

Introduction

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This volume of the *Yale School of Forestry and Environmental Studies Bulletin Series* assembles diverse perspectives on the question of academic research and its application to natural resource conservation. The volume authors pay particular attention to a number of intersecting dichotomies: academic research versus the practical application of research to conservation and development work; natural science versus social science, in both research and policy formulation; and western versus non-western understandings of natural and social systems.

Our geographical focus is the central African tropical forests of the western Congo River basin, part of the world's largest old growth tropical forest after the Amazon. The Sangha River, formed by the confluence of the Mambéré and Kadeï Rivers, flows into the Congo River, and defines an area with unique social and natural characteristics. The borders of Cameroon, the Central African Republic, and Congo meet at the Sangha River, forming a trinational region containing three contiguous protected areas (Figure 1). The Sangha River watershed serves here as a case study of international resource management over time, across social and ecological communities, and by means of interdisciplinary and international collaboration.

Remarkably rich in wildlife, timber, and mineral resources (Carroll 1986; Fay and Agnagna 1991; Fimbel 1996), the Sangha River watershed has historically experienced a wide array of resource exploitation and management schemes (Harms 1981; Dupré 1995). The Sangha basin was the object of territorial struggles between Germany and France at the turn of the century, and is still a locus of political and economic tensions among a variety of expatriate actors and long term regional residents. Despite its limited infrastructure, the region faces intensification of logging, mining and hunting pressures (Telesis 1991; World Bank 1996). Because of the international and regional complexities of such commercial exploitation, coupled with conservation and development efforts, the Sangha River watershed serves as a fruitful catalyst for interdisciplinary analysis and communication across institutions and nations. At present the Sangha River region is emerging as an experiment in transborder resource management; it deserves, and desperately needs, guidance and support on national and international levels.

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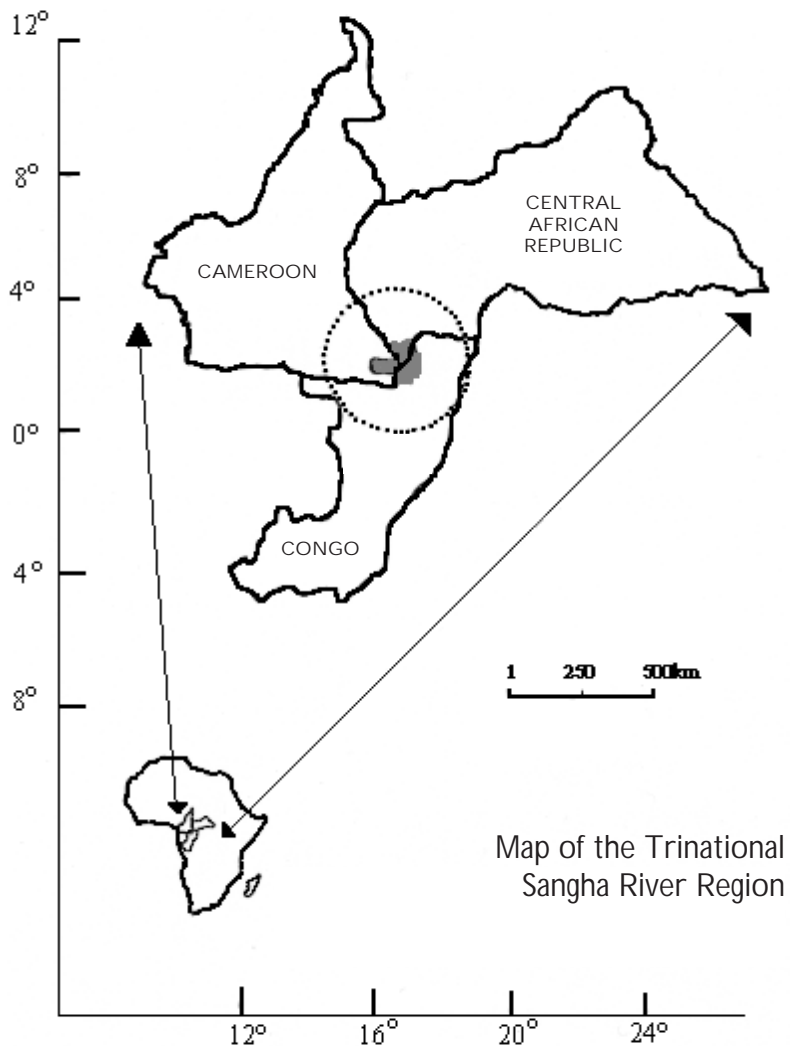


Figure 1 Map of the Sangha River trinational area. The three contiguous protected areas considered in this volume are shaded grey, within the circle of the broader region.

