomes. Some studies have questioned whether the traditional parks model of conservation promoted by international development assistance agencies is even appropriate for very poor countries, on both ethical and practical grounds. Furthermore, conventional parks projects are facing increasing scrutiny of the results that have been achieved, and rigorously defined measures of outcomes are surprisingly rare.

Many conservation programs are based on highly optimistic assumptions about the extent of the benefits that poor people will derive from natural forests. Although many programs aspire to both relieve poverty and conserve forests, in many cases they fail to achieve either. Many conservation projects are heavily dependent on external financing, management and technical support, and may be unsustainable over the long term. Furthermore, the current network of protected areas in tropical forest regions, including the Congo Basin, is not necessarily representative of the full range of biodiversity found there because representation was not a criterion for establishing them.

Multiple-Use Landscapes: An Alternative Model for Conservation in the Congo Basin

An alternative model for conservation in the Congo Basin would involve three general types of conservation area, each serving a different purpose in a multiple-use landscape. In this multiple-use mosaic model, parks and other strict protected areas would still be an important element, but would no longer be seen as the sole element of biodiversity conservation.

A relatively small number of elite, globally significant sites would be one leg of the biodiversity conservation triad in this model. These sites could be large, remote national parks, including already gazetted World Heritage sites. The forests of the Congo Basin are represented on the World Heritage list by six sites in three countries.

A network of smaller protected areas spread more broadly throughout the landscape, and including a relatively high density of small sites in more populated areas, is another element in this model. The distribution of these smaller natural areas should probably attempt to represent the diversity of forest types throughout the region, and conserve plants and animals not represented within the few big parks. The current protected area network in the Congo Basin has far fewer and much larger (on average) protected areas than in developed countries like Australia, the United Kingdom, and the United States. There is debate among conservation biologists about the merits of single large, versus several small, conservation areas. Small areas, if dispersed, may be better for conserving some kinds of organisms (such as plants and

invertebrates) while fewer but larger protected areas may be better for conserving other kinds (such as large mammals).

Multiple-use protected areas, designated by the IUCN as Category VI, are the third important element of this conservation model. There is a striking lack of protected areas of this type in the Congo Basin. By contrast, in many industrialized countries only a small part of biodiversity conservation is achieved in protected areas in IUCN's categories I, II, and II (strict nature reserves and wilderness areas, national parks, and national monuments), and species conservation is more often seen as one among many land-use objectives. In the western United States, for example, IUCN Category VI protected areas, such as national forests, are the dominant type of protected area. Timber harvesting, hunting and recreation are often equally important activities in these areas. This helps to build community support for conservation, and offsets some of the costs associated with it.

In the poor countries of the Congo Basin, reconciling local and national needs of human development with global concerns for biodiversity conservation is a challenge that may best be met if the conservation portfolio gives more emphasis to multiple-use areas. Such areas provide local and national benefits and economic incentives, while also helping to sustain global values such as species diversity. Economically integrated multiple-use conservation areas can help create the political will for long-term sustainable management of forests in the region.

Conservation in Multiple-Use Landscapes

There is still much to learn about how to effectively decentralize and devolve governance structures for natural resources management in developing countries. Management institutions for multiple-use landscape conservation will surely require significant adaptation from present models. They will certainly be very different than the command-and-control culture of conventional park and protected area agencies. They will require a greater degree of devolution of decision making and sharing of authority than has been common in the past. Local conservation programs will have to be tailored to local needs and negotiated with local stakeholders. Land managers will have to have the independence to make agreements with local people and the judgment to decide upon the trade-offs between local needs and national- and global-level conservation objectives. Success should be defined in terms of the quality of management rather than the extent of the area legally protected.

Much is already being learned from community-based resource management in other sectors, as well as joint forest management or co-management in other forest areas. Some of the most important conclusions to be drawn from this experience are as follows:

- Central governments cannot abdicate all authority; if they do, then conservation attributes of national or global importance will be lost.
- The credibility, authority, transparency and professionalism of intermediate organizations is very important if large numbers of local stakeholders are to be empowered to manage

resources. Such organizations can range from local NGOs to decentralized, autonomous government bodies.
- Economic incentives or compensation will almost always be required for local stakeholders if they must forego some uses of the natural resources of an area in order to maintain other competing values of interest to stakeholders at the national or global level.

The Malawi Principles for Ecosystem Approaches to Management (Box 1), at present under discussion in the context of the work of the Convention on Biological Diversity, are relevant.

Diversifying the Conservation Portfolio: A Precautionary Strategy

Forest conservation in the Congo Basin will require more diversified approaches in order to manage a wider range of land-use systems more effectively, at lower cost, and with significantly more local and national participation. A precautionary strategy would involve a balanced emphasis on a small number of large, elite parks; a network of smaller protected areas spread more broadly throughout the landscape; and conservation areas aimed at the sustainable production of natural resources. The current enthusiasm for the big, remote, pristine parks model of forest conservation is risky. This model may fail due to the lack of a strategy for achieving political, social, and economic sustainability. Multiple-use areas should receive far more attention in the Congo Basin than they have so far received. In the long term, an integrated strategy that links biodiversity conservation with regional development is needed.

Forests in Central Africa are an important source of revenues for national treasuries and are a very active economic sector.

The Malawi Principles for Ecosystem Approaches to Management

Management objectives are a matter of societal choice.

Management should be decentralized to the lowest appropriate level.

Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Recognizing potential gains from management there is a need to understand the ecosystem in an economic context. Any ecosystem management program should:

- Reduce those market distortions that adversely affect biological diversity;
- Align incentives to promote sustainable use;
- Internalize costs and benefits in the given ecosystem to the extent feasible.

A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.

Ecosystem must be managed within limits set by their ecological functions.

Management should be undertaken at the appropriate scale.

Management must recognize the varying temporal scales and lag effects that characterize ecosystems.

Processes and objectives for ecosystem management should be set for the long term.

Management must recognize that change is inevitable.

The ecosystem approach should seek the appropriate balance between conservation and use of biological diversity.

For More Information

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #4

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

This brief was written by the **WCS**, the **WWF** and the **Biodiversity Support Program**. For additional information contact Amy Vedder, email: avedder@wcs.org; Tony Mokombo, email: Tony.Mokombo@wwfus.org; David Wilkie, email: dwilkie@rcn.com.

Related Issue Briefs

- **#3 Rich Forests, Poor Countries**
- **#11 Forest Governance**
- **#12 Management Watchdogs**
- **#17 Keep Out**

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 con serve 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 with in 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.

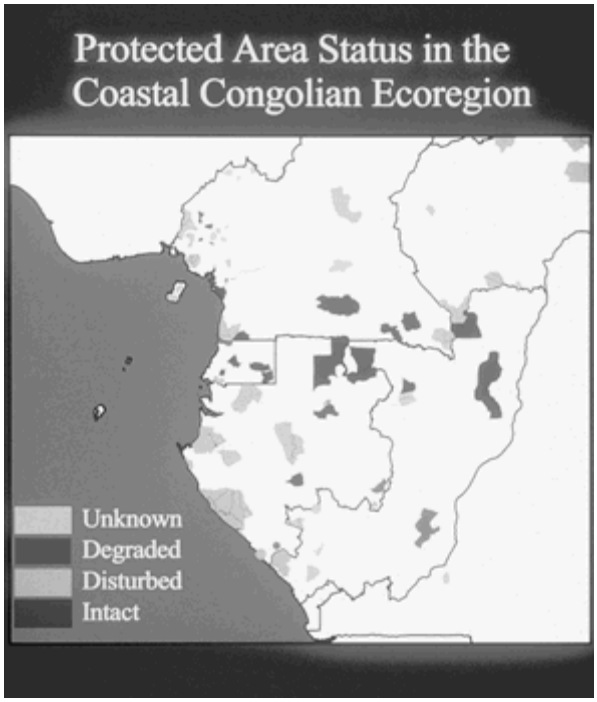
Can We Afford to Conserve Biodiversity in Central Africa?

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.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #5

#5 — Timber Tsunami
Tracking Logging in the Congo Basin

This brief was written by the Global Forest Watch Project of **World Resources Institute**. For additional information please contact Jean-Gael Collomb, World Resources Institute; e-mail: jg@wri.org.

Related Issue Briefs

- **#12 Management Watchdogs**
- **#15 Policy Reform**
- **#18 Sustainable Timber**

Key Concepts

- The Congo Basin contains the second largest contiguous tropical rainforest block in the world.
- Though agriculture is a primary cause of deforestation, its impact is localized, affecting less than 10% of the landscape. Most of the landscape outside national parks and reserves is zoned for logging, resulting in significant degradation.
- Logging is a mainstay of Central African national economies, generating in taxes in 1997-98 U.S. $60 million in Cameroon and U.S. $31 million in Gabon.
- Gabon and Cameroon rank among the world's top five tropical log exporters. Central African timber was primarily exported to Europe, but recently exports to Asia's markets

have increased substantially.

- European companies dominate the logging sector thanks to greater capitalization and strong political links with and interests from ex-colonial governments.
- As only a few tree species are commercially valuable, Central African forests are usually selectively logged. Harvesting one to two trees per hectare typically damages less than 10% of the canopy. However, logging roads fragment the forest and open once-isolated areas to commercial hunters and immigrant farmers.
- Weak enforcement and implementation of forestry legislation result in rampant illegal logging, significant loss of local and national revenue, and environmental impacts.
- Little relevant and timely information on forest resources is available. Basic information on logging sector practices and production is not collected, synthesized and made public by governments.
- Though satellite remote sensing is useful to detect forest loss, illegal selective logging and hunting are major causes of forest degradation that may only be seen in field-based surveys.

The Spread of Logging in the Congo Basin

Logging is important as a source of revenue and as one of the primary causes of forest degradation. In 1998, timber generated 28% of all non-petroleum export revenues in Cameroon. The logging sector is one of the largest employers in both Cameroon and Gabon, and often plays a key role in bringing roads, education, medical care and electricity to rural areas. However, logging may cause considerable damage to forests as a result of road construction, and felling and removal of logs. Studies in Gabon have shown that logging causes approximately 10% loss of canopy size trees. In addition, up to 50% of the canopy could be disturbed, because several trees are typically damaged or destroyed in the process of reaching and felling a harvestable tree.

Industrial-scale logging in the Congo Basin began at the end of the 19th century with the establishment of European colonies. Timber was felled initially along the coast, then logging spread inland along major rivers as the logs could be floated down to ports where it was exported. As the supply of quality trees diminished and the demand for timber grew, logging companies advanced deeper into the forest interior (Figure 1).

High operational costs, poor infrastructure, and, most important, demand make loggers focus on only a few valuable species. Harvesting all large individuals of only the best quality trees of a few species reduce the commercial value of the remaining forest and alters its species and size class composition.

Most trees felled in previously unlogged forest are 400-1000 years old. As felling cycles are unlikely ever to exceed 100 years, logging in the Congo Basin is likely to be a two-step process.

The first is the “unsustainable” harvest of “old-growth” trees as a one-time “gift of nature.” Followed by a “sustainable” logging cycle that harvests trees at a rate equivalent to their replacement. Most logging in Central Africa is presently in the first phase, with Cameroon, Central African Republic, and Republic of Congo likely to run out of old-growth trees in 15-20 years.

As loggers sweep over the landscape in search of valuable trees, they cause rural economies to boom and bust, because once a logging company has removed the few valuable trees, it moves on to a new area. Logging also attracts immigrants looking for good-paying jobs and access to social services not provided by the state. This leads to increased agricultural and hunting pressures on nearby natural resources, pressures that continue even after the logging company has moved on. Logging roads left behind by companies open up pockets of forests that were previously inaccessible to hunters. Motorized transportation allows more, faster and cheaper transportation between the hunting areas and urban markets. This promotes commercial hunting, which is largely unregulated in most of Central Africa and can quickly decimate local wildlife populations.

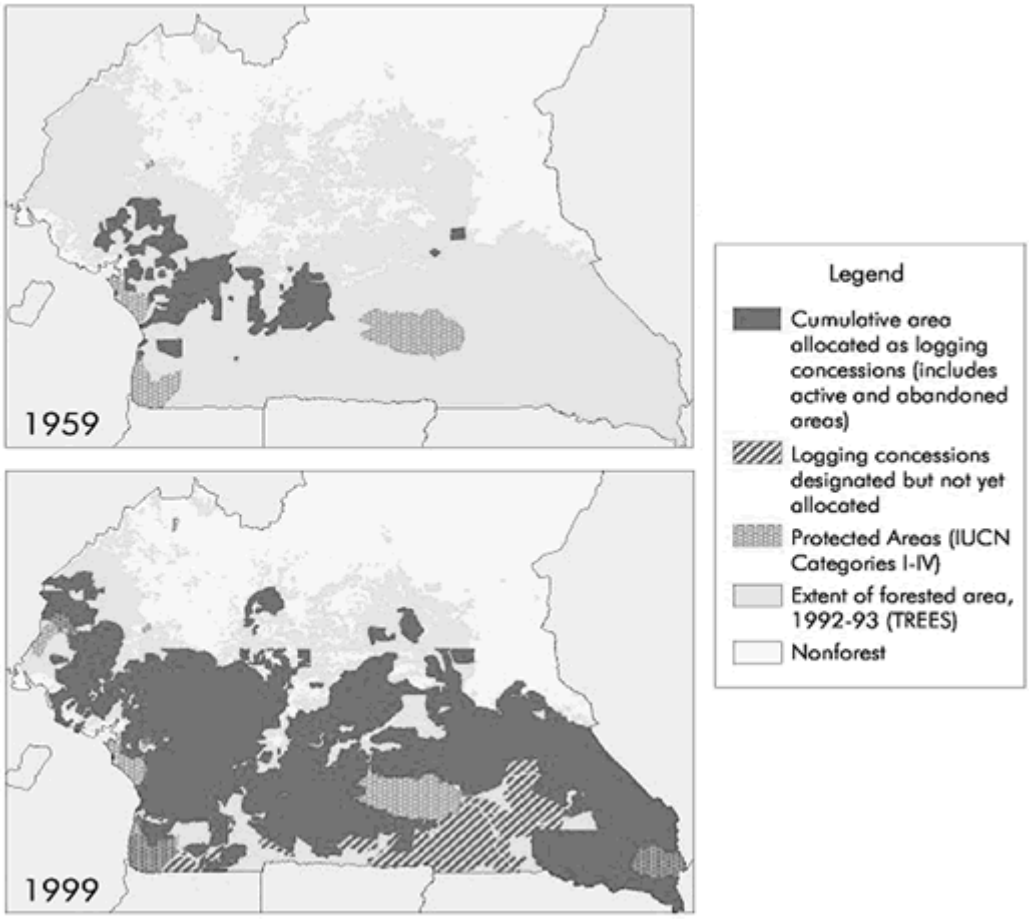

Figure 1: Evolution of Logging Concession between 1959 and 1999 in Cameroon.

Demand for Timber Keeps Growing

China imported 60 million m3 of timber in 1999, and is expected to import about 100 million m3 by 2010. The economic crisis that swept the globe in 1997-98 had a devastating impact on tropical timber production and trade (Figure 2), but a recovery seemed under way in 1999. Prices for African timbers have withstood the Asian financial crisis and demand remains strong. Cameroon's log export ban, which doesn't apply to sawnwood, has prompted other Central African nations to increase production to satisfy increased demand for African logs and sawn timber in Europe - a trend that is likely to continue. Though raw log exports from Central Africa declined in 1999, overall exports of processed wood increased; volumes still represent a small fraction of the global tropical timber trade.

Difficulties in Enforcing Forestry Legislation

The likely expansion of the timber sector could prove beneficial to Central Africa's national economies. However, the region has a poor track record of managing its natural and financial resources for social and environmental good. Central African nations are in the process of reforming their forestry policy but, as events in Cameroon have shown, the biggest hurdle to better forestry is not the law itself but the practical implementation of those regulations.

At present, no logging operation in Central Africa is certified using Forest Stewardship Council (FSC) international norms. Worse, most companies are far from meeting certification requirements, and certification has yet to be widely accepted as a potential tool to improve forest management.

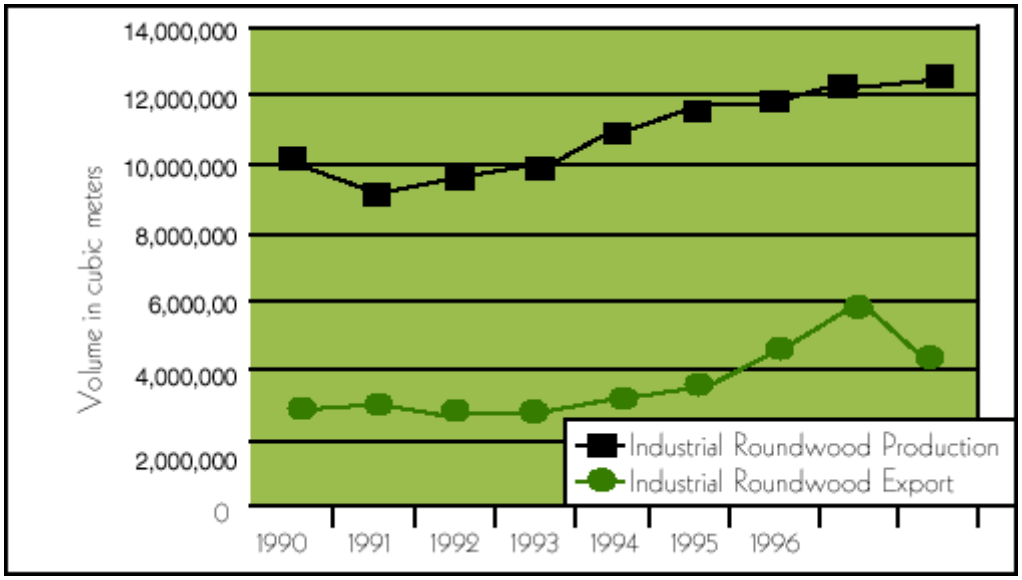

Figure 2: Log production and export trends in the Congo Basin.

The laws regulating the use of natural resources in Central Africa are poorly implemented and rarely respected. For example, three quarters of the planned application decrees, codifying the 1982 forestry law in Gabon, have yet to be written. Since 1997, the Gabonese Ministry that oversees the nation's forest estate has been engaged in the process of forest policy reform, but the new law has yet to reach and be accepted by the National Assembly. In Cameroon, the World Bank has supported the elaboration of a new forestry policy, which was enacted in 1995. It laid out strict and groundbreaking guidelines for the management, taxation and allocation of forestry concessions. Over half of the logging permits in 1997-98 and less than a third of the concessions allocations as of December 1999 fully complied with the new guidelines. (Figure 3). During the latest concession allocation round, two companies known to have violated the law were awarded new concessions. Furthermore, in both Cameroon and Gabon, logging concessions have been allocated within the boundaries of national protected areas.

Several factors may explain why laws are hard to implement and poorly respected. In Gabon, in 1997, only 100 forest agents were employed to monitor and inspect 84,000 k2 of logging concessions (roughly the size of Maine). Similarly, in the East province of Cameroon, on average, each agent was responsible for over 200 k2 of concessions. This is, in part, a symptom of the fact that most forestry revenues contribute to non-forestry related portions of the national budget instead of first supporting the ministry in charge of forests.

In addition, the region is plagued by corruption. Even when illegal activities are documented, there are only minor consequences. In 1992-93, only 4% of violations reported in Cameroon were brought to trial and fines levied. One out of five violation cases brought to the judiciary were dropped after "the intervention of an influential person."

Getting Information Into the Hands of Civil Society

Central African nations are in the process of reforming their forestry policy. However, basic information on logging sector practices and production levels is currently not collected, synthesized and made public by Central African governments. Lack of current forest sector information hampers the evolution of civil society institutions that can engage government and the private sector to reform forest management policies and practices to benefit nations as a whole. In Central Africa the public—and private—sectors dominate forest management decision making, and there are very few mechanisms in place to promote transparency and accountability within these sectors. As a result, the economic benefits of logging are seldom shared "equitably, and environmental concerns are seldom addressed.

Initiatives to increase public access, rather than simply public-sector access, to current and verifiable information are based on the belief that this will help empower civil society institutions to lobby government for changes in forest policies, and the private sector to improve their forest-use practices. Building civil society capacity to independently monitor the logging

sector is one step to helping prevent mismanagement of the forest estate, fight illegal logging, and expose corruption.

In recent years, three trends have been crucial to the development of these efforts. First, new technologies, such as computerized Geographic Information Systems (GIS) and the internet, have allowed information to be better synthesized and shared rapidly over great distances at low cost. Second, many wood products companies are adopting “green” purchasing policies, suggesting increased market demand for wood products from well managed forests. Third, ongoing economic crises in Central Africa encourage governments to make their economies more efficient, which may imply reforming resource pricing and decentralizing some responsibilities for forest management.

But change is slow to come, in part because powerful interests benefit from the status quo. Logging benefits a minority of people, often a mix of the national elite and foreign businessmen, who have accumulated great wealth from logging revenues. However, the international community is putting increasing pressure on governments to reform the forest sector.

New Initiatives to Better Track Logging Activities

To better monitor logging trends, it is important to know: (1) what logging activities are planned or underway, (2) where commercial logging is located, (3) who is involved, (4) whether or not the laws are respected, and (5) what the environmental and social trade-offs of these activities are.

To promote change, information must be targeted at a mostly non-technical audience: policy makers within national governments, the international donor community, media, advocacy groups, and others concerned about forest management issues. This entails a strong focus on visual information and basic well-documented facts. New tools, such as Geographic Information System (GIS), high-resolution satellite imagery, and the Internet, increase the quality, timeliness and cost-effectiveness of these efforts; however, they will never fully replace actions by groups “on the ground.”

To improve long-term management of resources, multiple efforts are under way to better document and monitor logging. The World Bank has launched a Congo Basin wide initiative, the Regional Environmental Information Management Program (REIMP), to synthesize and distribute environmental information among government agencies, research institutes, and civil society. The Canadian International Development Agency has helped the ministries in charge of forest management in Gabon and Cameroon create computerized databases for inventories and tracking production of concessions. The French Cooperation has also attempted to develop a logging concession map linked to a GIS to facilitate tracking of where logging is taking place. These initiatives, mostly within government institutions, may be powerful tools to develop sustainable management strategies. Their efficiency will be better assessed when the results are made widely available to civil society. Availability of open and transparent information is essential for sustainable management of forests.

Civil society has had a growing interest in logging issues. Local groups are looking for tools to monitor their forests and how they are managed. Non-governmental organizations in Gabon and Cameroon have recently assembled key forestry data sets and published them as part of the Global Forest Watch initiative. In Canada, the Sierra Legal Defense Fund (SLDF) conducted field audits of logging companies prompting greater public and government scrutiny of these companies' compliance with the law. Global Forest Watch facilitated an exchange between SLDF and a Cameroonian NGO, Cameroon Environmental Watch (CEW), which has resulted in similar audits in Cameroon.

The Democratic Republic of Congo: More Than 50% of the Congo Basin's Forests

A forest sector review in DRC carried out by International Institute for the Environment and Development in 1988 recommended legal reform. But the intervening years have brought political chaos and economic collapse. Kinshasa has been pillaged twice (1991, 1993), and the country has been invaded twice (1997, 1998). GNP has fallen by a half since 1990 and conditions are allegedly worse now than under ex-president Mobutu. Unpaid government officials regularly shake down businesses for spurious infractions, and the government has seized millions of dollars worth of logs for suspected tax evasion. Today, the forest sector represents less than 1% of the GDP. The very high cost of extracting wood and bringing in fuel and machinery are major barriers to wood exports. Some concessions are located 2,000 km upstream from Kinshasa, and wood that is shipped or floated down then has to be loaded onto a dilapidated single-track railway to be taken to the silted-up port of Matadi.

As a result, DRC's official industrial forest sector has shrunk at a time when wood exports have boomed elsewhere in Central Africa in response to strong Asian demand. Officially, only two foreign companies are active in DRC: the German SIFORCO and the Swiss SODEFOR. However, many anecdotal reports indicate that most natural resources (including wood) in the eastern part of the country are under severe pressure as a result of the armed conflict between DRC and its neighbors. There is no effective control as priorities are understandably focused on safety and humanitarian issues. Minerals, wood and game meat are reportedly extracted out of DRC through its eastern border.

What Can You Do About It?

National Governments

- Make basic data sets, such as lists of logging concession owners, timber export volumes and values, and taxes paid, available to the public through timely and accurate reports.
- Improve forest legislation enforcement, with the help of the international community if necessary.
- Incorporate the value of non-timber forest products into the national system of accounts.

Donors

- Support only those forestry sector projects where decision making is based on documented information “and where the decision processes are open and transparent.
- Support initiatives to fight illegal logging.
- Do not support activities known to have perverse social and ecological consequences.

Private Sector

- Make public more information about business and logging practices.

Consumers

- Ask questions when you buy wood products, such as: Where does the wood come from? Is the wood certified?
- Do not purchase wood products from companies known to either violate laws, or known to engage in environmentally and socially irresponsible logging practices.

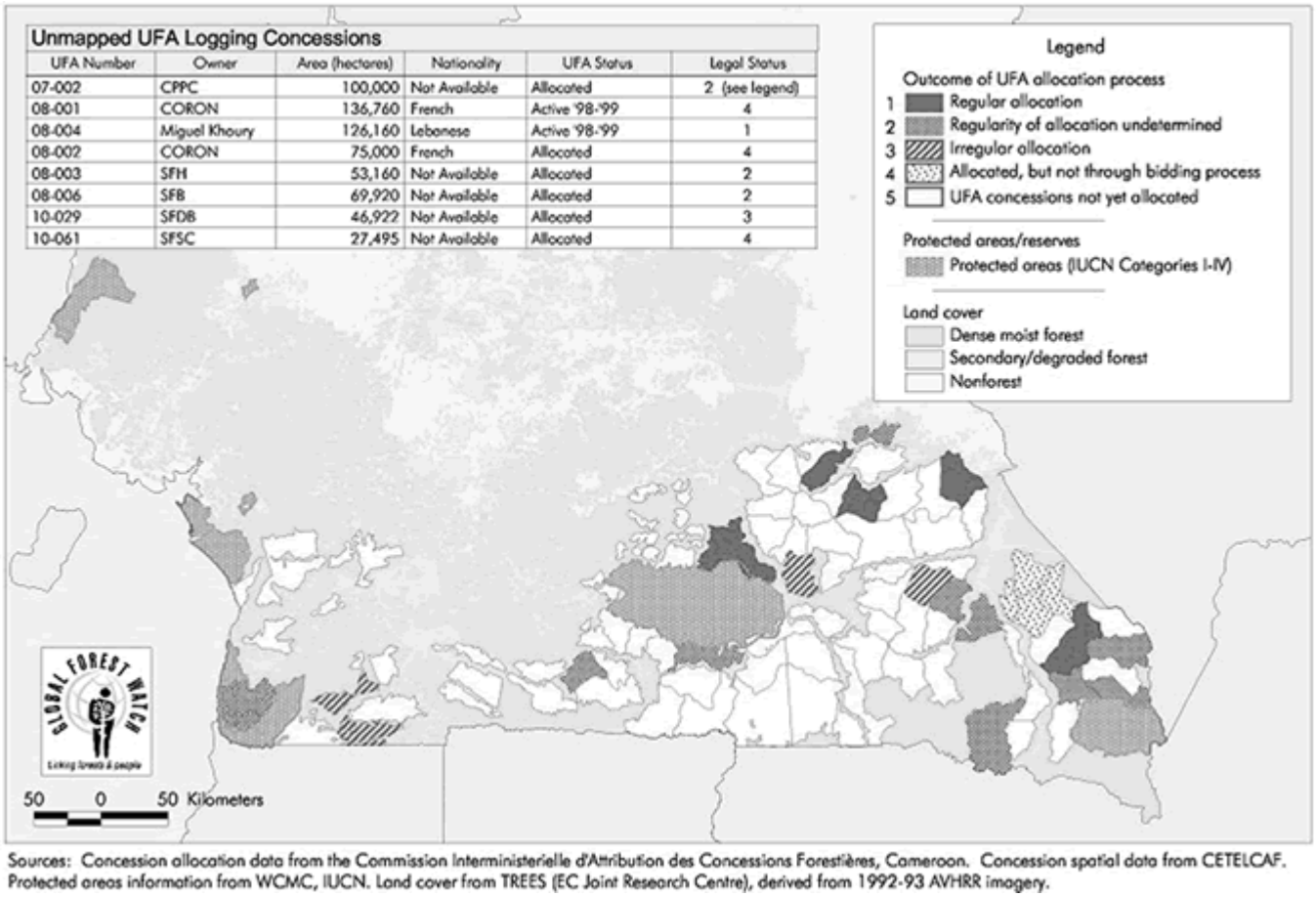

Figure 3: Irregularities in Concession Allocation.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #6

#6 — Deforestation in Central Africa Significance and Scale of the Deforestation

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This brief was written by the **University of Maryland** and **NASA**. For additional information please contact Nadine Laporte, e-mail: nlaporte@geog.umd.edu; and Chris Justice, e-mail: justice@hermes.geog.umd.edu.

Related Issue Briefs

#4 Identifying Gaps

#7 Seeing the Future

#8 Forest Disappeared

#13 Remote Sensing

Key Concepts

- Dense forests extend over 1.9 million km² of Central Africa, covering almost 50% of the landmass.
- Forests in the region are important as: (1) a source of food, materials and shelter for over 20 million people, (2) habitat for a diverse assemblage of globally unique plants and animals, and (3) a sink and source of carbon dioxide, the most important gas implicated in global warming.
- Tropical deforestation threatens biodiversity and forest conservation efforts.

- In a global context annual deforestation rates are relatively low in Central Africa (~0.6%/year between 1980-90) but vary considerably across the region. The location and rates of deforestation in Central Africa are poorly documented, limiting the development of regional and national forest management plans and policies.
- Annual rates of reforestation are very low and do not compensate for forest losses.
- Generation of information on deforestation at different scales within the region has to be driven by a political process that raises public sector and civil society demand for environmental information.
- Accurate estimates of land cover type, location and rates of change and associated biomass are necessary to develop land-use and forest management policies that reflect local, national and international interests and concerns. Political will and public participation is needed to reform present land-use policies and to implement them successfully.

Why Is the African Rainforest Important?

The Congo Basin contains the second largest continuous tropical rainforest in the world. The forest is home to more than 20 million people most of whom depend on natural resources for their livelihoods. The forest also harbors about 400 mammal species, more than 1,000 different species of birds, and over 10,000 plant species of which about 3,000 are endemic to the region.

The acceleration of human transformation of the biosphere is unprecedented in scale, and is dramatically altering important characteristics of the atmosphere, the oceans, and terrestrial ecosystems. With more than 90% of households in Central Africa involved in agriculture, and human population growing at 2-3% per year, demand for agricultural land is increasing, as is the scale of forest transformation. Forest habitat loss is a major threat to biodiversity, and can result in species extinctions. Moreover, extensive conversion of the forest to non-forest land cover would result in changes in soil fertility and rainfall patterns that would certainly affect human livelihood and ecosystem productivity.

West African rainforests are already highly fragmented. The only large forest blocks remaining are in the border zone between Liberia and Ivory Coast. In Ghana, small remnant rainforest patches are restricted to protected areas. Is this likely to be the fate of the Central Africa rainforest?

Accurate information on forest extent and the location and rates of deforestation, combined with socioeconomic information and an understanding of the processes of land cover change, are crucial to develop an understanding of the future of Central African forests. Establishing national and regional systems for tracking rates and distribution of forest transformation is important as a tool for land-use planning, and will be a requirement for implementation of the Kyoto Protocol

of the United Nations Framework Convention on Global Climate Change if ratified. Currently, little technical and institutional capacity is available in the region to develop such estimates due to the lack of funding for training and infrastructure.

Estimating Rates of Forest Loss

Remote sensing images, such as those generated by the Landsat, SPOT, AVHRR satellite systems, provide spatially explicit information gathered at different time periods. These images can be used to directly estimate the location, extent and rate of forest change, but require some form of ground level information on forest cover characteristics to validate the results.

Since the 1980's, the scientific and popular literature has published numerous, often divergent, estimates of tropical deforestation for Central Africa. This is not surprising because deforestation rates reflect the definitions used to characterize what is and is not forest, the data sets used to derive the estimates, and the methods used to summarize the data. For example, the NASA Landsat Pathfinder approach to forest change estimation uses wall-to-wall mapping over a 16 year time period, whereas FAO uses both a direct sampling approach and an indirect modeling strategy of population growth and national forest inventory data over a 10 year period.

CARPE and the UMD/NASA Landsat Deforestation Project

As part of the University of Maryland, NASA-funded Landsat Pathfinder Dense Humid Forest Project, Landsat satellite images are used to assess the rates and extent of deforestation in Central Africa. The major limitation of the wall-to-wall mapping approach has been the scarcity of Landsat imagery for the region, because of persistent clouds and irregular archiving of Landsat data sets. Only 19 pairs of Landsat Thematic Mapper images are available for the 1980s-90s period, and most of them (16 pairs) are located in the Democratic Republic of Congo. This scarcity of data has begun to be alleviated by the comprehensive data acquisition strategy of the new Landsat 7 program (http://carpe.umd.edu/landsat/).

How Are Deforestation Rates Computed?

A series of 16 pairs of Landsat images obtained at two different epochs (1980s and 1990s) within the Democratic Republic of Congo were used to estimate forest extent and rate of deforestation. Each Landsat image was classified into the following three land-cover categories: forest, degraded forest (including forest fallow), and non-forest (including cities, agriculture, bare soils and savannas). By overlaying and comparing the paired images, all transitions over time from one cover category to another (i.e., forest to degraded forest) were mapped.

The extent of rainforest area mapped in each 180 km by 180 km Landsat image varied from 462 km² (1% of the total image area) to 26,000 km² (80% of total area). The smaller and more fragmented forest patches were located in the Forest-Savanna transition zone in Eastern/Oriental Province, South Kivu, and Kasai.

The annual rates of deforestation and forest loss (km²/year) were computed for each Landsat scene as follows:

$$\text{Annual Rate} = \frac{Et_2 - Et_1}{Et_1} \times 100 / \#\text{ years}$$

$$\text{Forest Loss (km 2/y)} = \frac{Et_2 - Et_1}{\#\text{ years}}$$

Where:

Et^1 = Extent forest at time 1

Et^2 = Extent forest at time 2

years = Difference epoch (time 2 - time 1)

What Have We Learned?

