



The Ecosystem Approach

Learning from Experience

Gill Shepherd, Editor



Ecosystem Management Series No.5



The Ecosystem Approach

Learning from Experience



IUCN

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This publication has been made possible in part by funding from the Netherlands Ministry of Foreign Affairs, Directorate General of International Cooperation (DGIS).

Published by: IUCN, Gland, Switzerland

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Citation: Shepherd, G. (ed.) (2008.) *The Ecosystem Approach: Learning from Experience*. Gland, Switzerland: IUCN. x + 190pp.

ISBN: 978-2-8317-0957-4

Cover photos: Front: Discussing clan land management in the Baliem valley, highlands of Indonesian Papua © Adrian Wells.
Back: Women's forest user group, community forest, Nepal © Gill Shepherd.

Layout by: Patricia Halladay Graphic Design

Printed by: Imprimerie SADAG, Bellegarde, France

Available from: IUCN
(International Union for Conservation of Nature)
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1196 Gland
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www.iucn.org/publications

A catalogue of IUCN publications is also available.

Printed on FSC paper.

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Acknowledgements

This publication would not have been possible without the support and encouragement of a wide variety of people. We would like to acknowledge Ton van der Zon, Felix Hoogveld and Aart van der Horst in the Directorate for International Cooperation, Netherlands Ministry of Foreign Affairs; and Peter Bos, in the Directorate for Nature Netherlands Ministry of Agriculture, Nature and Food Quality. We are grateful for the guidance given by the Project Advisory Committee, which also comprised Hillary Masundire (the CEM Chair), Piet Wit (CEM Vice-Chair), Nordin Hassan (then South-East Asian Vice-Chair) and Frits Hesselink from the IUCN Commission for Education and Communication.

At IUCN we are grateful to each member of the Ecosystem Management Programme team, consisting for most of the period of Simon Rietbergen, Joachim Gratzfeld, Caterina Wolfangel, Patricia Hawes and Caroline Edgar. Additional mention is made at the end of each chapter of the assistance provided in each of those contexts. Finally we are deeply grateful for the editing and layout skills of Patricia Halladay and to all the individually acknowledged photographers on whose work we have drawn.

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Foreword

This book is one of the outputs of the programme of work undertaken in the 2005–08 inter-sessional period by the IUCN's Commission on Ecosystem Management (CEM). It was made possible with funding from the Directorate General of International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs. DGIS also funded most of the case studies that are used here, in two cases (Mekong and Congo) by funding the placement of Junior Professional Officers in IUCN offices or projects.

It continues CEM's commitment to developing more practical guidance for the application of the Ecosystem Approach, and follows on from an earlier publication (*The Ecosystem Approach: Five Steps to Implementation*, IUCN 2004).

In selecting the case studies, it was CEM's view that the Ecosystem Approach, to be properly tested, had to be applied in multiple-use landscapes where Protected Areas formed no part, or only one among several parts, of the whole ecosystem. The approach also needed to be seen to be applicable in a variety of different kinds of biome. Thus we have here the analysis of overlapping ecosystems in an area of dry sahelian West Africa which contains no protected areas at all; of a Mekong delta wetland area with an very hard boundary and little relationship with the lands and livelihoods that lie beyond; of the developing symbiosis between a logging concession and protected areas in northern Congo-Brazzaville; of a Panamanian archipelago containing both protected and sustainable use areas, being overwhelmed by a rapid increase in tourism; and of Indonesian Papua where the forestry department is trying to use ecosystem approach ideas to adjudicate between the competing demands of conservation, logging, conversion of forest to oil-palm, and local community use of forest in highland, lowland and coastal areas.

These cases make it clear that the 12 Principles of the Ecosystem Approach as they stand contain two major weaknesses. First, they do not address in any way the institutions through which ecosystem management stands or falls. Yet in fact the identification of the existing institutions which might be involved in ecosystem management, the development of better collaboration between them, or the invention of durable new institutional arrangements over time is fundamental. These institutions need to function adequately at the local level and to build or strengthen links through which they can reach other levels as well. Second, the impact on ecosystems of markets and other economic forces is under-recognised by the 12 Principles.

Both these weaknesses probably grow out of the fact that those who developed the 12 Principles were most familiar with protected areas, where there is only one managing institution and where market forces are largely held at bay. This was further justification for the choice of multiple-use ecosystems in the case studies.

CEM's ambitions for ecosystem approaches are broad. It is our view that these approaches to the management of rural areas need to be valued by government and other institutions beyond those concerned with the environment. This is because it will be impossible to address such issues as climate change mitigation and adaptation equitably and sustainably without using them.

I am grateful to Gill Shepherd and to all the authors who have made this volume a reality, and look forward to further volumes in the Ecosystem Management series.

A handwritten signature in black ink, appearing to read 'H.M.S.' with a stylized flourish.

Dr. Hillary Masundire
Chair, IUCN Commission on Ecosystem Management



Overview

The Ecosystem Approach

Gill Shepherd



Introduction

This book uses the terms “ecosystems” and “landscapes” more or less interchangeably. In this it follows Sayer, Maginnis and Laurie (2005) and some others. It takes particular account of landscapes as defined by the people who live in them, and uses the phrase “Ecosystem Approach” to analyze forms of management that attempt to address both human and biological aspects of ecosystems.

The Convention on Biological Diversity (CBD) defines its “strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way” as the Ecosystem Approach to management. This use incorporates the concept of an area used by humans as well as one containing plants and animals in a recognisable configuration.

Landscapes, especially in Europe, have always been defined to some extent by the beholder. Landscape boundaries are often defined by the people who live in them in terms of natural features such as water catchments or river boundaries, or by the territorial limits of the main economic uses made of the terrain. Landscape characteristics, goods and services — along with the different kinds of land ownership to be found in them — are all key features from the human point of view. Such a landscape is often no more than a few kilometres across (Forman and Godron 1986).

Global conservation organizations think at a very different scale, however. The World-wide Fund for Nature (WWF), for instance, has identified nearly 1,500 ecoregions world-wide (terrestrial, freshwater and marine) of which a much smaller number (WWF’s Global 200) are especially critical. Within each of these ecoregions, large high-priority areas for active conservation are referred to as landscapes (Loucks et al. 2004). Conservation International has identified 24 global hotspots; if conserved, they would capture more than half the world’s biodiversity (Mittermeier et al. 2004).

For landscape ecologists, landscapes are deemed to exhibit some heterogeneity (patches of different kinds of vegetation) against a fundamentally connected background which contains some kind of internal order or logic (Forman and Godron 1986; Forman 1995). Threats are increased disturbance and fragmentation, and landscape size is defined biologically by the habitat range of the main species under consideration.

From the local to the global scale, the multiplicity of stakeholders in conservation is now recognized. In almost every landscape, potential is shaped not only by the differing management regimes imposed by individuals, communities, government and businesses, but by other human factors located beyond the immediate landscape. These include the formal framework of policies, institutions and processes within which the landscape is located, and the local and distant markets which influence the engagement it has with a much wider area.

Many landscapes are on the brink of much larger changes driven by factors such as climate change and its anticipated impacts.

The Ecosystem Approach

The Ecosystem Approach (EA) stands at the meeting point of sustainable ecosystem management and enhanced livelihood security for the poor (the poverty reduction agenda of the Millennium Development Goals). It also encompasses conservation and development concerns, and has the potential to shape these two ways of seeing the world into a more complementary relationship.

Out of the interaction of these perspectives comes the possibility of “scaling up from the local ecosystem” (Berkes and Folke 1998) to other scales, as institutions and management arrangements adapt, take on new roles and diversify over time.

In the chapters in this volume, analysis begins at the level of the local ecosystem, and moves from the known to the less known or the unknown. This process is sometimes referred to as “progressive contextualisation” (Vayda 1983); more and more inclusive spatial and temporal contexts are investigated. Decisions on the size and detail of these contexts are made not only on the basis of “constraints on the time and tools available for research, but also the degree of completeness and precision that the investigators felt to be needed for explaining the problem to themselves and policy makers” (Kartawinata and Vayda 1984). The chapters try to show the processes by which problems were successively addressed, how narrow frames of reference had to give way to broader ones, and how problems at lower levels could be solved by also working at higher levels.

The EA, as promoted by the CBD, lists 12 guiding principles to be borne in mind in implementation. The principles often look complex, but their overall message is simple and can be summed up in a few points.

Ecosystems are not isolated. They overlap, interlock and interact with one another. The EA requires the recognition that any particular ecosystem is influenced heavily by surrounding systems and that all land and water is found inside an ecosystem. Ecosystems are not islands of excellence in an otherwise second-rate landscape.

It is never enough to consider only protected areas (PAs) when planning conservation. Other adjacent areas need to be taken into account, and not just the buffer zone. The sustainable interaction of people and biodiversity can only be developed in a larger ecosystem area, and the ecosystem approach encourages both a larger vision on the ground and an exploration of interconnections.

Human beings are ecosystem components. The EA values the active role of humans in achieving sustainable ecosystem management. Under most scenarios, ordinary poor people have to be responsible for many of the everyday decisions that collectively determine the sustainability of vast areas. People and their livelihoods should always be considered alongside conservation measures.

Adaptive management is essential. Full information for the successful management of a particular area is never available, and it will always be necessary to adapt management as more is known. Ecosystems are dynamic in space and time and they have multiple potential futures that are uncertain. Management has to be flexible while keeping in sight the long-term goal of resilience. Institutions must also adapt.

In a learning environment, old institutions develop new links and new capacities, and new institutions come into existence. The EA implies flexibility, requires learning-by-doing and is incremental. This makes it very different from integrated management in the past, where there was an attempt to achieve integration from the start of the process.

The 12 principles are arranged in a somewhat arbitrary order and are in consequence quite difficult to apply. IUCN's Commission on Ecosystem Management (CEM) tried to simplify their use by grouping them in five steps, which are arranged in a roughly chronological sequence (Table 1).

Building on pre-existing frameworks

Many sectors have developed their own way of dealing with the world. Rangeland management, water resource management, and forest management, for example, are based on certain assumptions and strengths as areas of discourse and action.

The EA can add value to this thinking. Dryland management becomes ecosystem management when the biodiversity interests of settled, mobile and migrant inhabitants are known, the areas of conflict and overlap between them are better understood and management regimes and responsible institutions are established which take account of them. Water management becomes integrated water resource management or ecosystem management when it goes beyond irrigation concerns to consider management for the health of all aquatic resources and the people who depend on them. Forest management becomes ecosystem management when forest conservation and production and local livelihoods are considered together, and when the units considered and managed include relevant agricultural areas as well as forest areas. The terminology is less important than the understanding that a coherent whole, whatever its form, should encapsulate the best compromise available between resources and users.

Table 1. The 12 Ecosystem Approach principles, grouped into five steps by IUCN's CEM

Step A. Key stakeholders and area		
Stakeholders	Principle 1 Principle 12	The objectives of management of land, water and living resources are a matter of societal choice. The EA should involve all relevant sectors of society and scientific disciplines.
Area analysis	Principle 7 Principle 11 Principle 12	The EA should be undertaken at the appropriate spatial scale. The EA should consider all forms of relevant information. The EA should involve all relevant sectors of society and scientific disciplines.
Step B. Ecosystem structure, function and management		
Ecosystem structure and function	Principle 5 Principle 6 Principle 10	Conservation of ecosystem structure and function, to maintain ecosystem services, should be a priority. Ecosystems must be managed within the limits of their functioning. The EA should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
Ecosystem management	Principle 2	Management should be decentralized to the lowest appropriate level.
Step C. Economic issues		
	Principle 4	There is usually a need to understand and manage the ecosystem in an economic context and to: i) reduce market distortions that adversely affect biological diversity; ii) align incentives to promote biodiversity conservation and sustainable use; and iii) internalize costs and benefits in the given ecosystem.
Step D. Adaptive management over space		
	Principle 3 Principle 7	Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems. The EA should be undertaken at the appropriate spatial scale
Step E. Adaptive management over time		
	Principle 7 Principle 8 Principle 9	The EA should be undertaken at the appropriate temporal scale. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term. Management must recognize that change is inevitable.

The case studies

In all cases in this volume except the Congo study, IUCN and/or its partners set out with an explicit ecosystem approach framework in mind, and the goal of testing its usefulness and applicability. This is a step forward from several other collections of case studies where the EA was retrofitted to work carried out earlier for other purposes. These case studies were selected in multifunctional land-use areas where different kinds of users worked alongside or were in conflict with one another. Mostly the cases involve a protected area and other land uses. Only in the case of dryland West Africa is there no protected area at all. Case studies were also selected for diversity of biomes.

It was possible to follow the evolution of change at each site over a period or two or three years, with considerably greater time-depth in some cases because of the existence of valuable prior work.