The papers in this volume are taken from presentations and discussions at the international conference entitled *Natural Resource Use Relations in the Trinational Sangha River Region, Northwestern Congo River Basin*, held at Yale University from 25-28 September 1997. The conference brought together African, European, and American scholars, government officials, and conservation professionals with common interests in this specific region of central Africa. This volume's contributing authors all conduct long-term work, either technical or academic, in the Sangha River region. The articles and discussions are presented here in an effort to engage a wider readership, but also to encapsulate the conference for colleagues who were unable to attend the gathering, but who may wish to be

involved in the network development and information exchange that has ensued.

Far from the metropolitan centers of the three nations they straddle, the forests of the Sangha River trinational region support large numbers of rare and endangered plants and animals, and may constitute an area of previously unrecognized endemism (Beresford and Lundy 1997; Ray 1996). They also support, and have supported since prehistoric times, diverse communities of human inhabitants with their respective uses of forest resources for subsistence and trade (Lanfranchi, Section I, this volume).

DYNAMICS OF THE PAST

PREHISTORY

Based on paleo-ecological and archaeological research, scholars have suggested that the dense equatorial forest of the region emerged as a result of climatic shifts that occurred approximately 12,000 BP and resulted in forests expanding from scattered patches beginning 8,000 to 9,000 BP (Bailey *et al.* 1989). But because archaeological remains are often ill-preserved in the moist, acidic soils of the tropical forest, the details of prehistoric human migrations, movements, and modes of life remain mysterious. Lively debates among archaeologists, historians, social anthropologists, and biologists animate this field of inquiry (Hardin, Section I, this volume). Whatever the origins, the broader Congo River basin remains, all too often, characterized as a vast, undifferentiated tropical forest, with little effort made to distinguish among distinctive ecological or cultural areas.

The Sangha River originates in northwestern Central African Republic, running to its confluence with the Oubangui River (in the northern portion of the Congo River system). It is one of the few rivers in central Africa that runs from north to south, facilitating contact among forest, savanna, and desert-dwelling peoples in prehistoric, historical, and contemporary contexts. For centuries, traders and migrating peoples have transported commodities between geographical regions along the Sangha, creating interwoven networks of kinship, language, cultural practices, and beliefs. The upper-Sangha thus contains multiple, overlapping linguistic communities that organize themselves along parallel lines of kinship based on clans (Copet-Rougier, Section I, this volume) and according to similar totemic systems. Particularly since the introduction of the Arab and Atlantic slave trades into the region in the late 1800s, such movements and connections have had a more sudden, and sometimes violent, nature as groups battled and fled one another. But throughout

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such social change, political and economic inter-clan relations along the Sangha River have created the linguistically and culturally mixed communities of contemporary southeastern Cameroon, southwestern Central African Republic, and northern Congo. Such heterogeneity stands in contrast to the more homogeneous communities found in parts of the eastern Congo basin.

COLONIAL HISTORY

One of the last regions of Africa discovered and claimed by European explorers at the turn of the century, the Sangha River region shifted back and forth from German to French administrative control in the early 1900s. After World War I the region remained part of French central Africa. Colonists and missionaries established outposts and mission stations to oversee the twin colonial projects of military and administrative control, and to promote health, education, and Christian conversion of local communities. Such actions both encouraged and benefited from the budding resource extraction for metropolitan profits by private European trading companies (Coquery-Vidrovitch, Section I, this volume). While early colonial officers and missionaries arrived in the Sangha River region by boat following river networks, they and private agents quickly built roads using conscripted and forced labor, linking forests with the colonial capitals. Then, as today, the roads between forest zones and larger towns facilitated the movement of supplies toward outposts, while forest resources moved in the opposite direction, toward ports for shipment to Europe (Discussion and Comments, Section I, this volume).

For over a century, the tropical forests of the Sangha River region have been exploited for ivory, timber, rubber, diamonds, and animal products. During this time much forest land has also been converted to commercial plantations for coffee, cocoa, and tobacco. Since colonization in the late 1800s, shifting prices and changing world markets have provoked cycles of extractive activities, continuously luring or forcing new inhabitants into these forests as wage labor. Inarguably, the greatest benefits from such commercial exploitation in central Africa have accrued to its colonizers, and to those outsiders who have developed thriving informal “economies of pillage” (Bahuchet and Guillaume 1979: 129).