Forest change is a dynamic process that reflects how people respond to changes in socioeconomic conditions and opportunities. Consequently, forest loss and reforestation varies across the region and from one time period to the next. Annual rates of deforestation for the period 1984-98 varied from 0.1-0.7% with forest loss within a Landsat image ranging from 9 to 116 km² per year. Annual rates of reforestation are even lower and do not compensate for forest losses.

The largest annual forest loss estimated in this sample of 16 Landsat images was located in one of the most densely forested areas (the Equateur Province of DRC) where the population density is relatively low (6-21 inhabitants per km² in 1990) but population is predominantly rural (95%) and the annual population growth rate was about 3.4% for the 1980-94 period. Though most of the area is assigned to timber concessions only one is presently active, thus logging is an unlikely cause of the observed forest loss.

Predominately forested scenes exhibited less variance in rates of deforestation than those scenes dominated by savannas or at the interface between forest and savanna. This may be associated with greater variability in human population density and access to forest resources in the latter.

Average annual rates of deforestation estimated for DRC (0.4% over the period 1984-98) are lower than those published by FAO (0.6% over the period 1981-90). Though comparison of

these estimates is difficult because the methods and data sets used are different, DRC appears subject to relatively low rates of deforestation (0.4% on average) relative to the rest of tropical Africa (Ivory coast 1%, Ghana 1.3%, Sierra Leone 0.6%, Liberia 0.5%) (Fig.1). However, it has been suggested that deforestation rates in West Africa have been overestimated in the past.

The highest rates of deforestation are not necessarily associated with the highest population densities. In Equateur Province, for example north of Lisala, the rates and extent of deforestation are almost two times higher than those found north of Bumba, even though population density is two times lower in the Lisala. This may indicate errors within the population dataset or suggest that deforestation is fueled primarily by other factors, such as economic activity.

The highest rates of deforestation were located at the forest-savanna interfaces where forest occupies a small area and savannas dominate the landscape. Though the absolute area of deforestation is small and the contribution of these areas to global warming limited, forest clearing is resulting in the rapid disappearance of riparian forests that constitute the last bastions of forest-dependent plant and animal species.

Patterns of deforestation (size, shape and distribution) are also variable. For example, household-level agriculture is typically restricted to within a short distance of roads, and the average size of the disturbed area is small. In contrast, industrial-level or plantation agriculture results in larger clearings, but less forest fragmentation, at a much more variable distance from main roads.

What Next?

Remote sensing image analysis can provide the basis for producing more accurate and more frequent estimates of where and how much deforestation is taking place. However, to understand what policy levers might be appropriate to redirect or reduce forest clearing, decision makers also need a better understanding of the factors driving deforestation at different locations across Central Africa. Furthermore, urbanization and urban growth play important roles in determining the fate of the forest, and warrant greater attention.

Appeals to systematically gather demographic, land-use and household economics data across the region that would help determine the causes of deforestation are unlikely to convince Central African governments with numerous other priorities to invest scarce financial and technical resources. Moreover, donors have had little success in improving forest management through capital intensive supply-side environmental information projects. Consequently, increasing the supply of systematic and timely information on deforestation at its causes at different scales within the region has to be driven by a political process that raises public sector and civil society demand for environmental information.

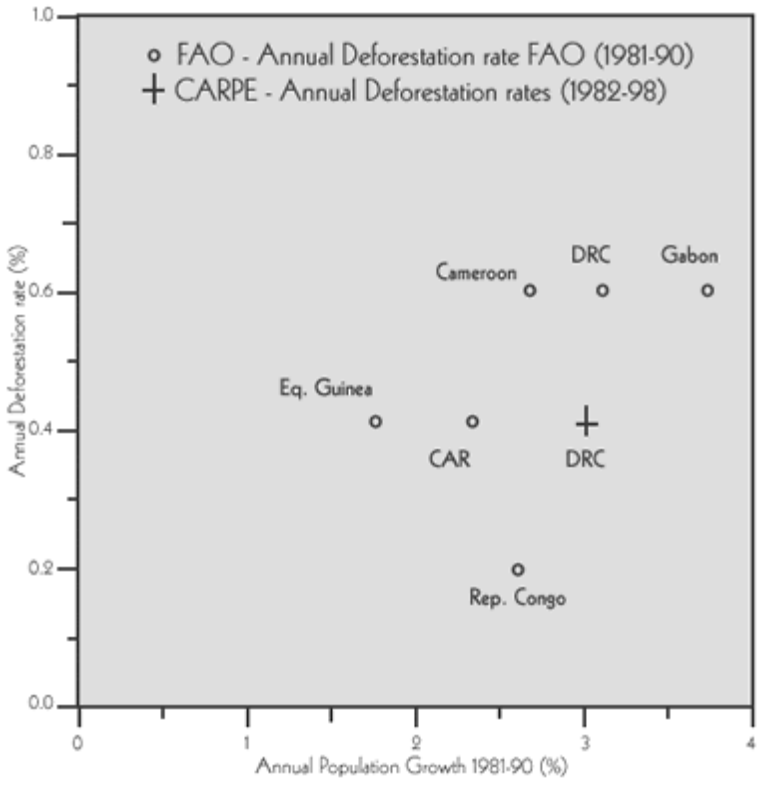

Figure 1: FAO, 1994 rates of deforestation and CARPE estimates for RDC.

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Web site:
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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #7

#7 — Seeing the Future Now Simulating Forest Changes in the Congo Basin

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This brief was written by the **University of Maryland** and **University of Virginia**. For additional information contact Chris Justice, email: justice@hermes.geog.umd.edu; Quanfa Zhang, email: quanfazhang@yahoo.ca.

Related Issue Briefs

#5 **Timber Tsunami**

#8 **Forest Disappeared**

#13 **Remote Sensing**

#24 **Carbon Offset**

Key Concepts

- Unless government officials in Central African nations are able to visualize and quantify how their decisions directly or indirectly alter land use and forest cover in the region over time, they will be limited in their ability to develop and implement policies that effectively address national economic and resource conservation concerns and priorities.
- Rule-based spatial simulation modeling can provide policy makers with a flexible tool to

explore the economic and conservation impacts of various policy options on land use and forest cover.

- Given current conditions, forest clearing over the next 50 years will result in a 41% reduction in present dense forest cover and extensive forest fragmentation.
- Simulated deforestation between 1990 and 2050 will release 9 Pg of carbon (one Petagram = one billion metric tons = 1 thousand billion kg) into the atmosphere. Though equivalent to only 1 year of current global carbon emissions, deforestation and forest fragmentation will likely result in a major loss of forest dependent plant and animal species.

History of Forest Change

The majority of the forest within the Congo Basin is of relatively recent origin. During the last glacial maximum, savanna was much more extensive and forests were restricted to a few refugia (c. 16,000 BC; Fig 1). As rainfall increased in the Basin, forest once again invaded the savannas and dominated the landscape (c. 6,000 BC).

The first farming people to enter the African equatorial rain forest (c. 3,000 BC) were Bantu migrating from the northern periphery to the east and south following rivers and settling primarily in the transition zone between forest and savanna (Fig. 2). Thousands of years of agriculture have left its mark on the landscape by modifying forest distribution, structure and species composition. Today, human transformation of the forest continues to occur primarily along rivers and road networks, and the forest remains the primary source of subsistence and income for Central African families.

Logging in the Congo Basin is highly selective, focusing on a few tree species. Timber extraction thus seldom results in deforestation, rather it causes forest fragmentation and degradation. Though deforestation to establish industrial scale plantations of coffee, oil palm and rubber increased substantially during the colonial period, forest clearing is still predominantly a result of individual families securing traditional tenure to agricultural land. With human populations expected to double over the next 25 years, family farms are likely to continue to be the most significant driver of forest cover change in Central Africa in the near future.

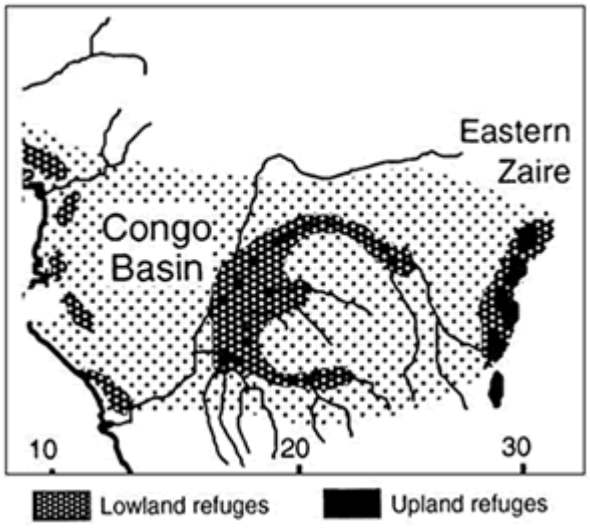

Figure 1: Rain forest refugia during the last glacier maximum (c. 18,000 BC) in contrast to approximately current forest distribution (1996). Source: Maley.

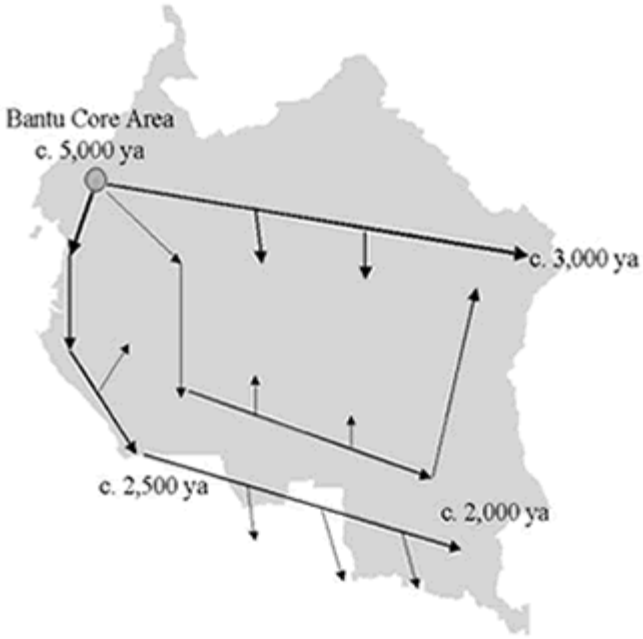

Figure 2: Migration of farming people along the northern periphery of the rain forest and coast in Central Africa (1995). Source: Newman.

Value of Predicting the Future

Though family farms are the primary direct cause of deforestation in the region, the pattern and extent over space and time are determined by a complex combination of factors that include population growth and movement, land-use and tenure policies, commodity prices and transportation costs, and the opportunity costs of labor and capital.

It is relatively simple to extrapolate the scale of future deforestation and the extent of future forest cover based on presents basin-wide estimates of the rate of change. However, knowing how much forest is likely to disappear tells us only so much about the ecological impacts of expected deforestation. Growing evidence from the Amazon suggests that the spatial patterning of deforestation is as important as the overall scale of forest clearing, because forest fragmentation results in tree biomass collapse at the edges of forest patches, and risks the loss of wide ranging animals species that require large intact blocks of forest. Predicting both the extent and spatial pattern of future deforestation is thus essential to understanding what will be gained and lost as a result of development policies.

Given how intertwined and interdependent are the drivers of household-level deforestation it is difficult for decision-makers to visualize, a priori the environmental consequences of their policies. To help policy makers better understand how the continuation of recent trends and present policies are likely to impact the forest over the next 50 years, and to help minimize the environmental impacts of development policies it is critical to develop realistic spatially explicit models of forest change.

Spatial and non-spatial regression models are able to combine historical changes in land-cover with geographic and socio-economic data to characterize the factors that determine deforestation. Model results can then be used to predict the future local and extent of forest cover conversion. Absence of data throughout most of Central Africa typically precludes the use of regression models as crystal balls, and mandates the use of deterministic, rule-based models built on expert knowledge.

Developing a Crystal Ball

The current model was developed using (1) a forest cover map of the region generated by the TREES project derived from 1km resolution satellite data, (2) population distribution and change information from the WRI Africa Data Sampler, (3) road network from the Digital Chart of the World, (4) protected areas from WCMC, and (5) logging concession information from WRI's Global Forest Watch program. Deforestation rates were obtained from UN/FAO and the NASA Landsat Pathfinder program. We assumed that the direct cause of deforestation was demand for agricultural lands that increased linearly by population growth. The probability of forest being converted to farms was related to population density, and proximity to roads and logging concessions. Though an optimistic assumption, protected areas were excluded from deforestation during the simulation. The relative weight of each factor driving deforestation was derived subjectively from the pattern of forest change data generated by the NASA Landsat Pathfinder project. Using this simplistic regional model, the extent and spatial distribution of deforestation

was estimated between 1990 and 2050, with the annual rate of deforestation increasing from its present value of 0.5% to 1% by the year 2050.

Future Forests

The simulation predicts a general contraction of large intact contiguous forest blocks inwards from the forest boundaries to create three large fragments, one in the triangular intersection of Cameroon, Gabon and Congo, and the other two in the East and West of DRC (Figure. 3). The most extensive loss of forest cover can be expected in southern Congo, coastal Cameroon and Gabon, north of the Congo River within DRC, and southern DRC. Increasing penetration into the forest can be expected along the road network, especially within DRC.

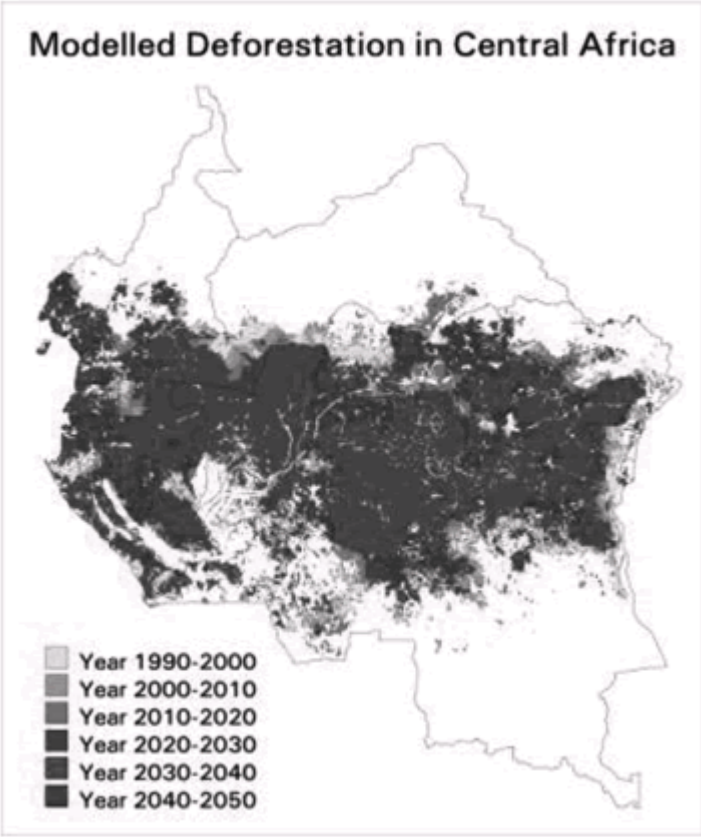

Figure 3: Simulated change in forest cover 1990–2050. Source: Quanfa Zhang.

In addition to regional scale fragmentation of the present contiguous forest blocks, land use over the next 50 years will generate a large number of small forest patches, isolated from the larger forest fragments. Increased fragmentation will make the forest more accessible by 2050. In the 1990s over 70% of the forest was at least 10 km away from non-forest land cover, whereas less than 50% will be ‘interior’ forest by 2050.

Deforestation over the next 50 years is expected to reduce the forest area by 41% across the region, with overall dense forest cover declining from 46% to 27%. Direct loss of carbon from simulated deforestation is estimated to be 9 Pg over the next 50 years (Table 1), with an additional 1 Pg of carbon released because of higher tree mortality along fragmented forest edges. This would account for half of the carbon stocks presently contained within Central Africa's dense forests. However, given that present global carbon emissions from biomass burning (i.e., vegetation fires, and fuel-wood and charcoal burning) are estimated to be 4.1 Pg/year, and emissions from fossil fuel burning are 6.1 Pg/year, total simulated emissions from Central Africa between 1990 and 2050 would contribute less than one year of current total global emissions. Assuming continuation of present population growth rates and land-use policies, deforestation in Central Africa over the next 50 years will contribute little to global warming relative to fossil fuel burning.

Conversion of 41% of the remaining dense forest in the region to agricultural land-uses and the extent of forest fragmentation will likely have a profound adverse effect on biodiversity conservation. Large bodied, wide-ranging animals will increasingly find their greatly diminished habitat insufficient to supply dietary needs throughout the year and will consequently encroach more frequently on human dominated landscapes. Increased human-wildlife conflicts will threaten the livelihoods and safety of forest dwelling families, and risks retaliatory slaughter of elephant, buffalo, pigs, and gorilla, that are often viewed simply as crop pests. Moreover, reduced size of forest fragments will increase the influence of forest edges resulting in sufficient changes in microclimates that many shade loving, moisture dependent species may decline in abundance or become locally extinct.

What Are the Policy Implications?

The results of the simulation only reflect status quo conditions and assume that land-use policies and effect of demographic pressure remain the same over the next 50 years. Sensitivity analyses indicate that logging, which dominates the landscape outside of protected areas and builds roads into previously isolated forest blocks, is the most important variable in determining the future of the moist forests in the Basin. Human population growth will have a relatively small effect on the current pattern of deforestation, because settlements are already well established across the Basin and future population growth will simply expand the size of these settlements and follow the existing road networks, especially if road improvements are made.

Forest sector policies that reduce the extensive logging in isolated forests, minimize construction of roads within concessions, and discourage establishment of permanent settlements within concessions would help reduce the role of logging in forest fragmentation.

Lastly, results of the simulation can be used by the conservation community to identify areas known to be of high biodiversity value that are likely to be converted to other land-uses by 2050, and conversely areas that will remain intact. This information would help to prioritize biodiversity conservation investments in the region.

Table 1: Changes of Forest Extent and Carbon Stocks (1990–2050)					
Country	**Land Area**	**Forest Extent 1990**	**(km^2) % 2050**	**% of forest remaining**	**Loss of Carbon (Pg)**
Cameroon	465,400	173,780	109,500	63	0.7
CAR	622,980	60,370	26,700	44	0.34
Congo Rep.	341,500	239,160	165,200	69	1.27
Dem. Congo	2,267,600	1,141,470	646,600	57	5.37
Eq. Guinea	28,050	18,110	12,100	67	0.01
Gabon	257,670	206,770	127,000	61	1.35
Regional Total	3,983,200	1,839,660	1,087,100	59	9.04

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #8

#8 — If the Forest Disappeared What Would We Lose and What Might We Gain?

This brief was written by the **Biodiversity Support Program**. For additional information, contact David Wilkie, e-mail: dwilkie@rcn.com.

Related Issue Briefs

- **#14 Monitoring & Evaluation**
- **#15 Policy Reform**
- **#24 Carbon Offset**

Key Concepts

- The forests of the Congo Basin are valuable in terms of both the benefits that they generate directly, tangibly, and immediately, and those that are indirect, intangible, and may be accrued in the future. Land uses to capture these values often conflict with one another. The benefits generated are often not equally distributed both among those alive today and between present and future generations. Deciding what blocks of forest to use in what way, over what time period, to whose benefit, is clearly a political process, the results of which will be determined by how power is shared or concentrated within and among nations.

- Regional-scale deforestation may result in a reduction in rainfall of 40-50%, down to a level comparable to that of many of the most productive savanna regions of Africa - regions that typically have robust agrarian and livestock economies and higher human population densities.
- Regional-scale deforestation will result in the loss of forest-dependent plant and animal species and the local or global extinction of species unique to the Congo Basin. It will jeopardize the forest's capacity to generate a regular stream of desirable goods and services in the future.
- Complete deforestation of the Congo Basin over the next 50 years, though unlikely, would result in a release of carbon equivalent to five years of present global emissions, a relatively small quantity compared to that contributed by the industrialized nations.

Deforestation in Central Africa

In the Congo Basin the overall rate of deforestation at present does not exceed 0.5% per year and is considered low relative to other tropical forested areas in Africa, Asia, and the Americas. Yet given the extent and rate of forest fragmentation by roadside farming and logging, preliminary simulations suggest that few large blocks of relatively undisturbed forest will remain in 50 years. Forest clearing will (1) reduce the long-term economic value of the landscape as a source of timber and other wood and non-wood products to household and national economies, (2) result in the loss of habitat for forest-dependent plants and animals, causing the local or global extinction of species that are both unique to the region and that may produce chemicals of vast potential value as pharmaceuticals, and (3) release carbon into the atmosphere, contributing to global warming.

Impacts of Forest Clearing

The impact of regional-scale deforestation on rainfall is highly speculative. Research in West Africa suggests that though deforestation in the sahelian region may have little impact on rainfall, large-scale clearing of dense coastal forests may disrupt movement of the intertropical convergence, causing a collapse of monsoon rains and an overall reduction of rainfall in the region. Though no such studies are available for Central Africa, massive deforestation may result in average rainfall decreasing by as much as 50%, from 2,000 mm to 1,000 mm per year, because much of the moisture that falls as rain is generated by evapo-transpiration of trees growing within the region.

Light grey areas show that most of the forest in West Africa has been disturbed and is now either regrowth forest or agricultural land. Source: TREES Project, Joint Research Centre.

Farming and Pasture Land Uses

Depending on the timing of this reduced rainfall agricultural practices will need to adapt to new conditions with new crops and cropping practices. Overall farm productivity may not be adversely affected if — and this is a big "if" — farmers are able to respond successfully to changing rainfall conditions. On the positive side, at least in the short-term, forest cleared for agriculture contributes tangibly to household and national economies, as does the felling and selling of timber.

Forest converted to pasture will also increase the carrying capacity of the land for herbivores, thus potentially increasing consumers' access to the meat of domesticated animals. Moreover, a decline in rainfall associated with deforestation may reduce human mortality and morbidity, as the prevalence of water-borne and respiratory diseases decreases. In contrast, a 50% drop in rainfall will fundamentally change the composition and production of forest tree species, jeopardizing the huge revenues generated from the logging industry and resulting in widespread loss of habitat for obligate forest species and a massive loss of forest biodiversity.

Consequences and Precautions

Whether regional deforestation results in such huge changes in rainfall, and what the consequences of such changes will be, are matters of mere speculation. However, given the uncertainties associated with regional scale deforestation, it would be more than merely imprudent for anyone to advocate for policies and practices that would put into motion such an enormously risky global engineering experiment. The precautionary principle strongly suggests that forest management policies should, without evidence to the contrary, assume that regional-scale deforestation will have severe adverse impacts on local and national economies and may have global implications.

This said, determining the optimal scale and rate of forest transformation is a political question, one that must be answered by the governments and citizens of Central African nations. Given present population growth rates and per-capita Gross Domestic Product (GDP), resolving conflicts over forest land-uses will most likely be settled in favor of generating immediate, tangible, and assured benefits for today's residents of the region, at the risk of jeopardizing potential, future, and largely intangible benefits that would accrue primarily to global citizens. Donors and the international community should seek ways to address the immediate priorities of local and national forest resource users so that short-term mining of forest resources does not jeopardize the long-term economic and intangible values of the forest.

Dark areas on this satellite image-based map suggest that most of the forest remains relatively intact within Central Africa (dark green = intact forest cover, light green = agriculture and regrowth forest). Source: TREES Project, Joint Research Centre

Table 1: Indicative Data for Worldwide Tropical Forest Distribution

South America	Forest > 60%, km²	Total Land, km²	% Forest
Brazil	3,909,940	8,372,890	0.47
Peru	713,487	1,276,300	0.56
Colombia	563,572	1,125,450	0.5
Bolivia	541,357	1,077,650	0.5
Venezuela	429,448	902,937	0.48
Guyana	180,982	208,591	0.87

Suriname	123,761	139,742	0.89
Ecuador	102,939	253,075	0.41
French Guiana	65,829	83,420	0.79
Total	**6,631,315**	**13,440,055**	**0.49**
Southeast Asia	**Forest > 60%, km²**	**Total Land, km²**	**% Forest**
Indonesia	1,030,590	1,854,610	0.56
Papua New Guinea	316,356	448,817	0.7
Malaysia	219,285	323,970	0.68
Total	**1,566,231**	**2,627,397**	**0.6**
Central Africa	**Forest > 60%, km²**	**Total Land, km²**	**% Forest**
DRC	1,271,860	2,268,380	0.56
Gabon	222,362	256,118	0.87
Congo	216,775	342,173	0.63
Cameroon	199,640	462,188	0.43
CAR	46,218	620,236	0.07
Equatorial Guinea	25,265	26,203	0.96
Total	**1,982,120**	**3,975,298**	**0.5**

Source: Defries, R.S., M.C. Hansen, J.R.G. Townshend, A.C. Janetos, and T.R. Loveland. 2000. "A new global 1-km data set of percentage tree cover derived from remote sensing." *Global Change Biology* 6:247-254

Forest Evolution and Use

During the last glacial period, rainfall in the Congo Basin was insufficient to support dense forest in all but a few remnant patches and river galleries, and the landscape was dominated by scrub-savanna. It was not until 6,000 BC, after the glaciers had receded and rainfall increased, that the savannas were fully re-colonized by trees and the forest reached somewhat beyond its present extent. Not only is the forest young in geological terms, the ubiquitous presence of scorched oil-

palm kernels suggests that almost all of it has been cleared by subsistence farmers at least once, and thus should best be described as old regrowth forest.

Though the forests have been used by humans as a source of food, medicines, construction materials and agricultural production since the last glacial period, it was not until the last 100 years, when roads and railroads were constructed, that forest resources began to be exploited at an industrial scale for export to global markets. Between the 1940s and 1970s export agriculture was an important component of the economies of Cameroon and the Democratic Republic of Congo (DRC), and resulted in a pulse of deforestation. Low commodity prices and insufficient maintenance of the transportation infrastructure have substantially reduced the economic viability of export agriculture, particularly in the DRC, lowering the incentives for forest conversion. Timber now constitutes the most important economic value of the forest to national treasuries, whereas commercial trade in bushmeat and non-timber forest products has risen in importance to household economies and to a few pharmaceutical companies.

Lessons From Deforested West Africa

Nigeria and Ghana have cleared over 75% of their forests, yet their economies are growing more rapidly than those of any Central African nation. This land area supports three to five times the density of families in Cameroon, the most populated nation in Central Africa. Agriculture continues to contribute significantly to the economy, and per-capita GDP and life-expectancy rates are as good if not better than in most Central African nations.

Given cessation of civil wars and political and economic instability, experience from West Africa suggests that Central African nations could use their forest resources as the fuel for economic development. In Nigeria and Ghana, however, this approach has now relegated forest plants and animals to a few remnant patches of forest that are probably too small and too isolated to continue to support viable populations indefinitely. In gross terms, then, deforestation has not been catastrophic to the agricultural productivity of either Ghana or Nigeria; it appears to have contributed positively to economic growth and social welfare, at least in the short-term; it has, however, been calamitous to biodiversity and has placed the future of most endemic forest species in severe jeopardy. Over the next 50 years whether the extent of forest clearing within Central African nations will approach that of West Africa, and whether the ecological and economic impacts will be comparable, remain unresolved questions. Whether the forests of Central Africa are used for short-term profits or long-term economic development will be determined largely by whether forest resource-use decisions continue to be made by a few government officials or through a more inclusive and transparent public debate.

Deciding How Much Forest to Conserve

If forest values are to be used efficiently and the benefits shared equitably, decisions about how the forest is used over a given time frame is a political decision that must be made collectively by the governments and citizens of Central African nations. The international community interested in promoting economic development, enhancing social welfare, and conserving biodiversity within Central Africa must help governments and citizens in the region establish the political processes needed to negotiate what land uses are desirable within which blocks of forest across the region. Moreover, if international perspectives on the value of forests and desired land uses conflict with regional priorities and would result in lost revenue-generating opportunities to local and national economies in the short-term, then international donors must be willing to pay compensation to mitigate these costs, or accept that use of the forest is unlikely to reflect international interests.

What Can You Do About It?

Governments

- Commit to establishing national and regional processes for land-use decision making to ensure that forest resources are used efficiently and the benefits are shared equitably.

Donors

- Commit resources to establishing and nurturing institutions necessary for Central African nations to negotiate forest land uses that benefit the majority and do not close the door on future options.
- Establish trust funds to compensate households and governments for lost revenues associated with land uses that favor global, rather than local and national, values.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #9

#9 — Sustainable Management of the Forest Estate
What Do We Mean and How Do We Get There?

This brief was written by the **Biodiversity Support Program** and the **U.S. Forest Service**. For additional information contact David Wilkie, email: dwilkie@rcn.com; Melissa Othman, email: mothman@fs.fed.us.

Related Issue Briefs

- **#4 Identifying Gaps**
- **#15 Policy Reform**
- **#19 Private Sector**
- **#20 Mobilizing Communities**

Key Concepts

- Sustainable resource management means policies and practices that will ensure that a given area of land continues to generate a relatively constant stream of specific benefits at a desirable level, over a long period.

- Forests generate tangible and intangible benefits that accrue to and are valued by individuals, communities, institutions and corporations. Sustainable management is a relative concept based on the perceived values of, and desired benefits from, a given area of forest.
- Most uses of the forest undermine, or preclude, other uses (e.g., logging and tourism are largely incompatible). No single forest management system can generate all possible tangible and intangible benefits simultaneously.
- Sustainable forest management is a compromise that reconciles competing uses, and must be responsive to changes in values ascribed to the forest by individuals and political and corporate representatives.
- All consumptive uses of forest resources will impact biodiversity. When the level of use exceeds the point where the stream of desired benefits from a given area declines progressively, that use is unsustainable. A use that generates a sustainable stream of benefits may be undesirable, if it reduces the flow of economic benefits below an acceptable level.
- Sustainable forest management is a scale dependent process. At small scales (<100 ha), over short time frames, no single system can generate all desired benefits. At larger scales over longer time frames, multiple forest units can be managed differently, and in combination generate the full range of benefits.

What Is Sustainable Resource Management?

Sustainable resource management is a much used and much misunderstood term. This is not surprising as the term is actually short-hand for a complex socio-political process that must reconcile competing land uses to generate a stream of benefits over time that satisfy the needs, and reflect the values, of both present and future generations, without adversely affecting the landscape's capacity to generate such benefits. Sustainable resource management is not, as is often thought, a single array of policies and practices that when combined generate all possible tangible and intangible benefits, simultaneously, from each plot of land. Rather it is a set of policies and practices each of which favors a particular resource use or uses, at the expense of others, that when implemented in combination over a large enough area, generate the full range of desired benefits at desired levels. Deciding what range of benefits, at what level, to generate from a given area, over a defined time period, is the socio-political challenge that faces all nations.

Our Values Determine What We Manage Sustainably

The grass covered hills surrounding the Italian city of Parma have supported herds of dairy cattle since the Roman Empire, and, over a period of at least 2,000 years, have generated a relatively constant stream of cheese, from the cows milk, and dried ham, from pigs fed on the whey bi-product of cheese making. No one can argue that these pastures have not been managed sustainably. Yet, archeological evidence shows that these same grazing lands were once forested and that conversion to pasture resulted in a loss of biodiversity and a decline in people's access to forest products. The concept of resource use sustainability is tricky because its interpretation depends on the value one places on particular resources, in a given area, over a certain time period. Thus pastures of Parma are managed sustainably for cheese and ham production, but not for forest resources.

All Resource Use Has An Impact

Even if human resource use does not result in the complete transformation of one land cover to another and the replacement of one set of benefits for another, harvesting of wild resources always changes the age and size structure of the exploited population, and the relative abundance of that population within the harvested area. Only if all wild resources within an area were harvested simultaneously at a level that reflected their age/size distribution and relative abundance within the area, would biodiversity measured in terms of evenness and richness not change. This is unlikely as not all wild resources are valuable to humans. The challenge in sustainable resource management is to agree upon how much and what kind of change, if any, in the resource base is acceptable as a result of consumptive or non-consumptive resource use. As all resource uses change the resource base in some way, the key is legislating and enforcing thresholds beyond which the change is considered unacceptable.

Sustainable At What Scale?

Sustainable resource management is also scale dependent. Hunter-gatherers in tropical forests typically exploit resources within their immediate vicinity using simple and relatively inefficient technology. They tend to move to a new area only when resources are depleted, and return rates have fallen below subsistence levels. At one scale, hunter-gatherer practices are unsustainable in that they overexploit resources within their short-term foraging area. Yet the hunter-gatherer cycle of resource overexploitation, abandonment and recovery when viewed within a larger landscape (i.e., their home range) has been sustainable for millennia. No single approach to management can generate all desired benefits, and satisfy all sustainable resource management criteria, in all patches of forest simultaneously. However, separate patches of forest within a large landscape can be managed differently to sustainably produce different combinations of tangible and intangible goods and services, that in aggregate generate all the benefits desired by all stakeholders, and satisfy the criteria advocated by most sustainable forest management protocols.

Getting to Sustainability

Any attempt at sustainable resource management must (1) reflect that all uses of resources result in changes in the population of exploited species, (2) specify what resources are to be sustainably managed and what resources we are willing to deplete or lose outright in any given patch of managed forest, (3) acknowledge that land use practices that may be unsustainable at one scale, may, in combination, be sustainable at a larger landscape level, and (4) characterize the size of the stream of products that is both economically and culturally desirable, and that can be produced relatively consistently over time by the ecosystem. The latter is particularly important, because if a given landscape cannot under any circumstance generate a stream of products at a desirable level, then sustainable management of this tangible or intangible product is untenable, at this particular scale.

No single forest management system can be expected to generate all possible benefits simultaneously within the same block of forest.

Competing Values of Central African Forests

In the Congo Basin, forests are important presently for their value as sources of, *inter alia*, timber, agricultural land, bushmeat, non-timber forest products (NTFPs), biodiversity, and climate regulation. If every patch of forest could simultaneously generate all such values then managing the forest would not be a challenge. Unfortunately, many land uses tend to undermine or preclude other simultaneous land uses that would capture other values of the forest. For example, a forested landscape planted with coffee to generate income for families and national governments may no longer be a forest filled with food or medicines that can be harvested for local use or for sale; a forest where wildlife are hunted for meat generates food and income for families today, but may jeopardize future families' likelihood of capturing the same values; and a

forest set aside as a national park, is, most likely, no longer accessible to loggers to harvest and sell the trees and to provide a source of employment.