Niger/Nigeria

This dryland West Africa case is located in an area of extensive dryland farming and livestock herding which is subject to broad climate fluctuations. The ecosystem has been greatly changed by population growth through in-migration. There is a resulting need to integrate agriculture and livestock more fully into a less open landscape. Rapid and creative adaptive management, carried out entirely by local people, is taking place over time and over space in response to these pressures. The EA was used to examine the overlapping and sometimes conflicting ecosystems defined by different categories of users, and to try to resolve these. The authors also examined the role of market hierarchies in ecosystem evolution.

Mekong Delta

The Mekong delta location is a PA of wetland, grasses, reeds and flood-tolerant forest and is important for migratory birds, including the Sarus crane. It has been the object of unclear and unresolved PA goals and conflict with locally resident stakeholders. Inflexible management hierarchies and prescriptions made it difficult to reorient goals even as the need to do so became apparent. The EA was used to analyze problems, and to indicate the main difficulties. Management goals and modalities needed clarification at a national level; a national-level EA workshop was held where wetland issues from all over Vietnam were re-examined.

Congo

The site chosen for the Congo basin case study is a logging concession in an area covered by lowland rainforest and swamp forest. Originally, concession managers had limited ecosystem knowledge and limited involvement with local stakeholders such as pygmies. Illegal hunting, trapping and marketing of bush-meat was rife in the area.

Driven by the desire to achieve FSC certification, however, the company employed researchers to help it understand the dynamics and regeneration of various forest tree species, the relationship between logging and key forest mammals, and to map local land and resource rights. The company also entered into a symbiotic relationship with the managers of the PAs on the borders of the concession. They have formed an organization, and, with the Congo government, will manage forests and protected wildlife sustainably across the larger ecosystem. Neither the concession nor the conservation organization formally used the EA in planning their interventions, but the steps they have taken and the institutional evolution which has occurred has exactly mirrored the EA process.

Panama

Bocas del Toro is a marine archipelago with a range of mangrove and coral-reef habitats. An earlier government drive to support commercial levels of fishing resulted in collapsing fish stocks, and a project had begun with fishermen and a local NGO to establish a zoning system of use and “no-take” zones and to monitor stock recovery. The project collapsed for a variety of reasons, mainly government support for a huge growth of tourism in the area, which project funders and implementers had not realized would fundamentally affect their goals. The NGO overseeing technical aspects of the project collapsed, and reef monitoring came to an end. The EA was explicitly chosen by the project manager with the goal of devolving as much management as possible to local people, but it was not used at the time to analyze the other factors threatening the archipelago. The EA was later used as a tool for evaluation, and it then became more apparent that not all stakeholders had been identified at the start, changing market forces in the area had not been acknowledged, and relationships with the local municipality and other bodies had not been established.

Indonesian Papua

The focus in this case study was at a larger scale. The provincial head of forestry decided to apply the EA to the whole forest area he was responsible for, covering highland and lowland tropical forest and coastal mangroves. Papua's forests are designated as conservation, protected, production or conversion forest at the national level in Jakarta, but a more fine-grained approach to each of these areas is possible if the will is there. Local land categories have been recorded through participatory mapping, which can be laid over national forest capability maps. Attempts are being made to adopt water catchment-based logging concessions within which some areas will be designated for community logging. In conservation areas, attempts are being made to define boundaries jointly with local clans and to use all legal land categories (such as traditional use zones and excised areas) to diversify the area. Ecosystem approaches to each forest land-use category helped integrate new dimensions into government planning, and existing institutions are taking on new tasks to deal with new activities.

Emerging issues

Incentives for trying the Ecosystem Approach

For the EA to be valued, it must be seen to be a problem-solver. Willingness to look at issues in a new way might come about as a result of a crisis, because sectoral issues can be better bridged that way or because a different frame of reference is sought. The application of the EA began in just such a way in several of the case studies analyzed here.

In the case of the Mekong delta PA, Tram Chim, for instance, the protection goal was unclear and management decisions were not dealing with key problems. What should have been a wetland site, protected for the endangered migratory birds that visited it and ensuring that the grasses on which they fed were available, was being managed for forest values and in such a way as to prevent local people from fishing. EA analysis helped to clarify the problems, and suggested some of the solutions.

In Bocas del Toro in Panama, aspects of the EA were used to try to address an emergency: the collapse of local fish stocks and local fishing livelihoods. The project manager was also eager to test EA Principle 2 (management should be devolved to the lowest possible level).

In Indonesian Papua, the trigger for new ways of working was land-rights conflict between indigenous peoples in the province and the national Ministry of Forests' attempts to continue to allocate land for logging concessions without consulting them. The provincial head of forests is using an EA to develop complementary systems of community use, conservation and commercial use throughout the province in as many forest management units as possible.

At the *Congolaise Industrielle des Bois* (CIB) logging concession in the Congo, the company's desire for certification led it to deepen its understanding of biodiversity, local people's use of forest and its own effects on the landscape, and to take on broader alliances and responsibilities.

In the Niger-Nigeria borderlands, an intensively-used and mainly farmed ecosystem is overlaid by other broader ecosystems used for non-farm products, grazing animals or wage-labour. The EA provided a way of conceptualizing the overlapping uses made of these ecosystems by different stakeholders, and gave insight into household and group decision-making about ecosystems.

Ecosystem size and scope

Several of the case studies show how over time, as issues are better understood and if institutional mechanisms allow, mosaics of different kinds of complementary land-use can be harmonized into larger and more coherently managed areas.

In the Congo, the CIB company began to work closely on the management of one of its forest management units (FMU) with a conservation organization managing an adjacent PA. Joint planning took place for the monitoring of legal hunting and the limitation of illegal hunting in both areas, minor adjustments were made to the boundaries of the FMU and PA, and broader assessments were made of human impacts and how to divert some of them to a nearby town. While not all problems have been solved, a plan for further action is in place.

In Indonesian Papua, the whole province is treated as a single area, with planning for conservation, production, and local community livelihoods and productive activities. In production areas (where FMUs are often structured on a water-catchment basis) ideas for both community and commercial logging are being tried. In conservation areas, the planning of boundaries, enclaves and possible excisions by local forestry officials and local people will dovetail local land-rights and livelihoods with the Lorentz World Heritage site. The EA provides structure for the thinking in all these areas.

The Bocas del Toro archipelago in Panama is an example of unclear ecosystem management boundaries, weakly managed by either the state or conservation organizations. Local fishing groups' attempts to conserve fish stocks and create set-aside areas were taking place at too small a scale. It is now apparent that zonation planning needs to be led by the municipality in collaboration with those responsible for conservation, sustainable fishing, tourism and holiday-home investments.

Each case shows that the management of ecosystems of increasing size cannot outrun the development of the necessary institutional arrangements.

Stakeholders and scale

Ensuring the involvement of key interest groups in decision-making is a major challenge to successful long-term conservation, and a great deal of effort has been expended in understanding and promoting participatory processes at the community level. While much work remains, there have been sufficient studies to demonstrate that local communities can and do play a key role in the sustainable management of resources.

A key challenge remains: opportunities for making land-use trade-offs at the local level are often relatively limited when compared to broader geographical areas. More sustainable outcomes may be found by developing approaches that enable decision-making on ecosystem services and economic systems at the broader landscape (or seascape) scale.

At this scale, however, involving stakeholders in meaningful and equitable decision-making becomes increasingly complicated. Scaling up is best fostered by first making

sure that there is clarity about local-level rights to manage, take decisions and make choices. New institutions will be needed (or existing ones given a clearer mandate) so that local capacity can work with other levels to address broader issues.

Though ecosystems seem to be “natural” entities, their uses at the local level are dictated by human goals and decisions. This means that it is necessary to ask who shapes the ecosystem. Who has decided its boundaries on the ground, and whose structures, disciplines, experience, concerns and priorities are being brought to bear on it? Since diverse tenure and institutional arrangements exist within ecosystems, people trying to broaden management goals must learn how to do so in a consultative way, often without overall authority, through negotiated land use with others.

Understanding ecosystem structure and function — and the management actions needed to maintain and enhance them — grows most rapidly through building support for multi-stakeholder relationships, and through identifying the scale at which conflict can be resolved and an enabling environment fostered.

Management and the institutions to deliver it

The case studies shed light on management and institutional challenges and solutions. The ideal management arrangement, which is well explored in the Niger-Nigeria case study, has a range of functioning institutions that have evolved over time at village/district and higher levels. These have long been nested one inside the other and have open channels of communication between levels in both directions. With such institutions in place, new tasks can be taken on fairly readily as population densities go up, or as climate fluctuations force changes in the ecosystem and create a need for new ways to conserve resources.

The more common scenario is a lack of the right range of institutions or impediments to the flow of information between levels. In the case of Tram Chim in the Mekong delta, for instance, there are no appropriate stakeholder institutions by which the thousands of villagers who live around the park can interact with park authorities. Even more problematically, park managers have very little independent authority and fear the censure of regional officials. These officials in turn act only on the basis of decrees from the national level. There is no incentive to innovate or even to collect much new data in such contexts; in fact there is every incentive not to. While an independent ecosystem analysis at Tram Chim made these issues very clear, the EA cannot be used for implementation if adaptive management on the basis of new enquiry and new results is proscribed. Incremental institutional and management change can take place only where there is authority to diagnose problems through the use of the EA; in other words, if a higher-level authority is prepared to consider innovation.

In the CIB concession in the Congo the company undertakes a very wide range of management activities, some linked directly to the timber business and others related to the welfare of employees and local residents. The company negotiates with the government and with conservation NGOs and manages researchers. Institutional inadequacies are found at lower levels, where, although local people are consulted, they have no systematic way of recording their opinions or their knowledge. A Village Committee exists, though it is not truly representative of all parties, and the village development fund created by the company is unlikely to be spent wisely. The company has, however, now employed a social scientist to oversee process improvements.

In Indonesian Papua institutional innovation is also required. Clan organizations need to settle outstanding conflicts with each another so that they can move on to negotiating effectively with provincial government and others. Institutions for joint management and planning by clan organizations and commercial timber companies will shortly be required. Similarly, provincial and district-level government levels need to take on new roles as strategists, umpires and extension agents. Since the provincial forest office is eager to see all these institutions evolve and develop in this way, it will be possible for outside supporters to help them to do so.

In Bocas del Toro, Panama, fishermen's cooperatives needed effective supporting NGOs to liaise between them and local government. The local government needed to be aware of their efforts and able to understand the impact of tourism ventures on local people. Above all they needed a facilitating organization — ideally The Nature Conservancy — to create a framework to support local government as it planned zonation to encompass conservation, sustainable use and commercial activity

These examples show that management goals have to emerge through the exchange of stakeholder perceptions if the right institutions are to be strengthened or developed. The tasks best devolved to low administrative or implementation levels, and those which need the muscle of higher levels to be effective, need to be identified on a case-by-case basis. For this to take place an active resident process manager seems to be needed to facilitate discussion and planning.

Markets

The case studies illustrate the strong influence of markets on ecosystems. This influence may be negative when the traded product is illegally snared bush meat, but it is often highly positive. Markets often provide incentives for active management where there would otherwise be few or none.

The Niger-Nigeria case study shows how, just as ecosystems are embedded one inside the other and managed by hierarchically-linked institutions, so too market chains

mean that villagers have interests far from each village. Local ecosystems and the uses made of them by local people are influenced by the existence of markets at the village level, nearby weekly markets, cattle-markets up to 80 km away and at markets over the border in the next country. Often it is only these long-distance high-value sales that make it possible to buy the fertiliser to maintain local farms.

In Papua, under its current provincial forest department head, markets for timber, and the demands of sustainable and profitable timber production are driving the move towards better rights for local people and an end to conflict between large-scale producers and local people. Timber producers have been pressing for improved rights for local people so that conflict can be reduced.

The CIB Congo case shows that rich local ecosystems indirectly engender markets which trade across an enormous area. Timber is trucked to Cameroonian ports, Cameroonian oil and foodstuffs are imported to the concession from equally distant points, and people have been attracted to the concession from all over central and even western Africa for trade as well as employment reasons. CIB's company town, Pokola, has become a regional hub. What drives this market is the purchasing power of CIB's salaried employees. This has enormous implications for local ecosystems, which must be protected from illegal hunting by potentially large numbers of people for potentially insatiable markets.

The case studies suggest that it is very important to understand that the physical ecosystem sits within an economic ecosystem, and that it is important at the outset to try to understand what this consists of.

Undervaluing ecosystem services has been one of the primary reasons for many of the short-sighted management practices of the past. One essential element of an EA is helping communities, governments, and industries assign more accurate values to ecosystem services so that they can factor these values into their planning processes. These are not just local issues. Just as Kano City's markets, in Northern Nigeria, are a driver of distant ecosystems in Niger and Nigeria, so too can economic decisions at the national level shape what will take place within subnational ecosystems.