Such extractive activity was at its most intense during the colonial “scramble for Africa” at the turn of the century, when spoils from the equatorial African forest regions (relatively untouched compared to earlier established colonial territories) were divided into concessions and distributed among private companies (Bouteillier 1903; Coquery-Vidrovitch 1972). The relations between

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these young companies and the colonial government structures of the early 20th century created precedents that persist today. They are reflected, for instance, in the political power controlled by a more metropolitan élite, and in continued local resistance to certain forms of such power.

Such a complicated heritage of injustice provoked by external intervention does not seem to be disappearing with time. Indeed, the social gulf between those who control extractive industry and those who provide its labor has only widened since political independence, achieved in most of these countries in the early-mid 1960s. In the late 1990s, the forests in the Sangha region continue to be dominated by timber and mineral companies which create local labor markets and extended transportation networks. These commercial operations contribute to an international appetite for luxury items and deplete the resource base on which local communities depend for basic sustenance and local or regional trade.

Although this relationship of extraction and exploitation continues to dominate the international political economy of the Sangha region, local communities have, thus far, adapted with resiliency to changing market dynamics. They have embraced new skills and languages to compete for access to jobs, development or educational opportunities, and economic stability, while they continue to support themselves through agriculture, hunting, fishing, and gathering. Yet the combination of international industry and local opportunistic exploitation has often resulted in difficult conditions under which forest communities (whether plant, animal, or human) struggle to maintain their basic health and diversity.

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INTERACTION OF KNOWLEDGE FORMS IN CONSERVATION

During the conference that gave rise to this volume, Joseph Mewondo Mengang, Sub-Director of Protected Areas for Cameroon, said: "Here today as a representative of the Cameroonian government, I am requesting assistance and collaboration from international universities... to best integrate experimental policy approaches." He identified the following domains as urgent for research to support the generation of more effective, appropriate environmental policy: bioecology, ethnobotany, anthropology, and monitoring of species (Mewondo Mengang, Section IV, this volume). His comments refer both to fields of academic specialization and to more applied research agendas. They thus resemble many of the texts in this volume: interdisciplinary studies that address practical dilemmas of ecosystem management across national frontiers.

This volume also reflects the increasingly supple conceptual frames available to natural, social and policy scientists. Particularly with regard to Africa, experts in development studies are currently calling for a return to basic research to better orient future policy (Sachs 1998). But scholars pursuing “basic” research are, increasingly, analyzing the inter-penetration of political, economic, and biological systems. Interdisciplinary innovation is becoming the rule, alongside the scientific integrity of highly specialized competence. The injection of environmental concerns has better defined and refined more established fields such as development studies (Fairhead and Leach 1996), and has contributed to the creation of younger, hybrid fields such as globalization studies (Appadurai 1996) and environmental epidemiology (Grifo and Rosenthal 1997).

While promoting and drawing from such innovations in academic scholarship, researchers and technicians working in the Sangha region also recognize the contributions of specific disciplines to understanding of Central African forests (Discussion and Comments, Section II, this volume). We thus remain committed to reviewing work within separate domains, and aspire to further work that builds on skills from a range of specialists, reducing the competitive tension that all too often prevents effective collaboration across disciplines (Rupp, Section II, this volume). For the purposes of this introduction, we thus consider natural and social science trends separately.

NATURAL SCIENCE

Tropical forests are complex both structurally and biologically, incorporating a network of tall woody vegetation, an herbaceous understory, and vines which link the various levels of the forest to one another (Harrison 1962). These varied levels or layers combine to form ecosystems that maintain a high diversity of species, accompanied by relatively low densities of mammal populations when compared with other ecosystems, particularly the African savanna (Bodmer 1989; Hart *et al.* 1989; Plumptre and Harris 1995). The tropical forests of central Africa, which form one part of the Guinea-Congolian forest belt, comprise the largest tract of unbroken forests in Africa, and represent approximately 15% of the world’s remaining tropical forest (Barnes 1990; Wilkie 1994).

The meeting point of separate Guinean and Congo basin forest bioregions (Fotso, Section II, this volume), the Sangha watershed is characterized by its combination of broad clearings and dense forest. Within the central African equatorial forest, numerous vegetation types are patchily distributed across the landscape and have been categorized as colonizing forest, *Marantaceae* forest, mixed-species forest, mature closed canopy forest, marsh/swamp forest, and

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disturbed areas (White *et al.* 1995). As a result of relative climatic stability, wildlife distributions are greatly influenced by vegetation structure and phenology (Harrison 1962). Rainfall in the Sangha region is usually highest in September and October, with a relative dry season generally lasting from November through March. The terrain is characterized by light relief, and is accented by numerous rivers that run through the valleys, with variously flooded areas along their courses. Soils are primarily ferric oxisols (Moutsamboté *et al.* 1994).