National parks and reserves ensure that most forest species will survive for future generations, but preclude many other uses of the forest such as agriculture and intensive logging.

Choosing What to Manage Sustainably

Sustainable management of the forest estate has to be benefit oriented and must also be a process of compromise. Management for agriculture might involve a 15-20 year forest-fallow rotational farming system, that would maintain regrowth forest cover on the majority of the land for a time period sufficient to rebuild soil nutrients such that the productivity of agriculture without external inputs would be maintained over the long-term. This system would generate sustained benefits in terms of agricultural products, and might also produce quantities of bushmeat and NTFPs, but is unlikely to generate trees suitable for timber, and has severe adverse impacts on the biological diversity of the farm-fallow area. Similarly, incorporation of tree crops such as cacao and coffee into household level farming systems may provide a sustainable source of supplementary income for farmers, may reduce incentives to clear forest for commercial root-crop production, and may offer woody habitat for forest birds. Yet, forestland dominated by tree

crops is less likely to support commercial logging or large mammals, and may compete with some NTFPs for sunlight and soil nutrients.

Decades of research and subsidies appeared to have demonstrated that natural forest management (i.e., timber production forests that do not result in significant changes in tree species composition and relative abundance) for timber is both economically and ecologically unworkable. Yet, it may be possible to manage timber harvesting to generate a relatively constant stream of marketable wood, knowing that tree species richness and evenness will change, while ensuring that logging practices do not result in significant changes in animal species richness and evenness. Thus, sustainable forest management for timber, may need to compromise plant diversity, NTFP harvesting, and agriculture for economically viable wood production, but may not necessarily compromise large animal species diversity within logged landscapes.

Sustainable forest management is a compromise process that must reconcile competing forest uses— clearing forest for agriculture.

Sustainable forest management for biodiversity (i.e., to conserve the full assemblage of plant and animals species and their relative species composition, and size/age class distribution) is likely to impose the most severe restrictions on all other possible uses of the forest, because even low level consumptive use may unacceptably impact populations of large, slow growing and reproducing species such as apes, elephants, and emergent trees.

Sustainable Management: A Combination of National Level Zoning and Site-Level Planning

Sustainable management of the forest estate must be an evolving, adaptive two-tiered, transparent, inclusive, democratic, consensus building process. The first tier determines, through open public debate and effective negotiation by all stakeholders, what mix of forest management systems are to be applied to which areas of forest, to generate what tangible and intangible products, to benefit whom, over what time period. This national scale zoning process would subdivide the forest estate into resource use areas, the aggregate size of which reflects their relative value according to the stakeholders. The second tier, is a site-level process that designs each forest use system such that it generates the desired level of particular tangible and intangible products consistently over time, but does so without unnecessarily compromising alternative uses and the generation of other benefits. FSC certification is one such site-level process for planning sustainable timber production within a logging zone. Protected area management plans are the equivalent process within areas zoned as parks and reserves. Both tiers must by dynamic and adapt to varying conditions, because people's needs and perceptions of the value of forests change over time, as does the forest's capacity to generate desired products.

What Can You Do About It?

Everyone

- Stop thinking and talking about sustainable management of forests as a one-size-fits-all approach to reconciling conflicting land uses within the Congo Basin.
- Help facilitate the socio-political negotiations needed to conduct an inclusive, democratic, adaptive, national forest zoning and site-level resource use planning process within each Central African nation.

Though bushmeat is an important source of protein and income for poor rural and urban families, commercial hunting is most often unsustainable and soon wildlife will disappear from many forest areas.

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Issue Brief #10

#10 — Non-Timber Forest Products Economics and Conservation Potential

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This brief was written by Laurie Clark, under contract to the **U.S. Forest Service**. For additional information contact Laurie Clark, e-mail: Lclark9069@aol.com.

Related Issue Briefs

#9 Forest Estate

#18 Sustainable Timber

#23 Bushmeat Crisis

Key Concepts

- Non-timber forest products (NTFPs) from the humid forests of Central Africa play an important role in the livelihoods of African households, providing a source of food, medicine, spices, services, and income.
- For poor families, NTFPs are an essential dietary and economic safety net, and are valued through minor components of the diets of wealthier households.
- NTFPs play an important role in livelihoods, but focusing solely on them fails to capture the full range of forest values and may not offer a sufficient incentive for sustainable forest resource management.
- As NTFPs increase in value there is a trend toward overharvesting of wild resources, on-farm production, and exclusion of resource users by resource managers. Adding value to

NTFPs should coincide with efforts to minimize forest degradation and ensure equitable access.

- Formalized land tenure and NTFP-access rights are important steps towards sustainable forest management.
- As nations in Central Africa do not have a process for recording the value of NTFPs being consumed and traded, their contribution to national economies may be significantly underestimated.
- For a time, NTFPs were seen as a possible "magic bullet" to solve deforestation issues. Experience has tempered that belief while reinforcing the fact that NTFPs are an important, ubiquitous, and culturally integral part of rural and urban lives in Africa, and must continue to be considered in forest management decisions.

What Are NTFPs?

Non-timber forest products are the huge variety of materials derived from forests excluding timber and fuelwood. NTFPs include bark, roots, tubers, corms, leaves, flowers, seeds, fruits, sap, resins, honey, fungi, and animal products such as meat, skins, bones, and teeth. NTFPs are harvested from forest areas and are produced in farmers' fields. They are used for food and medicine and as a source of income. NTFPs are consumed in rural and urban homes, and are traded in local, regional, and international markets.

How Valuable Are NTFPs?

NTFPs provide small but significant sources of income, particularly for women and for families that do not have access to agricultural markets. NTFPs also provide critical supplies of food during periods when agricultural crops fail or are otherwise scarce. Transportation costs largely determine whether what is the most important source of rural household income: low value-to-weight ratio agricultural crops that can be produced consistently in large quantities or high value-to-weight ratio NTFPs that are available inconsistently in relatively small quantities. In the South West and North West provinces of Cameroon the value of NTFP production and marketing exceeded U.S. $19 million in 1999, and contributed 2.8% to the regional economy. In contrast, timber, in this predominantly logged-over area, contributed 5% and agricultural crops 27%. In unlogged areas of old-growth forest, the value of timber is considerably higher.

Figure 1: Prunus seedlings at the Limbe Botanic Garden

Though harvested primarily by rural people, urban dwellers and the African diaspora in Europe and North America drive market demand for NTFPs. In urban markets *Gnetum africanum* leaves, called Eru in Cameroon, sells for U.S. $0.47/kg, which is almost three times the price of a cultivated alternative called bitter leaf (*Vernonia amygdalina* or Ndole). Though African diaspora in Europe and the United States are willing to pay U.S. $50/kg for air-freighted Eru, the volume of trade is tiny relative to that supplying the national and cross-border markets. Interestingly, high demand for NTFPs spices has driven up prices such that some families are now substituting the much less expensive Maggi seasoning in their cooking.

Pharmaceutical uses of NTFPs generate the most significant revenues. Extracts from the bark of the *Pausinystalia yohimbe* (Yohimbe) tree are consumed locally as a "cure" for many ailments, and is sold in North America and Europe as an unproven aphrodisiac and as a stimulant in soft drinks. The total value of Yohimbe bark exports from Cameroon was U.S. $600,000 in 1998 and is growing each year. Similarly the bark of *Prunus africana* (Pygeum) is used to extract a chemical cocktail used for the treatment of benign prostate hyperplasia in Europe and North America and was worth $700,000 to Cameroon, and $200 million to the pharmaceutical companies in 1999.

NTFP Use Sustainable?

Though NTFPs have been used for millennia, human population in Central Africa is higher now than it ever has been, and is likely to double to over 60 million in 20 years. As with any wild plant or animal, if demand and harvesting exceeds annual production the resource will progressively be depleted and become locally extinct.

NTFPs prized for their leaves, roots, or bark are particularly prone to unsustainable use, because harvesting either damages or kills the parent plant. Demand for *Gnetum* has driven wild populations of this leafy vine to local extinction in Nigeria and much of southwestern Cameroon. Cameroon can supply approximately 200 tons of *Prunus africana* bark sustainably. Yet, over 3,500 tons were harvested and exported in 1999. Worse, for both Pygeum and Yohimbe, current "sustainable" harvesting practices that partially strip bark from live trees exposes them to stem-boring insects that can result in 50-90% post-harvest tree mortality.

Though harvesting seeds and fruits only adds to what is normally high seed mortality, and may not adversely impact plant regeneration, inappropriate harvesting techniques can put some fruit and seed NTFP species at risk. *Piper guineensis* fruits are widely harvested, dried, and used as a spice in local dishes. However, rather than picking the seeds from the live plant, harvesters typically uproot the plant and then strip all its seeds. This practice is clearly unsustainable as it both destroys the plant and reduces seed production and plant regeneration.

Studies show that as NTFPs increase in value there is a trend toward overharvesting of wild resources, increased on-farm production, and exclusion of resource users by resource managers. Of the 20 most economically valuable NTFPs in Central Africa, 11 are unsustainably harvested and 12 are now cultivated. This trend suggests that few if any commercially valuable NTFPs can be harvested sustainably from the wild, given present resource access and ownership laws.

Pathways to Sustainable Use of NTFPs

When the value of an NTFP and the intensity of exploitation are low, human impacts on that NTFP are likely to be minimal and little if any formal management of the resource is required (Figure 2). At the other end of the continuum, when the value of an NTFP and the intensity of its use are extremely high, it is highly likely that the resource is being overexploited and is threatened with local extinction. In this case substitution or domestication may be the only way to conserve the wild resource without adversely affecting local livelihoods. Between these two extremes, human use of wild resources has a measurable impact on NTFP species abundance and productivity but can be sustainable if appropriate management systems are in place (i.e., if there is control over resource access and harvest levels).

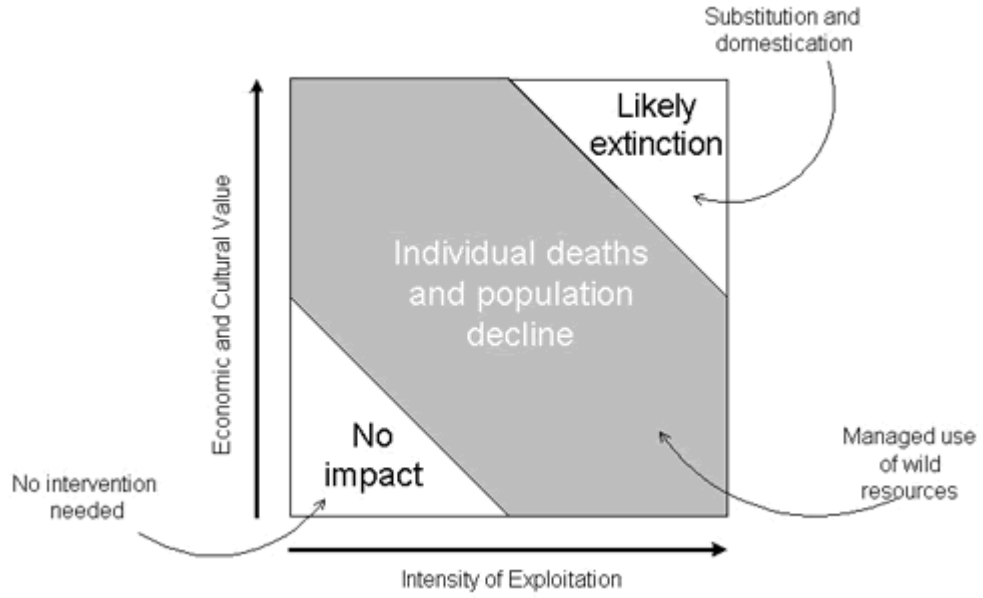

Figure 2: Effect of value and use intensity on NTFP management options

Two major options are available to manage NTFPs. The first, domestication and on-farm cultivation, is appropriate when wild resources are being over-exploited. The second, putting in place systems to define who has access to wild NTFP resources in a given area and to monitor (measure and control) harvest levels, is appropriate when wild resource use is still within sustainable levels.

Several NTFPs are already grown within farmers' fields (e.g., *Irvingia*, *Dacryodes*, *Ricinodendron*, *Piper*) and field trials are demonstrating the potential for on-farm cultivation of *Gnetum* and rattans. On-farm cultivation, however, amounts to the privatization of NTFP production and, as wild stocks are depleted, will further reduce access of landless families to NTFPs. Unclear and unenforceable NTFP access and management rights leave most NTFPs open to overharvesting. In other words too many people are harvesting too much plant and animal products too quickly. Given that economic factors are driving unsustainable use, attempts at maintaining the number of harvesters but lowering their harvesting rates and consequently their economic returns, are unlikely to be effective.

We know that market exploitation is likely to be sustainable only by exploiting those NTFP parts that do not result in the death, declining productivity, or reduced replacement of the plant. Applied research is critical to identifying and disseminating best practices. For example, though evidence shows that strip-barking of Yohimbe is unsustainable, a system of selective felling and complete de-barking of senescent individuals (the Senility Criteria Yield Regulation (SCYR) system) is both ecologically sound, as it mimics what would happen in the absence of human intervention, and economically desirable, as it is the largest trees that have the most bark with the highest concentration of active ingredients.

Future Role of NTFPs

One of the basic questions CARPE has asked in Central Africa, is: "What are the roles that the NTFP sector plays in improved farmer livelihoods, and what are the roles it plays or could play in forest conservation?"

Livelihoods

Research has conclusively demonstrated that NTFPs are important sources of food, medicines, and income to many households in Central Africa. These same studies also indicate that use of NTFPs is a symptom of poverty and not a cure. Wealthy households or those with access to agricultural markets (i.e., those that can sell cash crops) often consume NTFPs, but seldom harvest them for sale. If agricultural markets revitalize or on-farm cultivation of NTFPs increases substantially, interest in wild harvesting of NTFPs is likely to decline, except within the poorest, most marginalized, and landless families.

In the absence of NTFP access reform, most commercially valuable NTFPs will be overharvested in the wild. On-farm cultivation will increase the economic value of NTFPs to landowner families, but will decrease NTFP access for landless families. On-farm cultivation of high value NTFPs may reduce pressure to harvest from the wild, but may increase incentives to clear forest to cultivate these new crops. Expansion of international markets for NTFPs will drive up prices, increase overharvesting of NTFPs in forests, encourage on-farm production, and increase the contribution of NTFPs to local and national economies.

Forest Conservation

NTFPs have an important role to play in household livelihoods but it is unclear whether or not the commercial use of NTFPs will result in increased conservation of natural forests.

Logging and agriculture can, but do not necessarily, adversely affect abundance and diversity of NTFPs. Though NTFPs are found in primary forests, many are also found in secondary forest, roadsides, and fallow farmland. Conservation of biodiversity and reduction in the rates of deforestation in a landscape as large and varied as the Congo River watershed will not be simple, particularly as it will require reconciling multiple uses of the forest. The challenge of managing forest resources that have multiple uses is exemplified by the case of the Moabi tree (*Baillonella toxisperm*), which is valuable as a source of timber, cooking oil, and elephant food.

Clearly, any sustainable forest management or forest conservation plans or activities will need to begin with a clear understanding of local land and resource tenure and access rights. Further layers of class, education, elite, and statutory "rights" overlying these basic traditional tenure guidelines will affect how innovations and management options are implemented, and together these relationships will play a direct role in management successes or failures.

Baillonella toxisperma presents in one species the range of opportunities and conflicts present in many economically valuable NTFP. Baillonella toxisperma, or Moabi, is one of the most highly valued and beautiful timber trees in the Central African forests. The oil extracted from its seeds is so highly valued that it is rarely traded or found in markets; the women who are its primary users prefer to keep it for their own consumption. The tree occurs as scattered individuals across a forest, or, rarely, in small groves, so that when a tree is felled, it may remove the source of oil for many villages. Long-lived, the tree is estimated to be of far greater value for its oil producing capacity than for timber, but the short-term profit gained by logging overwhelms its long-term oil-producing value. Trees younger than about 100 years are not particularly valuable for either timber or oil. Finally, elephants are the primary mechanism for seed dispersal of Moabi. As forests are logged, converted to agriculture, and demand increases for the meat and ivory of elephants, elephant populations are rapidly vanishing. If the Moabi vanish, the elephants would lose part of their food source, and if the elephants vanish, the Moabi's principal means of distribution across the forest ecosystem will disappear. Moabi is Red Listed by CITES and steps need to be taken to integrate short-term profits from logging with long-term sustainability issues, including the provision of the valued oil (and the host of other medicinal and cultural uses for which Moabi is valued). Baillonella toxisperma is a prime species to be included in sustainable forest management plans and practices.

What Can You Do About It?

Ecology

- Collect baseline ecological data both for key NTFP species and for their habitats. Different harvesting regimes should be tested to verify their sustainability.
- Sustainable land management plans reflecting ecological, social, and economic concerns need to be established for forestlands, with key NTFP and timber species serving as indicator species for investment and monitoring.
- Test the senescent tree harvest/debarking methods for all bark-based NTFP to examine their economic and ecological effectiveness against current methods.
- Evaluate the effect of on-farm NTFP cultivation on common-pool forests.

Policy

- Management agreements for many potentially high-value NTFPs should be developed

and implemented, addressing intellectual property rights, land tenure, and resource access.
- Communities should possess the legal authority to regulate access to NTFPs, while ensuring that all users within the community retain access rights.
- Governments need to foster collaboration within appropriate ministries to share information on key NTFP species, bushmeat, fuelwood, and construction poles.
- The contribution of NTFPs to the economy needs to be integrated into national accounting systems.
- Collaborative networks between local and international NGOs, private industry, and the government should be developed for the sharing of information and data and in developing conservation management plans that reflect the cross-cutting nature of NTFPs, local uses, and customs.
- Review forest use and land tenure policies and make necessary changes to close open-access to the forest estate and to encourage investment in sustainable forest resource management.
- Encourage open, public debate on resource use allocation of the forest estate.

Socioeconomic and Marketing

- Accelerate on-farm cultivation of high-value NTFPs that may have a competitive cash advantage over other cash crops, and that encourage the maintenance of trees on the landscape.
- Assessments of the cultural, religious, culinary, and medicinal uses of NTFPs should be gathered and collated to set the economic aspect of NTFPs within its cultural context.
- Develop "green" criteria and a certification process for trade in wild-harvested and on-farm NTFPs.
- Expand Central African participation in international markets for certified on-farm NTFPs and other domestic agricultural crops (cassava leaves, yams, coco-yams, bitter leaf, cocoa, coffee, etc.) and products (honey, paper from banana leaves, inks, dyes, soap, etc.).
- Provide producers with timely information on the market prices of NTFPs (to allow producers to negotiate more effectively with buyers). Also make available to farmers information on transformation, packaging and marketing options, access to micro-loans, grants, and cooperative possibilities.
- Layer the results from NTFP market surveys, non-market NTFP assessments, and traditional and statutory land management and use these to more functionally describe the picture of the roles, movement, and importance of NTFPs in various livelihood strategies of people all across the Congo Basin ecosystem.
- Develop transparent and useful methods to monitor the effectiveness of management activities.

For More Information

Technical Reports

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Web site:
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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #11

#11 — Central Africa and Forest Governance Counter-Balancing the Powers of Public and Private Sectors

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Related Issue Briefs

#8 Forest Disappeared

#12 Management Watchdogs

#17 Keep Out

#19 Private Sector

Key Concepts

- Concentration of management authority in the hands of a few powerful politicians and private sector actors results in inequity in the distribution of benefits derived from the forest, ignores resource use concerns of the majority, encourages people to flout unpopular and illegitimate laws, and promotes unsustainable forest resource use.
- Helping citizens build and participate in civil society is essential to improving forest use

governance as it will create a third sector within the nation state that can counter-balance public and private sectors.

- Until government spending is based on revenues generated by taxing national consumption, citizens are unlikely to demand accountable and representative government or expect quality social services.
- Technical solutions such as changes in forest codes and policies, are necessary but not sufficient to create conditions for better forest management.
- Reform of the administrative and political bodies that make and implement environmental laws; the ways these bodies represent and are accountable to society; the laws that enable civil society to flourish, enter into dialogue with the state and bring state actions in line with popular aspirations, is the pathway to governance that can promote sustainable forest management.
- Better information on modern forest management and threats to forest ecosystems and species does not in itself lead to reform. Education has to be backed by fundamental changes in governance structures, investment patterns and state-society relations.

How Did These States Become the Way They Are?

The colonial powers of Central Africa left an unstable and flawed foundation upon which to build a modern State. Economic structures privileged foreign investment and extractive industry, and little was done to build local governance institutions and the capacity of citizens to participate effectively in policy making. The Democratic Republic of Congo had only a handful of college graduates on the eve of independence, a situation not atypical for the region.

Division of African territories may have facilitated resource extraction and tax collection but they also seriously disrupted traditional governance, land use, trade networks and population movements. In urban areas, European-style rule-of-law was introduced, with civil rights and recourse through civil courts. But in rural areas, villagers lived under a different form of administrative rule, in which colonial authorities typically recognized customary or tribal authorities, often hand-chosen by colonial powers. Urban Africans and Europeans had formal access to land and resources through commercial licenses, permits and quotas. In contrast, rural Africans only retained usufruct or use rights, and only as long as these had no commercial value from the standpoint of the modern sector. Thus, subsistence economies were permitted in rural areas, but once a resource of commercial potential was identified, the urban-based State would immediately assert its right to control and exploitation.

The dualistic legal legacy of the colonial system continues to the present, influencing nearly every aspect of economic activity, including foreign investment, the control of assets and the uses of foreign aid, patronage, and investment funds usually in favor of external investors and urban elites. Pressure by ex-colonial governments and the capital intensity of industrial scale

extractive industries has resulted in foreign monopolization of the oil and timber sectors. Three corporations, partially or wholly financed by French interests, controlled almost one-third of Cameroon's logging concessions in 1998-99. In Gabon in 1997, more than a third of the logging concessions was held by five companies, partially or wholly owned by foreign interests. As private sector logging companies are the de facto managers of the majority of the forest estate in the Congo Basin they heavily influence the fate of the forest. Given foreign domination of the logging sector and the ex-colonial arm-twisting of national governments, forest use decisions tend to reflect foreign economic concerns, rather than local or national interests, which is a prerequisite for sustainable forest management.

The State as Ruler

Central African countries of the Congo Basin Democratic Republic of Congo (DRC), Republic of Congo (RC), Gabon, Equatorial Guinea, Cameroon and Central African Republic (CAR), are highly centralized
politically but economically weak. The government mainly derives its revenues from the industrial-scale production and sale of natural resources to international buyers, and not from taxation of citizens or local businesses within the broader economy. Hence, government has little incentive to widen public participation and share benefits within society. Similarly, citizens who receive social services as gifts of the state are unlikely to demand accountable and representative government, nor expect cost-effective government spending.

"Until government spending is based on revenues generated by taxing national consumption, citizens are unlikely to demand accountable and representative government or expect quality social services."

Though parliamentarians are no longer rubber stamps to presidential fiat, and get more involved in political debates, political power in most Central African nations still resides in the executive branch. Thus, while parliament makes the laws their interpretation and implementation in the form of décrets (executive or ministerial orders) and arrêtés (administrative orders), remain the domain of ministers appointed by the president. In this way the executive reserves for itself many decisions that otherwise would be the appropriate object of parliamentary debate and legislation. Moreover, in the absence of civil suit and freedom of speech provisions, neither parliamentarians nor the electorate are able to force compliance with environmental regulations, nor to legally disclose information that might prove embarrassing.

Internal Divisions also Contribute to Weak Political Institutions

Central African States are built on a foundation of multiple ethnic groups, many of which have a small population and remain marginalized politically. Moreover, ethnic and regional divisions

and alliances, the role of the military in local and transborder conflicts, and relations with and among local entrepreneurs and leaders, have severely constrained the populace from organizing and uniting behind multi-ethnic issue-based parties, such as the ANC in South Africa. Internal divisions and the weakness or absence of civil society groups has helped perpetuate executive authority and the influence of foreign governments and corporations, to the detriment of the national economy, social welfare, and environmental management.

To have governance systems that can promote sustainable management of the forest estate, government officials must enter into dialogue with other stakeholders.

Decades After Independence, Land Tenure Remains Unresolved

Since the colonial period there has been an uneasy coexistence of village-based land-use systems alongside more modern modes of formal legal ownership, zoning, planning and control. Village and clan land rights and resource use regulation persist, but in an ambiguous legal context, often at cross-purposes with official policies and the formal economic sector. The State claims ownership to all the land and resources of the country without allocating the means to manage these assets efficiently or equitably. This ambiguity has often proven useful to those in a position to manipulate resource allocation, particularly given the absence of an independent judiciary that can ensure laws are applied to all residents of the nation equally. Local land claims are largely informal and are based on mise en valeur, the principle of giving rights to those who put land to use. Not only is this process contentious, it provides a strong incentive to clear idle land or forest. Formal land registration with title that can be sold or exchanged, can result in more sustainable

resource use. However, land registration can have perverse impacts when it encourages speculative and extensive land clearing followed by poor management and unproductive land use.

Technical solutions such as changes in forest codes and policies are necessary but not sufficient to create conditions for better forest management.

Weak Local Authority Leads to Open Access Situations

Colonialism and the modern State have shaped local authority structures to their needs, both for convenience of political administration and for ensuring that the maximum economic opportunity was accessible to those in power: initially the colonial rulers, and later the urban-based elites who took their place. Thus, the present system offers neither the economic efficiency of a modern governance system, where laws and regulations structure economic transactions, nor the social stability of kinship-based systems, where norms and social control keep people in line. The persistence of this dual system means that rational land management such as zoning and land use planning are not effective in putting into place effective resource management rules and sanctions. Confusion over ownership and authority leads to open access situations in much of the region, paving the way for resource mining.

Economic Reforms Have Not Changed the Situation

The domestic private sector of most Central African nations consists primarily of family firms focused on cash crops, retail sales, transportation, and small-scale manufacturing with little economic or political
influence, but important as a source of wages for the growing urban labor force. International commercial enterprises are often entrenched in primary resource-extraction with little local value added, and in many cases are also deeply involved in corruption.

Economic reforms introduced under pressure from the International Monetary Fund (IMF) and World Bank have generally failed to bring about economic growth sufficient to allow Central African countries to grow their way out of crisis. This is partly because government remains the dominant force in national economies with the private sector still a distant second. More rapid privatization of national enterprises and government focus on regulatory oversight rather than service provision would do much to build the domestic economy.

Downsizing government and reducing public expenditure on salaries is unlikely to result in improved government performance unless employment and promotion are based on merit and not patronage and nepotism. Cutting the size of the civil service has further reduced the capacity of government to implement its policies, and has increased middle class unemployment, as the private sector is still too weak to mop up redundant government workers.

Government reliance on revenues from taxes on international exports has resulted in their neglect of the domestic economy, which has largely failed to diversify and develop a true private sector-based middle class. In other nations of Africa, a robust middle class concerned about its economic investments has had both a stabilizing effect, and has been the driving force behind demands for more accountable forms of government

Lastly, pressure to maintain foreign debt service payments and a weak domestic economy leaves Central African nations with little alternative but to focus on extractive export industries to generate foreign exchange. The 1994 devaluation of the CFA increased timber sales from the region. Economic decline in urban areas sends many back to rural areas to try to live off the land, where few authority structures able to set limits on resource uses are in place.

Resource Management Policy Reforms Provide a Framework

Community forestry laws in Cameroon and Gabon, although flawed and implemented poorly, have begun to provide a legal framework for positive change. In other countries, experience has shown that the first round of decentralization is marked by laws that are non-participatory, bureaucratic, poorly grounded in knowledge of local institutions, elite-dominated, and politically controversial. Nevertheless, they open up, often for the first time since the arrival of colonialism, opportunities for local level negotiation for greater right. This process takes time and is likely to be marked by political turmoil. Poor and marginalized communities and interests, including

women and ethnic minorities, are also unlikely to see significant benefits until they are able to advocate and build alliances with more powerful groups.

Decentralization Can Lead to Better Management, If...

Sustainable use of natural resources tends to happen for two reasons. The first is when it addresses the self-interest of resource managers. The second is when civil society deems that individual self-interest undermines the interests of the majority.

Decentralization is a process for returning to local communities resource management rights that they lost during colonial administration and never regained on independence. To be effective, this process should be founded on the principle of subsidiarity which implies that responsibility for management is best vested in the political-administrative decision-making level closest to the resource. This arrangement is most likely to address the self-interest criterion for sustainable resource management, because it places control in the hands of those that have the most at stake if the resource base degrades. However, to ensure that the resource use decisions of local communities do not adversely affect the welfare of society as a whole, government should retain some oversight powers and responsibilities. Decentralization is thus a misnomer, because what is needed is a nesting of powers with principal decision making authority being vested at the local level, but some minimum standards authority remaining with the state.

Local Government Accountability and Entrustment

Local government, if elected and accountable, should play a key role in decentralized resource management. Yet, present attempts at decentralization often merely provide local authorities with nominal control but without the skills and means to implement their newly acquired powers. This does little to strengthen resource management, and can even further erode respect for laws and regulations.

Establishing accountable representation is one step to better environmental governance. Entrustment is another. To entrust means to devolve powers to, as in the central government entrusting local government with real resources and real decision making powers. In recent years the notion of trust a key element of social capital has been recognized as essential to the working of markets, civil society and government. To empower local government and to build legitimacy, local governments must be entrusted with real powers and the skills and resources to use them.

Accountability Measures

- Social and cultural institutions such as self-help associations and maintaining social

reputations may help representatives to become more accountable to the local population.

- Support for public sector workers. They can be highly dedicated to their jobs if they are given respect and adequate compensation.
- Courts that are accessible to people who know their rights.
- Third party monitoring and lobbying, e.g., controllers, NGO monitoring, monitoring by associative movements, CITES monitoring.
- Taxation: governments that depend on taxes derived from the earned income of their populations are more likely to have populations that make demands on government and hold their governments accountable.
- Contracting arrangements: line ministries can become more accountable to local governments if funding is channeled through local governments that hire line ministries or alternative providers for services. This requires entrusting local governments with a budget for the services the central state would ordinarily assume to be its own responsibility.

Community-Based Approaches Form Part of a Wider Strategy

Local community knowledge of the land and resources, as well as their claim to benefit from these, is greater than any external stakeholder. Thus communities who depend on an area's resources for their livelihood must be included in resource planning and management. If not, they will likely undermine any reforms. Given this reality, community-based natural resource management (CBNRM) has been seen as one avenue toward sustainable resource management in the Congo Basin. But CBNRM should be part of a wider reform process or it risks simply adding domination by unaccountable local elites to that by national or international actors. And if perverse incentives continue to drive natural resource use, little will change at the local level.

NGOs Are Part of the Answer

NGOs hold long-term promise as key players in forest management, but remain hindered by lack of technical capacity, weak management, unsustainable financing, and institutional models that emphasize external linkages at the expense of building domestic constituencies. They need technical and participatory development skills as most, presently, are dominated by educated urban elites. NGOs need to become client centered, focused on rural resource managers and urban consumers. Kin-based development groups, local associations, neighborhood and church groups are also under-utilized as partners by conservationists.

What Role for International Conservation Organizations?

Interest groups must acknowledge the fundamental political nature of resource management and conservation. Better performance is not just a matter of technical issues or capacity. However, the basis for external actors to directly engage in political domains is tricky. The question of outsider intervening in the internal affairs of African States can arouse fears of return to the abusive patterns of the colonial past. In addition, the risk to local people of engaging with agents of change should not be underestimated. A first step for international organizations is to be clear on priorities and strategies. Consider if conservation and sound management of forests can be accomplished when people in the forests have few rights and receive few benefits. Second, build alliances with local and national actors to achieve both conservation and better governance objectives. Finally, assess the risks and benefits of approaches and actions with African partners at all levels.

Information and Education Are Key

Unless people understand their rights and the powers and obligations of their representatives, they are ill-equipped to expect or demand accountable government. Political education and awareness raising is best achieved by a media free from political manipulation. Information diffusion and lobbying proved very effective in increased enforcement of diamond mining laws in Central African Republic. More generally, literacy and numeracy are essential if people are to understand the actions, and demand changes in the behavior of their representatives, social servants and private sector executives. When people are educated about the services that government can provide, they learn to make more demands on their representatives. The World Bank and USAID have held regional meetings to provide information to local populations across West Africa on environmental policies and the benefits of democratization.

Environmental Governance Definitions

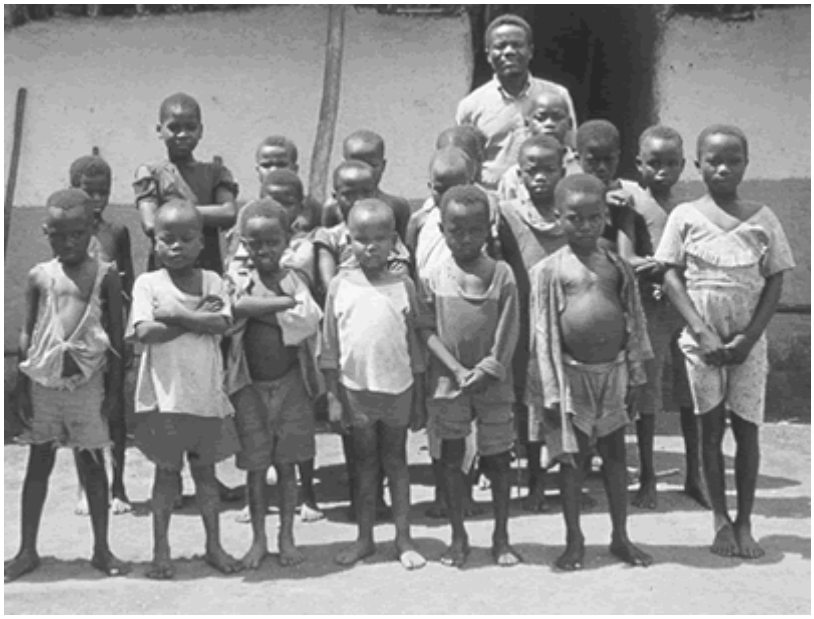
Common Pool Resource Management — non-private property managed by the state or many actors in common. Examples include lakes, rivers, forests, water tables, and fisheries.