A key challenge for the future will be to provide decision-makers with more robust economic arguments for maintaining and restoring ecosystem goods and services as providers of infrastructure that is every bit as important as roads and schools.

Adaptive management

Two of the case studies show the evolution of adaptive management over time and over space. The Congo case is able to report how CIB has moved over a decade from narrow sustained-yield forestry to a style of management strongly infused by ecosys-

tem management thinking and knowledge, which was recently rewarded with an FSC certificate. It has taken on broader responsibilities over a wider area and its ambitions will take it still further in these directions.

In the Niger-Nigeria case study adaptation has been undertaken by local people. The researchers who worked on this study were able to draw on 20 years of their own previous research, and on a record of the situation along a five-village continuum from a more arid northerly village to a somewhat less arid village 200 km to the south. Growing populations have caused considerable intensification of land-use, a changed management regime for animals and changing tree tenure. Within rainfall limits, soil fertility — a key determinant of ecosystem health — can be maintained under good management. Resource conservation and resource use are intertwined, and linked to ownership and rights. As the writers point out, stakeholders are conscious of the fragility of their ecosystems and the necessity to conserve them and are aware of the changing interrelationships between ecosystems. They see the necessity of integrating the interests of different stakeholders, in order for these ecosystems to survive and thrive.

In these two cases, those in authority (CIB in the first, and local farmers in the second) have had the freedom to adapt as they chose and as they needed to. Researchers may also be free to do this. But such freedom is often the exception: more usually government officials are not at liberty to adapt in this way and projects may not be on the ground long enough to do so. The slow, participatory and skilled processes needed for good quality adaptive management do not fit with tight schedules.

A further difficulty in successfully adapting management in favour of biodiversity conservation is the need to extend change to more than management. Bad land-use may spring from weak land rights or land access. Ensuring that people have some kind of long-term land access will strengthen their capacity to make long-term pro-environment decisions.

In Nepal, for instance, Community Forestry User Groups (CFUGs) have been managing small forests for over 25 years, developing a strong understanding of forest management techniques and practical conservation in the process. A recent book (Ojha et al. 2008) compares outcomes in Nepal from six types of participatory arrangements for forest management or conservation (community forestry, collaborative forest management, leasehold forestry, watershed management, buffer-zone forestry, and integrated conservation and development). It shows that the most effective and durable institution has been the CFUG, offering the most sustainable support for both livelihoods and biodiversity.

There is a relationship between ecosystem size, institutional capacity and capacity for adaptive management. CIB has a huge capacity and almost total control of its area

and has been able to undertake adaptive management on an impressive scale in only a decade. Niger and Nigeria's dryland farmers have adapted on a smaller scale as individuals, households and villages, but over 20 or 30 years their combined interventions have also changed the landscape over an extensive area.

Over shorter periods, or with more modest management inputs, less should be expected, but change will occur whether or not it is managed and planned.

Using knowledge effectively

The close relationship between knowledge and power is not always acknowledged. Who owns knowledge, who gathers knowledge and who has the authority to act upon knowledge are important topics, as shown in the case studies.

Debates sometimes arise about the difficulties of combining different kinds of knowledge (scientific knowledge, indigenous knowledge and so on) and there are certainly methodological challenges in so doing. The use of different kinds of knowledge once gathered is almost more important, however. The EA requires that knowledge be shared between all users and all knowledge generators; there also has to be a willingness to share the power that knowledge brings, and to make sure that information becomes available to all the people who took part in the information gathering.

The EA can only be implemented if people are ready to share knowledge and can act jointly upon it. Without this willingness, the EA cannot get beyond the analysis stage, for the gathering of knowledge should lead to the realigning of management goals and to joint practical action.

All the cases make it directly or indirectly clear that knowledge management is a vital part of management. Some of the knowledge management failures in the case studies are instructive. In the Mekong delta, for instance, data collected locally must be referred up to the provincial level for decision-making. This is true even of such simple and repetitive actions such as when to open or close sluice gates at the beginning and end of the rainy season. Here the hierarchy of authority (and a consequent fear of taking responsibility and being wrong) has prevented a system being developed where action is triggered automatically based on indicators such as water height.

In Panama, an NGO collecting simple data on the availability of various fish species did not teach local fishermen its counting methods, nor did it share the data with them at the end of the exercise. It also did not explain why a balance between types of fish (herbivores and carnivores) was essential for the health of the reef. Fishermen knew a lot about species availability from their own catch data, but were not taught about the balance between them. When the NGO abruptly ceased to exist, the data were lost without ever being used.

Sometimes the contrast between different kinds of knowledge can spur new approaches to problem solving. In the case of Indonesian Papua, for instance, the poor fit between broad, nationally prepared forest land capability maps and the valuation of forests revealed by participatory mapping and forest-focused Participatory Rural Appraisals (PRAs) conducted among Papua's indigenous peoples, that convinced the provincial head of forests that the two had to be coordinated. The results could help to deliver both greater equity and greater ecosystem benefit. Neither side had any idea of the forest classifications and related management activities employed daily by the other until they met to exchange knowledge.

In the Congo, CIB's problem-oriented approach to data-gathering on the dynamics of the forest and the distribution of animals contrasts very positively with the World Conservation Society's species-based data-gathering through its support to PhD students. Neither has fully shared its information with local people, however. CIB has paid for the mapping of local pygmies' food gathering areas, hunting areas, sacred trees and grave-sites, and has incorporated this data into its exploitation maps and zonation arrangements which protect local people's livelihood areas. Although the data has been used for positive purposes, the concept of "prior informed consent" requires that knowledge-sharing go further.

The methods used for knowledge sharing and knowledge combining are very important. It is vital to choose methods that can be understood by all parties. Some imaginative effort may be required to achieve inclusivity.

Mapping has often been an excellent way to do this. In the CIB concession in the Congo, for instance, local pygmy leaders were taught how to use GPS to record boundaries and key sites. The GPS units were equipped with symbols for these purposes so that illiterate people were able to use them in the field. The participants returned to CIB's mapping office to see their symbols being transferred to CIB's master concession maps, and have seen their data incorporated in officially demarcated exclusive hunting and gathering zones. In Papua, local people spent weeks helping to map customary territories, devising symbols for different kinds of forests and forest resources, drawing sketch maps and aligning these components with satellite imagery.

The EA's stress on the democratisation of data-gathering and sharing deserves even greater focus, and should apply to all phases of data-collection, from the creation of baselines through assessment and monitoring to evaluation.

How easy has it been to apply the Ecosystem Approach?

An assessment was made of how successfully the twelve EA principles were applied at each site and which principles proved difficult. A summary of this assessment is presented in Table 2.

Table 2. Applying the 12 Principles of the Ecosystem Approach

1. Niger/Nigeria 2. Mekong Delta 3. Congo 4. Panama 5. Indonesian Papua

P#	Principle	1	2	3	4	5
Group 1: relatively straightforward						
5	Conservation of ecosystem structure and function, to maintain ecosystem services, should be a priority.	√	√	√	X	√
8	Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.	√	√	√	X	√
9	Management must recognize that change is inevitable	√	•	√	√	√
10	The EA should seek the appropriate balance between, and integration of, conservation and use of biological diversity.	√	•	√	√	√
Group 2: some difficulties						
3	Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems	√	X	√	•	√
11	The EA should consider all forms of relevant information.	√	•	√	X	√
12	The EA should involve all relevant sectors of society and scientific disciplines.	√	•	√	X	√
Group 3: difficult						
4	There is usually a need to understand and manage the ecosystem in an economic context and to: (i) reduce market distortions that adversely affect biological diversity; (ii) align incentives to promote biodiversity conservation and sustainable use; (iii) internalize costs and benefits in the ecosystem	√	X	√	X	√
7	The EA should be undertaken at the appropriate spatial scale.	√	X	√	X	√
Group 4. very difficult or meaning unclear						
1	The objectives of management of land, water and living resources are a matter of societal choice.	√	•	X	X	√
2	Management should be decentralized to the lowest appropriate level	√	X	X	•	√
6	Ecosystems must be managed within the limits of their functioning	—	—	—	—	—

√ yes X no • partially — unknown

Success in applying the principles, by site

In the cases of Niger-Nigeria and Papua, 11 of the 12 principles were successfully addressed. The Congo evaluation indicates that nine principles were dealt with. In the Mekong delta only two principles were fully addressed, while five were partially addressed, and in Panama two were fully addressed and two partially addressed.

The most successful applications of the EA took place where there was both the freedom and the capacity to manage effectively. This was the case for farmers of the Niger-Nigeria border, the Provincial Forest Authority in Papua and CIB managers in the Congo. CIB does a little less well than the other two because it does not yet address the societal choice principle or the need to devolve some parts of its responsibilities to local government and village development committees.

The Mekong example had many challenges, but because park authorities have been supported by a well-funded project, progress has been made in applying some of the principles. In Panama major challenges existed. Local institutions could not cope, and gave up.

It would also seem that the first three cases mentioned (Niger-Nigeria, Papua and Congo), where different kinds of land-use are being managed contiguously or were coordinated from the outset, are better able to deal with the EA. The Mekong and Panama cases, which began as pure PAs, have found it difficult to extend their capacities capacities and responsibilities more broadly, and to interact with a wider range of stakeholders.

Success in applying the principles

In scoring each principle by how widely it was successfully applied, it has been possible — again, just from these five examples — to see which principles were easy to address and which were more difficult.

The first and easiest group of principles (Table 2, Group 1) are those which are closest to traditional PA management or to an understanding of the need for the maintenance of ecosystem services.

Slightly harder to address successfully were principles 11 and 12 (Group 2), which stress the need for wider consultation with those stakeholders with an interest in the ecosystem concerned, and a wider identification and consideration of information from these stakeholders and others. Not surprisingly, the cases in Mekong and Panama, which began as PAs and tried to adapt to EA principles, found it difficult to consider impacts to adjacent ecosystems.

The third group of ecosystem principles, which Mekong and Panama also found difficult, concerned assessing and managing economic impacts on the ecosystem, and selecting a spatial scale broader than the PA at which to manage ecosystem sustainability.

Group 4 brings together the hardest principles of all. Principles 1 and 2 are difficult because they involve making complex judgments. In the case of Principle 1, how is societal choice decided? How are different kinds of stakeholders, and their choices, rated

against one another? How can global and local ecosystem values be accommodated? Principle 1 challenges much of conservation practice and can only be accommodated by a mosaic landscape which accommodates different values in different parts. As we have seen, the move to a landscape frame of reference is difficult for people accustomed to PA management with its clear-cut land-use and responsibility boundaries.

In the case of Principle 2, how are decisions made about the lowest appropriate level of management? This principle does become clearer through trial and error and adaptive management, but it takes time.

None of the cases was very clear about the limits of ecosystem function (Principle 6). The Niger-Nigeria case has probably come closest to hitting the limits of ecosystem function; the rest are in the process of trying to find out how to improve ecosystem functionality and productivity.

Implications of Table 2 analysis for CEM's five-step methodology

It would be simpler if CEM's methodology was able to move from easier to more difficult actions in moving from old PA approaches to ecosystem management, but since it is structured as a time sequence, this is not possible. The principles which concern ecosystem structure, function and area (parts of Steps A and B) and those concerning some aspects of adaptive management (Steps D and E) seem to be the most straightforward. The most challenging are Step A — at the very beginning of the process — concerning stakeholder identification and consultation, and Step C (also needed early), concerning ways of identifying and managing economic impacts on the ecosystem. The other stumbling block, particularly for managers who have managed only a PA, is taking on a broader landscape in which the PA is only one component. The case studies have highlighted the need for a great deal more help and guidance in these areas for would-be implementers of the EA.

What is missing from the Ecosystem Approach?

The EA, except by implication, does not address four topics which will become more and more important as the approach is more widely applied:

- Institutions are barely mentioned, except for “ecosystem managers.” The normal state structures — including district and provincial administrations and sectoral representatives of various ministries with local responsibilities for land-use planning, agricultural extension, forest management and so on — are unused to considering ecosystems as units of management. Planning actions from an ecosystem point of view will not be easy if these officials are not made part of the process and if joint planning is not undertaken. Consultation with local inhabitants of the ecosystem is simple by contrast.

- The principles do not focus on how ecosystems, and the biodiversity within them, actually contribute to and affect livelihoods. There is some indirect consideration of economic benefits for local people, but issues related to livelihood security and the resilience of the ecosystem so that it can continue to produce fundamental goods and services, are not an explicit part of EA thinking.
- The implication in EA Principle 4 is that market forces tend to be bad for the sustainability of the ecosystem. These forces cannot be excluded outside PAs, however, and may be strong forces for good. Analyzing market forces is complex; the Niger-Nigeria case shows that markets hundreds of miles away may shape choices made within particular ecosystems.
- Nothing in the description of the EA explains the incentive to use it for anybody except biodiversity specialists. This is a very large omission when the plan is to apply the EA to multiplex landscapes already owned, managed and administered by those with no special interest in biodiversity.