Despite its impoverished soils, the tropical forest ecosystem holds vast resources for those nations, institutions, and individuals that have access to it (Johns 1985). Disturbance, whether natural or human-induced, may both enhance and reduce species richness depending upon the circumstances of the disturbance phenomenon. The study of tropical ecology has moved from consideration of relatively static, bounded climax systems to subtle models for disturbance ecology and ecosystem management (Whitmore 1984; Denslow 1984; Phillips 1994; White 1994; Vogt *et al.* 1997). Much remains to be learned about the characteristics and consequences of disturbance in these forests; a primary determinant of the diverse biological structures of tropical forests, its occurrence may also be linked to the historical land-use practices of human populations (Wilkie and Finn 1988). It is important, in developing improved ecological understanding of these forests, to distinguish between large- and small-scale disturbances, and between human and non-human related disturbances.

Of course, through various means, these different scales and types of disturbance are deeply interconnected. Many plant and mammal communities in equatorial Africa have co-evolved, particularly in areas of forest that have been disturbed. This dynamism opens possibilities for robust growth of both plants and animals, resulting in an intricate balance of species development and diversity. Central African forests contain areas of high densities of plants in the *Marantaceae*, *Zingiberaceae*, and *Commelinaceae* families, collectively referred to as terrestrial herbaceous vegetation (THV), which grow rapidly and abundantly in disturbed areas of the forest. Some researchers attribute the high occurrence of these plant families to elephant activity (Calvert 1985; Carroll 1988), because elephants are well known to cause openings in the forest canopy, allowing the rapid growth of THV. Indeed, this vegetation type provides large quantities of important foods for elephants (*Loxodonta africana cyclotis*) and western lowland gorillas (*Gorilla gorilla gorilla*). The high productivity of particular forest types has also been directly correlated with the activities of large mammals including elephants and gorillas (White *et al.* 1995). Although tropical forests are generally consid-

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ered to be diverse, in places where disturbance is limited, monodominant stands often result, and botanical diversity is primarily determined by interactions between plant and animal communities (Hart *et al.* 1989).

Commercial-scale exploitation of these forests, such as logging, can result in significant canopy destruction, with consequences for animal populations. Although natural disturbances of the canopy resulting from elephants' activities and windfalls create small-scale, dynamic patches of forest and thus are considered beneficial to the forest environment, large-scale disturbances, such as those caused by logging, may favor only certain plant and animal species (Frumhoff 1995). Certainly, large-scale disturbances such as road building facilitate economic systems and infrastructure for the exploitation and consumption of forest products (Eves and Ruggiero, in press; Wilkie *et al.*, in press; Auzel and Wilkie, in press). These large-scale, human-related disturbances must be taken into account in any ecological framework for understanding change in the forest environment (Discussion and Comments, Section IV, this volume).

SOCIAL SCIENCE

The organizational histories offered in this volume demonstrate that natural scientists' studies of wildlife and botany were largely responsible for the creation of protected areas in the Sangha River region during the mid-1980s and early 1990s (Carroll, Vedder, Section III, this volume). The subsequent introduction of new user-groups, including commercial exploiters as well as development-oriented organizations, is both a cause and a result of the rapid environmental transformation under way in the forests of the Sangha watershed. Since the initial establishment of parks and reserves, the social sciences have offered a valuable analytical lens for examining the interfaces between natural changes and political, economic, and social changes (Mogba and Freudenberger, Section II, this volume).

In addition to contributing ethnographic and historical analyses of cultural, social, and political systems in central Africa, social scientists' work has been responsible in recent years for the institutional development and formulation of regulation processes on local, national, and international levels (Joiris, Section II, this volume). It is thus useful to explore the kinds of social science projects that are carried out in central Africa, and to explain approaches that may be emerging in reaction to previous efforts and in anticipation of future questions.

Recent Africanist history and anthropology have been at the heart of vital interdisciplinary approaches such as historical anthropology and social history. Such approaches consider the broad social

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impacts of colonialism (Hobsbawm 1983; Vail 1989; Comaroff and Comaroff 1991, 1997) as well as the history and practice of western environmentalism within the tropics (Anderson 1987; Grove 1995). As for the central African “tropics,” one can argue with certainty that equatorial African forests are characterized by social systems where authority is ephemeral, and stable political hierarchy is rare (Vansina 1990). Where imposed political hierarchies occur through expanding trade systems or state structures, they encounter the more fluid socio-political systems typical of forest communities, and hybrid social solutions emerge. These hybrid systems, within the complex “mixed communities” we describe in the “Histories” section of this introduction, pose particular challenges to western development and conservation agendas, both historically and at present.