Open Access — situation where access and use of resources is open to all comers, and characterized by weak or nonexistent resource management institutions, or where management systems are in flux or so complex that rules are not followed.

Resource Mining — extraction of resources at an unsustainable rate that greatly exceeds replacement and damages ecosystems in the process.

Perverse Incentives — policies often shaped by patronage and corruption, that may achieve their primary objective but more importantly result in unexpected and undesired outcomes that

are both economically inefficient and environmentally destructive.



Education is an essential step to improving forest use governance, but has to be backed by fundamental changes in governance structures.

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CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #12

#12 — Management Watchdogs A Key to Sustainable Forest Management

This brief was written by the Global Forest Watch Project of **World Resources Institute**. For additional information please contact Jean-Gael Collomb, World Resources Institute; e-mail: jg@wri.org.

Related Issue Briefs

#5 Timber Tsunami

#15 Policy Reform

#19 Private Sector

Key Concepts

- Though the logging sector in Central Africa is a vital source of national revenue, one of the largest commercial employers, and a significant source of environmental degradation, no information is systematically gathered and made public on companies involved, areas exploited, timber volumes harvested, and revenues generated.
- Worldwide experiences show that civil society monitoring of corporate and government activities has been critical in ensuring that national environmental laws are effectively being implemented.
- The capacity of non- governmental organizations (NGOs) to implement monitoring programs in Central Africa is limited by insufficient staffing, inadequate training, and

lack of support infrastructure.

- Though good information does not necessarily mean that natural resources will be managed well in the interest of the majority, lack of information almost assures that it will not.

What Do We Know About Logging in Central Africa?

Very little! Transparent management of natural resources in Central Africa is hampered by inadequate data, limited access to existing data, and inadequate communication of public information. Accurate national timber trade figures (volumes produced, exported, and imported) do not exist. Information collected by the Food and Agricultural Administration, the International Tropical Timber Trade Organization, and others rarely match. In Gabon, local environmental nongovernmental organizations (ENGOs) had to piece information together to determine where logging is underway, as the government has never released concession maps. Finally, information found in the public domain is often outdated.

So what? Forests in Central Africa belong to the state and should be managed for public benefits, not for private interests. Without information, the efficiency and fairness of forest management and policies cannot be assessed. However, the limited data available already indicates a growing pressure on forest resources (Figures 1 and 2), and hence a need to hold all the actors involved accountable. Despite the money this industry generates for national and local economies, it is often accompanied by several potentially environmentally damaging secondary activities, such as agriculture and bushmeat hunting.

Involving All Levels of Society in Natural Resources Management

The state, as owner of forest resources, is ultimately responsible for their management, which should theoretically benefit the country as a whole. The private sector, through large-scale logging activities, has a significant impact on the future of these resources. So far, local (urban and rural) people have limited information on how and why particular natural resources policies were elaborated and whether regulations are being enforced. In general, the forestry sector in Central Africa is characterized by (1) a lack of informed decision making and (2) a lack of transparency in that process. These factors hamper efforts to promote stewardship of forest resources and prevent the private sector and the government from being held accountable for their actions.

Local involvement leads to more successful decision making. Urban and rural communities have a direct stake in how natural resources are used, as this affects their daily lives. They know the political, economic, and environmental costs at the local level, and are an insightful group to involve in the design of specific monitoring activities. Outside experts may know what information to look for and how to communicate it, but local people know best how to get it.

Why Should Information Be Public?

When information is not made public, it is impossible to determine if management decisions are in the common interest. People who are dependent on, or care about, the future of natural resources but who have traditionally been excluded from management and policy dialogues, face deeply rooted social, political, and economic barriers to requesting accountability from logging companies and the government. Independent (i.e., non-government and non-industry) reporting allows the elaboration of tools that can be used by anyone to assess what is happening to natural resources. Mapping out where development occurs and who is involved promotes transparency by indicating who is responsible for what; monitoring the implementation and enforcement of laws fosters accountability.

Opportunities in Central Africa

There is an increasing effort in Central Africa to improve the knowledge base and enhance the distribution of information. The French cooperation, CIRAD and CIFOR financed the FORAFRI project (1996-99), which aimed to synthesize and distribute results from forestry research in the Congo Basin. While these initiatives are vital to developing better logging techniques based on scientifically proven facts, they have not, to date, fostered increased transparency and accountability. They have yet to actively involve local civil society groups and the information is often kept within the scientific community, government institutions, and enlightened individuals from the private sector.

However, civil society involvement and transparency are increasingly prevalent on many political and economic agendas. Two eloquent examples are

- La Conférence des Ecosystèmes des Forêts Denses et Humides d'Afrique Centrale (CEFDHAC), a collaborative regional ministerial-level initiative to address environmental opportunities and concerns, and
- The Central African heads of state's pledge, through the Yaoundé declaration, to improve forest management and biodiversity conservation partially by increased participation of local communities and better information sharing.

The time is right to help local groups participate in processes their leaders have committed to create for them. Independent monitoring can improve forest management by providing credible

and timely information. If it remains objective and neutral, it can foster more discussion between governments, private sector, and civil society.

Successful NGO Contributions Around the World

In Cambodia, Global Witness, a British-based NGO, has successfully documented illegal logging activities through analysis of secondary sources and ground-truthing. As a result, the Cambodian government recently appointed Global Witness to serve as the official independent monitor of that country's forestry sector.

In British Columbia, Canada, a group of concerned citizens formed Forest Watch a Global Forest Watch partner to gather information on the implementation of forestry legislation in their communities. Audits of logging companies' compliance with the British Columbia forestry code fostered greater public and government scrutiny of companies' performance.

In Indonesia, NGO reporting and mapping of forest fires helped identify large landowners as a source of the problem. In turn, pressure was placed on the government to pass new legislation to foster more sustainable natural resources extraction.

World Resources Institute's Global Forest Watch

The World Resources Institute helped create networks of local nongovernmental organizations through its Global Forest Watch (GFW) project. The objective is to develop independent monitoring of development activities in the world's forests, with the belief that reports published by organizations that do not have commercial interests in the use of these resources are likely to be more objective. GFW helps local groups access, process, and distribute information that can be used to better understand development trends, and that provides a basis for sound management decisions by the administration. In Central Africa, GFW is active in Gabon and Cameroon. They have recently published *A First Look at Logging in Gabon* and *An Overview of Logging in Cameroon* and can be visited at www.globalforestwatch.org.

Limitations of the Central African Context

The difficulty in Central Africa lies in the fact that democracy is relatively new. NGOs are of limited experience, as they have only been able to develop since the early 1990s in most Central African countries. Few individuals within these groups have the education necessary to

successfully manage an independent organization or the technical knowledge to be taken seriously by the government or the private sector. Qualified people are often recruited by the private sector, the government, or large international nongovernmental organizations that offer more financial security. Individuals willing to take a chance and grow within NGOs are difficult to find. As a result, NGOs, governments, and the private sector are unaccustomed to collaborating and, consequently, are often mistrustful of each other. In addition, development activities often involve large sums of money, and the concept of transparency is often viewed as threatening by entrenched interests.

The Power of Information: A Sign of Hope

However, creating access to information spurs further information flow. When the first drafts of the GFW reports were circulated, they were questioned. However, the data were fully documented and GFW partners were open and receptive to all comments. As a result, initial products have been generally well received to date, and participating local organizations have found that, as a result of the success of these publications, they have increased access to previously unavailable data. Our assumption is that circulation of maps and other information leads to more open discussions on forestry issues, and greater awareness of the need for data to be publicly available and as accurate as possible.

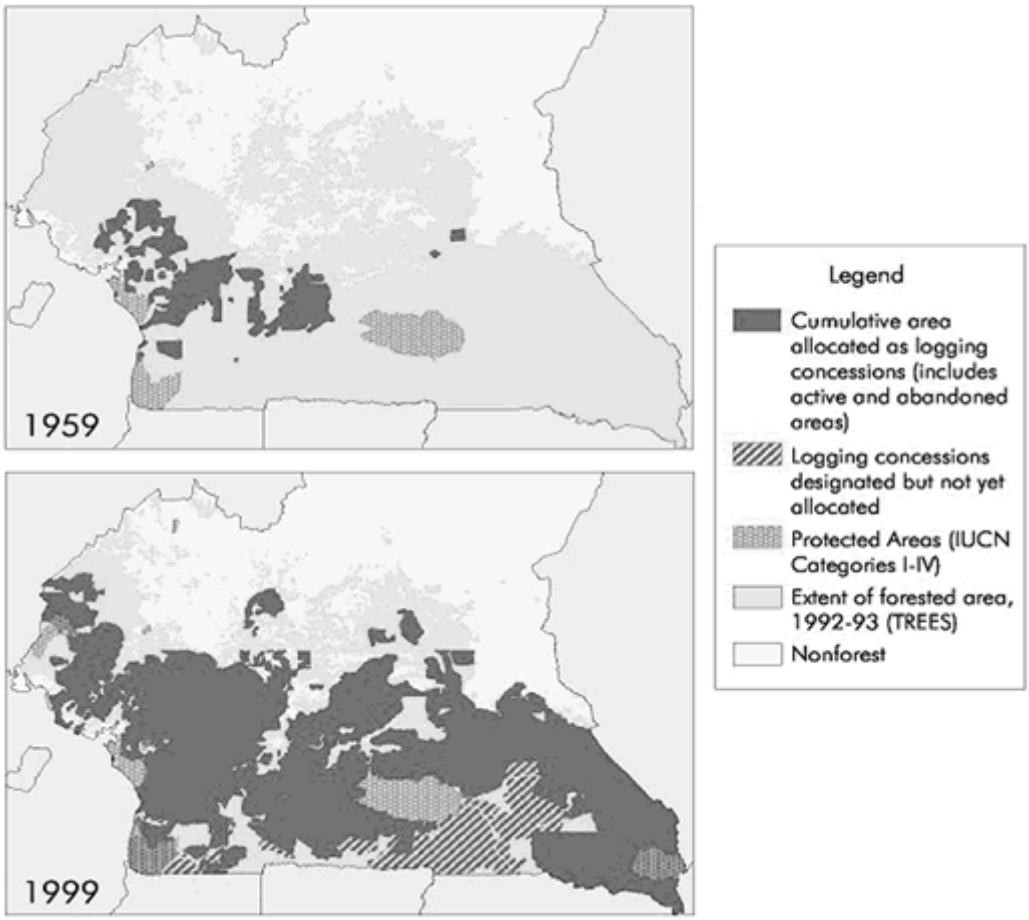

Figure 1: Evolution of Logging Concession between 1959 and 1999 in Cameroon. Sources: Global Forest Watch, An Overview of Logging in Cameroon (2000). Concessions data from WCMC, CETELCAF. Land cover from TREES (EC Joint Research Center), derived from 1992-93 AVHRR imagery; forested area includes dense moist forest and secondary/degraded forest classes. Protected areas information from WCMC, IUCN.

Figure 2: Congo Basin countries included: Gabon, Equatorial Guinea, Central African Republic, Sao Tome y Principe, Republic of Congo, Democratic Republic of Congo. Source: http://apps.fao.org/ (as of 8/24/00)

What Can You Do About It?

- Governments should increase transparency by developing legal frameworks allowing free information flow regarding decisions affecting national natural resources.
- Help nascent civil society organizations be heard and taken seriously by the private sector and governments. Design capacity-building exercises around specific desired outcomes and products. Invest in capacity building with a long-term vision and the understanding that not every trainee will be a success.
- While it is important to involve local partners in the implementation of projects funded and designed by the international community, nascent civil society organizations will greatly benefit from support to activities they have designed themselves in response to their local concerns.
- Individuals who are dedicated to specific issues but who are struggling to address them

given economic, political, or social realities, should be given the means to channel all their energy towards that goal through financial support and access to international resources.

- Donor-funded forestry projects should be contingent on the successful and constructive collaboration between national governments, private industry, and civil society. Donors should make the results of the projects they fund widely available to national and international audiences.

Table 1. Production and export volumes ('000 m^3) of tropical timber for selected African countries, 1998 and 1999.

Country	Product	Production		Exports		
		1998	1999	1998	1999	% change
Cameroon	Logs	2895	2135	1604	900	-40
	Sawn	588	600	353	345	-2
	Veneer	59	53	41	30	-24
	Plywood	90	85	41	65	61
Central African Republic	Logs	530	600	117	135	15
	Sawn	91	119	72	108	50
	Veneer	0	0	0	0	-
	Plywood	1	2	0	0	-
Republic of Congo	Logs	1056	1191	710	862	21
	Sawn	78	120	47	92	95
	Veneer	55	60	46	52	13
	Plywood	2	2	2	2	0
Gabon	Logs	2100	2200	1679	1800	7

	Sawn	90	100	30	60	50
	Veneer	35	40	22	30	-24
	Plywood	54	60	11	20	61
Totals	Logs	6581	6126	4110	3697	-10
	Sawn	847	939	502	605	20
	Veneer	149	153	109	112	3
	Plywood	147	149	54	87	61

Source: http://www.itto.or.jp/newsletter/v10n2/7.html as of 8/24/00

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CARPE...What Is It?

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #13

#13 — Monitoring Forest Cover in Central Africa
Why, What, How and When to Monitor

This brief was written by the **University of Maryland**. For more information on forest mapping activities contact Nadine Laporte, email: nlaporte@geog.umd.edu; Chris Justice, email: justice@hermes.geog.umd.edu.

Related Issue Briefs

#5 Timber Tsunami

#6 Deforestation

#7 Seeing the Future

#8 Forest Disappeared

#12 Management Watchdogs

Key Concepts

- Central Africa contains the second largest rainforest in the world, with relatively low annual rates of deforestation compared to Asia or Amazon.
- Estimates of Central African rainforest extent, based on early 1990s AVHRR satellite

observations, are approximately 1.8 million km², but recent model predictions suggest that disturbed forest will dominate by 2030.

- Information on forest state and forest uses is not gathered systematically nor made public.
- More access to information does not necessarily mean resources will be managed for benefit of the majority. But, lack of information almost ensures that forest resources will not be used equitably.
- The goal is to provide timely and reliable information on forest composition, condition, and extent, as a basis for informed decision making.
- National forest and mapping agencies are plagued by inadequately trained staff with little technical expertise and insufficient resources to perform inventories, and monitor changes.
- The cost of forest monitoring increases with area, frequency, scale and number of attributes to be monitored.
- Monitoring has to be driven by a political process that raises popular demand for environmental information.
- Monitoring schemes have to be developed in collaboration with end-users of the information (e.g. governments, conservation organizations, local communities) to ensure the information meets their needs and is appropriate for adaptively managing policies and practices.

Why Monitor Africa's Rainforests?

The Congo Basin contains the second largest continuous rainforest in the world. It includes the some of the highest biodiversity of Africa and sustains more than 20 million people (Table 1), most of whom depend on natural resources for their livelihoods, including agriculture, non-timber forest products as a source of food, medicines and income, and timber. Collection of, and public access to national and regional scale information on forest types, distribution and rates of conversion is a necessary but insufficient step to greater equity in forest management decision making and benefit sharing. In the 1980's, after publication of the deforestation rates in the Amazon basin, the government of Brazil and the World Bank were accused of promoting deforestation by building new roads and giving away large areas of forestland to settlers. As a result a new policy was adopted that settlers would have to retain at least 40% of their land in forest. Similarly, in Indonesia, forest monitoring proved that, contrary to government assertion, most of the forest burning was not caused by smallholders, but by politically influential industrial plantations. Monitoring does not always lead to new forest policies, but is a fundamental step in managing natural resources.

Africa's national forest agencies have been under-funded for long time and have had to rely on collaboration with foreign institutions to overcome the lack of up to date information on forest cover and forest conversion. The combination of high population growth and increased world demand for forest products necessitate the development and implementation of innovative and

sustainable forest management plans that will help ensure that forest uses benefit the majority and do not compromise access to these benefits in the future.

What Should Be Monitored?

What is monitored must be determined by the demand for environmental information. For example, local communities might be interested in tracking the expansion of immigrant farmers into their traditional territories, national forest agencies may want to know where timber companies are logging particularly if they are taxed based on their concession area, protected area managers may be keen to monitor the location and size of gold and diamond mining camps, biologists may want to track tree mortality and regeneration rates under different management regimes, and global climate modelers would like to monitor rates of carbon accumulation and emissions within forests of different types.

"The goal is to provide timely and reliable information on forest composition, condition, and extent, as a basis for informed decision making."

Supplying forest information in the absence of demand is, however, unlikely to result in changes in forest policies and practices. After five years, the logging company that collaborated on the API-Dimako project was uninterested in making use of the vast supply of research results for improved forest management, because more efficient harvesting offered it no competitive advantage. Similarly, the influence of FORAFRI and REIMP two other donor projects, on forest management by making environmental information more available to governments, has yet to be assessed.

That said, increasing public rather than simply public-sector access to information may empower latent constituencies for forest policy reform, and consequently build demand for more and better forest information. Providing nascent civil society institutions with environmental information with which to lobby government for changes in forest policies and practices may be a more effective use of environmental information than providing it directly to uninterested ministries.

How and When to Monitor

Different characteristics of forests can be monitored at different spatial and temporal scales to address different management concerns. Moreover, information can be gathered both physically by people on the ground, or remotely using cameras and other sensors flown on airplanes and satellites. To monitor compliance with forestry laws, information on the location and extent of logging may only need to be gathered once a year within and bordering a concession, over an area of typically less than 200,000 ha, and could be accomplished either by forestry staff visiting the concession, or by using remote sensing to record the location of new logging roads and the number of new canopy gaps associated with felled trees. To establish a sustainable forest

management plan information on tree fruiting times, seedling mortality, recruitment, and mortality would have to collected monthly by field staff, over an area of at least 10 ha. Agricultural expansion into forested areas, and forest fragmentation by roads, could be monitored on a yearly basis using satellite imagery over relatively vast areas.

Field-based monitoring is, not surprisingly, more expensive than using remote sensing data. In general monitoring costs increase with spatial scale, level of detail and accuracy, and the frequency of data collection (Table 2).

Table 1: Central African Statistics on Forests and Population

	Population[1] (millions)	Population Density	Deforestation Rate 80-90s[2]	Forest Cover[4] (%)	Agriculture and Fallow[4] (%)
Cameroon	12.80	27.5	0.6	37.0	14.0
Central African Republic (CAR)	3.20	5.2	0.4	10.0	10.0
Dem. Rep. of Congo (DRC)	42.60	18.3	0.6 0.4[3]	48.0	4.0
Equatorial Guinea	0.39	15.6	0.4	65.0	23.0
Gabon	1.30	4.9	0.6	80.0	9.0
Rep. of Congo	2.50	7.3	0.2	66.0	11.0

1 - Bahuchet (1995) estimates the forest population to be 24 million.
2 - Annual rate in percent from FAO Tropical Forest Assessment (FAO 1993).
3 - Annual rate in percent from CARPE-Landsat Pathfinder Project (1984-98). Details in Brochure "Deforestation in Central Africa?"
4 - Derived from AVHRR analyses of the 1990s, see Figure 1 for illustration (Laporte et al. 1998)

National and Regional Scale Forest Cover Monitoring

Traditionally Africa's national forest services have provided inventories and monitored forests for timber exploitation using expensive, time consuming, and intermittent aerial surveys. High cost of aerial photography and photo-interpretation limited these surveys to only small areas. In most countries, lack of demand, high cost, and insufficient technical staff and operating budgets, has meant that forest assessments have not been updated for decades, if at all.

Remote sensing imagery provides Central African nations with an alternative, timely and cost-effective approach to monitoring changes in forest cover at multiple scales. Satellite imagery and aerial-videography are now an essential part of most large area forest monitoring systems. However, remote sensing images are not a substitute for field-based data collection, which is essential for accurate image interpretation and to provide the necessary data on forest characteristics that are undetectable by air- and space-borne sensors.

What Are the Existing Remote Sensing Tools for Forest Cover Monitoring?

Given the immense area covered by Africa's rainforests (approximately 1.8 million km^2), and their relative inaccessibility, a combination of remotely sensed data used and targeted field-based forest inventories will produce the most accurate and timely estimates of forest cover type, relative distribution and rates of change, at local to regional scales.

At the regional level, optical image data from NOAA-AVHRR sensors, and the new MODIS and SPOT VEGETATION instruments are the primary systems for gross differentiation between forest, savanna and agriculture. These systems have neither the spatial nor spectral resolution to discriminate multiple forest types.

At the national or local level, Landsat or SPOT imagery can provided finer scale information on forest type distribution and agriculture expansion.

Optical sensors like the Landsat Enhanced Thematic Mapper offer good spatial coverage for most of the Democratic Republic of Congo and Central African Republic. However, wall-to-wall mapping of Cameroon, Gabon and the Republic of Congo is difficult because of perennial cloud cover. Radar systems such as JERS and Radarsat are not affected by clouds, and are useful for determining the extent of forest and non-forest landscapes where topographic relief is not substantial (<200m). Radar imagery is, however, unable to differentiate between high woody biomass old-growth or unlogged forests from degraded lower biomass forest types.

Moving Toward an Operational Forest Cover Monitoring System in Central Africa

International efforts are underway to improve operational forest monitoring as part of the Global Terrestrial Observing System. At the first Global Forest Observation of Forest Cover (GOFC, 2000) workshop held in central Africa (February 2000 in Libreville, Gabon), several issues limiting the development of operational forest monitoring systems were identified by national forest services and their international partners. These included: (1) lack of human and financial

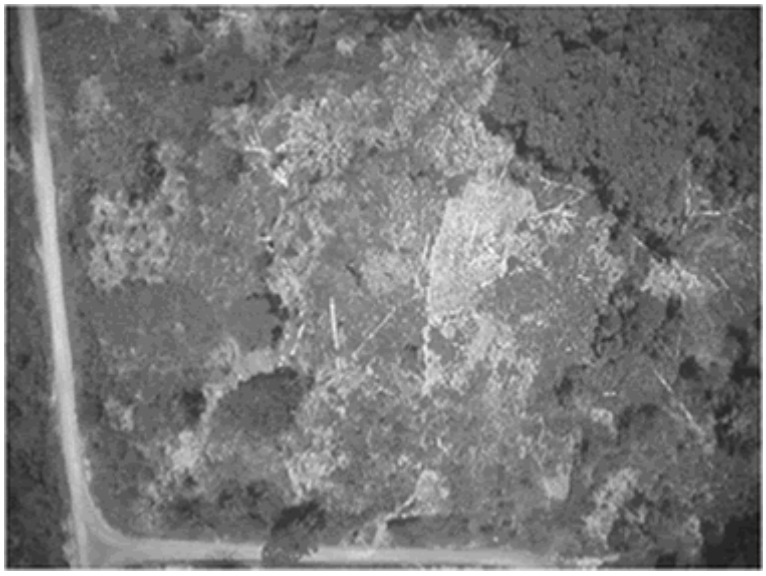
resources; (2) poor access to data and information; (3) poor Internet access; and (4) lack of training facilities and opportunities.

In the Central African region, as part of the international GOFC initiative, new remote sensing tools and methods will be tested for local and regional scale monitoring. In addition, future workshops, technical exchanges, and collaborative research activities will continue to strengthen national capacity for forest monitoring. The latter is particularly important given the paucity of technical expertise in the region.

These activities will foster the growing collaboration between national forest services, universities, conservation organizations and the logging private sector. For example the utility of new high resolution IKONOS imagery (at 1 and 4m resolution) will be evaluated for forest concession management at very fine scales. In Gabon IKONOS data will be tested for mapping recolonization of Okoumé in savanna areas. This tree species is important to the nation economy as it represents more than 70% of log exports. Landsat imagery will also be tested for developing a monitoring system for logging activities in Cameroon, Gabon and the Republic of Congo. The FAO Africover Project will be extended into Central Africa strengthening capacity for national forest mapping and monitoring and building on the satellite data sets developed by CARPE, NASA and the ECE.

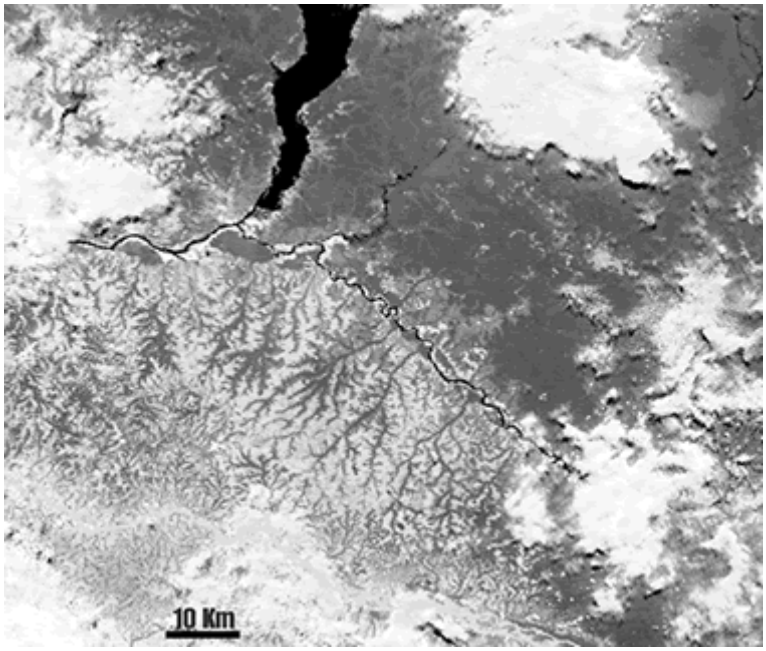
To improve the access to spatial information for forest monitoring, recent imagery from Landsat 7 will be made available on CDs by CARPE for nationals forest services, conservation organizations and the CARPE - GOFC network. Also, the NASA Landsat Pathfinder archive will continue to be available via the Internet and CDs. (http://glcf.umiacs.umd.edu; http://www.bsrsi.msu.edu/trfic/).

Satellite Imagery



Legend 1: Tracking logging with digital videographies.

Legend 2: Tracking logging with digital Landsat TM imagery.



Legend 3: MODIS image of Bandudu province.

Figure 1: Extent of the Rainforest from TREES and CARPE (1990s)

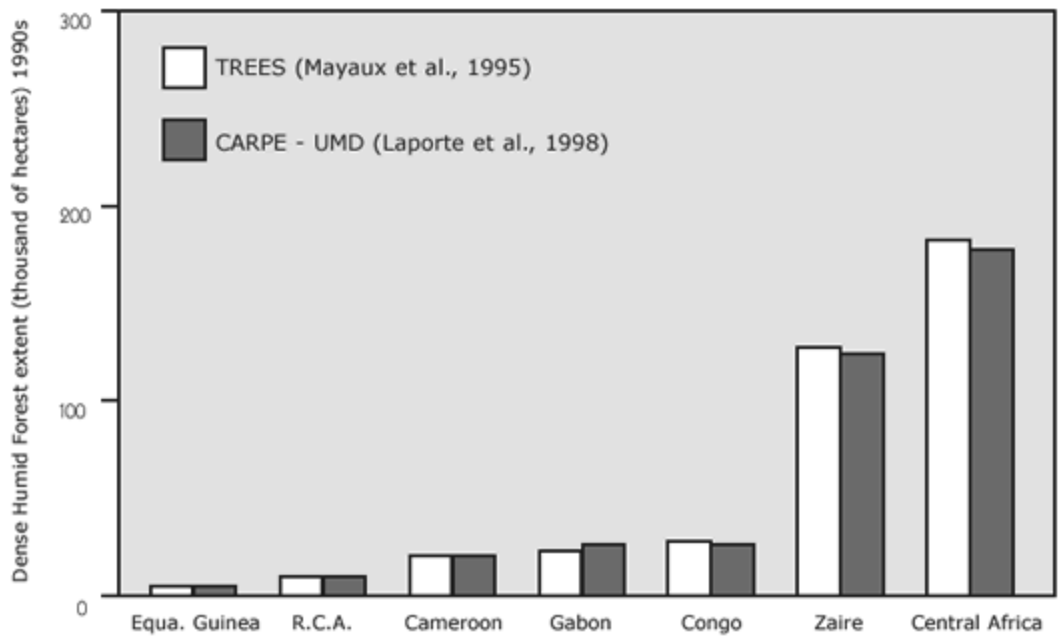


Table 2: Tools for Monitoring Changes in Forest State						
Scale	**Data Source**	**Forest Attributes**	**Spatial Resolution**	**Temporal Frequency**	**Mapping Scale**	**Monitoring Cost**
REGIONAL	AVHRR	Forest/Non forest				
	SPOT vegetation	Net primary productivity				
		Seasonality				
		Forest disturbances:	1 km²	daily	>1/500,000	Low
		Agriculture				
NATIONAL	Landsat	Forest types				
	SPOT					

		Forest disturbances:	100 m² to 900 m²	15-20 days	> 1/50,000	Low to high
		Agriculture				
		Logging roads				
		Plantations				
LOCAL	IKONOS	Tree species				
	Aerial-videography	Human population growth and movements	1 m² to 16 m²	User defined	> 1/500	High
		Forest disturbances:				
		Agriculture				
		Logging roads				
		Plantations				
		Tree gaps				
	Field staff	Species composition	<1m²	User defined	> 1/500	Very high
		Harvest rates				
		Level of degradation				
Note: Due to cloud coverage data availability differs from data temporal frequency						

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #14

#14 — Establishing Ecological Monitoring Programs
What, Where and How to Monitor

This brief was written by the **Wildlife Conservation Society**. For additional information contact Andrew Plumptre, email: Aplumptre@aol.com.

Related Issue Briefs

#4 Identifying Gaps

#7 Seeing the Future

#13 Remote Sensing

Key Concepts

- Monitoring of threats to forest resources and changes in the state of forest resources is costly relative to monitoring nonforested landscapes.
- To be cost-effective biodiversity monitoring must be based on: (1) identification and prioritization of the biophysical and socioeconomic factors that threaten forest biodiversity in a given area, (2) clear characterization of the desired or target state of forest biodiversity in the future, (3) identification of direct or proxy measures that will indicate progress toward the desired forest state over time, (4) specification of the techniques to be used to quantify the direct or proxy measures of forest state, (5)

estimation of the level of effort in time and money to have confidence in the accuracy of the measures of changing forest state, and (6) have in place a set of responses to likely observed changes in state of direct and proxy measures.

- Relatively cost-effective tools now exist that facilitate monitoring in forests at local- (recce-transect, informant recall, aerial videography) and regional-scale (satellite image analysis).
- Focusing monitoring activities solely within protected areas may not provide sufficient early warning of changes in threats and forest state in surrounding human dominated landscapes that may adversely impact the long-term persistence of the flora and fauna protected within the park or reserve.
- Determining the appropriate scale at which to monitor different threats to biodiversity is critical to ensure that remedial action can avert unacceptable habitat and species losses.

The Importance of Monitoring for Conservation

There is a growing understanding by governments, donors, and conservation NGOs that monitoring is an essential component of effective conservation practice. Yet, it is seldom clear why monitoring is taking place and how monitoring results will be used to produce intangible improvements in the effectiveness of conservation actions. Sadly, many monitoring programs are designed more to characterize how conservation dollars were spent, rather than how that investment resulted in a conservation benefit. Worse, monitoring is even less geared to characterizing how that conservation investment might need to be adapted to benefit from the lessons learned from analysis of the monitoring data.

Monitoring is typically considered as mere research and consequently a luxury in protected area management. This perspective is best exemplified by the fact that most National Parks institutions in Africa do not fund research positions. In those that do, when funding becomes scarce, research and monitoring are often the first areas that are cut from management programs. As an illustrative example, the Uganda Wildlife Authority has stated that it cannot fund research in its parks but encourages NGOs, universities and individual researchers to help them carry out research projects they feel are necessary.

Yet, monitoring should be a central and operational component of all conservation management activities, because if we cannot measure and assess what impact we are having on the conservation of biodiversity, we can never adapt our assumptions and management practices and thus improve the effectiveness of our conservation actions. Monitoring should not be considered a dispensable luxury, but an essential tool for adaptively managing conservation actions as conditions change and we learn from our efforts.

Monitoring should always be planned with potential responses in mind if the monitoring detects levels of unacceptable change in the state of the natural resource base. Monitoring can be expensive and therefore it is important to think very strategically about what to monitor and where to monitor. Monitoring should focus on assessing the outcome of management actions specifically designed to resolve some threat to biodiversity conservation. Monitoring should be able to track, using specific measures of change, progress in achieving the target condition desired (i.e., an ecologically viable population of 600 lowland gorillas). Monitoring should also lead to a response when expected results are not achieved and a change in management actions are required.

Deciding What and Where to Monitor

The first step before a monitoring plan is developed is to carry out a threat analysis for the management area. This allows you to identify the spatial pattern and causes of threats to long term conservation and also to prioritize which threats are more important/immediate and which need to be addressed urgently. A monitoring program should focus on these primary threats when financial resources are limited. Monitoring should measure how the primary threats are reduced by management actions and also be able to detect if the location of the primary threats is changing within the management area. For instance, poaching around a village may be one of the primary threats and so a monitoring program should measure the incidences of poaching activity around the village as management actions to reduce poaching (such as increased patrols and community education programs) proceed. However, the monitoring program should also be able to identify if the management actions have simply shifted poaching to another part of the park. Many of the threat indicators that need monitoring will be socioeconomic rather than biological factors.

If there are additional funds, then it is useful to establish biological monitoring programs that will measure changes in the ecosystem over a longer time period. Natural changes in the vegetation structure, biological community and ecosystem processes take place continuously, but often do so at a rate that makes them difficult to notice unless monitoring continues for several years at least. Yet, understanding how complex communities and ecosystems change is important if we are to manage them effectively. For example, as a result of monitoring efforts we now know that many important timber species require disturbed forest, and that if we want to promote regeneration of these economically valuable resources we may need to artificially disturb some areas during timber harvesting to ensure that seedlings survive and ultimately replace felled trees. A monitoring program should to try to include basic biological surveys whenever feasible. If financial resources are limited, it may be possible to link up with a University in Europe or the United States that would be interested in establishing a research program that would provide this kind of information.