Moving towards implementation

Using the Ecosystem Approach as a framework for analysis

The Ecosystem Approach is useful for planning, monitoring and evaluation of what went right and wrong. The EA provides a way of marking progress against a baseline and noting incremental change towards final goals. It highlights management dilemmas and forms, overall, an excellent assessment framework.

Shaping conservation in the context of development

The major challenge now is to translate the EA into an effective, accountable and democratic planning and negotiating process. In non-PA landscapes people and their use of landscape and biodiversity are at the centre of ecosystem management. In many parts of the world conservation, productivity and sustainability outside PAs depend on decisions made by local managers, many or most of whom are poor and small-scale farmers or livestock producers. Sustainable ecosystem management cannot be imposed from outside in these contexts; it calls for skills in facilitation, negotiation and empowerment. It also requires the right incentives so that development objectives and poverty-reduction objectives are incorporated in the goal of the sustainable management of the ecosystem.

In other words, the economic and governance dimensions of biodiversity conservation are deeply embedded in the daily decision-making of individuals as well as in the frameworks imposed by other levels. This reflects the realities of poor people, who understand ecosystem degradation and environmental risk as threats to their livelihoods. The EA is potentially well adjusted to deal with these factors.

Using the Ecosystem Approach as a framework for implementation

For the EA to go beyond analysis and investigation to application, certain preconditions may have to be in place. The EA can only be fully applied where people are ready to share power and knowledge. There has to be willingness to invest in the gathering of knowledge, and to realign management goals and activities in the light of that knowledge.

To be effective, the Ecosystem Approach must have the freedom to be a multilevel initiative. National and sub-national policy and legal frameworks may be just as important as what is going on within the ecosystem itself. Local stakeholder issues may not be able to be addressed until ambiguities are resolved at the national government level. In the case of PAs, it is important to understand that often the manager is only an implementer, and that innovation must be agreed to at a higher level.

The EA, applied in a landscape mosaic of different types of tenure and land use, can become an integrative mechanism if stakeholders work together to make it so. However, several of these cases show that if goals are not clearly worked out with stakeholders at an early stage, or where absent stakeholders hold much of the power, the EA can only provide an analysis of problems; it cannot deliver solutions.

Fine-tuning the Ecosystem Approach for use at different levels

If the EA is to be widely used, it has to be seen to be useful not only at the field implementation level, but at other levels too. The EA needs to be seen as useful by several groups:

- national-level policy makers who set strategy;
- provincial/sub-regional agencies who adapt national policy to local conditions; and
- district and local-level officials and PA staff who implement policy and who have been the main focus of these case studies.

At the national level, the EA needs to appeal to Ministries besides Environment, such as Rural Development, Welfare, Agriculture, Water, Forests. To do so, arguments have to be made in a way that meets the priorities of the ministries concerned. This may involve arguing for the capacity of the EA to address governance, equity, justice and decentralised decision-making. It may also involve stressing the contribution of well-managed natural resources to poverty reduction, and the benefits of lifting the barriers to invest in ecosystems by local people by addressing issue of property and management rights. Arguments need to be made in the context of Millennium Development Goals targets, such as better health and reduced vulnerability.

At the provincial level the EA may be useful for provincial officials trying to develop regional working plans which coordinate the inputs of different sectors more sustain-

ably. The EA is also useful at this level as a way of resolving inter-sectoral conflict. It provides a framework for negotiating and resolving difficulties that may arise when two or more sectors conflict, or when neither of two adjacent sectors fully address a perceived problem. For instance, the fisheries and agriculture sectors may fail to protect mangroves from being cleared for tourism or fish farms, because neither sector factors in the full value of mangroves in its calculations.

At both these levels the EA has the potential to address some major natural resource issues, such as the growing need in many countries to make sustainable decisions about the allocation of land between food, fuel and fibre in the context of biofuels. In many cases application of the EA will be intended to ensure the sustainable use of ecosystem goods and services rather than the protection of biodiversity; this is in line with the principles of the approach. It will be important to show how the application of the principles leads to truly sustainable development taking into account all factors (social, environmental and economic).

Fine-tuning the Ecosystem Approach for use in specific contexts

So far, the Ecosystem Approach has mainly been applied in developed countries, where there are substantial resources for problem analysis, coordination between agencies and implementation.

EA proponents in less developed countries (LDCs) will need to be realistic about limited resources and should set goals which enable the EA to simplify rather than complicate the goals of sustainable management.

There is a further distinction to be aware of: in middle-income countries (much of Latin America, for instance) 70–90% of the population lives in towns and cities, and rural ecosystems are relatively empty of people. In poorer LDCs such as many of those in Africa and south and southeast Asia, 70% or more of the population lives in rural areas. In middle-income countries, the task may be simpler in one way, but the ecosystem cannot command the attention it deserves because of the lack of locally resident managers. In poorer countries, there is the challenge of multiple uses in the ecosystem, but the advantage of many protectors and managers.

Conclusions and next steps

Involvement in the case study locations over time has generated new opportunities for engagement in an ecosystem context. In the case of Vietnam, for instance, issues arising from the case study have led to a national-level EA workshop, the preparation of a national-level policy brief and plans for the preparation of an inter-Ministerial circular. In the case of the Niger-Nigeria border ecosystem, new work funded by GEF and UNEP is based on the EA analysis conducted by the research teams from the

two countries. CEM itself will turn its attention to a series of manuals for field-level implementation and for guidance at provincial and national levels.

On the one hand the cases have revealed a daunting insight about the issues which need to be addressed if the EA is to be of use. On the other hand, participants and researchers at all sites said how much they had learned from applying EA criteria and attempting to respond to these issues. The next few years will show how widely a spatially-based management system can be embedded into current practice, and how useful it is found to be.

Acronyms

CBD	Convention on Biological Diversity
CEM	Commission on Ecosystem Management
CFUG	Community Forestry User Groups
CIB	Congolaise Industrielle des Bois
EA	Ecosystem Approach
FMU	Forest Management Unit
IUCN	International Union for the Conservation of Nature
LDC	Less Developed Country
NGO	Non-Governmental Organization
PA	Protected Area
PRA	Participatory Rural Appraisal
WWF	Worldwide Fund for Nature

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Niger and Nigeria: the Maradi-Kano region

A dryland case study of local natural resource management

2

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Purpose and approach

The need for a holistic approach to ecosystem management has emerged with renewed force since the signing of the Convention on Biodiversity (CBD). From the local to the global scale, multiple stakeholders in conservation are now recognised, and research is revealing complex interactions in every landscape. These interactions are subject as always to the forms of management intervention imposed by individuals, communities, peoples, institutions and corporations. Under most development scenarios, these people will continue to be responsible for the everyday decisions that collectively determine the sustainability of vast landscapes, such as the semi-arid drylands of Africa.

The poverty-reduction agenda of the Millennium Development Goals calls for interventions in which equity among beneficiaries — a concept to which many past conservation projects paid scant regard — is a prime consideration. The balance now sought between sustainable ecosystem management and enhanced livelihood security for the poor requires both a theory and a strategy. The Ecosystem Approach (EA) developed by the CBD represents a learning strategy that brings together local and scientifically-based knowledge.



Doom palms (*Hyphenae thebaica*).
Photo: Joachim Gratzfeld

A dryland case study

Drylands are typically very extensive and tend to extend across national borders. While many have little relief, they are environmentally heterogeneous and multiple scales are required to understand them. Different users perceive and exploit them in a variety of ways (Kowal and Kassam 1978). Variability from year to year (especially in

rainfall) and rapid economic, political or demographic change in the longer term necessitate flexibility, adaptability and innovation on the part of their inhabitants. These capacities, rather than any carrying capacity of natural resources, determine the number of people who can live there and the substance of their livelihoods (Mortimore 1989, 1998).

Drylands do not exist in isolation: economic symbiosis with more humid regions, towns and overseas migrant destinations, always important, has become quite critical for sustainable livelihoods. This characterisation is based on the Sahelian region in particular (Raynaut 1997); however, it is believed to be representative of tropical drylands in poor countries.

Research in the drylands has not adequately informed policy. It is now generally agreed that environmental planning and management should be decentralised, but appropriate institutions are often lacking at the local level. New thinking about integrated ecosystem management must therefore be translated into effective, accountable and democratic planning, negotiating processes, and decision making.

The purpose of the case study is to capitalize on the lessons learned from the application of the EA as a means to managing dryland ecosystems sustainably and ensuring the livelihoods of the people and the conservation of the natural resources.

People and their use of landscape and biodiversity are at the centre of ecosystem management, and no other users' interests (including those of external agencies such as donors and conservation organisations) should automatically be privileged. However, conservation, productivity and sustainability (outside protected areas, where the focus of conservation efforts is now shifting) all depend on decisions made by local managers, a majority of whom are poor and small-scale farmers or livestock producers. The institutional framework governing access to natural resources, and the distribution of benefits from their use, is thus intimately linked with the ecosystem itself. Both have evolved together, and have been modified during several millennia of occupation and exploitation.

Selection of the study area

The Niger-Nigeria border region has attracted attention since colonial times as an area of alleged natural resource degradation, potential desertification and economic marginalisation. There have been numerous development projects on both sides of the border (e.g., the *Projet du Développement Rural de Maradi*, in Niger, 1978–1984; the *North-East Arid Zone Development Programme*, 1990s, and the *Katsina Afforestation Programme*, 1990s, in Nigeria). A new proposal for a major, long-term (eight-year) programme (*Integrated Ecosystem Management in Shared Catchments between Niger and Nigeria - SCNN*) has been approved for funding by the Global Environment Facility (GEF), and began to be implemented by UNEP through the Niger-Nigeria Joint Commission (NNJC) in 2006.

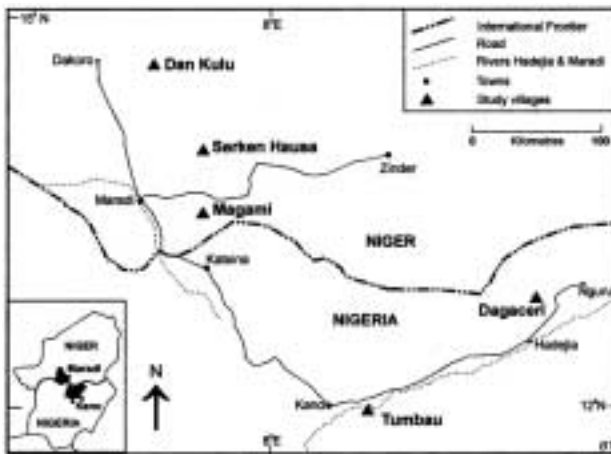
The Niger-Nigeria border region is characterised by extensive flat drylands with several characteristics:

- transhumant livestock herders move several hundred km north and then south again each year, following the rains and the grazing;
- sedentary farmers grow crops along a south-north gradient of diminishing rainfall and increasingly erratic distribution; and
- population density is growing as a result of both natural increase and immigration from more densely settled areas in the south.

The study focuses on rain-fed dryland ecosystems, in which wetland ecosystems play a subsidiary role. The sites selected are representative of the transborder region in which the shared catchments of the NNJC project are found. To build on and add value to earlier research, activities of the EA case study took place in the following five villages and their local government areas (Map 1):

- Maradi Region, formerly Department, Niger (listed from north to south, dry to less dry): Dan Kulu, Serken Hausa, and Magami.
- Jigawa and Kano States, Nigeria (listed from northeast to southwest, dry to less dry): Dagaceri and Tumbau (Mortimore and Adams 1999).

Map 1. Location of the study villages in Niger and Nigeria



The five villages comprise a 400-km transect from the desert margin (or northernmost limit of rain-fed farming) through Sahelian environments of diminishing aridity and riskiness to the edge of the Sudanian biome, and from average annual rainfall of less than 400 mm to more than 600 mm.

Given the challenging realities of a dryland environment, developing an integrated Ecosystem

Approach to research for development must include sharing access to ecosystem goods and services; securing equitable benefits for livelihoods; conserving biodiversity and ecosystem integrity; maintaining or improving biological productivity; and building institutional sustainability.

Approach and methods

The primary methods used were structured group or individual discussions, supplemented by inventories of biodiversity (as defined by user groups), livelihood and technical options, and some participatory mapping of ecosystem resources and ecosystem areas. Evaluations of ecosystem health based on local understanding were integrated with science-based indicators. In Nigeria, the main emphasis was stakeholder focus groups and village meetings; in Niger, it was key informants interviewed on their farms. Following the conclusion of field enquiries, a micro-project linked to biodiversity protection was identified and set up by the communities. The purpose of this exercise was to learn lessons relating to the mobilisation of institutional structures for a common purpose in ecosystem management.