Indeed, applied social science and initiatives for the study of development have shown that, relative to other world and African regions, indigenous non-governmental organizations (or NGOs) are remarkably rare in equatorial Africa, particularly at local levels (Fisher 1993; Charancle 1996). International NGOs thus merit particular attention in this region, as they may powerfully manipulate the intersection of their interests with those of local and national communities (Bratton 1989; Najam 1996). Despite the proliferation since 1980 of international environmental NGOs active in the Sangha Region (and more broadly in the three countries concerned), information about the region’s natural and cultural systems remains relatively inaccessible to educators and policy makers. Conversely, despite flourishing trans-border trade and other wide social networks, rural communities in the Sangha River area have limited access to information about environmental and economic factors influencing their futures.

To make matters more complicated, primary sources of news that shape local public opinion (for example, national radio broadcasts and, increasingly, television), frequently reflect global scarcity perspectives (Fairhead and Leach 1997). Contemporary news sources thus contribute to perceptions of crisis rather than using new communications technology to support constructive local or regionally based solutions to resource base depletion (Gupta 1995). Of course, pessimistic perceptions of scarcity, and more sanguine views of emerging solutions can and must interact in the minds and lives of those involved in the region at present. This interaction may even shape the future, which can be seen in terms of productive new partnerships among national and international agencies and actors, or alternatively as repeated cycles of colonial-style external intervention.

In fact, the development of equatorial African forest regions has entailed both change and continuity through several separate phases

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of international intervention. Post-independence intervention in Africa was guided by international actors' aspirations that African states guarantee both growth and equity for the populations living within their borders. But such aspirations are currently in crisis, especially in equatorial Africa, where the state has been recognized by political scientists as particularly fragile within a continent-wide context (Bayart 1993; Schatzberg 1988). Current international pressure on African governments to privatize industry and to streamline (or "structurally adjust") their central bureaucracies is strong. While many African functionaries express frustration with increased financial and logistical belt-tightening brought on by such reforms, the outcomes of such policies remain to be studied in detail.

Political science also brings new insights about the roles of private companies in the emergence of colonial African political systems, revealing startling past and present similarities between the political mechanisms of African nations as different as South Africa and Cameroon or Congo (Mamdani 1997). Many African nations face common challenges of rural administration at present. And now, as at the turn of the 20th century, private companies play an important role in mediating and defining the circumstances of economic, social, and political development in rural zones. In fact, some scholars would argue that a second "scramble for Africa" is presently underway, with one important addition. In today's race for territorial control over tracts of central African forests, an influential contender is the international non-governmental organization, often with a conservation imperative. Although their objectives differ, what corporations or international aid agencies may share is provision of infrastructure and services that some African government agencies are able to provide only with difficulty, particularly in remote areas such as the Sangha region (Hardin *et al.* 1998).

This second "scramble" is creating new political and ecological precedents. How do particular state actors in equatorial Africa respond to the collaboration and competition among various international organizations? How can responses of both African states and international corporations and organizations be strengthened, where they encourage environmental "best practices"?¹ Furthermore, whose knowledge and opinions are solicited in the elaboration of "best" versus "worse" environmental practice? Are the gulfs between rural and urban, labor and management, local and settler, professor and policy maker, still widening in places such as the Sangha region? Are new connections and forms of communication emerging across previously separate communities? Such questions require attention to varied forms of knowledge as they relate to current processes of social and environmental change.

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¹ The World Resources Institute is developing a "best practices" initiative that enables policy processes concerning environmental issues to be abstracted and taken as lessons or models across national and regional case contexts, from both African regions and beyond. We adopt this phrase, in part, from that context.

SCIENTIFIC INNOVATION AND “INDIGENOUS” KNOWLEDGE

It is essential that those central Africans who will carry out conservation and economic development programs and direct environmental policies have the tools necessary for assessing and analyzing biological diversity and human-wildlife interactions (e.g. Saterson 1990; Cracraft 1995).² The abilities of expatriate scientists to provide additional expertise for current research, development, and conservation projects are limited, however, by competing commitments to their home academic institutions. To further complicate capacity-building efforts, research and educational institutions within equatorial Africa have been challenged by tumultuous political and economic transitions in recent years (for example, the school system in CAR closed altogether for three years or more between 1988 and 1998). As a result of such complex circumstances in many African contexts, contributions of expatriate researchers to fledgling local research communities may foster as much dependency as they do intellectual independence (Diawara 1997). Common discussions of intellectual and material resources are thus essential, and are beginning to emerge through efforts such as this Yale conference, volume, and network development.