Some types of monitoring require highly trained people who are needed at regular intervals, such as vegetation monitoring using permanent plots where trained botanists or are required to identify tree species. Other types of monitoring are less specialized and can easily be done by protected area rangers as they go about patrolling the landscape. Self-monitoring by local

communities can be used to gauge the economic success of new livelihood enterprises and the strength of nascent constituencies for community-based natural resource management. Determining who can collect what data accurately and efficiently is one of the decisions that must be thought about carefully when designing a monitoring program. It is generally best when the people who will use the data are the ones who collect and analyze it themselves.

The scale at which the monitoring program takes place is also very important. For instance, a monitoring program can monitor areas within a protected area, over the whole protected area, and also within and outside a protected area. Determining at what scale monitoring should take place is vital before implementing a monitoring program. Monitoring at sites within a protected area is useful when you want to detect local changes, such as animal numbers around a human settlement. Monitoring across the whole protected area might include systematic surveys of illegal human activities and linking this with information from more ad hoc ranger patrols and patrol effort. At a large scale it may be important to monitor activities outside a protected area that may have an impact on the protected area, such as effluent discharge from a factory upstream of a reserve or road developments in a logging concession adjacent to a reserve.

New Techniques that are Useful for Ecological Monitoring

More Robust Detection Methods

Field scientists in Central Africa have been looking at the current field methods that are used in tropical forests and their efficacy for monitoring animal populations. What these analyses show are that economically feasible monitoring using current line transect methods cannot detect increases or declines in mammal populations unless the population changes by more than 30-50% between censuses. To try to improve on this a recce-transect method has been developed that combines the standard transect methods with reconnaissance walks. This method is able to survey more territory with less effort, thereby reducing uncertainty, increasing our confidence that an observed change in population density is real, and making reliable monitoring more affordable.

Aerial Videography

The use of aircraft mounted video as a cheap and easy means of monitoring changes in the environment has been developed and refined over the last 15 years. Video is easy to shoot these days and with digital cameras it simple to import the information to a computer for interpretation and analysis. For example, in the Nouabalé-Ndoki National Park in northern Congo, a NTSC format Sony VX-1000 Digital Handicam is mounted on a Cessna 172. It has been found that at a ground speed of 100 knots and the focal length of the videocamera set such that a single frame covers a 200 meters wide swath of terrain, about 4,000 ha can be covered in one hour's flying. Aerial videography is particularly useful for repeated surveys over relatively small areas or along linear features such as roads or rivers. When assisted by a GPS (global positioning system) receiver, a skilled pilot can refly transects in unmarked terrain by using a standard set of way-points. Aerial videography can be used to (1) monitor changes in human settlement (number,

distribution and quality of houses) and land clearing for agriculture, (2) track the expansion of roads into frontier areas, (3) detect illegal mining and poaching camps, and (4) count the number of elephants killed near water holes or salt licks. Videography is a useful and underutilized tool for monitor biological and socioeconomic variables over moderate scale between 5 and 500 km².

Satellite Image Analysis

Satellite image analysis is not new, and its use in monitoring programs has increased as multi-date image sets have become available, thereby allowing analysis of changes in land cover and land use over time. With the return of the Landsat program to the U.S. government and a decrease in the price to power ratio of computers, the cost of buying and analyzing remote sensing imagery is now economically feasible for many more protected area projects. Satellite imagery is particularly suited to monitoring land cover and land-use changes where the features of interest are larger than 1 ha, but they cover large areas (1,000 - 10,000 km²). In general they do not provide early warning of forest degradation. The decrease in the cost of computing has made regional time-series analyses using Landsat data feasible, however obtaining cloud free imagery in persistently cloudy areas remains a problem for optical systems. Hyperspatial resolution (1m-3m) data from IKONOS is currently being investigated for identifying forest disturbance and scaling up from field measurements to the resolution of Landsat data.

Costs of Ecological Monitoring

Monitoring in forests is significantly more costly than monitoring in savanna ecosystems. In savannas it is relatively cheap to fly an airplane over a protected area and obtain a lot of useful information on habitat patterns, wildlife densities and movement patterns. In forests, monitoring of animal populations and human impacts on animals requires intensive efforts on the ground because we cannot look through the forest canopy and identify individual animals, yet. As a result, wildlife population monitoring has occurred only at a fairly local scale, even though many large-bodied, wide ranging species such as elephants, gorillas, and leopards should realistically be monitored over much larger scales if we are to detect what is happening at the population level. For instance, if monitoring focuses only within protected areas and detects an increase in an animal's population does this mean the population is increasing or animals are fleeing from hunting pressures outside the protected area and hence are artificially increasing the population within the protected area. CITES is trying to develop a monitoring program for forest elephants that aims to look at how you monitor the populations of an animal over the scale of the Congo basin, while at the same time minimizing the costs of the survey effort required. Understanding how to monitor at much larger scales when you need to use methods that are more applicable for more fine scale monitoring, is an important future avenue of research.

Determining the relative merits of different monitoring approaches such as ranger based monitoring versus aerial videography is also important if we are to ensure that monitoring efforts are the most cost effective. To facilitate this analysis conservation projects across the basin should measure and report the costs of monitoring programs and characterize the quality of the data and its utility for tracking changes in the state of the forest.

Determining Causes of Change

In many cases regular ecological monitoring allows changes in the natural resource base to be detected, but rarely tells us much about the underlying socioeconomic causes, or whether these driving forces are themselves changing. Ideally a monitoring program should be designed around a conceptual model that incorporates socioeconomic monitoring in threat assessment. In this way, both the factor driving change and the change itself can be monitored.

A Cessna used to monitor changes in the forest using aerial videography.

Monitoring changes in wildlife populations within the forest is much more time consuming and costly than in grasslands and scrub savannas.

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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 Principe.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

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Issue Brief #15

#15 — Policy Reform
A Necessary but Insufficient Condition for Better Forest Management

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Related Issue Briefs

- **#5 Timber Tsunami**
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Key Concepts

- Several countries in Central Africa have introduced forest policies aimed at increasing efficiency in logging and processing operations.
- The World Bank has strongly supported these policies, and has tied policy reform to structural adjustment loans, a powerful incentive.
- In Cameroon, which introduced a new forest law in 1994, policy implementation has

been very problematic because of the lack of political will and inappropriate policy sequencing.
- In the absence of effective enforcement, efficiency incentives may, paradoxically, encourage illegal logging and accelerate forest degradation.
- Credible enforcement requires the development of innovative public-private partnerships, implying a redefinition of the role of the state in Central Africa.
- One opportunity to promote better forest management is to tie concession allocation and renewal to countrywide certification backed by independent verification.
- Policies aimed at concentrating timber production and simplifying forest taxation can help to reduce the need for costly enforcement and government oversight.

Forest Policy Reform

In Central Africa, important productivity gains are available at every step in the chain of production, from the forest to the market place. In one concession in Gabon, the yield per hectare of okoumé was doubled at no extra cost by cutting off the buttress before felling (to reduce accidents and increase the portion of the trunk that is recovered), cutting off the branches (to allow the entire trunk and large branches to be extracted), and tracking trees with a simple marking mechanism (to ensure cutting of all inventoried trees and extraction of all cut trees). Similar opportunities exist in the processing sector. According to a mill owner in Cameroon, average mill efficiency could easily rise from 30 to 40%, and by investing in dryers and finishers, could reach 65%. Other productivity gains include the use of secondary species such as fraké and tali in the production of plywood.

Changing Behavior

Many of these improved practices have been shown to be profitable. So why aren't they adopted? First, there is the mistaken perception that improved logging is more expensive than conventional logging, which results in part from the failure of conventional logging to incorporate the costs associated with waste and inefficiency. Second, under conditions of high political and market insecurity, the up-front costs associated with improved logging (e.g., hiring a forest manager, carrying out more detailed inventories) may be prohibitive. Companies therefore tend to be risk-averse and favor business as usual practices. Third, if logging is already highly profitable, the additional margins offered by improved logging may be insufficient to promote innovation, especially under high-risk conditions. Although it may be profitable to adopt improved logging practices, it may be even more profitable not to.

The goal of forest policy reform is to encourage companies that are willing and able to invest in better forest management to benefit at the expense of those that are either insufficiently capitalized or not motivated to do so. Incentives and regulations are required to promote a

process of technical and economic selection, whereby the efficient and productive gain at the expense of the inefficient and wasteful. The desired outcome is an industry that produces more value from less forest. Achieving this outcome requires both stroke of the pen reforms and long-term changes in government attitude and capacity.

Cameroon's 1994 Forest Law

In 1989, the World Bank commissioned a study of forest pricing and concession systems in Central Africa. The study provided specific policy recommendations, including the allocation of concessions by competitive bidding, higher area taxes, a free market in log exports (no log export ban), the use of performance bonds, and other reforms aimed at improving the economic and environmental performance of the forest industry.

Cameroon was the World Bank's flagship attempt to improve forest management in Central Africa through policy reform, and offers important lessons for the rest of Central Africa. The first round of negotiations between the World Bank and the government culminated in the 1994 Forest Law, which contained many elements of what the World Bank considered to be the forest policy reform "conventional wisdom." The World Bank believed that if the government changed the way it allocated, taxed, and managed forest concessions, it could prevent the worst environmental damage and increase tax revenue to help it deal with the country's pressing social and economic concerns. The need for reform was also motivated by the increased pace of industrial investment in wood processing and the huge increase in demand for wood from Asia.

Under the previous law, concessions were allocated based on mutual agreement between the companies and government authorities, typically at prices well below what the concessionaires are willing to pay. Companies had no incentive to manage the forests efficiently because they were unlikely to derive any benefit from good management. The law did not allow the transfer of concessions, and did not guarantee long-term access so that companies could benefit from previous practice during a second felling cycle. Since export taxes were not linked to the market price of wood, and area taxes were very low, loggers were encouraged to cut only the best trees and the government received less revenue. Companies constructed roads deep into the forest to exploit the rarest and most valuable timber species, opening up these areas to agricultural settlers and bushmeat hunters.

Boosting Revenue

Cameroon's 1994 Forest Law clearly succeeded in boosting tax revenues. After accounting for the effect of the 1994 devaluation, revenues went from 10 billion CFA in 1990, to 14 billion CFA in 1994, to 24 billion CFA in 1997. Over the same period, wood production rose from about two to three million m3. The government therefore increased its share of the value of the wood from 6,000 CFA/m3 to 10,000 CFA/m^3.

This increase was due to two factors. First, in 1995, the government invited the Swiss company SGS to control log exports, which accounted for 80% of forest taxes. Second, in 1997, the World Bank succeeded in having market prices introduced as the basis of export tax rates. These prices previously underestimated the value of logs by 30 to 40% and of processed wood by 90%, and

represented a significant loss in government revenue. However, implementation of the law has been difficult, and the government has rendered meaningless the market-based export tax rates by manipulating the reference prices through obscure administrative decisions.

Concession Allocation

The 1994 Forest Law introduced concession allocation by auctions on the grounds that they are transparent (because any qualified company can bid and the criteria for allocation are predetermined), objective (because the company, not the government, decides what price to pay for the concession), and economically efficient (because it favors those companies that can make the most money, and pay the most tax).

1997 Concession Auction

In August 1997, the government auctioned 26 concessions with a minimum area tax of 1,500 CFA/ha, for which 190 companies submitted bids. The results showed that applicants were prepared to pay two to three times more than the minimum area tax, demonstrating that logging companies were willing to pay an area tax much higher than the 98 CFA/ha in effect at the time of the law.

But 16 of the 26 concessions were not awarded to the highest bidder. In most cases, concessions were allocated to the company ranked first according to the technical criteria, even if the financial bid was much lower. Six concessions were awarded to individuals who had not even submitted bids, but are known to have been key supporters of the regime. Strictly speaking, the law was respected because it reserves for the government the right to ignore the auction results in cases where the national interest is threatened, but the government's decision emphatically broke the spirit of the law.

Increasing Transparency

The 1997 auction succeeded in revealing the extent to which the forests was undervalued, but showed how hard it is to implement reforms that threaten the ruling class that depended on the discretionary allocation of forest concessions to garner political support.

Policy Sequencing

The failure to allocate concessions to the highest bidders resulted in a loss of 2 billion CFA/year to governments as tax revenues. Moreover, many individuals awarded concessions did not have the technical or financial means to start logging, let alone prepare management plans. The result was a severe shortage of logs, at a time that the demand for logs was rising rapidly.

The 1994 Forest Law, which called for a log export ban effective January 1999, led to a boom in mill construction; by 2001, processing capacity will have reached 3 million m3. API-Dimako,

the French research project, estimates the average sustainable timber production to be 10 m3/ha, which translates into a maximum sustainable yield of 2.2 million m3, much less than the installed processing capacity.

Over-capacity of domestic sawmills provoked by the log export ban, the delay in concession allocation, and the fact that logging stops during the rainy season because of the poor quality road network, means that the supply of logs does not meet demand and thus domestic log prices remain high. In the absence of
any real government control in the forest, high demand and reduced legal supply have resulted in widespread illegal logging. Policies that favor inefficient processing, such as taxing processed wood leaving the mill rather than logs entering the mill, also work against better forest management.

Forest Taxation

Cameroon's 1994 Forest Law introduced a significantly higher area tax coupled with concession auctions. (Higher area taxes were offset by lower log export taxes in order to maintain a constant forest tax burden.) The World Bank argued that by increasing the cost of the raw material, a higher area tax encourages greater efficiency in its use, and that a company with large margins to improve efficiency is more likely to invest in reducing waste than in acquiring larger concessions. Area taxes have other advantages. They are easy to calculate, reducing the scope for fraud and they provide a constant revenue stream because they are unrelated to wood price fluctuations.

Intensification

Economic theory suggests three main effects of auctions and area taxes. First, because an area tax increases the fixed cost of logging per hectare, forest areas that were previously economically marginal to harvest (forests far from the mill where only the highest value trees are harvested) will become economically inaccessible. A reduction in the economically harvestable area will reduce log supply and increase log prices. Second, area taxes and a potential reduction in log supply will increase the cost of accessing the forest, which should lead to increased efficiency in its use. The magnitude of this effect depends on the existence of within-company innovation and waste-reduction possibilities, and replacement within the sector of more efficient companies. Third, auctions and area taxes should lead to an intensification of forest use. This could take the form of a wider spectrum of species and sizes being used. There are many reasons to expect this effect. Because the tax is paid regardless of whether logging takes place or not, area taxes (combined with auctions) will put companies that keep their forest idle under pressure to use it or sell it. Because the area tax is paid well before the logs are sold, the company is exposed to market and political risks that translate into a higher discount rate and faster depletion. Because of the reduction of the economically harvestable area, more wood will have to be extracted from a smaller area to meet a given demand.

Theory suggests that higher area taxes will lead to higher volume harvesting from a smaller area. There is evidence from Bolivia that this is indeed the case. Bolivia's 1996 Forest Law replaced a volume-based tax by a minimum area tax of $1/ha/year. This led to the reduction in the area under concession from 18 to 6 million ha. Of the abandoned forest, 9 million ha were given to local communities and 3 million ha to municipalities, thus achieving an important equity objective. The result is less area under concession, smaller concessions (the average size is 40,000 ha), a rapid increase in the share of value-added products among wood exports, and higher export earnings from a smaller volume of wood harvested.

Conservation Concerns

But some wildlife conservation NGOs are opposed to Cameroon's area tax-based auction system, because it is likely to result in smaller, more intensively logged concessions. They prefer conditions in Congo and Gabon, where a negligible area tax and minimal processing capacity have resulted in very large concessions that are under little pressure from logging-induced forest degradation or agricultural encroachment. NGOs can therefore negotiate antipoaching agreements with a few large concessionaires.

Although this position may make sense in the short-term, it limits the economic contribution of the forest sector, and is therefore questionable in terms of long-term development. A compromise solution, which has been proposed in Cameroon, is to set a high area tax, but to allow companies to pay no tax on areas of special environmental value. These within-concession set-asides could be designed in collaboration with NGOs to maximize the biodiversity benefit and minimize the revenue foregone.

Modeling

To get a better idea of the interaction between higher area taxes and enforcement, a model was developed using logging costs and forest inventory data from Cameroon. The model yielded the following findings.

First, in the absence of enforcement, area taxes will motivate a quicker exploitation of a concession and its earlier abandonment. It is unclear what the consequences of a quicker exploitation and abandonment of the concession would be for the environment. Unregulated harvest seems to be particularly troublesome where wildlife poaching (for which forest access is essential) is serious.

Second, better forest management requires policies to look beyond what happens inside the forest and to harmonize the productive capacity of the forest with balanced industrial development. In the absence of such harmonization, depletion may occur at a rate faster than anticipated. This is particularly true in the absence of enforcement.

Third, in the absence enforcement, area taxes may promote a faster depletion of the resource base. This is what happened in Cameroon, where higher area taxes and inadequate government control in the forest made
illegal logging both easy and profitable. In one 2,500-ha concession, over 12,000 ha were

actually logged. But from an environmental standpoint, area taxes will make remote forest areas uneconomic to harvest, thus potentially contributing to forest conservation.

Forest Management

Cameroon's 1994 Forest Law introduced the requirement for forest management plans. Whereas auctions and higher area taxes were believed to constitute sound forest policy, there was little empirical evidence of their impact on harvesting practices, which some feared would intensify. Forest management plans were intended to mitigate the potential negative effects of more intensive logging. They also responded to growing international support for the notion of sustainable forest management.

Ensuring Implementation

Forest management plans are often regarded as the answer to all of Central Africa's problems. They are relatively cheap to produce. The only one completed in Central Africa cost $500,000 for 1.4 million ha in northern Congo, or less than $0.40/ha, a fraction of the market value of the wood. But management plans will only be used if they meet the company's needs, and they will only meet the company's needs if it is in its interest to implement them. Governments therefore need to introduce policies that make compliance attractive. If companies are not motivated to behave better (which is emphatically the case in Central Africa), then governments need to provide such motivation through both incentives and regulations. Effective regulation is the only practical way to ensure that a beautifully written management plan does not gather dust on a shelf.

One way to encourage better forest management would be to make concession renewal conditional on compliance with forest management norms. Concession renewal has been shown to be a powerful incentive, and is easier to implement than performance bonds. But the region's governments have neither the credibility nor capacity to verify compliance. Since concession cancellation implies less tax revenue, governments would be under pressure to approve compliance. Nor could a government be expected to cancel a concession held by a politically influential individual. Even if the political will existed, the size and remoteness of the Central Africa's forests (Costa Rica fits into one of Congo's protected areas) far exceed the government's capacity to monitor conditions on the ground.

Certification

So who should verify compliance? One option (which Bolivia, another large country with a weak administration, is pursuing) is for the government to make the allocation and renewal of all concessions conditional on being Forest Stewardship Council certified, and to subcontract verification to an independent organization (e.g., SGS, Smartwood). Certification includes the forest management standards that have been proposed for Cameroon. These include the use of mapping to optimize the layout of logging roads, the use of directional felling and other reduced-impact logging practices, and the demarcation of community forests and environmentally

sensitive areas as off-limits for logging. Making concession renewal conditional on certification could also increase the demand for skilled foresters and forest science.

The proposal that every concession in a country be certified is intended to improve its reputation as a source of "good" wood, and to address the fact that a large portion of the region's wood goes to China, where consumers are unwilling to pay a premium for certified wood, the standard justification for certification in European and North American markets. This approach would also avoid a vicious synergy, common in Cameroon, whereby foreign companies find it profitable to work in partnership with local businesses, which often engage in the most destructive and unsustainable logging. The proposal to delegate verification to an independent group is intended to increase the efficiency and credibility of the process.

Government Credibility

Concession renewal reduces (but does not eliminate) the need for monitoring, because even the threat of inspection encourages compliance. But this threat only works if the company believes that the concession will be terminated in the case of non-compliance. The success of this approach therefore ultimately depends on government credibility. Forest administrations in Central Africa are typically regarded as ineffective, because of entrenched corruption. One reason why corruption is hard to suppress is that so many government officials have made substantial investments in the status quo. The result is a classic prisoner's dilemma: the risks associated with denouncing corruption are much greater than the potential gains. Changing this equilibrium requires external pressure and support.

A commitment to independently verified certification could strengthen the hand of reformers within government by removing the monitoring burden from an understaffed and poorly equipped public sector, and by ensuring that verification is out of reach of those with a vested interest in bad management. A government's commitment to cancel concessions in case of noncompliance could be further strengthened
by creating an independent observer with the authority to report on law-breakers, as has been proposed in Cameroon. Finally, the effective implementation of these reforms could be tied to structural adjustment lending.

Local Businesses

But if this approach were applied across the board, it would effectively exclude poorly capitalized national businesses that could not afford to prepare and implement a forest management plan. Some countries in the region have sought to promote a national entrepreneurial class by reserving part of the forest estate for their use. But the protection of local companies from the pressure of foreign competition has emphatically failed to improve the quality of their operations. These companies should be supported through special government funding, not by excusing them from the obligation to manage the forest properly.

Recommendations

Differences between countries and the presence of confounding factors make it impossible to arrive at firm conclusions about the effects of specific policy reforms. According to the World Bank's conventional wisdom on forest policy, a log export ban leads to lower domestic log prices, and higher area taxes to more efficient harvesting and processing. Yet, in Cameroon, increased log demand resulting from the rapid expansion in processing capacity, and reduced log supply resulting from the delay in concession allocation have maintained high log prices, which, combined with weak law enforcement, triggered a wave of illegal logging. Forest conditions are more stable in Congo and Gabon, but there have been no significant changes in the way that forest concessions are allocated and taxed in these countries, and pressure on the resource is much lower.

But we can provide the following "best bet" recommendations based on the available empirical and theoretical evidence.

- Better forest management can only work if it is implemented as part of a broader strategy of industrial development. The approach Cameroon took in promoting industrialization first, and worrying about forest management later, seriously undermines attempts to improve forest management, including certification.
- The opportunity cost of the proposed reforms should be carefully evaluated and, to the extent possible, minimized. For example, instead of a complete log export ban, a log export quota could be introduced, which would maintain government revenue from log exports while ensuring that domestic price of logs is not too far off world prices.
- Fraud and tax evasion should be heavily sanctioned. In Cameroon, 4 billion CFA could be recovered with no increase in the overall tax burden. Outlawing the practice, also common in Gabon, whereby a concession is awarded to a national, who then subcontracts with a foreign company, would capture another 2 billion CFA. These losses are twice the operating budget of the ministry of forests.
- An area tax should be set that encourages active loggers to concentrate production, thereby reducing pressure on the remaining forest where other environmental services (e.g., non-timber forest products, carbon storage, biodiversity) would be maintained.
- A portion of forest taxes should be invested in the research, training, and monitoring needed to generate a long-term revenue stream from the forest.

Roads constructed deep into the forest open up these areas to agricultural settlers and bushmeat hunters.

Bush fires set by forest settlers represent a challenge to better forest management.

For More Information

Technical Reports

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Issue Brief #16

#16 — The World Bank, Conditionalities, and Forest Sector Reform The Cameroon Experience

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Related Issue Briefs

#3 Rich Forests

#15 Policy Reform

#19 Private Sector

#20 Mobilizing Communities

Key Concepts

- Any resource in short supply cannot be managed sustainably if its price is significantly below market value and does not reflect growing scarcity. The World Bank has argued for raising the price of access to Central Africa's forests as a necessary step to improve forest management.
- This efficiency objective runs counter to a political objective, where low cost access is

granted to influential individuals in return for political support and other favors. This approach has resulted in widespread forest mismanagement and loss of government revenue.

- Because so many people have a stake in the status quo, such practices are hard to reform. The World Bank's approach in Cameroon has been to tie forest policy reforms to structural adjustment lending.
- This approach can empower latent constituencies for reform, deal setbacks to those with a vested interest in business-as-usual practices, and raise the profile of the forest sector on development agenda.
- Forest conditionalities are effective at "stroke of the pen" reforms, such as the introduction of a concession auction system; they are poorly suited to ensuring the long-term institutional reforms necessary for effective policy implementation.
- Meaningful reform requires an overhaul of the legal system to allow citizens to sue government and companies in the name of public interest. This implies linking adjustment lending to institutional reforms outside the forest sector.

Introduction

In 1989, the World Bank initiated a major attempt to improve forest management in Cameroon by tying forest policy reforms to structural adjustment lending. The first round of negotiations between the World Bank and the government of Cameroon culminated in the 1994 Forest Law, which introduced far reaching changes in the way that forest concessions were allocated, taxed, and managed. The law also included provisions that, for the first time in Central Africa, granted local communities the right to benefit financially from wood cut in their customary forests. Yet, despite the World Bank's substantial efforts, the government repeatedly reneged on its commitments, throwing the implementation of the reforms into disarray. Given the poor quality of forest management in most countries in Central Africa and their dependence on World Bank assistance, the Cameroon experience is of regional significance.

Economic Background

During the 1960s and 1970s, Cameroon enjoyed a reputation as one of the more successful economies in Africa. Growth over this period averaged 5% a year, driven largely by high prices for its principal exports, including cocoa, coffee, cotton, aluminum, and from the late 1970s, petroleum. But imprudent use of its oil revenues, a 65% decline in the terms of trade for its chief export crops, and a marked expansion in government employment led to a balance of payments crisis in the early 1980s, the inauguration of an IMF structural adjustment program in 1988, and a 50% currency devaluation in 1994.

The World Bank has been closely associated with Cameroon's development efforts since 1967. But there has been a significant shift away from project lending, which fell from $902 million in 1980-91 to $154 million in 1992-98, toward structural and sectoral adjustment lending, which increased from $150 million to $612 million over the same period. Project lending has thus declined in both relative and absolute terms. The World Bank would like to do more work in Cameroon, but it has not disbursed project funds because of the poor management and problems linked to a lack of transparency and good governance in that country.

Adjustment Lending and Forest Policy Reform

The forest sector contributes significantly to Cameroon's economy. Timber production increased rapidly after 1992 as a result of the economic crisis, the currency devaluation, and a surge in demand for logs in Asia. In 1998, the sector contributed 10% of non-oil GDP, 9% of all tax revenues (if transport and related activities are included), and 28% of all exports by value. Sixty-six sawmills were active in 1999, producing a total of 2.7 million m^3 of wood and directly employing 10,400 people.

Tying concession allocation and renewal to countrywide certification backed by independent verification can help promote better forest management.

Starting in 1989, the government, with strong World Bank support, targeted policy reform as the cornerstone of improved forest management. Cameroon's forests were declining in both size and quality. Clearing for agriculture was identified as the major cause of deforestation, but logging,

and the commercial poaching that goes with it, was considered to be the main cause of forest degradation. The World Bank believed that if it changed the way that logging concessions were allocated, taxed, and managed, the government could prevent the worst environmental damage and increase its share of revenue to help deal with its most pressing economic and social concerns.

"Because so many people have a stake in the status quo, such practices are hard to reform. The World Bank's approach in Cameroon has been to tie forest policy reforms to structural adjustment lending."

The regime had used the allocation of logging concessions to maintain political support, as shown by the jump in the number of registered logging companies prior to the presidential elections in 1992 and 1997. Strong vested interests were opposed to changes that would have limited the use of Cameroon's forests for political purposes. The World Bank tried to overcome these interests by tying reforms to structural adjustment lending, a powerful incentive.

The 1994 Forest Law

The 1994 Forest Law introduced four basic reforms.

First, concessions were to be allocated by auctions on the grounds that they are less susceptible to political pressure and more economically efficient than the previous discretionary practices.

Second, the law introduced changes in pricing and taxation to allow for an increase in fiscal revenue and the use of market-based incentives to improve forest management. A key reform was a significantly higher area tax indexed to inflation. The World Bank argued that by increasing the cost of the raw material, a higher area tax encourages greater efficiency in its use, and that a company with large margins to improve efficiency is more likely to invest in reducing waste than in acquiring larger concessions.

Third, the draft law introduced forest management plans. Whereas auctions and higher area taxes were believed to constitute sound forest policy, there was little empirical evidence of their impact on harvesting practices, which some feared would intensify. Forest management plans were intended to mitigate the potential negative effects of more intensive logging.

Finally, the draft law included provisions for local communities to acquire the exclusive right to manage and exploit up to 5,000 ha of their customary forest. Local communities could earn revenue by logging their forests themselves or contracting with a logging company. They were also to receive 10% of the area tax, with 40% going to the *communes*, the lowest level of government administration.

Lack of Borrower Ownership

The process by which the 1994 Forest Law was drafted reflects the central role played by the World Bank and the passivity of the government of Cameroon. Letters from the World Bank to the government between 1990 and 1992 show that the World Bank was instrumental in shaping the reform agenda and maintaining the momentum of the policy dialogue. The government failed to participate effectively in the reform process for several reasons.

First, authority over the negotiations was widely dispersed. By 1992, nine different governmental agencies had some input into, or degree of oversight over, forest policy. Although officially responsible for coordinating the policy dialogue, the President's advisors never met with the Ministry of Environment and Forests (MINEF) staff to discuss the proposed law, nor did they consult with the President's party to assess the political implications of the new law.

Second, in 1987, the government was forced to agree to IMF conditions that included severe reductions in administrative expenditures. Staff salaries were cut by 40% (and were often paid several months in arrears), virtually all perquisites (such as housing and vehicle allowance) were abolished, and the operating budgets of most ministries were slashed. In 1992, only 5% of MINEF's total budget was allocated to non-staff expenditures, and the last time the Ministry received new vehicles was in 1984.

Finally, declining salaries, poor working conditions, and the offer of very large sums of money provided a strong incentive for corruption. The average MINEF official earned 60,000 CFA francs per month and had no means of transport or communication, but could gain millions of CFA by not reporting logging in areas to which a company had no right. The fact that many senior ministry officials benefited from the discretionary practices that the World Bank sought to end, undermined its interest in seriously engaging in the forest policy dialogue.

Implementation Experience

Implementation of the 1994 Forest Law has been problematic. On the face of it, the forest and finance laws have succeeded in boosting tax revenues. After accounting for the effect of the 1994 devaluation, revenues went from 10 billion CFA francs in 1990, to 14 billion in 1994, to 24 billion in 1997. Over the same period, wood production rose from about two to three million m^3. The government therefore increased its share of the value of the wood from 6,000 CFA/m^3 to 10,000 CFA/m^3. This increase was partly from higher area taxes and the use of market prices to determine export tax rates. But it mainly resulted from the Ministry of Economy and Finance deciding to invite the Swiss company SGS in 1995 to control log exports, which accounted for 80% of forest taxes. This was done because of MINEF's poor tax recovery record. Implementation of other aspects of the new law has proved equally difficult, notably in the case of the concession auctions.

The 1997 Concession Auction

In August 1997, the government auctioned 26 concessions with a minimum area tax of 1,500 CFA/ha, for which 190 companies submitted bids. The results showed that applicants were prepared to pay three or four times more than the minimum area tax. But 16 of the 26 concessions were not awarded to the highest bidder. In most cases, the inter-ministerial committee recommended that concessions be allocated to the company ranked first according to the technical criteria, even if the financial bid was much lower. Then, after the recommendations were submitted to the Prime Minister for approval, six concessions were awarded to individuals who did not even appear on the list reviewed by the commission, but are known to have been key supporters of the regime. Strictly speaking, the law was respected because it reserves for the Prime Minister the right to overrule the committee's recommendations in cases where the national interest is threatened, but the government's decision emphatically broke the spirit of the law.

Regaining the Initiative

The failure of the first concession auction dealt a major blow to the forest policy reform process. Almost a year passed before the World Bank reestablished dialogue, but this time it was better prepared. After lengthy internal discussions, the World Bank decided to include forest conditionalities in a structural adjustment loan. Thus armed, the mission insisted that the government take two steps: first, clarify the rules governing the bidding process to avoid any possible future misunderstanding, and second, appoint an independent observer who would report publicly on the bidding process. The government agreed to the first, but because the Prime Minister wanted to preserve his room for maneuver, was opposed to the second.

But in the face of World Bank threats to cancel the loan, the Prime Minister issued two decisions that met these conditionalities. The new auction rules included three changes intended to increase transparency and reduce the scope for fraud. First, bids would be assessed based on a list of yes and no questions. Second, criteria other than the actual bid price would represent less than 20% of the total score. Finally, bidders were required to make a down payment of 2% of the area tax for the whole concession, which could amount to hundreds of thousands of dollars.

The World Bank also succeeded in having an independent observer appointed to the inter-ministerial committee responsible for reviewing the concession auction bids. This set an important precedent. The observer's report on the *vente de coupe* auction in September 1999 showed that in many cases the committee ignored the new auction rules, demonstrating once again the government's resilience in the face of externally imposed reforms. Nevertheless, the independent observer was allowed to carry out his functions without interference, and his report was made public, suggesting that there is scope for similar process reforms that increase transparency and accountability in the forest sector.

Private Sector

The major logging companies stood to gain from the new law. First, the World Bank promised that, while the minimum area tax would be increased, it would be largely offset by lower taxes on log exports. Cameroon already had the highest tax rates in Central Africa, and the World Bank did not want to increase the overall tax burden, beyond the additional area tax offered by the companies when the concessions were auctioned. Second, the reforms would grant them larger and longer concessions. Third, they supported the World Bank's opposition to a log export ban.

But the industry disagreed with the World Bank on two basic points. First, the industry was opposed to a significantly higher area tax because, while it represented less than 20% of the tax burden, it was a fixed tax and payable up-front and on the whole concession, not just the area logged annually. Second, the World Bank wanted to reduce the protection for domestic sawmills, which it believed encouraged inefficient processing, by raising taxes on processed wood exports, which had previously been untaxed. The industry, on the other hand, argued that inefficient processing was due to the lack of skilled labor and the poor quality of the logs, and called for continued protection for Cameroon's developing industry.

The larger companies also resented being asked to shoulder a growing share of the tax burden, since many small companies were able to avoid paying any taxes through illegal practices. Given the failure of many established companies to win concessions, a shortage of wood to feed the sawmills, constant changes in taxation, the government's reluctance to crack down on tax fraud, and a growing set of costly obligations to local communities, the industry felt under attack from all sides.

In response, 15 large European companies operating in Central Africa established the Interafrican Forest Industries Association (IFIA) to give the industry a single voice in forest policy negotiations in Cameroon and elsewhere in Africa. The IFIA was highly critical of the World Bank, which it accused of hiring experts without the necessary experience; constant shifts in policy; presenting *faits accomplis* with no opportunity for discussion; and failing to respond adequately to its written proposals. Contrary to these assertions, the World Bank claims that industry representatives were regularly invited to discuss the content of the new law. Although civil, the discussions apparently went nowhere because of the industry's refusal to agree to concession auctions and higher area taxes, which were key ingredients of the reform package.