Stakeholder interests in ecosystem resources

The nature of ecosystem management

The ecosystem in a natural world is most often conceived of as a discrete spatial or organisational unit; for example, a river basin or catchment. The nesting of ecosystems appears to demand a matching hierarchy of institutions. Logic suggests that mirroring natural organisation in such a way offers the best possibility for optimising management. However, contradictions arise between ecological, social, political and economic units. Stakeholder groups are not mutually exclusive; rather, they tend to overlap within the local community. As a result it is incorrect to assume that the summation of all interests in a given location necessarily equates with a “community” in the sense of universally shared common interests that can together manage the ecosystem sustainably. The way to achieve sustainable ecosystem management is found closer to the ground – in understanding the complex and interactive behaviour of stakeholder groups, achieving consensus within groups about the ways and means of managing ecosystem services, and enabling negotiations between competing interests. Such an agenda cannot be imposed from outside, and the challenge for any conservation or development agency lies in facilitation, empowerment and incentives.



In the past, long fallows enabled ample tree regrowth, shown here is Faidherbia albida.

Photo: Jim Harvey

Essentials of regional ecology

The essentials of the regional ecology for all five of the villages, from south to north — Tumbau and Dagaceri in the Kano region of Nigeria and Magami, Serken Hausa and Dan Kulu in Maradi Department, Niger — are summarized in Box 1.

The minute adaptations which have to be made between more and less dry areas is indicated in Tables 1 and 2, which show data from Tumbau and Dagaceri (Dagaceri lies about 100 km north of Tumbau).

Box 1

Essentials of regional ecology

- The temperature and rainfall distributions follow a seasonal pattern: October–April, May or June is dry (relative humidities of <20%); July–September is wet (relative humidities often >80%).
- Mean annual rainfall ranges from 200–400 mm in the north (Dan Kulu) to 600–800 in the south (Tumbau), with variations of around 30%.
- From the 1960s until the 1990s, average rainfall declined throughout the Sahel region by up to 33%.
- Perennial rivers are scarce and wetlands are confined to the floodplains of rivers or inter-dune depressions. The water table is normally 20–40 m below the ground.
- Soils are derived from former dune sands and have low inherent fertility and scarce organic carbon. They are prone to lose their nutrients over time when cultivated unless replenished by long fallows or fertilization.
- The natural vegetation is open savanna woodland (Sahelian or Sudanic): thorny tree species, regenerating shrubs and perennial or annual grasses and forbs. In natural depressions, river valleys and around seasonal ponds larger trees benefit from shallow groundwater and form small areas of dense woodland. The number of woodland and grassland species identified in the region is reported to be >400.
- Under extensive agriculture, woodland has been cleared from very large areas and the land converted to fields and fallows. On this land, trees are increasingly protected.
- Risk is endemic in production systems owing to the variability of the rainfall and its associated threats. Livestock keepers try to counter risk by moving herds seasonally or year-round; farmers try to store surpluses against crop failure and find supplementary sources of income. All agriculturalists also invest in livestock.

Table 1. Variations between Tumbau and Dagaceri: farming specialists (primary stakeholders to whom livestock are also vital for farming)

Primary livelihood resources		Secondary livelihood resources	
farming	livestock	ecosystem-based resources	other
Tumbau: resources highly integrated: farming is impossible without livestock for manure, traction and ploughing			
<p>Rainfed Millet.sorghum, cow-peas</p> <p>Irrigated farming in low-lying fadama areas. Rainy season: rice and sugar cane. Dry season – some irrigable fields</p>	<p>Livestock type Sheep and goats (manure for farm fertility); hens; better off people also have milking cattle and work bulls or donkeys for carts and ploughs. Overall, small flocks/ herds</p> <p>Grazing regime Animals compounded in growing season with cut grasses, weeds and browse supplemented with stored fodder. In dry season browse millet, sorghum and cowpea residues</p>	<p>Resource availability Many tree species, trees increasingly found on-farm; grasses rare; stover used for fencing, mud for walls, roofs; small animals found locally; monkey and gazelle in forest reserve; two wells</p> <p>Resource use blacksmithing; carving wooden tools; selling wood, wild fruits, leaves, thatch grass; herbalists; fishing; hunting bush-meat; mudbrick making; selling water</p>	Trading; house construction; dry season migration; Koran classes for children; prayer services
Dagaceri: farming specialists, mainly indlgenous Manga and immigrant Hausa			
Similar to Tumbau but (i) rainfall is lower (ii) population density much lower (iii) the distance to major markets greater (iv) no fadama land (iv) growing season shorter: production of early millet critical to household food security. Sorghum chancy, depends on rainfall.	Same as Tumbau, animals produce manure for soil fertility; but there is not enough of it, hence the continued importance of fallowing. Land can be cultivated annually with manuring, or for 3-5 years with fallowing. May be left longer to become shrub-grassland.	<p>Resource availability Some degraded secondary woodland. Trees increasing within the settlement and very slowly in open fields.</p> <p>Resource use: Same as Tumbau plus weaving and making a variety of products using doum palm (<i>Hyphaene thebaica</i>) fronds; pottery.</p>	trading, house construction, dry-season migration and dress-making

Table 2. Variations between Tumbau and Dagaceri: livestock specialists

	who	livestock type	grazing regime
Tumbau Settled	Fulani households in the village combine livestock with farming, but invest more in livestock	Cattle: herds of 20-50 corralled at night	Crop residues; fallows; grass strips on the edges of fadama land; cattle corridors between fields. In the dry season animals moved south to graze
Dagaceri Settled	Settled Fulani combining farming with livestock rearing, keeping mostly cattle. Their farms are larger than those of local Manga farmers	Large herds of cattle and flocks of sheep and goats	Use grain stovers and community grazing lands, grass on farmers' fallows (often purchased). Send herds away to dry-season grazing 25 km south.
Tumbau Transhumant	Six groups of transhumant herders were camping within the village area at the time of the survey (rainy season); one group was interviewed	62 cattle and 12 sheep	Grass strips on the edges of fadama land. In the dry season animals should be moved south to avoid competition with resident livestock keepers. But some transhumants steal crop residues and cut browse from privately owned trees. ²
Dagaceri Transhumant	Bororo Fulani from Niger pass through the area during the dry season in years when their home pastures are exhausted	Large herds of cattle and flocks of sheep and goats	They compete for farmers' unharvested residues and grasses on farmers' fallow fields, as well as for the use of community grazing lands and forest reserves.

In the three Niger villages, farther north again, individual interviews were held with about ten key informants in each community. They made interesting points, which confirmed and amplified the picture from the Nigeria side of the border.

The primary stakeholders in the Niger village Magami are perceived to be the resident people and the transhumant pastoralists. Both groups have common interests in vegetation, land and water, and have concerns about the sustainability of rainfall and woodcutting (for fuel and for construction). In pursuing their interests in ecosystem resources, these stakeholders draw on a wide range of local knowledge. They value their ecosystem primarily for its various use values, and they have become more sharply aware of these values as resources that used to have no cash value (such as grasses on field borders) have become scarce and have begun to enter the market.

Individuals noted that farm yields are better where there are more trees, partly because leaf litter contributes to soil fertility but also because trees reduce wind speed and soil erosion. Specialist woodcarvers noted the increasing scarcity of the species best for carving and there was talk of planting them (although suitable indigenous species are very slow growing). The importance of protecting *Hyphaene thebaica* was noted here as in Nigeria, and cutting permits are now required for this species.

Farmers discussed at length the results of population growth and the consequent increasing demand for cultivable land. Permanent cultivated fields have extended and fallowing is no longer practised in the fields near the village, although it continues farther away because transport constraints prevent farmers from using manure. To protect the environment, more trees are needed on both types of land.

Interviewees in Dan Kulu, the most marginal of the five villages, explained their strategies for using ecosystem services to diversify livelihoods, including investing heavily in livestock. It is also important to encourage natural regeneration and protect valuable trees when clearing fields.

The inhabitants of both Serken Hausa and Dan Kulu drew field sketches of what they regarded as their immediate ecosystem (Map 2).

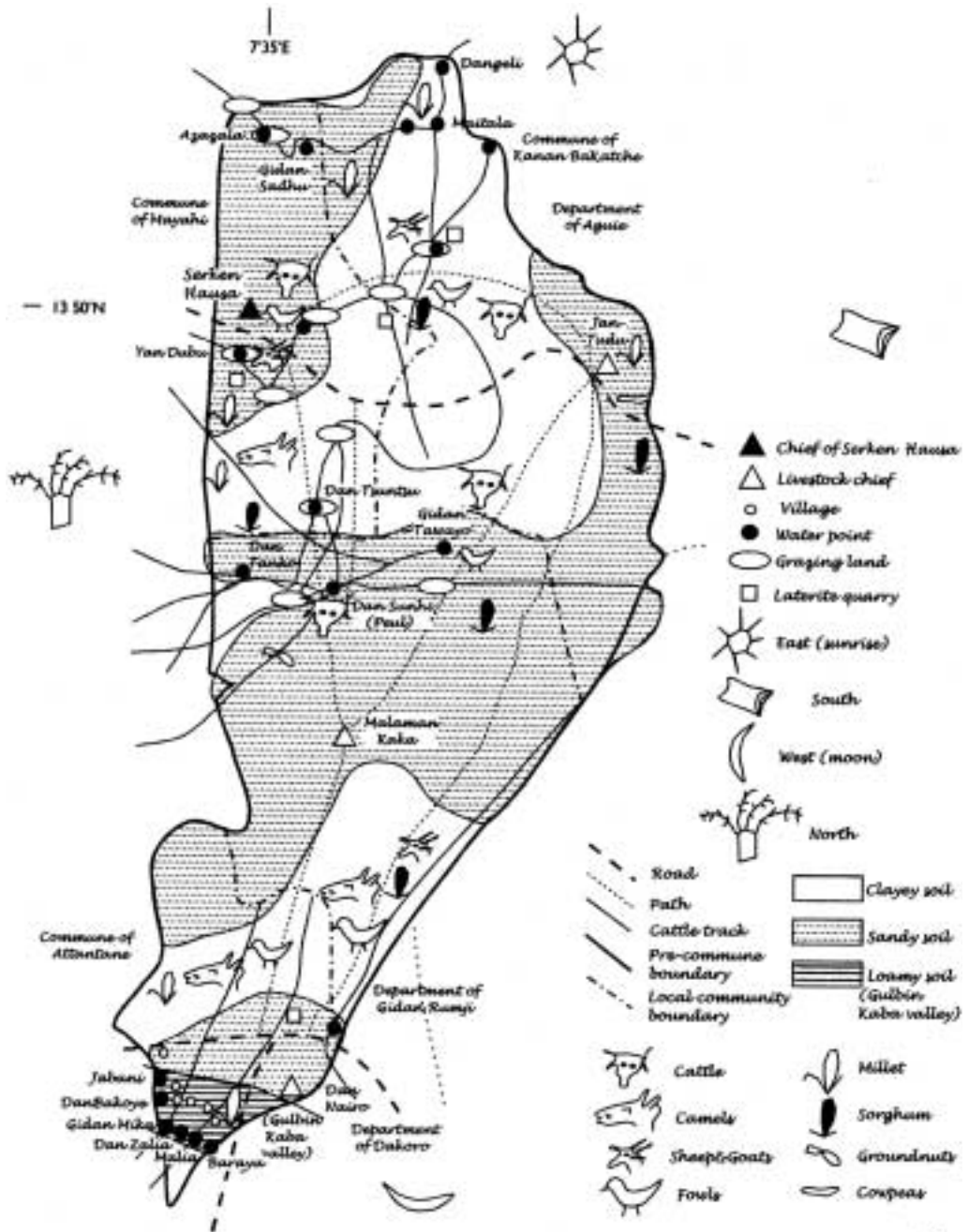


Herder with transhumant cattle.
Photo: Jim Harvey

Map 2. Field sketch of Serken Hausa

This sketch, a composite result of field enquiries with and sketches by local residents, gives a local view of the ecosystem with its differentiation of sites for crops and livestock-based activities. It shows awareness of adjacent locations and points of the compass (N: baobab tree; E: rising sun; S: bag of groundnuts; W: the moon).

Cartographer: Beryl Turner



Their functioning and management

Changing land use

Unmodified natural vegetation is rare or non-existent, and anthropic factors are omnipresent and persistent. Cultivation of short-fallow grassland extends to >70% of the region, throughout most of northern Nigeria and southern Niger, even where population densities are relatively low. In areas remote from towns and political centres, and in the far north of Maradi Region, this transformation has been accomplished relatively recently. In Nigeria, dense populations have been associated with intensively cultivated areas for many centuries and the Kano Close-Settled Zone has rural population densities in excess of 220/km² and ratios of annually cultivated land of >80%.