Expatriate researchers do offer economic and educational opportunities on an extended basis to central African communities. During times of political and economic crisis, when expatriate development or diplomacy professionals have either elected to leave or have been evacuated from metropolitan areas of central Africa, research projects have maintained operations in rural areas. Particularly in border regions such as the Sangha River, easy access among research sites in different countries creates the possibility for continued data collection and development of African research capacities over time, even during tumultuous times (Fay, Section IV, this volume). Such field-based contributions merit greater recognition and reinforcement, given the current upheavals across equatorial Africa.

The research process also benefits local communities by developing human resources and local markets without necessarily causing uncontrolled growth of population centers, and the attendant ecological and political dilemmas associated with urbanization and migration. Enhancement of scientific capacity and knowledge exchange among host country researchers can thus promote the use of natural resources to benefit a wide scope of national and regional institutions, providing a sustainable foundation for growth in the local communities and the private sector (Rudran 1990). Research thus merits consideration as an economic activity within regional development scenarios, and contrasts markedly with the resource

² This discussion of African capacity to carry out research is drawn, in part, from work by Melissa Remis in the context of the Research and Rural Development Work Sessions, held in Bayanga, CAR (Hardin and Remis 1997).

depletion, population influx, and community fragmentation brought by extractive industry.

In analyzing the politics of research, consultancies, and technical aid in remote areas of the developing world, we must bear in mind that research occurs on many levels. In terms of reference for conservation or development project evaluations, we note the emergence of several categories of “experts” called to carry out assessments, feasibility studies, or basic research. These categories include: local experts (African residents of research sites who have not been formally educated); national experts (formally educated nationals, often from areas outside the research zone); and international experts (formally educated expatriates). But such “levels” of researchers and communities of scholars and practitioners inevitably interact, as do their respective bases of knowledge. Interaction alters the levels of expertise, giving rise to new forms of knowledge that escape any simple tiered scale. Indeed, interaction among experts across social and cognitive categories pre-dates most contemporary typologies, and demands further analytical attention for adequate understanding of the interplay between knowledge, power, and the development or conservation process (Agrawal 1995).

At the local level in the Sangha region, specialists with little or no formal education have enabled and allowed western-style science to be practiced, whether out of curiosity about the activities of expatriate researchers, or simply because their ability to exercise territorial control within the forests is constrained. Local communities have provided crucial collaborators for the natural and social scientists whose work has contributed to new perceptions of these forests. Together, local, national and international researchers have contributed to new images of central African forests. No longer are these forests discussed as mere wilderness to be tamed for development through agriculture and extractive industry. Rather, they may be described at times as species-rich regions containing a kind of ecological “capital” to be collectively managed for new forms of development.

This exchange across knowledge communities is constantly being negotiated, with surprisingly successful results, despite the very different circumstances under which its participants have acquired knowledge of central African forest systems. But negotiations of the roles, rights, and responsibilities of researchers and practitioners whose lives span local, regional and national political frameworks remains a difficult task. In several of the papers presented here, we sense that such a task generates considerable tension. Current conservation efforts in the Sangha region are faced with the complex cultural mosaic left by a long history and pre-history of cultural contact, exacerbated by successive waves of exploitative industry. In order to

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effectively assess ecological impacts, conservation and development projects must come to new understandings of the relationships among culture, ecology, and resource use, or between resource use practices and the perceptions that shape them.³

The debates that arose during our Yale conference were among local, national and international specialists, and between natural and social scientists (Gartlan, Section III, this volume). Participants debated which phenomena—socio-economic, biological, political—are the most relevant to the future of the Sangha region, discussing which sorts of inquiries merit particular attention, concern, and committed resources for further investigation. Both natural and social science fields, however, seem to be slowly becoming more attentive to their interfaces with the knowledge systems of local residents of the Sangha River forests.

As an eclectic group of co-authors and conference participants, we agree on two essential points: the proliferation of extractive industry in the region has exceeded the creation of protected areas; and information must be managed better, more openly, and faster to conserve more carefully the forest resources that are still intact. To improve overall management and monitoring of the Sangha region forests, large-scale disturbances must be limited and closely observed while our understanding of the beneficial and deleterious effects of small and large-scale disturbances improves. Room for improvement exists as well in the capacity of various sorts of specialists to communicate what they know (Ascher, Section IV, this volume). As knowledge circulates, it will of course be challenged. Such debates can be heated, but must be continued, and made more inclusive. To support these ongoing debates, new communities of scholars must be created and fostered so that conversations may occur outside of the ordinary institutional and intellectual frameworks to which researchers and professionals are accustomed.