Interviews with company officials suggest that they were not opposed to the reforms proposed by the World Bank *per se*, but the fact that the reforms failed to take into account the high level of policy instability in Cameroon. This instability substantially increased the cost of doing business and put a premium on security, which translated into a desire on the part of industry for very large concessions, minimal area taxes, and no auctions. The World Bank's reform agenda threatened these objectives. The real target of the industry's anger was not the World Bank, but the Government of Cameroon. For obvious reasons, industry preferred not to blame the government publicly for its problems.

France

France played an ambivalent role during the reform process, an attitude that reflected its rapprochement with the IMF over the need for macroeconomic adjustment in Cameroon, and its desire to protect its economic and geopolitical interests. Cameroon is the second largest economy, and France's second largest trading partner, in francophone Africa. France had viewed Cameroon as a bulwark against the tide of anglophone influence from Nigeria, its giant neighbor. On several occasions, France had bailed out the Government of Cameroon when confronted with the need to make painful reforms that might have led to political instability.

In October 1993, however, the French government pronounced the "Abidjan doctrine," whereby it refused further budgetary support to countries without an IMF agreement in place. This marked a watershed in relations between France and the IMF, and in January 1994 the CFA was devalued by 50% against the French franc, an act long advocated by the IMF. France, therefore, did not overtly oppose the World Bank during the forest policy negotiations, since the government's failure to reach agreement on key reforms could have led to canceling of vital macroeconomic support. Neither did it provide the high-level political support that would have strengthened the government's commitment to policy implementation.

France's support to the reform process was therefore confined to providing technical input to drafts of the law. This included recommendations based on the results of the *Aménagement Pilote Intégré* (API) project in Dimako in the East Province about minimum concession size, sustainable yield calculations, forest inventory methods, and improved logging practices. France also offered financing to qualified logging companies (not just French ones) to prepare forest management plans.

Community Forests

At the World Bank's insistence, the 1994 Forest Law included provisions granting villages the exclusive right to manage and exploit up to 5,000 ha of their customary forest. Local communities could earn revenue by logging their forests themselves or contracting with a logging company. They were also to receive 10% of the area tax, with 40% going to the communes, the lowest level of government administration, and 50% to MINEF. However, communes often keep the 10% of the area tax that villagers are entitled to.

In 1996, MINEF granted villagers the right to receive 1,000 CFA/m^3 of wood cut from concessions that lie within customary forest. The 1,000 CFA tax goes straight to the villagers, and represents the first direct financial benefit that they have received from logging. Though villagers had, in the past, often resorted to violence to defend their customary forests against loggers, they now encourage loggers to cut illegally in exchange for 1,000 CFA/m^3. These economic alliances between the villagers and loggers, and against the communes, threaten to undermine the government's decentralization program. Some observers believe that MINEF authorized the 1,000 CFA tax to weaken the villagers' interest in acquiring community forests.

The World Bank has been criticized for not taking into account Cameroon's land reform project in the mid-1970s, which was hijacked by well-positioned government officials who sought title to land over which they had no right. The World Bank's strategy was to delegate responsibility to the British-funded Community Forest Development Project (CFDP), which would establish the legal framework and administrative capacity within MINEF to implement the provisions. The project, which started in 1995, received a hostile reception from some officials because it threatened their ability to subvert the allocation process for personal gain. In November 1998, after a six-month delay, the Minister finally approved a manual outlining the procedures and standards governing the allocation and management of community forests.

While implementation has been problematic, the community forest provisions within the 1994 law have made local communities more aware of their rights with respect to the government and logging companies. This has resulted in villagers demarcating their customary forests in order to benefit financially from logging and to protect their land against the claims of adjacent communities. Increased awareness of the law has also led to the almost instantaneous diffusion of information about the tax benefits to which communities are entitled.

Domestic NGOs

The controversy surrounding the passage and implementation of the 1994 Forest Law raised awareness among domestic NGOs of the inherently political nature of forest policy reform. Some expressed strong support for tying reforms to structural adjustment lending. Others argued that lasting improvements in forest management require that the concession allocation and tax systems be insulated from political pressure, and have called for an overhaul of the legal system to allow private citizens to sue the government and logging companies in the name of public interest. They recognized that tackling forest policy effectively might require linking adjustment lending to institutional reforms outside the forest sector.

The Bottom Line

The forest policy reform experience in Cameroon yields a number of insights. First, conditionalities were essential for ensuring the passage of key laws and decrees, but proved ineffective at enforcing the institutional changes needed to implement them. MINEF failed to participate effectively in the reform process because of its internal weaknesses, conflict of interest, and the lack of high-level political support. During the negotiations, the World Bank put demands on the Ministry for policy papers and studies that it had neither the ability nor authority to carry out. The result was a growing gap between what the World Bank demanded and what the Ministry was able (or willing) to deliver.

Second, the World Bank was unable to overcome strong vested interests within the private sector and French government. Many logging companies had benefited from the previous discretionary

practices and were opposed to change. Their opposition explains why the views of many industry officials differ markedly from those of the World Bank regarding its willingness to seriously engage them. Although the World Bank often consulted the industry, irrevocable differences of opinion over what constituted sound forest policy may have blocked any meaningful dialogue. While France contributed technical input to the reform process, it withheld political support for fear of destabilizing the regime and upsetting the major French logging companies.

Finally, the World Bank was caught in a dilemma following the failure of the August 1997 auction. On the one hand, the World Bank's credibility required that it hold the government accountable for the auction irregularities; on the other, it did not want to jeopardize its dialogue over key economic reforms. By wavering at a critical point in the negotiations, it avoided provoking a possible political crisis. But it also missed a golden opportunity to reinvigorate the forest policy reforms. This decision may have inflicted broader damage. According to outside observers, there are younger foresters in Cameroon who seem concerned about greater efficiency and transparency, but if they are not supported and encouraged by outside pressure, they could well be subverted by the corrupting influence of their seniors. Every time the government is allowed to get away with breaking the law, the prospects for real change diminish, and the hopes of this group of professionals fall.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #17

#17 — Community Management of Forest Resources
Moving from "Keep Out!" to "Let's Collaborate!"

This Briefing Sheet was written by Michael Brown of **Innovative Resources Management**. For further information contact Michael Brown, email: brown1irm@aol.com.

Related Issue Briefs

- **#11 Forest Governance**
- **#12 Management Watchdogs**
- **#15 Policy Reform**
- **#20 Mobilizing Communities**

Key Concepts

- Community level property rights to the forest have never been legally recognized by Congo Basin States, marginalizing community rights and potential community management contributions.
- Despite lack of tenure recognition, many communities expect a more equitable stake in

forest benefits and decision making than comes from "traditional" user rights recognized by states.

- Local perceptions and behaviors regarding external stakeholders are in great flux due to changing incentive structures including fiscal and judicial reforms, decentralization trends, and opportunistic rent-seeking activities.
- The "keep out!" message is in response to the marginal status forest communities have endured since colonial times; immigrants and elites have come to take over land belonging to communities with traditional rights.
- Those espousing "come into my forests" to logging concessionaires may be acting out of desperation or absence of perceived development options.
- Elites and chiefs often sell land belonging to families and clans, capitalizing on short-term opportunities and undermining the community.
- Frameworks linking communities to other stakeholders could change the "keep out" message to "let's collaborate," if accompanied by legislative changes buttressing traditional rights.
- To manage forest resources, communities must negotiate with groups with competing claims to resources.
- Multi-stakeholder coalitions promoting collaborative formats may help secure communities' role in forest management.

The Status of Local Forest Tenure Rights in the Congo Basin

From the colonial period to the present, Congo Basin states have enjoyed full ownership of forest resources, and remain the sole authority, with rights to alienate resources for conservation and/or development purposes. Local communities retain different traditional claims, but these do not confer legal property rights.

While communities have only use rights, they often perceive that they bear ownership rights based on historical use, supported by oral histories of origin and occupancy. And while state rhetoric often appears supportive of community claims to tenure for restricted use purposes, in practice, Congo Basin communities remain as marginalized by forest estate zoning as they were during the colonial era.

Communities often find their subsistence and traditional forest use lifestyles are in direct opposition to the official state zoning of the forest estate. This has been documented through CARPE's work with participatory mapping where several communities clearly documented their use of the forest conflicted with its official zoning.

Equity and Reality — Just What Can Communities Expect?

In Cameroon, according to Decree 95/678/PM, the state is the principal legal owner of the forest estate. New community forest legislation has created a legal precedent for increasing community control over forest resource use and promoting greater equity in forest based revenue sharing. However, even so-called community forests are still owned by the state, with communities simply assuring the management of the forest based on an agreement with the State. The State has the right to break the agreement if it feels the agreement it is not being respected. The status of the community forest is therefore reduced to a kind of contractual rental arrangement.

Communities expect a more equitable stake in forest benefits that comes from traditional user rights.

There are two current tendencies on the part of communities regarding capitalizing on community forest legislation. The strongest tendency is to be expedient and collaborate with logging interests, thereby producing short-term rents for communities. This invites external agents into community forests. The second tendency (to date much weaker in Cameroon) is to formalize community forest agreements. This takes lots of work, and communities are often unaware of how exactly to go about the process, or find the process too overwhelming and abandon the effort. The table below illustrates the current situation.

Box 1: Impediments to Community Forestry in Cameroon	
Impediments Identified	**Origin**
Tendency 1 (strong): Abandonment or lack of interest on the part of the populations to	Village populations believe short-term gains of the "1000F tax" as a rent are most profitable

create community forests, despite sensitization efforts by development agents.	given their perceptions that the current forest estate zoning seen in the APEC map is non-negotiable.
Tendency 2 (weak): In contrast, the search for technical assistance to develop a formal request to MINEF for community forest attribution.	Adaptive strategy to secure tenure in light of the *Unité Forestière d'Aménagement* (UFA) "threat" that current zoning poses to communities

Thus, while the intent of 1,000 CFA tax was to contribute to decentralized benefit sharing, to date local elites in power at the commune and village level have primarily benefited. Logging interests have also benefited, as illegal logging has expanded through support of corruptible local interests. Furthermore, the reason why local populations have become keenly interested in the rent produced by this tax is because they perceive that the government's *Plan de Zonage* reflects a definitive delimitation of forest use zones, rather than a basis for negotiation of new agreements.

Management Realities — Are Communities Better Potential Allies to Biodiversity Conservation than Logging Companies?

CIRAD-Forêt has recently evaluated the [in]effectiveness of current fiscal measures to promote sustainable forest management in Cameroon. They conclude that dysfunctionality in forest management is leading to comprehensive abuse at all levels. Given current evidence, the argument cannot persuasively be made that forest conservation is better promoted through a private sector approach encouraging widespread timber extraction versus a community-based approach. Conversely, comprehensive data do not exist to prove that communities can manage forests sustainably. Most practitioners agree, however, based on experience and limited empirical data, that a significant degree of community participation is fundamental to good management. The nature and intensity of community participation in achieving conservation results under specific circumstances is the subject of much research. Ultimately, multi-stakeholder coalitions in which communities have an enhanced role in collaborative forest management may become the norm.

Community level forest management is also influenced by multipurpose use objectives of the forest resource. Community level management is influenced by social networks, occurrence of sacred sites, functional area location within walking distance to villages, risk minimization behaviors, patrimonial common property systems that go largely unrecognized by state entities, as well as land claiming strategies through mise en valeur land improvement/development strategies.

Many factors affect how communities participate. Results from the Biodiversity Support Program's study on decentralization and biodiversity conservation established that the clarity of goals, equity of participation and creation of alliances, incentives, policies, awareness and capacity all are crucial to shaping the impact of decentralized management arrangements. Thus, decentralized management alone will not bare results if incentives, alliances and capacities are not appropriately developed.

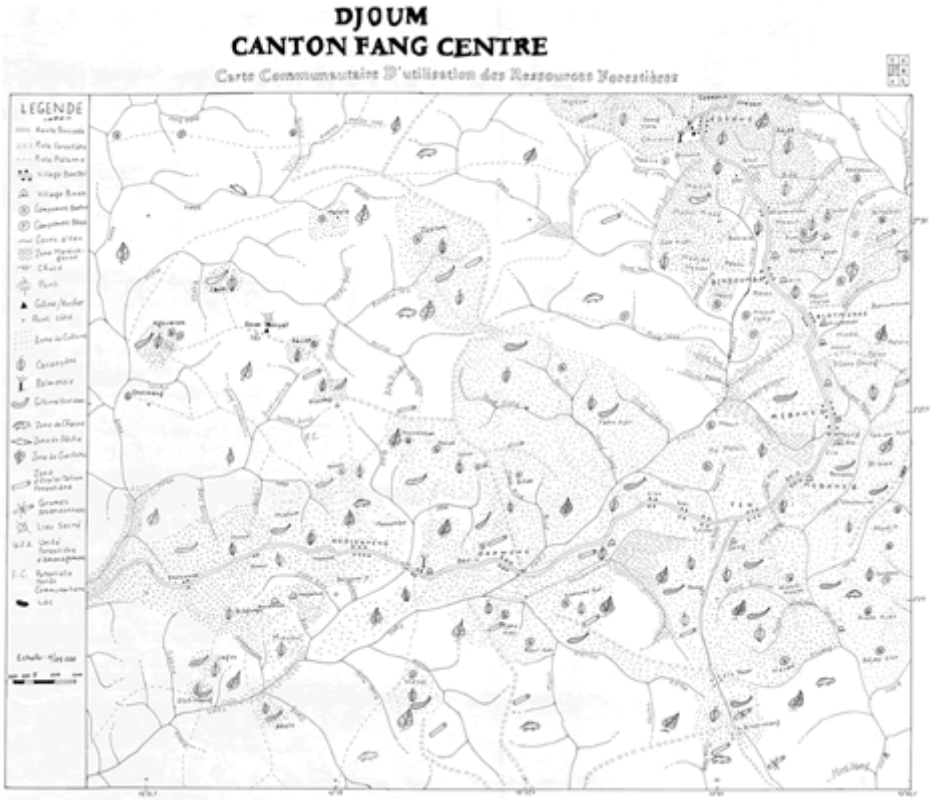
Box 2: Is "Keep Out" the Message for Eternity?

- "Keep out" is not a universal message. Some Congo Basin communities wish to keep external agents out of their forests, while others, trying to maximize forest rent collection, are letting them in to speed up locally negotiated rent-seeking through ventes de coupe.
- If negotiation for management and use of forest resources between states and communities becomes the norm, sustainable use options will be created, and communities will be less likely to maintain inflexible "keep out" messages to other stakeholders, as short-term opportunities forest harvesting through ventes de coupe manipulation will become less of an incentive.
- For communities to capitalize on sustainable use options, technical assistance and capacity building from foresters, conservation agents, and marketing agents will be required. Multi-stakeholder coalitions may prove the organizational format for planning, service delivery and implementation.

How Much Responsibility Can Communities Actually Assume Given Existing Capacities?

- Communities have significant long-term incentives for forest conservation that external agencies do not have, potentially lowering certain categories of transaction costs over the long-term. However, this potential will remain largely theoretical as long as "perverse incentives" to unsustainable forest management practices remain the rule.
- Realizing community management potential will require capacity building in strategic planning, administration, participatory forest resource monitoring and evaluation, participatory mapping, and negotiation.
- The overall political and macroeconomic situation in the Congo Basin limits communities' abilities to generate the social and economic capital to achieve sustainable management of forest resources. That said, capacity comes with power if communities had legal powers, social and financial capital would flow to them.
- External change agents with forest conservation and participatory development agendas can help expand communities' role in management to create win-win scenarios for conservation and development. CARPE through IRM's work has this objective. WCS's Banyang-Mbo project is premised on the integral role communities play in forest management.

- Many structural problems nonetheless militate against community involvement. These include: isolation of many rural communities, the fact the elites are often distrusted by village people, the lack of institutions that really speak for local communities, and the lack of national and local political space for action.



Multi-stakeholder coalitions that promote collaborative management formats may help secure communites' role in the Congo Basin forest management.

What Can You Do About It?

There are a number of actions you can adopt in the short-term to help communities realize a greater role in forest conservation:

1. Do not assume that opportunities for local forest conservation in the Congo Basin are few because there are so many general hindrances to development in the region. In fact, a number of interesting initiatives exist at different scales and intensities. Examples include the IUCN co-management program in the Basin, Wildlife Conservation Society work in Banyang Mbo, and IRM/CARPE's mapping and management efforts in Djoum, Tikar and Mt. Cameroon, to name but three.

2. Adopt an iterative, adaptive approach to determining how local alliances for forest conservation can be built and strengthened by bringing in other key stakeholders, and by broadening the scale.
3. Accept that forest management is a highly political and contentious process; but that communities have legitimate rights, and may in the long run be the Congo Basin forest's best friends and most effective stewards.
4. Advocate that legal frameworks be put in place to assure that local people benefit from long-term conservation.
5. Act to empower communities to use new forestry laws as a starting point for negotiating greater transparency, democracy and accountability in the management of the forest estate, which they depend on and have rights to.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

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Issue Brief #18

#18 — Sustainable Timber Challenges and Potential Solutions

This brief was written by **World Resources Institute** with input from the **Biodiversity Support Program**. For additional information contact Jake Brunner, e-mail: jbrunner@ci.org; David Wilkie, e-mail: dwilkie@rcn.com.

Related Issue Briefs

- **#5 Timber Tsunami**
- **#8 Forest Disappeared**
- **#12 Management Watchdogs**
- **#15 Policy Reform**

Key Concepts

- As timber companies are often both de jure and de facto regulators of resource use over the majority of the forest estate in Central Africa, attempts to "green" logging practices have the potential to generate significant conservation payoffs.
- Making concession renewal conditional on forest certification is a powerful, no-cost tool for governments to promote better management of logging concessions.
- Forest certification is not a blueprint, applied without modification to all logging concessions; rather, it is a process of negotiation and compromise, designed to optimize

the social, economic and ecological benefits that can accrue from forests.

- The process of sustainable forest management certification not only establishes minimum standards needed to monitor performance and compliance, it explicitly characterizes what we are willing to forgo to generate a sustainable stream of specific values from the forest.

What Is Sustainable Forest Management?

There is growing acceptance that forest resources should be managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. Though crop and livestock production continues to be the most significant cause of forest degradation and loss, concerns about sustainable forest management (SFM) have focused primarily on logging that has the most widespread impacts on the forest. Increasingly consumers are demanding that their purchases of wood products will not contribute to forest destruction but rather help to secure forest resources for the future. In response to these demands, international organizations like the Forest Stewardship Council (FSC) have established forest management principles and criteria, and a process for concession certification. The process is designed to ensure that wood production is sustainable and that logging practices (1) comply with national and international laws, (2) do not infringe on indigenous people's rights, (3) respect local community concerns and worker's rights, (4) help maintain the forest's multiple values, (5) minimize environmental impacts, and (6) set aside forest patches of high conservation value. Globally, over 18 million ha of timber production forests are FSC-certified.

The Role of SFM Criteria and Indicators

The Montreal Process, Forest Stewardship Council, and the Center for International Forestry Research have established economic, social and ecological principles, criteria and indicators to guide development of national and site-level plans to conserve and sustainably manage forests. The challenge that all face is that most uses of forest resources tend to undermine or preclude other uses (e.g., logging and nature tourism are largely incompatible in the same time and space), and though criteria may be exhaustive they are seldom mutually exclusive (e.g., practices that satisfy ecological criteria may not be economically viable or socially desirable). Sustainable forest management is, consequently, a relative concept that in practice will be based on the perceived values of, and desired benefits from, a given area of forest. Most important, SFM is a process of negotiation and compromise, designed to optimize the social, economic and ecological benefits that can accrue from forests. The use of criteria, indicators and thresholds is an essential component of the SFM process, because it not only establishes minimum standards needed to monitor compliance, it explicitly characterizes what we are willing to forgo to generate a sustainable stream of specific values from the forest.

Challenges to SFM in Central Africa

Promoting SFM in Central Africa faces many challenges because of perverse policies, inadequate law enforcement, and the nature of biologically diverse old-growth forests. Unlogged forests in Central Africa contain valuable timber trees that are often over 400 years old. As few would argue for a 400-year harvesting cycle, logging in the region is likely to follow a two step process: (1) low impact harvesting of old-growth trees and (2) sustainable production of wood products within logged-over forests. Though SFM principles may be applied in both cases, the former is a one-time "gift of nature" and is clearly not sustainable.

An example of perverse policies in the forest sector is the log export ban in Cameroon that was made effective January 1999. This policy led to a boom in mill construction, which on the surface may appear a positive outcome in that it would increase the level of employment in the logging sector, and would add value to timber. The latter, at least, has not been the case. By 2001, annual processing capacity in Cameroon will have reached 3 million m^3. The official estimate of sustainable timber production is 3.3 million m^3, assuming a yield of 15 m^3/ha. But the industry claims that only 10 m^3/ha is possible, a figure confirmed by API-Dimako, the French research project. This lower estimate translates into a maximum sustainable timber production of 2.2 million m^3 - a level that is almost 30% less than the installed processing capacity. Overcapacity in timber processing in Indonesia constituted a massive incentive to harvest as much timber as quickly as possible, as sawmills are only economic if they are running close to full-capacity. Processing overcapacity in Cameroon risks an equivalent "green rush".

Moreover, policies that mandated concessions to transform a portion of the logs as a tool to increase jobs have merely resulted in the establishment of a large number of highly inefficient sawmills that add little or no value to the logging section. For example, if a sawmill requires 10 m^3 to produce 3 m^3 of sawnwood worth \$450/m^3 for a total of \$1,350, and the wood could have been sold as unprocessed logs for \$200/ m^3 for a total of \$2,000, this represents a negative value-added of \$650 or \$65/m^3. Positive value-added will only be achieved if present processing efficiency doubles and/or higher value products such as plywood are produced.

High domestic log demand provoked by the log export ban, delays in concession allocation following the failure of the 1997 auction, and the fact that logging stops during the rainy season because of the poor quality road network these factors have kept domestic log prices high. In the absence of a sufficient control in the forest, high demand and reduced legal supply have resulted in widespread illegal logging. In one 2,500 ha vente de coupe, over 12,000 ha were actually logged. Policies that favor inefficient processing, such as taxing processed wood leaving the mill rather than logs entering the mill, also work against SFM.

Disincentives to Sustainable Timber Production Planning

Contrary to popular perception, API-Dimako has shown that preparing an SFM plan is cheap at U.S. $5/ha. This is less than 1% of the market value of logs. Yet, implementing SFM is financially unattractive, because mills are starved of logs (and thus insensitive to sustainability considerations), and because illegal logging undermines any attempt at better management. As the perceived benefits are minimal, encouraging companies to adopt SFM requires incentives (e.g., policies that encourage efficient use of the raw material) and regulations (e.g., dissuasive sanctions in the case of unnecessary forest damage). Policy sequencing is also important. If processing capacity is allowed to expand irrespective of the sustainable yield, concern over the future state of the resource is dwarfed by the immediate need to feed the mills.

Present Logging Practices Do Not Reflect the Biology of High Value Tree Species

SFM also faces technical challenges associated with the low growth rate of many high-value species, and the need to create large clearings for regeneration to occur. Because of high transportation costs and low processing value-added, current harvesting is very selective, with insufficient canopy opening to allow the regeneration of commercial species. The need for large clearings is supported by several facts. The bell curve diameter-size distribution of many species suggests that they are not regenerating within mature stands, and that regeneration was more rapid in the past, possibly due to widespread human disturbance. In fact, carbon dating and archeological evidence show that much of this "primary" forest was under agricultural use hundreds of years ago. The current abundance of medium-and large-size commercial species is attributable to rapid forest colonization after human population levels collapsed.

Key SFM Principles for Central Africa

To address the specific challenges of sustainable timber production in Central Africa, it may make sense to broaden SFM to include the following principles:

- First, harvesting and processing should be as economically efficient as possible. The purpose is not only to extract the maximum value per ha of forest, but also to stimulate economic and technical innovations that might have spillover effects in other sectors. According to one mill owner, average mill efficiency could easily rise from 30 to 40 %, and by investing in dryers and finishers, it could reach 65 %. Similar opportunities exist in the forest, where secondary species such as frake and tali could be incorporated into plywood.
- Second, the forest should be left in as good condition as possible. This may require the creation of larger openings and/or enrichment planting and/or implementation of reduced-impact logging. The latter has been shown to be profitable in Brazil, and IFIA, the Paris-based industry association, is interested in testing reduced-impact logging in Central Africa.

- Third, an area tax should be set that encourages active loggers to concentrate production, thereby reducing pressure on the remaining forest where other environmental services (e.g., NTFP, carbon storage, biodiversity) would be maintained.
- Finally, a portion of forest taxes should be invested in the research, training, and monitoring needed to manage the forest for a long-term revenue stream.

Moving Toward SFM in Central Africa

Central African governments have currently neither the capacity nor the credibility to control forest management. So what options are available to encourage better management of logging concessions?

One approach, which Bolivia has adopted, is to make concession renewal conditional on forest certification. Concession renewal has been shown to be a powerful incentive that is easier to implement than performance bonds. Companies can choose to have their concessions certified by the government or by independent groups (e.g., SGS, Smartwood). Most favor the latter, because they are cheaper, quicker, and more credible. In Bolivia, the industry has adapted quickly to the new law: six forest management plans have been prepared and 1 million ha of forest will be certified by the end of 2000, making Bolivia number four in the world for certified wood after Sweden, Poland and the United States.

Since concession cancellation implies less tax revenue, governments would be under pressure to approve compliance. Tying concession renewal to certification, rather than promoting voluntary compliance, addresses the fact that a large and growing portion of Central Africa's wood exports go to non-certified markets in Asia. By requiring that all concessions in a country be certified, a government can give a competitive advantage to companies prepared to invest in better forest management. This should also apply to all countries in the region to avoid the possibility of cheaper and less sustainable practices in neighboring countries.

Tying concession renewal to certification should improve forest management inside the concession. But it will not address illegal logging outside the concession. It is therefore critical to implement mobile patrols, spot checks, satellite-based monitoring systems, and other measures to detect and suppress logging outside of approved concessions. Prevention of illegal logging is particularly important in Cameroon as higher area taxes may increase the profitability of illegal logging and accelerate forest degradation.

If this strategy were applied across the board, it would effectively exclude local businesses that cannot afford to prepare and implement forest management plans. Some governments have sought to promote local businesses by reserving part of the forest estate for their use. But protection from foreign competition has emphatically failed to improve the quality of their operations. Identifying ways to ensure that local businesses have access to financial and technical support, is a key to preventing well capitalized foreign firms from excluding them from the logging sector.

Tree cutting in northern Congo

Table 1: Montreal Process Criteria and Indicators	
Montreal Process Criteria	**No. of Indicators**
1. Conservation of biological diversity	9
2. Maintenance of productive capacity of forest ecosystem	5
3. Maintenance of forest ecosystem health	3
4. Conservation and maintenance of soil and water resources	8
5. Maintenance of forest contribution to global carbon cycles	3
6. Maintenance and enhancement of long-term multiple socioeconomic benefits to meet the needs of society	19
7. Legal, institutional and economic framework for forest conservation and sustainable management	20

For More Information

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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 Principe.

Web site:
http://carpe.umd.edu

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #19

#19 — Conservation and Private Sector Partnerships A New Tool for Natural Resources Management

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Related Issue Briefs

#5 Timber Tsunami

#16 World Bank

#20 Mobilizing Communities

#23 Bushmeat Crisis

Key Concepts

- Private sector enterprises are often both de jure and de facto regulators of resource use over the majority of the forest estate in Central Africa. Consequently, attempts to "green" company practices have the potential to generate significant conservation payoffs.

- Minimizing the indirect environmental impacts of private sector practices is likely to be the most immediate avenue for conservation success, particularly when this only requires incremental changes in company practices.
- Experience gained by conservation NGO partnerships with the private sector has shown that the potential for alienating traditional constituencies, jeopardizing fund raising capacity, and eroding political capital exists, but the likely payoffs are considered worth the risk.
- Pilot private sector/conservation partnerships are necessary to build trust between traditional adversaries but should lead toward formal, third-party "green" certification of both private sector and conservation project practices and performance.

Traditional Antagonists/New Partners

The greatest immediate threat to conservation of the Congo Basin forests comes from commercial private sector enterprises. Logging, mining, and oil exploitation are industries that directly cause deforestation, forest fragmentation, pollution and forest degradation, and indirectly increase commercial bushmeat hunting, harvesting of other forest products, and human settlement in once isolated areas of the forest. In a region where government regulations and enforcement capabilities are weak, tenure to resources are frequently short-term or insecure, and many operators are foreign-based, there has been little incentive for companies to change the nature of their operations. As a result the practices of most private sector operators are focused on short-term profits, without regard for the sustainability of resource use, or the ecological, and socio-cultural effects of corporate behavior.

Given present practices, and the fact that private sector enterprises dominate the forested landscape outside of protected areas, it is not surprising that they have been seen as the major antagonists to forest conservation efforts. In turn, conservationists have been viewed by commercial actors as obstructionist, interested in locking up resources in parks and reserves, unable to recognize national and local economic imperatives, and quick to create scandal about any type of extractive use of tropical forests. Consequently, mistrust has combined with very different objectives to result in forest sector actors who have traditionally dealt with each other only as adversaries.

Several recent developments have, however, begun to bring these adversaries to the same table. Growing global awareness of environmental issues and concerns about sustainable development, have increased consumer demand for goods produced in ways that do not harm the environment. Consumer purchasing power, and highly-profile advocacy by civil society groups have pushed some commercial enterprises to reconsider their corporate behavior and look for ways to change their commodity production practices.

Similarly, conservation actors have come to realize that full protection (i.e., no consumptive resource use) will be a solution granted to a relatively small percentage of the forest estate. With 90% of the forest typically zoned for economic purposes, minimizing the adverse environmental impacts of land uses within these areas offers significant payoffs for biodiversity conservation. Furthermore, ensuring that land-use policies and practices in border areas do not adversely impact resources within the adjacent parks and reserves, would help ensure their biological integrity and persistence, and thus enhance their biodiversity conservation status.

Importance of Effective Action Now

In Cameroon logging companies now have de jure control over 80% of the forest outside of protected areas, an increase of 50% since 1970. Logging covers 50% of the forest estate in Gabon, and over 80% in northern Republic of Congo. The Chad-Cameroon oil pipeline will cut a swath through hundreds of kilometers of Cameroon's forest, opening up access to once isolated regions. With crude oil prices at a 10-year high governments may attempt to pressure multi-national oil companies to expand offshore and terrestrial oil exploration and drilling. And recent efforts to halt trade in conflict diamonds may increase mining in nations presently at peace.

Though the direct impacts of commercial logging and mining can be significant, more often it is the indirect consequences of company practices such as the facilitation of commercial bushmeat hunting and immigration into frontier forest that pose the most immediate threat to forest resource conservation. Given that bushmeat hunting can quickly create a situation where people are the only large animals left in the forest, it is vital to commence work with the private sector now to minimize the adverse effects of their corporate behavior.

Pilot Partnerships

Conservation programs and private sector companies are initiating partnerships in the Congo Basin forest, and developing models for interaction in both the forestry and oil sectors that are designed to "green" corporate practices. Reduced impact logging (RIL) is being assessed and promoted in several projects in Cameroon and Gabon. The World Bank is working with the CEOs of several logging companies to promote the adoption of timber exploitation techniques that will minimize the direct and collateral environmental damage associated with tree felling and log extraction. In the northern Congo Republic, the Wildlife Conservation Society and the Congolaise Industrielle de Bois are working cooperatively to eliminate hunting of protected animal species, designate no-cut zones for sensitive wildlife areas, establish local hunting regulations for non-endangered game, minimize the extent of road development, and close down roads following logging. In Gabon, as a result of negotiations among the national government, Wildlife Conservation Society and ECOFAC, and the LeRoy timber company, an unlogged block of old-growth forest was legally transferred from the LeRoy concession to the proposed Lopé National Park. A project sponsored by the European Union has convinced the Pallisco

logging company in Cameroon to raise chickens to feed its concession workers rather than letting the hunt for meat. Lastly, in the Gamba Protected Area Complex of coastal Gabon, the World Wildlife Fund is assessing the direct pollution and indirect hunting effects of oil extraction, and is working with Royal Dutch Shell, to seek full remediation and compensation for such impacts.

Private sector enterprises may be considered as the regulator of resource use over the majority of the forest estate in Central Africa.

Private sector/conservation relationships are developing primarily in biologically rich regions where (1) lands zoned for conservation and resource exploitation are adjacent to one another; (2) changes in operating practices of the private sector can provide significant conservation benefits but do not require major changes in production systems; (3) significant incentives exist for the company to improve practices (i.e., higher market prices and/or higher consumer demand for environmentally friendly products; potential consumer boycotts against company products); and (4) companies are accountable to environmentally aware share-holders or owners (frequently northern-based companies).

Conservation Benefits

Private sector/conservation partnerships have arisen for good reasons. It has become clear that the traditional means of wildlife conservation protected areas are necessary but rarely sufficient to conserve ecologically functional wildlands and to ensure the long-term persistence of large mammals. Conservation-compatible land use in regions outside the borders of parks and reserves is therefore a necessity.

In the Congo Basin forest, benefits of working closely with logging companies and oil production companies can be great, because their activities pose the most significant threats to biodiversity conservation over most of the forest estate that lies outside of protected areas. However, the most significant impacts of those industries in the Congo Basin are tied to the indirect effects of company practices, rather than those that directly generate company profits. For example, though many mammal and bird species are little affected by the canopy disturbance associated with tree felling and log transportation, commercial hunting by logging employees or their hired guns can strip logged forest of most of its wildlife. There is, thus, a real opportunity to assist the private sector in controlling the important knock-on effects of company practices, particularly as they are not, typically, integral to the companies' purposes.

Finally, partnerships with private enterprise provide an alternative means of paying a portion of the costs of conservation. If private sector operations can maintain sufficient profit margins, provide economic benefits to aspiring populations, and still conserve significant biological diversity, then they can very efficiently complement the conservation investments of government agencies and conservation organizations.