Tumbau

The land-use pattern as mapped from air photographs shows 76% in permanent cultivated fields in 1950 rising to 88% in 1981, when cropland was stabilised. The remaining land consists of a few fallowed fields, patches of rangeland, cattle corridors and settlements. This area is characterised by a farmed parkland of mature trees that are carefully protected and harvested by their owners, at 10-15 trees/ha, and found both on farmland and within settlements. They are systematically managed by lopping, pollarding and coppicing and are felled only when they die.

Dagaceri

The fraction of land under cultivation, including some short-grass fallows, after rising rapidly before 1981, stabilised at 57%, owing to government reservation of community grazing areas for livestock keepers. The vegetation is degraded woodland, comprising widely spaced trees and shrubs and a discontinuous ground cover of grasses and herbs.

Magami, Serken Hausa and Dan Kulu

The key difference between the Kano and the Maradi ecosystems in terms of their vegetation is the greater instability of land use and vegetation as one proceeds northwards. In contrast with the old farmed parklands of Tumbau, there is a shorter history of cultivation (in some areas, <60 years), more recent development of annual cultivation, fewer mature trees on farmers' fields, and degraded woodlands.

Land-use data at village level are not available, but in the region the percentage of cultivated land increased from 59% to 73% between 1975 and 1996 – at least as high as in Dagaceri.

Table 3 shows how tree species are typically spread across the 400-km study area. Some key species, especially those important for fruit, food and soil fertility, are zealously maintained throughout the whole area.

Table 3. Tree species commonly found across the Nigerian and Niger sites

Tree species	Tumbau 600-800 mm rainfall	Dagaceri 500-600 mm rainfall	Maradi 200-400 mm rainfall
Trees typical of farmed parkland in Tumbau			
<i>Anogeissus leiocarpus</i>	•		
<i>Butyrospermum paradoxum</i>	•		
<i>Ceiba pentandra</i>	•		
<i>Parkia biglobosa</i>	•		
Important trees found across the range of sites			
<i>Acacia nilotica</i>	•	•	•
<i>Acacia seyal</i>	•	•	•
<i>Adansonia digitata</i>	•	•	•
<i>Balanites aegyptiaca</i>	•	•	•
<i>Faidherbia albida</i>	•	•	•
<i>Mangifera indica</i>	•	•	•
<i>Tamarindus indica</i>	•	•	•
<i>Citrus spp.</i> (in damp depressions)	•	•	•
Common in Dagaceri			
<i>Combretum spp</i>		•	
<i>Commiphora spp</i>		•	
<i>Euphorbia spp</i>		•	
<i>Ficus spp</i>		•	
<i>Moringa spp</i>		•	
<i>Sterculia spp</i>		•	
<i>Vitex spp (doniana?)</i>		•	
<i>Ximenia spp</i>		•	
Common in Dagaceri and in Maradi villages			
<i>Azadirachta indica</i>		•	•
<i>Bauhinia rufescens</i>		•	•
<i>Boscia senegalensis</i>		•	•
<i>Guiera senegalensis</i>		•	•
<i>Hyphaene thebaica</i>		•	•
<i>Maerua crassifolia</i>		•	•
<i>Ziziphus mauritiana</i>			•

There is evidence of recent reforestation in southern Niger as the market value of tree products rises, and as a result of many environmental projects (Larwanou et al. 2006). The practice of protecting naturally regenerating trees on farmland has become widely accepted in Magami and Serken Hausa. In Dan Kulu, the most marginal of the villages, many tree species and perennial grasses reach or pass the northern limit of their distribution.

Farmers' capacity to have an impact on the effects of deforestation through conservation of trees on farms should not be undervalued (Mortimore and Turner 2005). For the Sahel as a whole, recent analysis of earth satellite imagery between 1982 and 1999 shows statistically significant increases in the "greenness index," from the Atlantic Ocean to the Red Sea (Eklundh and Olsson 2003). What the index does not show, however, is that as competition for land and natural resources has increased, farmers have protected on-farm locations for trees more often, and allowed trees in open-access areas to disappear: in other words, trees have been "privatised." (This "privatisation" of trees by resident farmers is a cause of conflict with transhumant herders, who rely on access to trees found in common areas or on private farms. Herders tend to deny that this privatisation is happening, and continue to obtain tree browse and crop residues wherever they may be found.)

The management of soil fertility

Long fallows are now the exception. Under annual cultivation, nutrient stocks and the amount of soil organic matter in the surface layer diminish and yields fall. Farmers try to obtain organic manure or purchase inorganic fertilizers for application in micro-doses. Success in fertilisation (Table 4) thus depends on economic resources (livestock or cash). The absolute level of soil fertility declines with the rainfall northwards, and actual yields are determined by rainfall in any given year.

What these data suggest is that soil fertility, a key determinant of ecosystem health (Harris 1998), is slowly being managed more intensively along the south-north continuum, and farmers struggle to the limits of their capacity to do this. Only in Dan Kulu is such management all but impossible.

Local knowledge

The term "local knowledge" recognises the dynamism, experimentation and adaptation that characterise local efforts to extend knowledge resource use and combine



Soil manuring with dried manure.

Photo: Joachim Gratzfeld

local and external knowledge. In managing ecosystem resources, stakeholders draw on collective and personal knowledge enhanced by science-based information from government services or project activities. Future resource sustainability depends on this knowledge.

Table 4. Farmer strategies for soil fertility

	Agriculture	Fertiliser	Livestock	Labour	Other
Tumbau 600–800 mm	early and late millet and sorghum; cowpea, groundnut, benniseed and hibiscus	heavy applications of manure, dry compost and ash	Stall fed in rains; high on-farm densities kept, which is vital for farm fertility	high use of labour per ha	no grazing area designated
Dagaceri 500–600 mm	early millet, sorghum, cow-peas, groundnut and beniseed, Hibiscus	use of manure	Lower livestock densities	less use of labour per ha	designated grazing area exists
Magami and Serken Hausa 400–500 mm	early millet, sorghum, cow-peas and groundnuts	manuring has begun in fields near settlement	Many farm livestock	increasing weeding inputs equals more intense land use	no designated grazing areas
Dan Kulu 200–400 mm	early millet sorghum, cowpea and groundnut; frequent crop failure due to pests/drought	limited manure available for fertilisation	Low livestock densities	extensive; little effort spent on weeding	livelihoods have to be supplemented by out-migration

Knowledge is embedded in social and political institutions at the local level. Exercising it is linked with leadership roles, governance functions, social and family status and reputation and wealth and with the functional needs of the individual in managing a production and livelihood system. Knowledge is a bridge between society and ecosystem management, and new knowledge therefore plays a role in social change. For effective ecosystem management, sharing of local and external sources of knowledge and experience is essential, and an institutional framework for such sharing is required.

In both Nigeria and Niger, the local chief has a complex, multi-purpose role touching on many aspects of ecosystem management, as well as some powers to intervene, whether executing mandates or directives from above or satisfying local political interests. Powers differ in Nigeria and in Niger, however, owing to differences in implementing decentralisation policies.

Local knowledge is dynamic and evolving, a mosaic of perceptions gathered from local legacy, personal experience, exchanges with travellers or relatives in other villages, exposure to media (especially radio) and interaction with development practitioners, including training courses (Manvell 2005).

Findings

The surveys in the five villages have revealed many key findings:

- Indigenous communities have the capacity to assess their ecosystem resources on the basis of an extensive and detailed knowledge of species, typologies and indicators.
- There is consensus that annual rainfall has been declining for at least 30 years, and that the onset and cessation of rain have become less predictable.
- The second major threat is increasing human and livestock populations. An increase in livestock numbers would increase the supply of manure to sustain agriculture, among other benefits. But farmland cannot be converted into range land, and livestock are increasingly dependent on crop residues (especially in Tumbau).
- Soil fertility, as shown in crop yields, is assessed on the basis of several typologies reflecting colour, texture, depth, wetness, hardness or cultivability, and perceived health. The effects of and need for fertilisation are understood.
- Although there is a problem in maintaining soil fertility, this is not perceived as a crisis. It can be corrected by treatments such as organic fertilisation, and soil fertility is not the prime determinant of crop yields — rainfall is.
- A large number of cereals, legumes and other cultivars are maintained from year to year within the community, from which seed is selected for planting.
- Diversity is valued and there is great interest in new species and in exchanging information and experience (Busso et al. 2000). Among the millets, there has been a shift from late-maturing to early-maturing landraces as a strategy for managing drought. Sorghum varieties are selected to respond to soil conditions and residual moisture.
- Agro-diversity continues to characterise farming practice, although there is a risk of loss if new improved varieties replace traditional ones as the main food providers. It is striking that in all four of the lower-rainfall villages, the same quartet of key crops (early millet, sorghum, cowpea and groundnut), with popular minor crops such as hibiscus, is found all the way to the desert margin of agriculture.
- Some plant species, including trees and herbs, are disappearing or threatened with disappearance. Biodiversity loss is far from being a crisis, however. Some losses are attributed to drought, others to the expansion and intensification of agriculture.

- New practices recognise symbiotic relations between trees and crops, and informants acknowledge the contribution of projects in helping to recover conservation values and methods.
- The practice of protecting naturally regenerating trees on farms is known to all farmers, and an awareness of threatened species and the economic value of trees (and increasingly forage plants) is supporting the evolution of integrated, small-scale cropping and silvicultural systems.



Woman hoeing.

Photo: Mike Mortimore

- Given the severe aridity gradient from south to north among the five villages, the extent of biodiversity recorded in northern locations is greater than was expected. An awareness of its value, both economic and intangible, appears to ensure that it will not be significantly reduced in the foreseeable future. Some missing plants are still available a little farther south on the rainfall gradient.

These findings suggest a scenario characterised by strongly held conservation values, and visible in an increasingly wooded landscape, good use of local knowledge in planning and an active search for more sustainable pathways in ecosystem management.

Institutions for ecosystem sharing and management

Ecosystem management institutions in Tumbau and Dagaceri

Tumbau and Dagaceri have similar ecosystem management institutions, which is a result of the dominance of Islamic governance in these parts of Nigeria.

Local ecosystem area

These are the active management institutions in the local ecosystem area:

- the tenure system sets out rules whereby both indigenous and non-indigenous people can have access to ecosystem resources;
- the family/household manages private resources, such as farms and trees, and has claims on common resources, such as grazing land;
- the ward or village head and the leader of a pastoral Fulani group allocate and protect rights to ecosystem resources in collaboration with the traditional village administration and religious leaders;
- village elders, title-holders, religious leaders and informal voluntary self-help groups;
- institutionalised gender relations;
- the exchange system within the village has traders operating under accepted rules for such activities as grain buying, commodity selling, the selling of prepared food and a range of services; and
- formal markets are controlled by the district.

District ecosystem area

These are the active management institutions in the district ecosystem area:

- the district head, although superior to the village head, backs him in upholding rules of access to ecosystem resources and deals with disputes between villages or ethnic groups;
- the district administration title-holders, and officials;
- the court (at district headquarters) adjudicates in disputed inheritances, claims of crop damage, tenurial disputes and conflicts over access to resources that cannot be settled informally or at the village level;
- weekly market regulators are visited by large numbers of village people for buying and selling and integrated through market chains with all ecosystem resources and their management; and
- transport and market associations, the former organising the safe movement of people and goods between villages and markets and the latter (including middlemen) managing the smooth transaction of business and security.

Local government area

Local governments include several districts and are arms of the state government with elected councils. They have larger administrations and infrastructure, are managed by career civil servants, and are subject to political control. Larger and more distant markets (which may meet daily or twice weekly) and their associated organisations are accountable to them. They may also provide rudimentary social services from which villagers may sometimes benefit. They are less involved directly in natural resource management except where a conflict or major development affects more than one local government area.

Regional ecosystem area

The state and federal governments manage the resources from which the people from Tumbau and Dagaceri benefit in the regional ecosystem area. These are some of the resources managed by these institutions:

- the large urban markets integrated into national supply chains for major food commodities and other ecosystem products, such as fish, timber, and livestock;
- forest reserves, through state forestry departments where some people from Tumbau obtain hardwood for charcoal and hunt large game;
- major highways that link the local ecosystems to urban and national consumers and provide employment opportunities for migrants; and
- river basins, subject to river basin development authorities, whose ecosystems are contested by multiple claimants for dry-season pasture, farmland, irrigation water or timber, and which support major national investments in storage dams.

Thus an institutional hierarchy reflects the embedding of local ecosystems within progressively larger ones, and the interdependence that characterises them. While the “higher” institutions need not concern themselves with ecosystem management at the local level, the interests of stakeholders at the local level are strongly affected by decisions by state or federal governments and the implementation of policies in whose determination they have not played any part.