INSTITUTIONS AND APPROACHES TO CONSERVATION

During recent years the growing perception of tropical forests as a kind of imperiled global patrimony has sparked new interest in the forests of the Congo River basin, lending new urgency to scientific efforts to understand tropical social and ecological systems. Indeed, expanding tropical deforestation is an issue of global concern, since these ecosystems provide numerous ecological benefits beyond their own borders, including the maintenance of high levels of biodiversity of both animal and plant species (Pottinger and Burley 1992; Montalembert 1991; Hamilton 1991). But because of poorly designed concession and forest revenue systems, current practices effectively result in the mining of forests for highly valued export

³ In the words of Emilio Moran: "Resources are not an absolute reality, they are largely a matter of perception....In analyzing the use of resources, I am interested in assessing the accuracy of the native conceptions of the environment (ethnoecology) in relation to the data collected by standard ecological methods. Because of the heterogeneous nature of the . . . population, no single set of native categories applicable to a domain is present" (Moran, *Developing the Amazon*, 198, p. 99).

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species (ITTO 1993). To achieve the diverse and sometimes divergent goals of national, regional and local economic development through sustainable ecosystem use, creative and constructive valuation and utilization of central African forests is essential. But today's territorial relations within the Sangha River region are no less complicated than those described in this volume for times past. State actors and institutions are wooed by a variety of suitors, each with their own agendas for the territorial control and use of rural resources.

Actors involved in these complex processes of resource valuation and management include state agencies, multinational corporations, multi- and bi-lateral aid institutions, local social collectives, and more. For the purposes of this volume, we chose to conduct a collective analysis of institutions that share a conservation agenda in the Sangha region. We thus focus primarily on international NGOs. Why, then, refer to institutions? Because the NGOs analyzed here have entered relatively recently onto an already crowded stage as concerns these forests. We hope, by the use of the term "institutions," to suggest these agencies' interactions with other structures, be they governmental, corporate, or community-based, as they all define and defend their roles in these forests.

The NGOs considered in detail here include: Worldwide Fund for Nature (WWF-US, although WWF Germany and Netherlands are also increasingly involved in this zone (Carroll, Blom, Session III, this volume); WCS, the Wildlife Conservation Society (Vedder, Ruggiero, Section III, this volume); and GTZ, die Gesellschaft für technische Zusammenarbeit (Debonnet, Hoffmann, Section III, this volume). The two former organizations have been in the process of establishing parks and reserves in the Sangha River region since 1990. Within a slightly larger radius, GTZ has claimed responsibility for managing buffer zones around these core areas.

Some important institutions, however, are not considered here. Beyond the scope of this volume, but represented by a few of the Yale conference participants, is the European initiative Ecosystèmes Forestiers en Afrique Centrale (ECOFAC). ECOFAC maintains forest management projects in Cameroon, CAR, and Congo, as well as in Gabon, Equatorial Guinea and Sao Tomé (projected activities in Democratic Republic of Congo have been delayed due to political turmoil). Also beyond the explicit scope of this volume lie those international actors who support conservation in equatorial Africa, including the International Union for the Conservation of Nature (IUCN) and the Global Environment Facility (GEF), an initiative of the World Bank, and the United Nations Environment Programme (UNEP). At the same time, private concessions for timber and mineral extraction are active throughout the region while commercial industries such as



Felis aurata

tourism and hunting operate in selected areas. Although we do not analyze them here, we hope to include representatives from such organizations in future meetings of this research network.

Each of these organizations and industries has a set of historical precedents, guiding principles, goals, objectives, and internal contradictions that influence their ability to coordinate with other agencies in the future (Eves, Section III, this volume). Compounding this complexity, international, governmental, non-governmental, and research organizations are often in conflict with one another, rarely communicating in constructive, critical dialogue (Discussion and Comments, Section III, this volume). It was with the hope of encouraging such dialogue that this conference and this volume were conceived.

We must mention, as well, that the European, American, and African educational and research institutions represented here also have distinct histories, structures, and agendas. If equatorial Africa is a meeting ground for French- and English-speaking international researchers, then the campuses of western European and American universities are places where French- and English-speaking Africans can and should meet. Connections between African countries, as well as among the academic institutions of Europe, America and Africa, constituted the focus of a third meeting of this fledgling network, in September 1998 in France. Such questions raise the broader relevance of this specific regional case, and thus bring us to the final section of this introduction to the volume.