What Do Conservation Groups Bring to the Table?

Conservation organizations can provide both tangible and intangible services to the private sector as encouragement for the latter to change their business practices.

In tangible terms, conservation NGOs may be able to provide even highly capitalized companies, with technical skills that might both reduce the operating costs of the company and the environmental impacts of logging or mining practices. For example, WCS was able to help CIB to develop a more efficient road system into a new logging block using satellite-based vegetation maps and GIS tools. By designing a road network that avoided swamplands and steep grades, the new roads saved the company money on road construction and reduced the environmental impact of road building.

Conservation organizations can also provide a broad range of short-term technical experts to the private sector that they would be unlikely to hire full-time. By doing so conservation organizations offer the private sector a low-cost way to identify practices that could avoid or mitigate adverse environmental impacts.

Lastly, conservation organizations that already work closely with government forestry and parks institutions can help ensure that the private sector has access to trained, reliable and nationally legitimate environmental law enforcement agents.

Conservation organizations also, by default, bring with them their "green identity." Unfortunately, there is the risk that private sector companies will use the "green" brand of their conservation partner to convey to the public and to consumers of company products a sense that their production systems are environmentally friendly, when they may in fact not be. Fear of "green washing" is one reason why conservation organizations are still wary of partnerships with

the private sector. However, company partnerships with "green" brands may empower latent constituencies for reform, deal set-backs to those with a vested interest in business as usual practices, and raise the profile of "green" practices and certification within the company.

Risks and Challenges

Private sector/conservation partnerships are not undertaken without risk. First, many of the best-practice techniques are not yet fully proven, and must continue to be considered experimental. Their conservation impacts are yet unknown, and should continue to be assessed as these collaborations mature.

In addition, present markets and fiscal incentives may render conservation-compatible resource exploitation a low priority for the private sector. If the costs of improved practices are high, and consumers are not willing to pay the increased cost, then either 'green' production will require subsidies or will fail. In these cases, industry is turning to conservation interests to cover these costs, yet little support is forthcoming.

An additional risk in private sector/conservation partnerships is that companies may merely participate in dialogue to appeal to environmentally-conscious buyers and share-holders, but not actually reform their practices nor dedicate sufficient resources to make reforms work. Two options exist to overcome private sector free-riding: (1) conservation partners must critically assess the commitment of potential private sector partners, remain independent within all partnerships formed, and retain the option to critique any partner with which they work; and (2) conservation partners should encourage their private sector partners to adopt globally accepted third party certification of their practices and performance.

Regardless of the intent or integrity of such partnerships, conservation groups risk criticism by allying with commercial interests. It is facile though often advantageous for fund-raising for others to claim greater conservation dedication and purity by not involving themselves in the difficult issues of commercial use within the realm of profit-making companies. Conservation actors entering into these partnerships must therefore be able to clearly quantify and explain the conservation benefits that will be derived, and the partnership must be transparent in its operations and allow public scrutiny of its agreements and performance.

Minimizing the indirect environmental impacts of private sector practices is likely to be the most immediate avenue for conservation success.

What Can Be Done to Enhance Private Sector/Conservation Partnerships?

Governments, private industry owners and managers, conservation-minded groups and individuals, and the public should recognize that these new partnerships hold tremendous potential, and should be encouraged. Governments can do this by requiring conservation-compatible resource exploitation management plans, giving favored status to companies which form such partnerships or are "green" certified, and reorienting policy to reward efficient companies and penalize those that waste resources and degrade the environment.

Donor agencies should support innovative partnerships between the private sector and conservation actors. These partnerships will require initial financial support to test various approaches and to assure cost coverage for those cases where market forces do not yet compensate for transaction and implementation costs.

Consumers should be discriminating as they purchase forest products, buying only from those industries that have "green" certification or are working in close collaboration with sound, experienced, conservation organizations. Organized buyers groups for 'green' products have

formed more often in Europe, leaving a strong need for such groups to form in countries like the United States.

Conservation groups should enter into more of these partnerships as the conditions necessary for success arise, yet always remaining independently able to assess conservation success or failure as the partnership evolves.

Experience gained by conservation NGO partnerships with private sector has shown risks for alienating traditional constituencies but the likely payoffs are worth it.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #20

#20 — Mobilizing Communities to Conserve Forest Resources Cameroon Case Study

This Briefing Sheet was written by Michael Brown of **Innovative Resources Management**. For further information contact Michael Brown, email: brown1irm@aol.com.

Related Issue Briefs

- **#8 Forest Disappeared**
- **#11 Forest Governance**
- **#12 Management Watchdogs**
- **#16 World Bank**

Key Concepts

- New community forestry legislation in Cameroon is, in theory, creating opportunities for greater community level of management responsibilities and authority.
- Actual community level mobilization is limited, as new legislation has not yet translated into incentives or sounder resource management.
- Decentralization (devolved power and responsibility to local jurisdictions) also remains theoretical but could eventually create conditions and incentives for more effective

community level management.

- Community mobilization may be necessary for sustainable management, yet it may be insufficient to achieve conservation in the absence of policies and operational mechanisms that catalyze and sustain activities.
- Participatory mapping can help communities mobilize to negotiate resource access and management reforms with the private sector.
- Community mobilization will be most effective when communities themselves take the lead; well designed projects can promote mobilization and equitable partnerships.
- Community mobilization is possible, as there is a sufficient nucleus of local management capacity derived from traditional systems and modern practices.
- Methods for successfully mobilizing communities across landscapes and embedded jurisdictions are in early development, requiring action- research to test and evaluate organizational innovations with conservation results.

What Is a Community in the Context of Forest Conservation?

Community is a word that encompasses many different types of social groups, organizations, and/or institutions. These may include locations such as villages or groups of villages, community councils, church groups, youth groups, women's groups, community banks, or kinship groups. Communities can be non-territorial, as the importance of urban-based people in local community decision making in Africa is considerable. For purposes of forest conservation in the Congo Basin, communities must be defined by geographic, spatial, ethnic and economic criteria, with networks linking community members across landscapes, and even continents, increasingly factored into conservation planning.

What Is Mobilization and Why Hasn't It Happened Yet?

Mobilization refers to a process in which people join together to take action oriented to accomplish one or more objectives. Mobilization bears political connotations. In the development lexicon, it is allied with empowerment and participation, both of which refer to processes whose ends are improved social welfare. It might be argued that externally driven community level mobilization in the forest conservation context is required when status quo management arrangements prove insufficient. When local institutions are weak and many barriers to involving communities exist, mobilization will be required. That said, attempting mobilization does not automatically lead to success, as constraints abound.

Centralized, paternalistic and patronage based political systems, inherited from colonial powers characterize current government-citizen relationships throughout Central Africa. When combined with limited access to education, absence of legal and fiscal mechanisms to force public and private sector accountability, and government controlled media and communications, civil society efforts to reform government to be more democratic, transparent and honest are, at best, weak. This is particularly true for rural communities that have also experienced erosion of traditional authority structures, and are both politically and economically marginalized.

Mobilization may nonetheless be able to provoke some degree of devolution of management authority to local administrative jurisdictions and, in particular, communities within jurisdictions. This can lead to more realistic planning and more effective local action. Conversely, mobilization may only be feasible once a degree of devolution has already occurred. The Innovative Resources Management/CARPE experience in local forest resource management systems shows that communities are capable of mobilizing under a minimum set of incentives, though we cannot yet demonstrate that this promotes sustainable conservation action.

Approaches to Community Mobilization

Throughout the Congo Basin, eight million rural households within communities decide how to use the forest in their immediate vicinity. This use is almost always outside of conservation project contexts. Rural peoples value and manage the forest as a source for agriculture, construction materials, wildlife and non-timber forest products. Communities also employ local institutions embedded within Congo Basin sociocultural systems to proactively promote forest management. The impact that communities have, even in lightly populated forest zones, can thus be substantial.

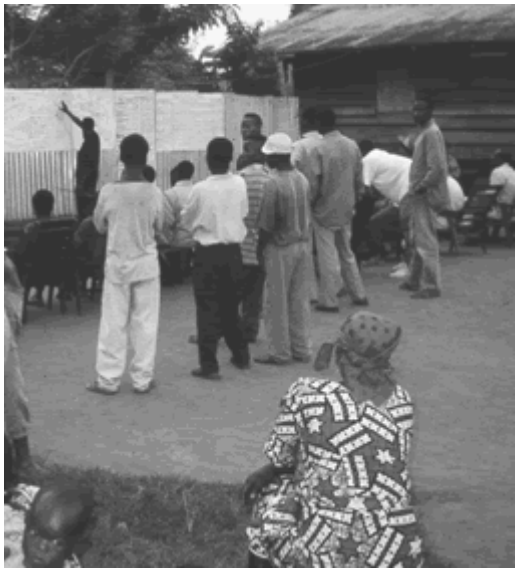
In the past, extended families, clans and tribes managed forest resources by traditional means, often restricting access to certain areas and to specific resources. Production of cash crops, increasing literacy, labor mobility and the superimposition of European laws and governance institutions have altered these traditional management systems, but have not totally destroyed them. The Ngui cult among the Fang of Cameroon, Equatorial Guinea and Gabon, and the Quifor among the Bafut of Northwestern Province in Cameroon, all possess resilient management systems that have persisted in the face of changing government policies. They are an indication of the contribution community-level initiatives can make to forest conservation though not all local systems are as resilient as these are.

"Community mobilization may be necessary for sustainable management, yet it may be insufficient to achieve conservation in the absence of policies and operational mechanisms that catalyze and sustain activities."

Several different project-based approaches are being tested to help rural communities demand and gain greater authority over forest management within their traditional territories. The Mount Cameroon Project in southwestern Cameroon has helped hunters to form user-groups bearing the legal authority to regulate who hunts within their forests, and to enforce hunting regulations

developed in collaboration with the Ministry of Environment and Forests. These user-groups have successfully excluded outsiders from poaching their wildlife, and have sanctioned members for infringing on the group's hunting regulations.

The Banyang-Mbo Wildlife Sanctuary project, managed by the Wildlife Conservation Society (WCS), is combining participatory rural appraisal techniques, awareness raising eco-plays and children's activities, and systematic biological and socioeconomic surveys to develop forest resource management agreements with rural communities. Banyang-Mbo is unique in Central Africa, as it is the first protected area within which local communities have legal authority to use and manage forest resources. Creation of this new type of protected area was considered a prerequisite for effective community-based natural resource management. In both Mt. Cameroon and Banyang-Mbo, effective collaboration between government and externally financed conservation agencies has been key to facilitate community mobilization.



Methods for successfully mobilizing communities for forest conservation are still in early stages of development, requiring an action-research approach.

Innovative Resources Management (IRM) has developed a decentralized approach for mobilizing communities across landscapes in the Congo Basin under CARPE. It is based on six levels of activities, and builds on lessons learned from rapid and participatory rural appraisal, co-management, community forestry and other participatory methodologies (www.irm.gt.com). One key element of the approach is landscape-level community mapping, based on a methodology developed by the Center for Support of Native Lands. Participatory mapping teams communities with government cadastral experts, enabling production of geo-referenced maps that reflect local resource use and ownership realities, allowing communities to represent resources and resource use as they see them. Not only does the inclusion of government employees in the mapping process help communities and governments reach new understanding of forest management issues, the fact that the finished maps have the government imprimatur is de facto

acknowledgement by government of local resource use realities. All this is key to the negotiation of more effective management agreements.

The participatory mapping process represents an appropriate technology. Its use has, in three different Cameroonian contexts, initiated the first stage of community mobilization in forest conservation. The new understandings generated through participatory mapping will be necessary for achieving any change in formal rights pertaining to communities on a legislative or judicial level. Following mapping in Djoum, for example, the communities went as far as officially writing the Préfecture of Dja and Lobo with a gently worded message of opposition to a particular forest attribution. This type of community-level action has, hitherto, been very uncommon in the Congo Basin.

Once Mobilized, What Can Communities Contribute to Achieving?

It is difficult to generalize what communities can and cannot contribute to achieving in conservation. Potential and capacities vary. There are many different forms of community management. These range from total community control, to temporary, experimental efforts in joint management between government agencies and local people.

Will conservation benefits ever, broadly speaking, be substantial enough to catalyze community mobilization? In the East African context, some reports suggest that a range of support activities is needed to make community-based management work. These include policy reforms, developing enabling legislation, capacity building at local levels, and refined planning processes to support community based decision making. Above all, it is argued, adaptive institutions at the local level are needed. The following table adapted from Chi illustrates the range of factors that provide incentives to communities, and governments in forest management, and are thus central to any mobilization strategy.

Incentives of Government and Community in Managing Forest in Cameroon		
Incentives	**Government**	**Community**
Ecological	Forest will be protected and wildlife conserved	Forest land will be fertile for shifting cultivation activities
Socio-cultural	• Foreign support will be attracted and forest ownership will be monopolized • Modern and formal forest management techniques will be introduced • Villagers access to forest will be limited to basic needs only	• Tangible and intangible resources supply will meet demand for subsistence • Spiritual and religious value of forest will be maintained • Government will not take over or reclassify forest as

		state property (reserve)
Economic	• Income will be generated from exploitation/export of timber and some commoditized minor forest products, e.g., bark of *Prunus africana*	• Income and employment opportunities will be increased • Forest can be used as an economic resource to bargain for social services from logging companies and government
Political	• Forest will become state • Existing public institutions such as Ministère des Eaux et Forêts (MINEF) and Office National des Eaux et Forêts (ONADEF) will effectively regulate and control use of forest resources	• Forest will serve as natural capital to consolidate ailing power of traditional ruler/leader (Chief or Fon) • Common property will be defended or outsiders will be excluded

Source: Co-management of forests in Cameroon: The compatibility of government policies with indigenous practices. 1999 (Chi).

Is Decentralization a Prerequisite for Mobilizing Communities to Conserve Congo Basin Forests?

Decentralization refers to a process by which power is more widely allocated among actors and across societal levels, occurring through a shift in authority and responsibilities from central government to more local levels, or to civil society institutions outside government itself. While conventional wisdom would suggest that decentralization play a role in community mobilization, much still needs to be learned. Current knowledge suggests that:

1. While decentralization is not a sufficient condition for community mobilization, it clearly provides communities with opportunities for action. An example from Djoum illustrates the point. Due in part to the lack of clearly defined and widely recognized land borders, the elites of Djoum have long been able to easily usurp agricultural land from local farmers. Using locally produced participatory maps, communities have clarified property limits, and have been able to largely stop this practice. For these communities, the maps are proving to be valuable tool that can be used to address a wide variety of situations related to land tenure and land use.

2. A study (in press) by the Biodiversity Support Program shows that there is no necessary correlation between decentralization and biodiversity conservation, although it is not clear if this is a failure of decentralization to achieve conservation goals, or because the decentralization effort itself was not implemented effectively. Part of the problem may be that transfer of accountability to lower levels has proven elusive, as has power sharing between the state and civil society.
3. Many Congo Basin countries have de-concentrated authority to local administrative levels or jurisdictions. That said, actual forest management within jurisdictions often occurs among smaller, sub-village level hamlets. Administrative villages are often arbitrary groupings of many smaller settlements. In other words, formal, de-concentrated authority stops at the start of the road where operational forest management begins.

When Legislation and Policy Are Unfavorable, Can and Should Communities Be Mobilized?

Conventional wisdom would have it that resources need not be wasted in mobilizing communities in places where local management is constrained through ineffective policies. IRM's CARPE experience shows that even in southern Cameroon, where decentralized community forest management is problematic given the structure of the forest sector nationwide, mobilization can advance local management options. This can benefit forest conservation, provided incentives are sustained.

Communities suffering from the absence of development programming through either states or international agencies, may have pent up demands, and mobilize in the absence of effective decentralization. Mobilization that is blocked politically may take place through traditional religious, ethnic or kinship institutions. In brief, mobilization, if strategically undertaken, can instigate demands for changes in policies and legislation. If well linked to programming, this can benefit forest conservation.

Participatory mapping appears to be an appropriate technology for communities to mobilize themselves and negotiate resources access and management reforms.

What Can You Do About It?

One lesson from the past twenty years of conservation is clear: without local community buy-in, sustainability in conservation is dubious. Barring military-style management of forests in Central African nation states, communities will have to play a more active role in conservation. Next steps must focus on further action-research to determine the range of roles and responsibilities that communities can assume in Congo Basin conservation given evolving political, economic and cultural realities, along with methods to promote effective coordinated action.

A focus on multi-stakeholder coalition building for forest conservation must increasingly become an objective. Resource poor, isolated communities with few incentives will never be able to play a major role. When common points of interest emerge, the situation changes. Mobilizing communities to act jointly with other stakeholders where interests converge, through negotiated processes (versus top-down agendas), must increasingly become the norm for conservation to be achieved. In this context, external agents within CARPE and partner organizations have a crucial role to play.

Donors and governments should continue to facilitate action-research to help determine the range of forest resource management roles and responsibilities that communities can assume under greater collaborative formats. The premise must be that if communities gain a more equitable

share of forest benefits, this will relieve pressure on government to regulate resource use across the whole forest estate. This in turn will lead to more effective conservation again when roles are complementary and well defined. Helping rural households build and participate in civil society groups and coalitions concerned with leveraging more transparent, representative and accountable systems for allocating and regulating forest resource use is therefore a necessary first step to more sustainable management of the forest estate in Central Africa.

Methods for successfully mobilizing communities for forest conservation are still in early stages of development, requiring an action-research approach.

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CARPE...What Is It?

Central African Regional Program for the Environment (CARPE)

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #21

#21 — Sustainable Financing of Protected Areas
The Role of User Fees

This brief was written by the **Biodiversity Support Program** and the **African Wildlife Foundation**. For additional information contact David Wilkie, email: dwilkie@rcn.com; Katie Frohardt, email: kfrohardt@awf.org.

Related Issue Briefs

- **#3 Rich Forests**
- **#4 Identifying Gaps**
- **#10 Non-Timber Forest Products (NTFP)**
- **#19 Private Sector**

Key Concepts

- For local people and national governments, the perceived intangible global heritage value of tropical forest plants and animals rarely, if ever, exceeds the short-term exploitation value of these resources.
- Biodiversity conservation usually requires that present generations forego some direct uses of, and benefit from, natural resources.

- Biodiversity conservation rarely pays for itself in full. Rather, it results in both direct management costs and indirect opportunity costs to local and national economies.
- Biodiversity conservation is not synonymous with economic development and donor attempts to invest in the former to attain the latter, may perversely achieve neither.
- In the Central African region tourism, research, safari hunting and even a 10% income tax are unlikely to cover a significant portion of protected area costs at present.
- Insecurity, geographic isolation of parks and reserves, paucity of reliably observable animals, absence of a customer service mentality, and intense, well organized competition from eastern and southern Africa, severely limit tourism potential in the region at present.
- If the international community values the biological diversity contained within the forest of Central Africa then they must contribute significantly to minimizing the economic impact of biodiversity conservation on local and national economies.

Protected Areas and Biodiversity Conservation

Protected areas are critical for the conservation of (1) large mammals that would otherwise be in direct competition with humans for space and resources; and (2) plant and animal species that are threatened elsewhere by commercial exploitation, or by conversion of habitat to other land-uses such as agriculture. In Central Africa, like other regions of the world, as populations grow and economies expand, wild habitats will progressively be converted to anthropogenic land uses. Protected areas will increasingly become the principal bastions of forest resource conservation, because only within protected areas is biodiversity conservation the primary land use.

Protected Areas Are Not Free

Unlike landscapes where agriculture, mining, and logging are the principal land uses, protected areas do not generate significant revenues for Central African countries. As a result, they are often a net cost to local and national economies. That parks and reserves in Central Africa cost money to establish and manage is not atypical for Africa, nor for the rest of the world. Setting aside areas to be managed as biodiversity reserves, where resource conservation is the primary land use, imposes direct costs to establish and maintain a management infrastructure costs that must be covered every year. Designating an area for biodiversity conservation also means, typically, that the land can no longer be used for agriculture, or logging, or strip mining. The costs of these lost opportunities can have a severe impact on both local and national economies. In Central Africa the opportunity costs of not logging in protected areas amount to millions of dollars per year.

Sources of Protected Area Finance

Securing sustained financing to pay the direct management costs, and to provide compensation for the opportunity costs of establishing and maintaining protected areas is critical if poor nations are to set aside and manage protected areas to conserve forest biodiversity over the long-term. Monies for protected areas can be derived from (1) government funds, (2) donor grants, and (3) user fees and environmental taxes earmarked for conservation. In high per capita GNP nations, environmental taxes and government funds derived from general sales, wealth, inheritance and income taxation are the most significant contributors to protected area financing. In low per capita GNP nations with a weak tax base, donor grants and user fees are often more important.

Present Financing of Protected Areas in Central Africa

In the Congo Basin it would cost about $30 million per year to manage the present protected area system at a level sufficient to ensure the long-term survival of the plants and animals the parks were established to protect. This cost is likely to increase as more areas are being gazetted. Donors and governments are currently spending less than 30% of that amount. Furthermore, no nation in the Congo Basin receives any financial compensation from the international community, nor pays compensation to its citizens, for the opportunity costs of conserving biodiversity of global and national heritage value. In contrast, in the United States ranchers are paid for livestock killed by predators that stray from national parks, and land owners receive tax breaks for conserving wetlands. Maybe surprisingly, when measured as a percentage of overall government expenditures, Congo Basin government spending on protected areas is comparable to that of high per capita GNP nations (Table 1). However, government investment per square kilometer is on average a mere $14, less than 6% of the average spent by other African nations, and less than 0.5% of that spent by nations in Europe and North America, even after controlling for national differences in purchasing power. As a result, most protected areas suffer substantial management spending shortfalls. If park managers are unable to hire enough staff, at salary levels that discourage corruption, and provide the equipment and training needed, it is not surprising that they are often unable to effectively control illegal access to, and use of protected resources.

Paying for Parks with User Fees

User fees can be roughly divided into two large categories: (1) visitor charges targeted primarily at foreign tourists to parks and reserves, but could also include a sliding scale for national tourists; and (2) fees and taxes that apply primarily to individuals or businesses resident in the nation.

Tourism charges can include: park entry fees; airport arrival or departure taxes; scenic-road tolls; hotel surcharges; protected area activity fees (diving, hiking, wildlife tracking, etc.); and hunting and fishing licenses and fees. National resource use fees within and outside of protected areas include: leasing fees for mineral and timber concessions; fees for watershed protection; resource degradation and pollution fines; and carbon emission charges.

In many regions of the world, user fees have generated substantial revenues, earmarked for conservation. Whether or not user fees can raise significant revenues depends on the size and wealth of the user base. Thus, they are more likely to be effective in high GNP nations or in nations that can capture a portion of the wealth of such nations. Moreover, whether user generated revenues contribute to biodiversity conservation depends on how governments decide to spend them.

Protected areas are critical for conservation of wildlife that compete with humans for space and resources.

Is Tourism Realistic in Central Africa?

Fewer than 15,000 foreign tourists visit protected areas in Central Africa each year, and most do so to see gorillas or chimpanzees. In contrast, over one million tourists visit New Hampshire state parks that cover less than 0.1% of the area of protected areas in Central Africa. Tourism in the region is economically viable only in easily accessible parks, that are relatively safe, and that offer visitors an intimate viewing experience with apes. Tourism to observe Central Africa's forest elephant, elusive duikers, and endemic birds that are heard but less often seen, is by nature's design difficult. As such, wildlife tourism in most protected areas in Central Africa cannot compete with the sheer number, diversity, and visibility of wildlife in east and southern African parks. Moreover, the greater security, ease of access and level of customer service readily available to tourists in East and Southern Africa, is in stark contrast with the rough and often hazardous conditions that tourists must face to visit Central African parks.

In the United States user fees cover only 33% of the budgets of state parks, and a mere 7.5% of national parks. New Hampshire claims to cover state park operating expenses of $5 million solely from user fees. However, the backlog of foregone maintenance and capital improvements exceeds $2 million per year and is growing. In Rwanda, Uganda and Congo tourists are willing to pay $200 per day to see gorillas. Yet, even if all tourists to Central African parks paid that amount and spent two days, gross revenues from entrance fees would only cover 20% of park operating costs. Consequently, in the near-term, and particularly until security and park access improves, tourism in Central Africa cannot be relied upon to contribute more than a small portion of the management and opportunity costs of maintaining protected areas.

Safari hunting in Central Africa offer hunters access to trophies such as bongo, giant forest hog, and forest elephant that are not available elsewhere. However, the range of desirable species and overall costs again cannot compete with those offered in East and Southern Africa. Moreover, trophy hunting in the region is dependent on roads built and financed by logging companies. Paucity of information on (1) the number of safari hunters visiting the region; (2) the number of animals harvested by safari hunters each year; and (3) the revenues generated from safari hunting leave governments, donors and international conservation NGOs uncertain as to the ecological and economic sustainability of trophy hunting, and its role as a tool for financing biodiversity conservation in the region.

What About Taxes on Individuals and Corporations?

Natural resource use fees and general wealth, income and consumption taxes on corporations and the citizens of Central African nations may not generate significant revenues for resource conservation because (1) per capita income is typically low and thus capacity and willingness-to-pay for conservation is extremely limited, (2) the size of domestic economies is typically small, as is consequently the tax base, (3) private land ownership is either non existent or found only in congested urban areas, limiting the scope for real estate taxation, and (4) much of the economy is run on cash and barter, and thus difficult to tax.

If taxes on individuals and corporations were set at a highly optimistic average rate of 10% of income Central African governments could raise over $1.6 billion in tax revenues — 14 times present revenues from income tax. If governments continue to allocate, on average, 0.17% of expenditures to finance protected areas, then national governments could raise a total of $2.7 million for conservation. Yet, with these tax revenues alone, no nation in Central Africa would be able to fully finance the recurring costs of managing its parks and reserves, let alone the much higher opportunity costs. Taxes would contribute on average 9% (range 1% and 25%) of protected area recurring costs. Moreover, whether citizens and the private sector of Central African nations would be willing to trust government sufficiently to pay taxes, and whether government would be willing to earmark tax revenues for conservation, remains an open question.

Biodiversity Conservation Is an Issue that Mandates Global Sources of Financing

With human population likely to double in 20 years, demand for land and resources will put increasing pressure on the forests of Central Africa. Protected areas will become ever more important for ensuring the long-term survival of Central Africa's unique plants and animals. Establishing and maintaining protected areas costs money, both in terms of management costs, and opportunity costs. Given the region's insecurity, inaccessibility, and economic troubles, very few domestic options exist for financing protected area costs. If the citizens of wealthy nations truly value the biodiversity contained within the forests of the Congo Basin, then they must convince their elected representatives to contribute significantly to their conservation. This includes offsetting protected area management costs, and compensating nations and local communities for the opportunity costs of conservation. At present, there is unfortunately little incentive and capacity for the local communities and poor nations of Central Africa to do so themselves.

Table 1: Protected Area Spending in a Sample of Nations Around the World

	Total Area	Protected Areas	PA %	PPP	Government Expenditures	PA Spending	% of Budget	Unit Area Spending
COUNTRY	**km²**	**km²**	**%**	**Int$/US$**	**Int $ million PPP**	**Int$/000 PPP**	**%**	**US% PPP/km²**
Germany	356,910	58,579	16%	0.68	$696,320	$45,968	0.01%	$785
Netherlands	37,330	3,500	9%	0.85	$144,500	$19,635	0.01%	$5,610
United Kingdom	244,820	46,271	19%	0.99	$487,674	$161,073	0.03%	$3,481
Canada	9,976,140	496,812	5%	1.09	$122,734	$308,470	0.25%	$621
USA	9,372,610	982,192	10%	0.95	$,570,350	$1,864,565	0.12%	$1,898
Angola	1,246,700	81,812	7%	1.4	$3,500	$30	0.00%	$0
Botswana	600,370	100,250	17%	1.1	$2,074	$5,654	0.27%	$56
Burkina Faso	274,200	31,937	12%	2.19	$1,077	$261	0.02%	$8

Cameroon	475,440	25,948	5%	1.2	$2,676	$771	0.03%	$30
Central Africa Republic	622,980	46,949	8%	1.58	$3,002	$505	0.02%	$11
Cote d'Ivoire	322,460	19,929	6%	1.8	$4,680	$2,524	0.05%	$127
Democratic Republic of Congo	2,345,410	100,262	4%	1.9	$464	$768	0.17%	$8
Ethiopia	1,221,900	32,403	3%	2.6	$3,848	$4,806	0.12%	$148
Gabon	267,670	18,170	7%	0.72	$1,058	$178	0.02%	$10
Ghana	238,540	13,049	5%	3.27	$4,251	$3,011	0.07%	$231
Kenya	582,650	32,726	6%	5.2	$14,040	$69,685	0.05%	$2,129
Malawi	118,480	10,585	9%	3.08	$2,076	$2,069	0.10%	$195
Namibia	824,290	112,159	14%	1.8	$2,160	$14,170	0.66%	$126
Niger	1,267,000	84,163	7%	2.12	$784	$143	0.02%	$2
Nigeria	923,770	34,218	4%	3.65	$50,735	$12,310	0.02%	$360
South Africa	1,221,040	57,638	5%	1.28	$48,640	$157,065	0.32%	$2,725
Tanzania	945,090	258,997	27%	6.7	$6,700	$52,074	0.78%	$201
Zimbabwe	390,580	50,736	13%	2.7	$7,830	$18,090	0.23%	$357

Source: (James et al. 1997), (ART, 1998), (CIA, 1992)

Insecurity and competition from East and Southern African parks makes tourism unlikely to generate significant funds for most protected areas in Central Africa.

What Can You Do About It?

Grassroots

Get involved! Contact your elected representatives to tell them that you are concerned about the under-financing of protected areas in West and Central Africa and that conserving biodiversity in Africa matters to you.

Government and Donors

Commit resources to ensure that all protected areas have funding, personnel, and the infrastructure sufficient to ensure the long-term persistence of the plants and animals within their borders.

Private Sector

Consider assuming financial responsibility for a protected area, by providing funds sufficient to cover either the direct management costs, or to compensate local economies for lost revenues.

Safari hunting that relies primarily on Bongo and only occasionally on other species (giant forest hogs, sitatunga, duikers) is unlikely to be economically or ecologically sustainable.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #22

#22 — Conservation In a Region of Civil Instability
The Need to Be Present and Assist

This brief was written by **WCS** and **Biodiversity Support Program**. For additional information contact Andrew Plumptre, email: Aplumptre@aol.com; Rebecca Ham at Conservation International, email: r.ham@conservation.org.

Related Issue Briefs

- **#11 Forest Governance**
- **#19 Private Sector**
- **#21 Sustainable Financing**
- **#23 Bushmeat Crisis**

Key Concepts

- More than a third of countries in sub-Saharan Africa have been affected by armed conflict since 1990.
- It is predicted that competition over dwindling natural resources will increase in the future, resulting in even greater social and political strife.
- The negative impacts of armed conflict on the environment are a result of many factors

such as human population displacement, lack of law enforcement, decline in tenure security that increases incentives for populations to mine natural resources, and increased dependence of people on wild resources when other livelihoods, such as agriculture, become impossible.

- Ways to mitigate these impacts include preparedness planning, making information on biodiversity readily available to relief agencies, trying to maintain a presence in protected areas throughout the conflict, collaborating with other sectors, and being prepared to start activities again as soon as possible.

Political, Civil and Military Conflicts and Their Environmental Impacts Are increasing in Africa

During the 20th Century the number of wars increased, particularly in Africa. Conservation organizations have been grappling with the direct environmental problems caused by wars and the secondary impacts of the resulting civil and economic instability. Many of these wars are fueled by the hegemonic desire of political elites or military strongmen to control natural resources, particularly mineral resources such as gold and diamonds. It is predicted that competition over dwindling natural resources will increase in the future, resulting in even greater strife. During the last ten years in the Congo Basin, the Central African Republic, Democratic Republic of Congo, and the Republic of Congo, as well as the neighboring countries of Rwanda, Burundi, Uganda and Angola have all suffered from civil and military conflicts. If conservation organizations are going to be effective in minimizing the environmental consequences of conflicts they need to learn what actions they can take and when.

How Do Wars Cause Environmental Damage?

The civil wars in the Congo Basin are not generally fought by two major armies facing each other across a front line, as has often occurred throughout history in other parts of the world. Wars today are primarily fought by transient groups of combatants, who often gain temporary control over towns and villages, but almost never are able to subdue the surrounding areas. Repeated fights for and changes in, who controls what has devastating impacts on human lives, and causes (1) a breakdown in the rule of law and other controls during and immediately after conflicts; (2) a decline in agricultural production and trade, (3) increased dependence on wild resources (such as bushmeat) for survival when other livelihoods are made impossible, (4) decreased incentives for people to conserve natural resources that once, but no longer, generate revenue from tourism, (5) increased abundance of firearms, (6) mass movements of people, (7)

lack of funding, (8) the need for governments to raise funds for fighting, or after the war to kick-start the economy and to pay off debts.

Parks and reserves can suffer even more significant environmental impacts than non-protected areas, because they are often located in remote, frontier areas and can provide refuge for rebels or a convenient location from which to stage cross-border attacks. They also often contain more wildlife than other areas and can, thus, provide a ready supply of meat for rebels or small armies. Moreover, when it becomes too dangerous for protected area staff to continue patrols the frequency of illegal mining of gold and diamonds, hunting for ivory and bushmeat, felling of timber, and agricultural encroachment often increases. It is therefore important for conservation projects working in protected areas to be prepared for conflict and have strategies for immediate action if war breaks out.

What Can You Do to Take Action on the Issue

Although it may seem that environment concerns should be a low priority during war, the fact that a large percent of human livelihoods in Africa are directly dependent on natural resources, makes it essential that the environment is considered. Rehabilitation after the damage has been done is often a great deal more expensive than the costs of preventive measures put into place before conflict. Although it may seem impossible to do anything during war, experience from the region shows that there are tangible actions that can help avoid or reduce the environmental impacts of war on protected areas.

Develop formal contingency plans in preparation for conflict

When over one-third of the countries in Africa have experienced conflict during the last decade, it is essential that all conservation projects be prepared for war. Organizations should clarify who will have what responsibilities and discuss plans for evacuation, strategies for continuing the flow of funds, and guidelines for what to do with equipment. They should also develop protocols for when to pull out and under what circumstances they are prepared to stay.