Constraints to good ecosystem management

In addition to the threats posed by rainfall uncertainty and population growth, the stakeholders in Tumbau and Dagaceri face a number of constraints in managing the ecosystem, especially in increasing its capacity to produce more in the long term. These are partly linked to institutional issues which originate beyond the village, such as very limited access to credit; diminishing cattle corridors and access to rangeland (because farmers encroach on corridors and go unpunished); lack of access to veterinary services; lack of good access roads; and overall perceived neglect by government.

Within the village, however, the key constraints concerned the need to deal with the rising competition between agricultural and livestock-related land use. Because of the run of the seasons, the two production systems put pressure on the local ecosystem at different times, and mutual adaptation evolved in the past to minimize friction. Nevertheless, the following issues were identified in respect to shared ecosystem resources.

Farmers remarked on the following issues:

- Transhumant livestock from the north are “parked” on fields during the dry season and add manure to the soil;
- There is no control over premature and indiscriminate cutting of trees by livestock herders, so farmers are reluctant to plant on distant fields because they cannot protect them;
- Major stress is caused when poor rains fail to produce adequate fodder and transhumant herds return early from the north. There are fewer and fewer fallows for them to return to, and few alternatives to crop residues. Farmers cannot effectively protect their fragmented holdings from crop damage.
- *Hyphaene thebaica* shoots, field boundary plants and millet stalks that provide fodder, and fruit from planted trees are sometimes stolen.
- As woodland is removed, more stresses are placed on the symbiosis between ecosystems. Instead of wood, people burn cow dung and millet stalks.

Livestock owners noted the following issues:

- There has been a decline in pasture area and the loss of some species that cannot set seed before the plants are eaten. Further expansion of farming should be stopped.
- Negotiated and fenced cattle corridors separate incompatible land uses in the rainy season, but are threatened by new fields established in the corridors by wealthy men with the backing of the chief and the connivance of government.
- People are starting to sell animals to buy fields, but the reverse practice has not been observed.
- Forest reserves gazetted by the government are relatively small in size, heavily cut and grazed, and their soils are sometimes visibly degraded. Common use strategies are needed at the level of the local community (as distinct from controls policed by forest guards, which are seen as directed against communities).



Storing millet stalk fodder in an Acacia away from herders.

Photo: Joachim Gratzfeld

Consensual regulation, of the sort which has in the past been applied to specific natural resource products, is now needed for the whole system. Fortunately, it is now more acceptable to government than in the past to advocate the use of local knowledge and skills, owing to a convergence between the rhetoric of decentralisation and the rediscovery of local capacities for association and consensus. Local chiefs already deal with land inheritance, and should probably take back the task of regulating access to common land from government agents. Even in the most threatened location, Dan Kulu, institutions and practices are in place for improving the environment by reconciling exploitation and conservation objectives. This awareness is partly driven by project and government interventions, but also by the scarcity of valued resources and a recognition of the need for negotiated consensus in management.

Poverty and inequality in Maradi

Key stakeholders were unanimous about the causes of poverty: not enough rainfall and poor soil fertility, where farming is the basis of livelihoods. The Chief of Magami noted that his village is 90% composed of poor people, the landless being the most vulnerable. They have had to sell their land because of a need for cash in an emergency and a lack of alternative assets.

In Serken Hausa, the Chief said that 30% of villagers were landless. Both private and common pasture areas are scarce. Thus, the emergence of landlessness, which denotes the end of a long phase of agricultural land-colonisation and population growth, is itself embedded in a more complex evolution towards a more socially differentiated economy in which livestock may play a crucial role in providing incomes for the land-poor.

The driving force of these interactions is the framework of incentives offered by the market system which influences the decisions of the users of ecosystem goods and services. The extent of control that the Nigerian government historically exerted over markets has been significantly less than in Niger, with the exception of the marketing boards that formerly controlled export markets for groundnuts and cotton, and the control of fertilizer supply and subsidies. The rapid growth of urbanisation, the improvement of regional road communications and the injection of some oil revenues into the wider economy have generated a *laissez-faire* attitude to markets which has both positive and negative implications.

Since the costs and benefits of moving commodities have played a major role in motivating economic activity and the demands made on ecosystem goods and services, ecosystems are inseparably linked to the market system through such factors as distance, time, costs and comparative advantage in primary production.

Ecosystem hierarchies

Natural and managed ecosystems occur in nested hierarchies. Since it is presumed that management is an integral part of a functioning ecosystem, management institutions also form part of this hierarchy (Table 5).

Table 5. Ecosystems and management

Ecosystem hierarchy	Management institution
Agro-ecozone	government
River basin	special authority (e.g. forestry service, river basin authority)
Landscape	community, association, village
field or pasture	family, clan
private tree or garden	the individual, operating under the rules of custom and law

Local concept of ecosystem resource components

Stakeholders share a common perception of the components of their ecosystem: the bounded places from which people draw their livelihoods. Not everyone has access to or uses the same resources or the same management institutions. Some stakeholders only have access to resources in close proximity to where they live; others have access to resources and institutions that are much farther away. Even those who directly depend on local resources and institutions often produce goods that are taken to distant markets by others, or buy commodities from elsewhere.

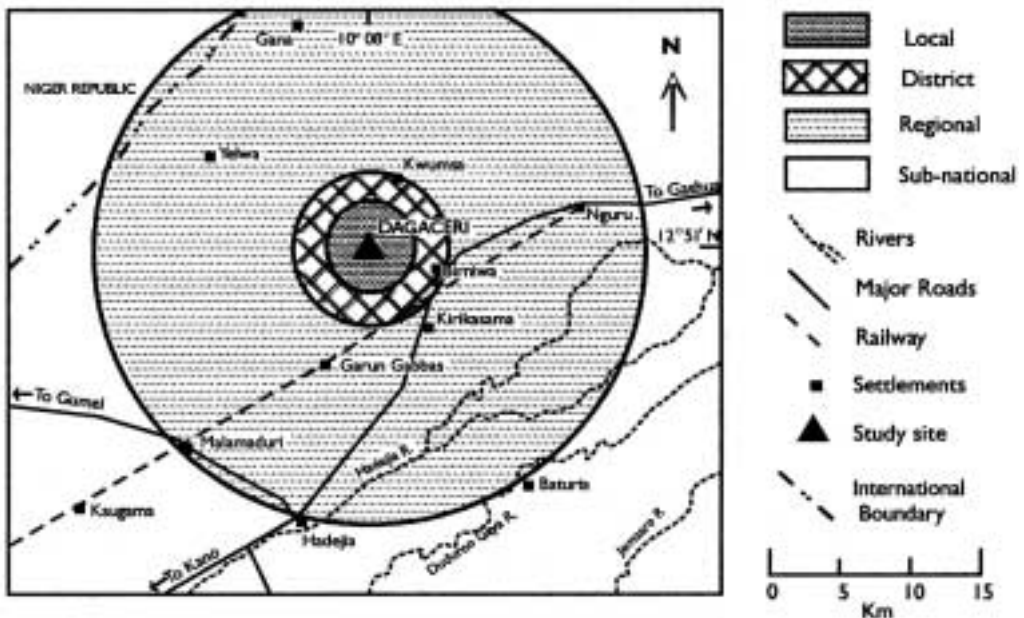
These components might be included in a common set of ecosystem components in the villages:

- houses and garden plots;
- cultivated fields with trees growing on them;
- fallow fields (if any) with their pasture rights;
- cattle corridors and roads with common grazing and access rights;
- common rangeland and rights to collect firewood;
- sources of water (wells and wetlands);
- local markets with rights to buy or sell;
- distant irrigated farms owned or rented for dry-season cultivation;
- distant rangeland customarily used for dry-season transhumance;
- access to urban informal employment or trading opportunities; and
- the government or chief, whose powers affect people's ecosystem access.

Interactive areas

Villagers perceive the location of the natural resources they use for their livelihood activities, and the institutions that mediate access to and management of them, as ordered in a hierarchy of interdependent local, district, regional and sub-national interactive areas. These are shown as four concentric areas in Figures 1 and 2.

Figure 1. Schematic representations of interactive areas, Tumbau



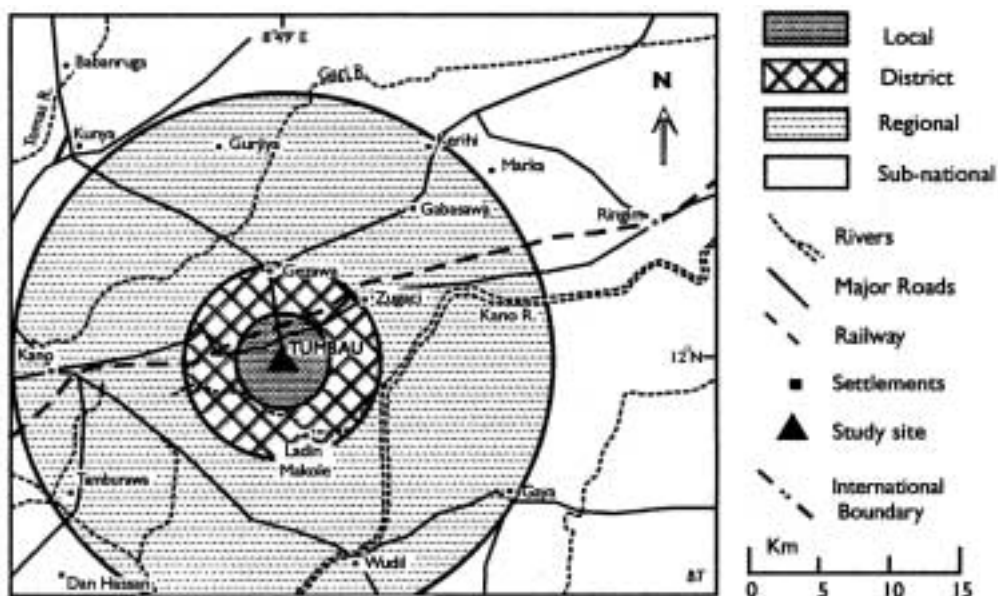
Cartographer: Beryl Turner

The local interactive area (inner circle)

This is where people involve themselves for a large part of their time in directly managing ecosystem resources, and where interaction and interdependence among the stakeholders are most intense. Farm and rangelands, water sources, markets and other resources, governed by local institutions, are used daily by the residents of the village.

In Tumbau and in Dagaceri the local ecosystem includes farms and rangelands, the locations of local resources (such as trees, wood, grasses, medicinal plants and fisheries) and the village market. The ecosystem management institutions at this level consist of the family, represented by the family head, the ward head, village head, the district head, religious leaders in the ward, village and district levels, the court and local government. Access to ecosystem resources is negotiated and disputes are settled by these institutions.

Figure 2. Schematic representations of interactive areas, Dagaceri



Cartographer: Beryl Turner

The district interactive area (second circle)

The boundary of this area is most often determined by the locations of the markets visited, or by the locations of scarce natural resources collected occasionally (such as hardwood for the blacksmith's forge and large game).

Tumbau's district area extends to Gezawa, the seat of local government, and to the large markets at Gezawa and Lahadin Makole. In Dagaceri the district area is bounded by the weekly markets in Kumsa and Birniwa. Local government and courts participate in managing the ecosystem resources at this level, as does the state government.

The regional area (third circle)

In the Tumbau example, the much larger regional area extends as far as the forest reserve near Gaya (27 km when the river can be crossed; otherwise 120 km) where hardwood for forges and large wild game are hunted, and to the markets in Guyung, Wudil and Kano, where craft items and bush meat, as well as livestock, are sold. These markets and resources are controlled by higher authorities including the state and local governments and forestry service. In Dagaceri the boundaries of this area are dictated by the distant markets of Nguru and Hadejia, and by the locations of scarce natural resources such as hardwood (*Prosopis africana*) for the forge near the village of Gana (about 30 km north). Local and state governments are involved in managing the resources in these distant locations.

The sub-national area (white area)

This area, the largest in the hierarchy, includes the dry-season grazing areas of the Tumbau and Dagaceri transhumant livestock producers and the destinations of their dry-season migrants. Local, state and federal governments control access to resources and support the transport systems on which they depend.

The tendency is for the “personal” ecosystem to enlarge as people find opportunities at greater distances from home. Many of these are obtained through markets in urban areas and so do not involve direct access to other ecosystems. As the markets themselves are linked with other ecosystems through their supply functions (fertilizers, labour, capital equipment) and demand functions (food commodities and wood fuel), however, it is impractical to separate them. Markets and ecosystems are locked together in a complex pattern of interaction that has an essential spatial dimension.

Thus, in travelling to an urban labour market or trading opportunity, migrants from Tumbau or Dagaceri are linking their ecosystem with a much wider ecosystem, which affects the management of their resources. A person’s trading profits from selling goats from other ecosystems in Lagos during religious festivals may be brought home and invested in expanding livestock production in his or her ecosystem at Dagaceri. For this reason, ecosystem management initiatives cannot be limited to the local scale.