CONCLUSIONS: DIRECTIONS FOR INSTITUTIONAL LINKS, INNOVATION, AND INFORMATION FLOW

Overall, this volume addresses the region's past ecological and social context, explores diverse perspectives concerning the current natural and social systems within the region, and proposes that the region may be thought of as a relevant unit for continued research, analysis, and action. One must recognize the splendid (albeit somewhat slippery) flexibility of the concept "region" for analysis of changing human-environment relations (Sivaramakrishnan and Agrawal 1998). We use "region" as an organizing principle for the papers presented here in order to pose specific questions about which humans, under what circumstances, have had what roles in relation to one another and to the forests of the Sangha River watershed. In addition, this volume identifies and analyzes current conservation actors, their historical roots, contemporary organizational structures, operational strategies, and future plans. The volume also reviews the political contexts for each country, examining how conservation agencies and other stakeholders shape knowledge for future policy recommendations and action.

Since detailed knowledge about the functions of these forests is still emerging, appropriate conservation action will be determined by future understanding of the structures, functions, and relationships among forest species. The effects of disturbance on forest structure and function, the movement of wildlife populations in relation to human activity, and the long-term changes that may result from logging and mining activities are all important points for further focused investigation and debate. In short, this volume argues that the Sangha River region constitutes an unparalleled opportunity to coordinate such investigations, and to experiment with innovative, appropriate action based on research results *before* permanent, irreversible changes have taken place across the landscape.

TRANSNATIONAL PROTECTED AREA MANAGEMENT

Despite promising first steps, however, coordination at the regional level continues to be elusive in the Sangha River case. The mosaic of contiguous protected areas in the Sangha region is just that: a mosaic in which fragments of research and policy undertaken by the several international NGOs cited above and by the national governments of three separate countries continue to exist side by side. Based on the conference, this publication aims to delineate possibilities and constraints facing future trilateral forest management in Cameroon, CAR, and Congo, from both academic and applied perspectives. To this end, it presents results of ongoing research and begins to identify gaps in existing knowledge. Further, some papers evaluate the relevance of research results and practices to the region's resource management and economic development strategies. Representatives from the Cameroon and Central African Republic governments engaged conference participants in a lively debate about the challenges of national level, and international transboundary conservation (Mewondo Mengang and Ngatoua, respectively, Section IV, this volume).

The absence of a representative from the government of Congo (Brazzaville) due to a civil war there underscored the political fragility of these equatorial African nations, compelling participants to reflect upon the need for regionally-rooted development strategies across national borders, which might also contribute to national coffers and capacities for further growth and stability. We should note that scholars and activists elsewhere have attempted to demonstrate that collaboration among local, national, and international actors for conservation objectives may produce peace, stability, and sustainable development for embattled border zones in Africa.⁴ The Sangha River case both refers and contributes to other transborder cases, for example the nextdoor Gabon/Congo/Cameroon initiative (de

... the Sangha River region constitutes an unparalleled opportunity to coordinate and to experiment with innovative, appropriate action based on research results before permanent, irreversible changes have taken place across the landscape.

⁴ See the following internet site for information on the southern African "Peace Parks" initiative: www.Peaceparks.org.za.

Wachter 1997), the trinational complex in west Africa, known as the "Parcs des W," or the trinational case of Uganda's Queen Elizabeth National Park/the DRC's Virungas/Rwanda's Parc des Volcans.

Beyond African contexts, the movement for transborder conservation practice is also being encouraged, often by the same institutions active in the Sangha region (see, for example, the WWF and UNDP-sponsored initiative in Asia, summarized in Dillon and Wikramanayake 1997). It is worth wondering whether such a transnational, interdisciplinary forum might emerge for the western Congo River basin, or sub-saharan Africa more generally, and how research and policy could intersect in such a forum.

TRANSDISCIPLINARY COMMUNICATION

To advance the intersection of research and policy in the western Congo basin, copies of this volume will be distributed to Yale conference participants as well as to university libraries, academic departments, and other organizations concerned with conservation and development in the region. Through this bilingual publication, the development of a bilingual website (<http://www.yale.edu/sangha>), and ongoing network development across campuses, projects, and forest sites in Africa, we hope to facilitate the sort of international, interdisciplinary community for which we call throughout this introductory text (for more information on the Sangha River Network, see the last page of this volume or visit our website: <http://www.yale.edu/sangha>). For the moment, as we write our way toward realization of these goals and objectives, let us simply thank our contributing authors for providing engaging material to orient the discussions and plans.

For according these authors your attention despite their specialized detail and their distinct perspectives, we thank you, readers, whether you are managers, entrepreneurs, consultants, academics, or the fishing, foraging, farming, wage-earning and (increasingly) page-turning residents of the Sangha River region.

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