Try to maintain a presence throughout the conflict

Areas where NGOs and governments are able to continue to operate and maintain some sort of presence throughout a conflict are less adversely affected than areas where projects pull out. Having people on the ground means that there are people present to negotiate with rebel groups, local government, international relief agencies and local people. They can help, for example, in decisions about where to settle refugees. The presence of a conservation project also demonstrates that the conservation of that area is valuable from both a national and international point of view.

Make information on biodiversity available to as many government and non government agencies working in the country as possible

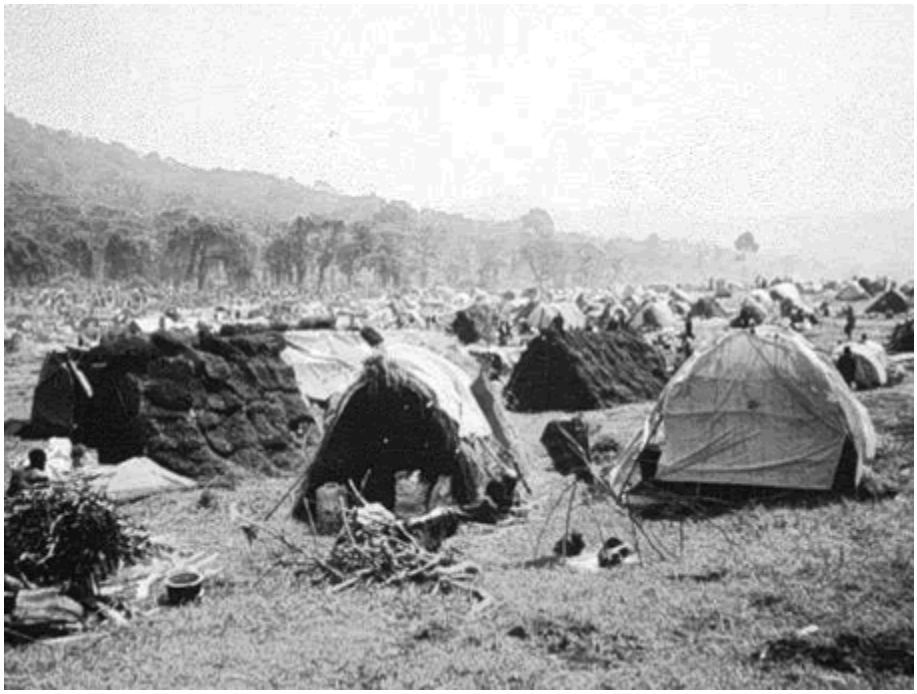
By providing information on biodiversity hotspots, boundaries of protected areas, endangered species, and ecologically sensitive areas, and the names and contacts of biological experts that can be called upon for emergency environmental assessments, relief and development organizations working in the country may be better equipped to include environmental concerns in their decisions.

Make Every Attempt Possible to Continue Funding

In Central Africa most conservation activities are supported by external funding. During conflicts donors tend to reduce or cease their financial support, either because of political constraints, or risk aversion. Yet to maintain a presence, a reasonably regular flow of funds for salaries and basic supplies is clearly important. Experience from conflict zones has shown that even when receiving no immediate financial reimbursement, the belief that support will continue sometime in the future is one of the most important reasons that project staff continue to work during times of instability and conflict. Donors should look for ways to keep funds flowing, maybe by channeling funds to sites through NGOs when it is politically difficult to give support directly to governments. NGOs should look for flexible funding sources whose funds can be used in these circumstances.

Promote the Training of Junior Staff

Senior project staff and protected area managers are often targets of armies and rebel group's aggression, as they are often perceived as having access to money or material goods such as the keys to vehicles. Many senior staff have been forced to flee or have been killed in the Congo Basin for this reason. It is often the junior staff (rangers, field assistants, accountants etc.) who are left to continue project activities. Traditionally support for leadership training has tended to focus on senior staff alone, but it is now apparent that junior staff should also be receiving some of this training so that they are able to competently continue activities in the absence of the senior staff.



The negative impacts of armed conflict on the environment are a result of many factors such as human population displacement.

Maintain Good Communications

Maintaining regular communication is vital in a war situation, as any military commander knows. This is also true for people working in conservation. Protected areas are often isolated and remote so that communication is difficult at the best of times. Staff on site should have the means to contact local administrative and military authorities, as well as other NGOs working in the region, in order to keep up to date on the current security situation. Similarly they need to be able to communicate with sponsors to let them know that activities are continuing. Radios or satellite phone systems that can easily be transported and, if necessary, hidden are ideal in such situations.

Attempt to Maintain a Neutral Position

Whenever possible, it is important that conservation organizations maintain a position of neutrality. If the local community perceives that the protected area authority favors the wrong side, this can lead to great risk to staff security. Of course, appearing to remain neutral can be extremely difficult at times, as conservationists must communicate with whichever authority is in

power in their region. Making decisions openly and with consultation with local community leaders is critical to maintaining their neutral status.

Ensure Staff Safety

Most important, conservation organizations have a responsibility to ensure the safety of their staff and families. In certain situations it may be necessary to withdraw staff for reasons of security. Rather than seeing this as a setback, staff can be provided further training during this time, even outside of the country.

Make an Effort to Work with Other Sectors

Greater collaboration between conservation organizations and other groups, such as relief, development and planning agencies, human rights organizations, and even the military is important. Relief organizations, for example, have much more experience in working during periods of insecurity than conservation organizations. Conservation organizations therefore have a great deal to learn, for example, in putting together contingency plans, and identifying ways to obtain regular updates on the security
situation during a conflict. By working more collaboratively, it is also possible for conservation organizations to help other sectors to use better practices and so reduce their impacts on the environment. For instance, the siting of refugee camps near Goma at the edge of the Virunga National Park led to the deforestation of 113 km² of the park, and might have been avoided if the relief and conservation sectors had worked more collaboratively. That said, it must be recognized that different sectors have very different mandates. The mandate of most relief organizations is to save people's lives. Conservation organizations therefore must learn to speak the language of the relief sector and make an effort link their environmental concerns to human welfare.

Post-Conflict, Be Prepared to Start Work Again As Soon As Possible

Often the greatest environmental destruction occurs post-conflict when governments are eager for cash, and before new policies regulating the use of the environment are formulated and enforced. Conservation organizations should be ready to jump in as soon as possible to help with policy reform, and capacity building of new government decision makers and other staff who may have little technical training or experience.

More than one third of countries in sub-Saharan Africa have been affected by armed conflict since 1990.

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #23

#23 — Bushmeat Crisis
Causes, Consequences and Controls

This brief was written by the **Biodiversity Support Program** with input from the **Bushmeat Crisis Task Force**. For additional information contact David Wilkie; e-mail: dwilkie@rcn.com; Heather Eves, e-mail: Heves@AZA.org.

Related Issue Briefs

#9 Forest Estate

#19 Private Sector

Key Concepts

- Hunting wildlife for meat is a greater immediate threat to biodiversity conservation than is deforestation. Habitat loss through forest clearing is the most important long-term threat to wildlife conservation in tropical forests.
- People in the Congo Basin eat as much meat as Europeans and Americans; approximately 80% of this meat is derived from wildlife.
- As much as 1 million metric tons of bushmeat is eaten each year in the Congo Basin.
- Meat consumption may increase by 3% or more per year as human populations continue to grow and household incomes increase. This rate far exceeds the natural replacement of wildlife hunted for meat.
- Working with logging companies to curb export of meat from concessions is essential to

conserving wildlife.

- Helping countries to make wildlife laws more locally appropriate and to enforce these laws is central to effective wildlife conservation.
- Securing long-term support for protected areas and buffer zones will be the only solution for many species' survival.
- Promoting access to cheaper alternative sources of animal protein may reduce demand.
- Rural families eat bushmeat nearly two days per week while families living in logging communities eat it two to three times more often.
- A significant percentage of animals being hunted are classified as threatened or endangered and protected by international agreements (e.g. CITES).
- In other parts of the world, poor people initially tend to eat more bushmeat as incomes rise. Consumption begins to drop when families become wealthy enough to switch to eating meat of domesticated animals. If this is true for Central Africa, then, depending on where people are along the income axis, changes in livelihoods may either increase or decrease their consumption of bushmeat.

What Is Driving the Bushmeat Trade?

Wildlife has been hunted for food throughout human evolution. Only recently has bushmeat become an important source of income in Central Africa. In rural areas, people once made money growing and selling rice, cotton, cacao, coffee, and peanuts. Over the past 20 years, livelihoods have suffered as increasingly poor road systems make it more difficult and costly to transport goods to markets. With farming unprofitable and almost no off-farm jobs available, many rural people have resorted to commercial hunting and trading of bushmeat because high returns can be made from a relatively small investment, and wildlife are free-for-the-taking. Urban populations fuel the demand for bushmeat; these populations have grown substantially since the 1960s and their buying power has declined with the weak economy. Families that were once able to afford to eat beef, chicken, and pork have now shifted to typically less expensive wildlife as their meat of choice. Bushmeat is relatively inexpensive because hunters do not pay the costs of producing wildlife as do farmers who raise livestock. Moreover, logging companies have opened up once-isolated forests, providing hunters with easy access to abundant wildlife and traders with cheap transportation, which in turn reduces bushmeat production costs and increases supply to urban markets.

What Are the Ecological Impacts?

Though habitat loss is often cited as the primary cause of wildlife extinction, commercial bushmeat hunting is now the most immediate threat, over the next 5–10 years, to wildlife conservation in Central Africa. The scale of commercial hunting to supply large, rapidly growing urban populations with meat is now exceeding levels that can be tolerated by most large-bodied, slow-reproducing forest animals. At current levels of exploitation this will result in the progressive depletion and local extinction of most species of apes and other primates, large antelope, and elephant from hunted forests. Only small, rapidly reproducing animals such as rodents and the smallest of antelope are likely to survive the pressure from commercial hunters.

Moreover, hunting indirectly impacts the forest by (1) threatening the survival of forest carnivores such as leopard, golden cat, crowned eagles, and snakes that rely on bushmeat species as prey and (2) significantly reducing the number of seed dispersing animals, thus changing tree species regeneration rates and forest structure and composition. The direct and indirect impacts of unsustainable hunting will have both immediate and long-term adverse impacts on the structure and function of the forest. In addition, bushmeat consumption may place people in increased jeopardy of contracting and transmitting animal-derived (epizootic) diseases such as Ebola or other emerging pathogens.

Why Is It a Crisis?

Today, bushmeat continues to be an economically important food and trade item for as many as 30 million poor rural and urban people in the Congo Basin. Animal parts are also important for

their role in ritual, and bushmeat has become a symbol for urban elites trying to retain links to "the village" often commanding high prices in city restaurants.

In Central Africa, over 1 million metric tons of bushmeat is eaten each year — the equivalent of almost 4 million cattle. A hunter can make U.S. $300–$1,000 per year — more than the average household income for the region and comparable to the salaries of those responsible for controlling the bushmeat trade. Traders, transporters, market sellers and restaurateurs also benefit from the commercial trade in bushmeat, and we must acknowledge that all of their incomes would decline if laws against the trade were strictly enforced. As demand for bushmeat increases, more people will be encouraged to become involved in the trade, increasing the pressure on wildlife populations, threatening the survival of rare species, and jeopardizing access of future families to the nutritional and income benefits from wildlife.

Not surprisingly, the high value of bushmeat as a source of food and income provides severe local, regional, and national disincentives to restrict bushmeat hunting and trade.

The commercial bushmeat trade is the most significant threat to wildlife in Central Africa today.

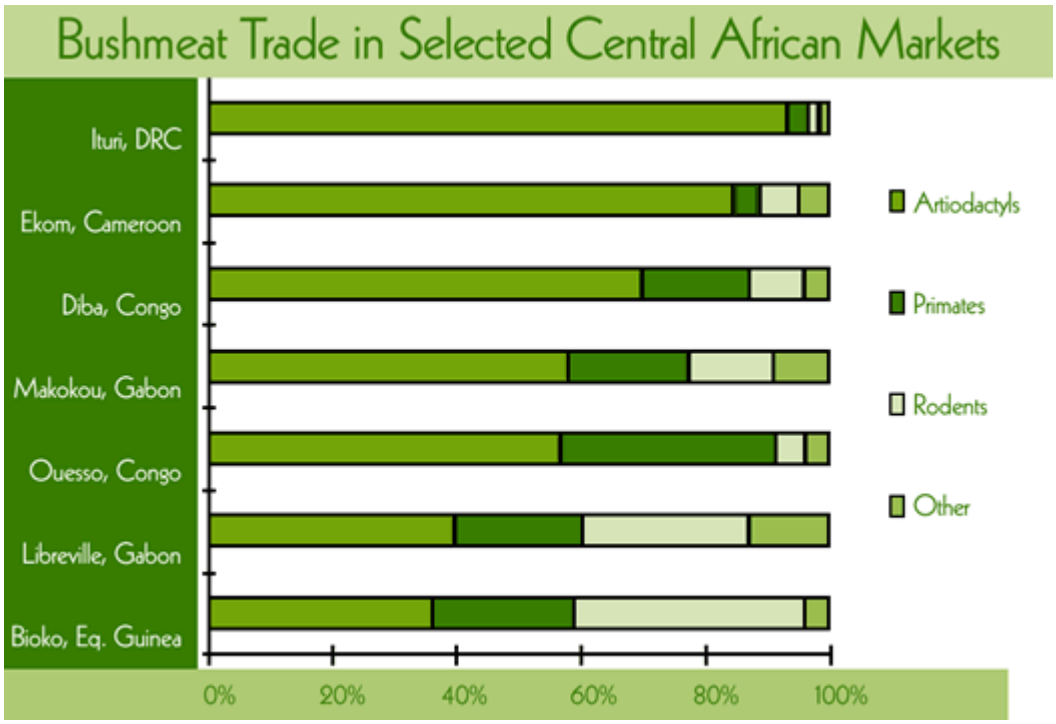
What Is Bushmeat?

In Africa, forest is often referred to as "the bush," thus wildlife and the meat derived from it is referred to as "bushmeat" (in French, *viande de brousse* or *gibier*). This term applies to all wildlife species used for meat including elephant, gorilla, chimpanzee and other primates, forest antelope (duikers), porcupine, bush pig, cane rat, pangolin, monitor lizard, guinea fowl, etc.

What Should Be Done?

Rising demand for bushmeat, lack of income — generating options for rural and urban communities, the absence of affordable and acceptable substitutes, the opening up of "frontier" forests by logging and mining companies, the complicity of government lawmakers and law enforcers, and the fact that almost anyone can go hunting anywhere without restriction — these are the most important factors driving commercial hunting and militating against wildlife conservation.

International awareness and support for control of the bushmeat trade was virtually non-existent until the late 1990s. It is, clearly, urgent that concerned individuals and conservation groups must work with an expanded group of government personnel and other key decision makers to convince them of the significance of the bushmeat crisis, and to cultivate the political will to ensure the financial resources, and professional capacity to tackle the problem.



Nongovernmental organizations (NGOs), governments, and industry are awakening to the challenge, and are currently seeking ways to address the bushmeat crisis at local, national, and international levels. Their pilot initiatives include working with logging companies to reduce or halt the flow of bushmeat from concessions and to minimize employee reliance on bushmeat as a source of food and supplementary income; convincing donors to increase their long-term support for protected area management; piloting projects to provide consumers with affordable and palatable alternatives to bushmeat; encouraging governments to develop legislation and law enforcement capacity appropriate to the local context; and facilitating collaboration among the numerous organizations and agencies working in the region.

What Can You Do About It?

Grassroots

Get involved! Educate yourself further about the bushmeat trade and keep informed about emerging activities involving local and national communities supporting biodiversity conservation in West and Central Africa. Contact your elected representatives to tell them that you are concerned about the unsustainable trade in wildlife for meat in West and Central Africa and that conserving wildlife in Africa matters to you.

Donors

Commit resources to (1) curb the export of bushmeat from logging concessions, (2) enhance the capacity of governments to legitimize and enforce existing wildlife conservation laws, (3) ensure that communities in Central Africa have access to alternative sources of animal protein, and (4) evaluate development projects to minimize potentially adverse impacts on forests and bushmeat species.

Government

Commit to financing bushmeat conservation initiatives and to legitimizing and enforcing existing wildlife conservation policies and legislation. Mobilize a G8 commitment to supporting Congo Basin countries in their agreement to conserve biological diversity, create and manage protected areas, and develop long-term capacity to manage wildlife collaboratively throughout the region, as stated in the Yaoundé Declaration of 17 March 1999, signed by the Presidents, or their representatives, of the Republic of Cameroon, Republic of Congo, Republic of Gabon, Republic of Equatorial Guinea, Central African Republic, and the Republic of Chad. Support bilateral and multilateral projects specifically designed to address the bushmeat problem in Central Africa.

NGOs

Commit to implementing, in collaboration with national governments, pilot activities to (1) curb the export of bushmeat from logging concessions, (2) enhance the capacity of governments to legitimize and enforce existing wildlife conservation laws, and (3) ensure that families in West and Central Africa have access to alternative sources of protein.

Private Sector

Concerned for-profit companies should commit to (1) financing wildlife monitoring and management programs within their concessions, including bushmeat control activities, (2) providing alternative protein sources for workers and their families, (3) allocating a percentage of capital investments for wildlife habitat restoration following harvesting (4) setting aside non-exploitation zones within their concessions, and (5) adopting low impact logging practices.

Quotes

Solving the bushmeat crisis is "going to need the full commitment of the range states, but the range states are going to need the full commitment of the United States, and other countries to provide resources so they can develop the kind of infrastructure, the knowledge and the expertise to deal with this problem."

– Congressman George Miller (D-CA)

".. it is terribly, terribly important that we find strength in the growing awareness of the problems that face these amazing creatures, and the problems that face the people that live in this rather sad, war-torn continent at the moment."

– Dr. Jane Goodall

"There are no easy solutions to break this downward spiral of loss, but a coordinated effort at both protection and substitution will work."

– Dr. John Robinson

"I think we have to put an enormous amount of pressure on logging companies so that they adopt best practices and become responsible global citizens."

– Dr. Russ Mittermeier

For More Information

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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 Principe.

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CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #24

#24 — Forest-Based Carbon Offset in Central Africa Issues and Opportunities

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This brief was written by **World Resources Institute** and the **Biodiversity Support Program**. For additional information contact Jake Brunner, email: jbrunner@ci.org.

Related Issue Briefs

#5 Timber Tsunami

#11 Forest Governance

#13 Remote Sensing

#18 Sustainable Timber

Key Concepts

- If adopted, the Clean Development Mechanism (CDM) could offer the countries of Central Africa an opportunity to take advantage of their forest resources to provide competitively priced carbon sequestration and emission reduction projects to industrialized countries.
- Central African governments should strengthen their engagement in the CDM negotiations to ensure that forest projects are not excluded.

- Governments also need to demonstrate a willingness to deal with the political and technical obstacles and contractual obligations to ensure eligibility of forest projects under the CDM.
- If forest projects were linked to lasting improvements in the performance of public forest administrations, the CDM could be a positive force for change.
- One way to encourage better performance is to implement forest projects using risk-sharing schemes such as options contracts that provide long-term incentives for project compliance.
- Investments in forest science and remote sensing monitoring are justified if the skills and information generated are directly tied to forest management compliance verification.

Carbon Dioxide and Global Warning

Carbon dioxide is a potent greenhouse gas, and increased levels of carbon dioxide in the atmosphere have been linked to rising global temperatures with serious economic and environmental implications. Every year, carbon dioxide emissions from human activity pour over six billion tons of carbon into the atmosphere. About a third is absorbed by the world's forests. This discovery lies behind the proposal to limit the increase in greenhouse gas concentrations by planting more trees or by reducing deforestation. It has been estimated that forests could offset up to 15% of the world's greenhouse gas emissions.

Clean Development Mechanism

The Kyoto Protocol, negotiated in December 1997, gave a major boost to the notion of forest-based greenhouse gas mitigation. Under the Protocol, 38 industrialized countries and the European Union commit themselves to reduce greenhouse gas emissions by 2008-12 to a level 5.2% less than the 1990 level. To achieve this goal, the Protocol establishes legally binding emission reduction targets for industrialized countries, and three flexible mechanisms: emission trading within and among the industrialized countries, the Clean Development Mechanism (CDM), and a revised Joint Implementation (JI) Program.

If adopted, the CDM allows industrialized countries to achieve cost-effective reductions in greenhouse gas concentrations by investing in emission reduction projects, including forest-based carbon offset projects, in developing countries. Poor, forest-rich, tropical countries could therefore take advantage of their comparative advantage in providing an environmental service (rapid photosynthesis, carbon dioxide capture, and carbon accumulation in woody biomass and soil) to industrialized countries, where large emission reductions are relatively expensive to

achieve. The potential value of greenhouse gas trades involving developing countries has been estimated at between $11 billion and $19 billion annually.

Although the rules of the CDM have yet to be worked out, several carbon-intensive companies have taken early action. This reflects the recent change in attitude of many large companies, which now openly accept that governments may bind them to reducing greenhouse gases emissions. Many are conducting audits of the amount of greenhouse gases emitted by their facilities and are taking on voluntary targets for emission cuts. Some are exploring forest-based carbon offset projects in an effort to achieve zero net carbon emissions. For example, Peugeot, the French car manufacturer, has invested $11 million in plantations and forest conservation in Brazil. Although the company receives no immediate financial benefit, it gains in public image, acquires experience managing this kind of project, and shelters itself from the risks of future regulation.

"Governments also need to demonstrate a willingness to deal with the political and technical obstacles and contractual obligations to ensure eligibility of forest projects under the CDM."

Project Eligibility

There are two broad classes of forest-based carbon offset projects. Emission reduction projects include preservation of forests under threat of conversion to other uses (e.g., permanent agriculture or pasture), shifting from conventional to better forest management (e.g., reduced impact logging, longer felling cycles, recuperation), and developing fuel plantations on previously deforested land. Sequestration
projects include reforestation through permanent (i.e., non-wood production) plantations or natural regeneration, and shifting from slash-and-burn agriculture to agroforestry. Most cost estimates of supplying carbon sequestration services in tropical countries range from $2/ton to $25/ton of carbon.

Central Africa is home to the world's second largest contiguous area of dense moist forest and should be able to benefit from forest-based CDM investments. Table 1 gives the area of dense forest (defined as forest with a tree cover greater than 60%) for the six Central African countries and other large, densely forested, tropical countries based on an analysis of 1 km AVHRR data for 1992-93.

Table 1: Dense Tropical Forest Areas Per Country

Country	Dense forest (x000 km^2)		Country (x000 km^2)	Dense forest
Democratic Republic of Congo	1,272		Brazil	3,910
Gabon	222		Indonesia	1,031

Congo Republic	217		Peru	713
Cameroon	200		Columbia	564
Central African Republic	46		Bolivia	541
Equatorial Guinea	25		Venezuela	459

The eligibility of forest-based projects under the CDM is very controversial. If not designed properly, the CDM could encourage the clearing of old growth forest in favor of fast-sequestering, but biologically impoverished plantations. Many groups are also opposed to any scheme that would let industrialized countries trade away their responsibilities for reducing their own emissions. If forest cover maintenance projects were deemed ineligible, Central Africa would be effectively excluded from the CDM. But even if these projects were accepted, industry's interest in financing CDM projects is likely to be greatest in countries where companies have already invested, where the learning and public relations benefits are high, and where the risks are low. By all three criteria, Central Africa finds itself at a disadvantage relative to Brazil, Malaysia, and other tropical countries.

Use of bulldozers for logging.

The main barrier to CDM investment in Central Africa is high risk associated with bad forest management and poor governance. Several countries have introduced reforms aimed at promoting efficiency and transparency in the forest sector. But implementing these reforms has proved to be a formidable challenge, because of opposition from vested interests, and high levels of policy instability and political risk. Until these governance constraints are resolved, some observers argue that forest-based CDM funding risks are doing more harm than good.

Emission Reduction Projects

France, the region's major donor and source of forest science expertise, generally favors emission reduction over sequestration projects, because they tend to be more permanent. Several potential emission reduction projects exist. A 43,000-ha eucalyptus plantation near Pointe Noire in Congo Republic not only exports pulp, but generates enough charcoal to meet two-thirds of the city's energy needs. If the plantation is managed for sustained production, carbon emitted during charcoal burning is sequestered by the plant growth. By displacing the cutting of slower-growing old growth forest and/or fossil fuel consumption, the plantation thus contributes to reduced carbon emissions through higher standing biomass.

A concern regarding such projects is whether fast-growing and water-demanding eucalyptus plantations would displace biologically rich natural forest, thereby forfeiting the biodiversity co-benefits that CDM projects could likely promote. Although possible, the few large-scale fuelwood plantations that exist in Central Africa are all located on degraded land that form an urban halo around the major cities (e.g., Bangui, Yaoundé, Kinshasa, Kisangani).

Forest protection is another form of emission reduction. But the inclusion of forest conservation in the CDM has run into considerable opposition, because of the risk of moral hazard, whereby landowners would have an incentive to clear some forest in order to benefit from avoided deforestation. There is also doubt about the wisdom of countries receiving windfall profits without having to undertake any kind of economic innovation. A mechanism that granted money for nothing could undermine much-needed reform in a sector that is notoriously prone to corruption. Another concern about forest protection is leakage, whereby better behavior at the project site is offset by worse behavior elsewhere. Many protected areas in Central Africa abut logging concessions. Given high demand for the region's wood, expanding a protected area to cover a forest slated for logging would probably displace logging to another location. Finally, the eligibility of avoided deforestation risks swamping the market with carbon credits from Brazil, where the rate of deforestation is higher and forests cover over twice the area of all six Central Africa countries combined.

It may be possible to control for leakage by broadening the region of interest from the project to the country or regional level. It may not be necessary to monitor the entire forest estate. Satellite analysis by INPE, the Brazilian space agency, has shown that deforestation in Brazil is highly clustered. Between 1991 and 1996, 82% of forest clearing took place in three states (covering less than 25% of the forest area), and 86% was less than 25 km from areas that were deforested before 1978. But implementing such a system requires human and technical assets that are beyond the reach of most countries in the Central Africa, none of which monitor and report on forest conditions on a regular basis.

Reduced Impact Logging

Reduced impact logging (RIL) has been proposed as a CDM-eligible project. RIL involves such practices as forest mapping, careful planning and building of roads and skid trails, climber cutting, directional felling, minimal use of bulldozers, and avoiding logging in the proximity of rivers and on steep slopes. Such practices can demonstrably reduce the amount of waste and damage to the cut trees and to the residual stand, thereby reducing carbon emissions. Because RIL leaves the forest in better condition, it also promotes higher carbon sequestration. In conjunction with other policy measures, RIL could also reduce pressure on the region's remaining large tracts of intact forest. The broad-based adoption of RIL is consistent with the thrust of the World Bank-supported forest policy reforms, which are aimed at increasing harvesting efficiency. Tests from Brazil show that RIL may be profitable.

A modeling exercise in Cameroon suggests that RIL can lower tree death and subsequent carbon missions by 8 ton/ha in forests within 300 km of the port of Douala. Carbon savings drop off with distance, and are very low beyond 900 km. Since RIL costs $135/ha to implement in Malaysia, this translates to a carbon emission mitigation cost of $17/ton. This is a conservative estimate, because the cost of implementing RIL in Central Africa may be significantly lower, around $20/ha. Nevertheless, $17/ton is comparable to existing tropical forest-based offsets, and cheaper than emission reductions in industrialized countries. As logging intensifies in Central Africa under the influence of policies that encourage harvesting a wider range of species, the cost per ton of carbon sequestered by RIL should drop. In Malaysia, where the forests are more homogeneous and higher intensity harvesting is possible, RIL could save 40 ton/ha at a cost of $8/ton

What contribution could RIL make to carbon dioxide emission reductions in Cameroon, assuming an average carbon savings of 6 ton/ha?

Table 2: Net Value of RIL within CDM to Cameroon

RIL Unit Costs	Value of Carbon	
$/ha	$17/ton	$6/ton
$135/ha	($4,950,000)	($14,850,000)
$20/ha	$12,300,000	$2,400,000

If RIL were implemented in all of Cameroon's forests, of which 150,000 ha are logged each year, it would yield a net revenue stream of US $12.3 million/year, assuming that carbon was traded at $17/ton and RIL costs were $20/ha. If, however, costs were much higher (i.e., $135/ha) and the value of carbon less (i.e., $6/ton), then RIL would result in a net loss of over $14 million.

The emission savings associated with RIL in Cameron would amount to less than 1% of France's total carbon emissions of 100 million tons/year. But since the marginal cost of emissions reduction in France is high (because of its reliance on nuclear energy), investing in forest-based carbon offset projects in Central Africa may be attractive, given France's economic and political interests in the region.

Risk Management

Forest-based carbon offset projects in developing countries are considered to be much riskier than emission reduction projects in industrialized countries, which usually involve the permanent installation of clean technology. Project-specific risks include uncertain initial conditions; natural hazards, such as fires, poor project design; and out of project events, such as a new road unexpectedly built; whereas, country-specific risks include political instability and policy swings. Market risk includes the existence of a carbon market and the rules by which it will operate.

No CDM credits have yet been sold, because the rules have not been finalized. Nevertheless, different financing schemes have been proposed that would influence project and country-specific risk, project cost, and hence project viability (Table 3). The most common approach is project-specific financing, whereby the host country or intermediary organization negotiates the price per ton of carbon sequestered with an investor (e.g., The Nature Conservancy's Noel Kempff project in Bolivia). Because most of the risk lies with the investor, the price tends to be low (<$5/ton). Grouping several projects under a single marketing umbrella can help reduce the risk of project failure. Alternatively, carbon can be treated as a commodity that is sold at a fixed price to many investors (e.g., Costa Rica sells certified tradable offsets on the Chicago Board of Trade). To insure against project and market risk, a reserve of offsets is set aside, not sold. Credits sold under this scheme tend to be priced higher (>$10/ton).

Table 3: Analysis of Project Financial Viability

Possible carbon offset contracts	Bearer of project financial risk	Bearer of market financial risk	Direct financial incentives for performance	Relative effect on price
Project financing (quantity and price depend on project performance)	Investor	Investor	Weak	Negative
Carbon sold as a commodity at a fixed price (quantity and quality guaranteed)	Host country	Investor	Moderate	Positive
Carbon sold as an option (price and quality guaranteed)	Host country	Host country and Investor	Very strong	Positive

A third approach, which has been proposed in Nicaragua, is a risk-sharing scheme, whereby the investor purchases an option to acquire an offset at a higher, but predetermined future price. This

approach has several advantages. A relatively small foreign investment is required, but the seller gets a small amount of money immediately, which may be needed to get the project going. The host party also has a long-term incentive to make the project work, thereby reducing the project risks. Finally, the option price does not have to be discounted too much as a result of current uncertainty. Risk-sharing schemes are particularly attractive in Central Africa, where governments have pressing short-term funding needs, and commitment to better forest management is vulnerable non-market risks.

Biomass Monitoring

The CDM depends on the scientific validation of the sequestered carbon. Tests in Noel Kempff, Bolivia show that field-based carbon monitoring can be relatively inexpensive (e.g., <$0.25/ton of carbon offset). But it is unclear if this approach can reliably measure changes in biomass over large areas. A study of field biomass measurements performed over the same boreal forest stands by two groups shows differences as large as 90 ton/ha for the same stand, and that the differences are greater for larger biomass values. The main reason for these differences is the spatial variability within each stand, which is likely to be even higher for old growth tropical forests. An alternate method is radar remote sensing. The standard approach is to fit a regression curve to a set of backscatter and ground-based biomass measurements. The curve is then used to estimate biomass over other areas and forest stands. But this approach is invalid if the forest types deviate from those used to obtain the regression. A more fundamental problem is that the radar backscatter saturates at about 150 ton/ha of biomass, yet biomass densities can reach 400 ton/ha in mature tropical forests. Until specialized biomass mapping sensors are available, it may be possible to use time-series optical data to build a forest class baseline, and then map changes between classes over time. Forest classes can be tied to standard biomass densities, and between-class changes then used to estimate carbon lost or sequestered. The launch of Landsat 7, which is designed to provide complete global coverage four times a year at a cost of less than $600 per 190 by 190 km scene, makes this approach technically and financially feasible.

Several projects, such as the World Bank's Regional Environmental Information Management Project (REIMP) and the French API-Dimako in Cameroon have tried to improve forest management by increasing the supply of technical training and data. But their contribution to better forest management has been limited by the lack of effective demand. Linking forest-based carbon offset projects to forest monitoring could increase the impact of such projects by boosting the demand for forest science, remote sensing, and other technical skills.

Role of Government

Governments must formally approve CDM projects on their territory. They can also influence, directly and indirectly, the level of project risk. A key issue for forest-based carbon offset projects is the coherence between the goal of the project and the thrust of government policy as it

affects forest management. There are three degrees of coherence. The deep integration approach implies a tight coherency between project and policy goals. This is evident in Costa Rica, where the government is committed to taking advantage of the CDM as a source of sustainable development financing. The technology transfer approach implies that the government picks a sector to benefit from the CDM. It appears that East European governments, for example, might have targeted the power sector for reform. Finally, the island approach implies minimal government buy-in to the project goals or integration within broader forest and land-use objectives. Under these conditions, risks escalate. Government attitudes are therefore critical to the likely success of forest-based carbon offset projects.

Forest cleared by a bush fire.

For More Information

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CARPE...What Is It?

Central African Regional Program for the Environment (CARPE)

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CENTRAL AFRICAN REGIONAL PROGRAM FOR THE ENVIRONMENT

CONGO BASIN Information SERIES

CARPE March 2001

Issue Brief #25

#25 — CARPE Small Grants Program Reference List

This list was prepared by the **Biodiversity Support Program**. For additional information contact Laurent Somé, email: laurent.some@wwfus.org.

The following list is a compendium of reports and publications on activities funded through the Central African Regional Program for the Environment (CARPE)'s Strategic Objective Support Fund (CARPE's small grants program). It complements the references given for each individual issue briefs and provides the CARPE Issue Brief readers with further supporting information. Most of these documents are posted on the CARPE Web site http://carpe.umd.edu, and may be downloaded free of charge.

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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 Principe.

Web site:
http://carpe.umd.edu

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