Market chains

It is clear that ecosystem interactions are driven by market chains. Markets are a well organised institution that provides income opportunities for all members of the chain: transport owners, drivers, truck pushers, loaders and commission agents.

The lowest level in the two villages is the daily village market. Here cooked food, fruits, and soup materials are sold by small boys and girls in the village square and around the village from compound to compound.

Grain

There are several small-scale farmer/traders in Tumbau and Dagaceri, who buy small quantities of millet, sorghum, beniseed and groundnuts from other farmers. They take what they have accumulated to periodic markets 12–22 km away (67 km in the rainy season when the direct route is flooded), where large-scale traders buy it, bulk it further and transport it to more distant wholesale markets and to Kano. The activities of these village grain traders are very important. They are indigenous to the village, and generally highly respected on account of their business success and relative wealth. They tend to invest more heavily in farming equipment, bulls and land, and to use more hired labour to supplement their family labour. Although they often had to borrow or save in order to commence trading, the capital for expanding their operations usually comes from agricultural profits. The impacts of policy on trading are as noticeable as they are unavoidable. Currency devaluation, fertilizer subsidies and fuel prices all affect profit margins.

Livestock

Livestock trading is somewhat differently organised, not least because animals can walk from ecosystem to ecosystem and must be fed and watered until the point of slaughter. Small ruminants are taken by their owners directly to markets where commission agents mediate between sellers and buyers for a fee. Animals may also be sold through these agents to larger-scale buyers. Alternatively, village traders may buy a few animals locally, using their own money, and take them to market. Cattle, on the other hand, are taken by their owners or a village middleman to the nearest large cattle market 20 km away (80 km away in the flood season) for sale through commission agents to large-scale buyers. These buyers take the animals up the hierarchy to a regional or urban market in Kano or Lagos.



Herbalist selling a variety of ecosystem products in the local market

Photo: Joachim Gratzfeld

Consumables

In addition to providing an export channel for ecosystem goods, periodic markets offer a wide range of consumer goods to local people including many products of the ecosystem itself (such as edible wild food, fruit, fibre, construction materials and medicines) and processed or secondary products (milk, butter, cooked food and dried fruit). A very large proportion of the population visits at least one market weekly to either buy or to sell.

They are also points of sale for imported foods, clothing and other commodities which substitute, over time, for local ecosystem goods; for instance, imported powdered milk substitutes for local cow's milk, and printed imported cloth replaces locally woven cloth dyed with local vegetable dyes. Thus the development process mediates between consumption patterns and the demands made on the local ecosystem in a continuously fluid dynamic. The market is not only a focal point in social and economic behaviour, but pivotal in the relations between social system and ecosystem on the one hand and between local and more distant ecosystems on the other.

Regional markets

The regional markets in Kano are integrated into a national and international trading system of some complexity (Ariyo, Voh and Ahmed 2001; Meagher et al. 1995). Despite a need to adapt continually to short-term uncertainties such as rainfall, harvests, price movements and exchange rates, in the long term there has been relative stability in the extent of Kano's major supply areas.

The trade in grains and in livestock links ecosystems and transmits demand pressures from urban consumers to local ecosystem managers. These linkages may take place over long distances (such as the demand for goats exercised by Lagos on northern producing ecosystems) and across international borders (such as the fluctuations in grain traffic between the Kano markets and southern Niger in response to fluctuating rainfall and exchange rates).

Incentives to invest in ecosystems

It is important to realise the full potential of human and social capital in managing ecosystems. Private investments are the key to the landscape of intensive farming that exists today in the Kano region. Such investments start small, are incremental over time, and may be created by unpaid family labour and skills as well as through the agency of markets.

In an ecosystems context, it is important to distinguish between production and sustainability objectives. Poor people are often assumed not to be able to invest in the sustainability of their ecosystems. This maligns small producers, since evidence from several areas in the African drylands show that the conservation of their natural resources is a prime objective for them, and that productivity and conservation can be combined in small-scale farming and livestock-keeping enterprises. Whether they actually do so depends on the incentives available in a given time and place.

Governments can provide economic incentives through a range of macro-economic, fiscal and sectoral measures. Macro-economic policies, such as changes in interest or exchange rates, can adversely affect small producers' investment decisions, as can other elements of structural adjustment, such as trade liberalisation and the withdrawal of government services.

Working through institutions affects enabling incentives. A key institution is the system of land tenure. Credit institutions, decentralised government services, and research and extension systems are also critical.

Much more needs to be documented about the extent, value and impact of investment by smallholders in dryland ecosystems, the trade-off, if any, between productivity and sustainable use, and the incentives needed to stimulate investment in ecosystem management.

The rationale

What distinguishes the focus of the present study on the EA is that sustainable management of ecosystems is given equal weight with development objectives. Such a balance reflects the realities of poor peoples' livelihood strategies in an environment where risk and degradation are understood as threats, and is better adjusted to these realities than an exclusively sectoral and technical approach.

Dagaceri, Nigeria

The process of participatory project identification

A general meeting of all the stakeholder groups in Dagaceri was held. Those who attended the meeting came from all the primary and secondary livelihood activities in the village. The researchers took the natural resources-based livelihood activities one by one, and drew attention to what were considered to be the constraints to sustaining the productive capacity of these resources in the long term. This was followed by a long discussion on the steps that could be taken to restore, sustain or even increase the capacity of the resources. Suggestions focused on obtaining and conserving more water; increasing the amount of manure available to each household by increasing livestock holdings, planting of a small village forest, and a wish-list — unlikely to be realised — of government interventions.

The choice of project was the creation of a community tree conservation area. Villagers decided to form the Dagaceri Development Association, to spearhead the planning and execution of the conservation area project. It was agreed that it would provide wood for community uses such as lining new graves in the village cemetery and for constructing shaded meeting areas where people could gather to meet dignitaries visiting the village. The development association established good links with the agricultural department of Birniwa local government to realise this proposal.

Technical sustainability

The view that prevailed at the opening session was that villagers' interest in the short run was in drought-resistant and fast-growing trees. No indigenous species match the neem (*Azadirachta indica*) for these qualities. Shortage of water was potentially a serious problem for the tree seedlings in the dry season, but it was overcome through the readiness of members of the management committee to allow the free use of their ox-drawn carts to collect water, and the readiness of many young boys to fill plastic containers, load up the carts and control the bulls as they pulled them home. There was a high seedling survival rate through the long dry season of 2005–06. After six months, 120 neem trees were well established, but there had been high mortality among mango, guava and cashew seedlings.

Institutional sustainability

Hope for the institutional sustainability of the project rests in the assembly of institutions that were mobilised in planning, establishing and managing it. These institutions include local village administration (the village head), religious leaders, representatives of all stakeholder groups and the youth, representatives of higher level institutions such as the District Head of Birniwa, the local and state government.

A lack of funds with which to procure fencing materials had been the major constraint to planting trees on a large scale in Dagaceri. So in spite of the enthusiasm for the stand of trees, it would not have become a reality if the IUCN project had not provided the funds for the capital items (plastic seedling bags, watering cans and fencing-materials), even though this capital outlay was minimal.

Lessons for community conservation

1. The decision to set up the project was knowledge-based: the insight gained during the focus-group interviews and discussions increased awareness among the stakeholders and researchers of the constraints and opportunities in the village ecosystem.
2. Participatory work in consensus building on community projects is vital. It was the dialogue among the stakeholders who participated in the research, in the interactive session at the end of the survey, and in the meetings held by the steering committee that led to enthusiasm for action.
3. This kind of community activity is more likely to be successful if it is managed by a core institution (formal or informal) consisting of a small group of dedicated people who share a common view of the project.
4. IUCN's modest support for the Dagaceri project was negotiated, and was in-kind, not cash.

Magami, Niger

Identifying the project

It was hoped to assess the selected communities' perceptions of their resources, and their interest in conserving the environment. Like the rest of Maradi Region, Magami villagers are mainly Hausa peasants or agro-pastoral Fulani and settled Tuareg. All of them recognise that biodiversity is important for several reasons:

- its ecosystem protection value;
- its economic value — some species are needed by specific professions (herbalists, blacksmiths, wood carvers, etc.). For livestock keepers, a rich pasture flora is needed not only for feed quality but also for good reproductive performance and for combating diseases;

- its food value — the disappearance of some edible species has affected the nutritional equilibrium of some populations.

Conservation has to be understood through the functioning of the agro-ecosystem of the village. Biodiversity conservation is a priority closely related to peoples' livelihoods, although it is affected by the economic and governance dimensions of biodiversity management.

The rapid growth of the cultivated area in Maradi has caused a scarcity of tree and plant resources for people and animals. Because of intensive exploitation and use-specific selection needs (e.g., durability of wood, softness of bark, termite resistance), a majority of villages now suffer from serious shortages. It is necessary to go farther afield to find certain species and collect high-priority materials. Although increasing tree densities are being recorded as a result of protecting natural tree regeneration when clearing fallows (*défrichement amélioré*), villagers recognised that this does not necessarily result in a more diverse flora.

The process began with a village assembly which identified stakeholders on the basis of activities internal to the production system. Diverse ecosystem resources and their users were identified. At the community level (organisation and decision making), the Chief and elders were interviewed. Village organisation officials were interviewed about legislative questions. Administrative and project officials in Maradi Region were also interviewed.

Perceptions of rights and benefits

In Magami the village territory accommodates numerous rights of access which apply to the use of resources by distinct user groups. Their perception of rights is expressed at four levels:

1. According to user groups, **the state** should assure the security of peasants' rights (both groups and individuals) and arbitrate in conflicts of interest between different users. The state should support rural communities by fixing the rules of play, by legislation that reflects social consensus; in controlling pests and diseases in the face of which peasants are powerless; in providing improved and adapted seeds and agro-chemicals; and in forestry training.
2. **Pastoralists** noted that "modern livestock keeping is different from before; extensive livestock-keeping needs space but today, livestock keeping must be done at the house as there are no pastures." They want to see the improvement of pasture in the cattle corridors and reserved forests where resources are held in common with village communities.

3. Provided that the State ensures security, it is up to **the village community** to maintain the viability of their ecosystem through collective or individual action. Respect for private property permits better conservation and gives more responsibility to villagers themselves.
4. **The individual** should continue planting trees and maintaining protected trees on-farm; he or she should prevent abusive cutting and respect established rules; the right to the tree should go with that to the land on which it stands; and women also have rights and duties where trees are concerned. Conservation of plant resources provides wood for construction, carving, energy and incomes.

The Magami nursery

There had previously been a nursery in Magami that had been used to grow neem (*Azadirachta indica*) for shade trees around the village and market. Villagers were eager to reconstitute the nursery to grow species which had disappeared from the local ecosystem, though it was difficult to find seed or seedlings for them. Blacksmiths were eager to reintroduce hardwood species; herbalists, wood carvers and women set priorities for many of the other species. Those eventually obtained were *Acacia nilotica*, *Adansonia digitata*, *Annona senegalensis*, *Azadirachta indica*, *Bauhinia rufescens*, *Detarium macrocarpa*, *Faidherbia albida*, *Ficus gnaphalocarpa*, *Prosopis africana*, *Khaya senegalensis*, *Mangifera indica*, *Tamarindus indica*, *Terminalia* spp, *Ziziphus mauritiana*, *Ziziphus spina-christi*, *Citrus* spp, *Eucalyptus* spp and *Psidium guajava*.

The establishment of the nursery in the rainy season of 2004 was made possible through the support of IUCN in providing facilitation, advice, and contributions of material (in kind, not in cash). Considerable thought was given to nursery sustainability and economic viability for the future. The decision to reanimate the nursery came at a time when the state was encouraging the planting and conservation of trees to rebuild tree-cover in the country. It also coincided with tenure changes under which trees are being moved into more protected tenure contexts, and found increasingly in fields rather than on open public land. Initiatives such as the *Projet de développement rural de la région d'Aguié* (PDRAA) had also encouraged tree protection and supported the shift to village management of the natural regeneration of trees. An enquiry carried out by PDRAA has estimated that nearly 100,000 ha has been regenerated, with seedling densities in some places attaining 200–250 trees/ha.



IUCN tree nursery, Magami.

Photo: Joachim Gratzfeld

Conservation in the community

The following observations reinforce the finding that conservation values are important to the community:

- The peasants have a sophisticated understanding of their ecosystem and adapt their interventions in response to this understanding. Innovation is very important, especially in areas of high population density.
- All stakeholders are conscious of the fragility of their ecosystems and the necessity to conserve them in order to ensure continuity of their activities and benefits. They are aware of change, and of interrelations between different ecosystems, notably through observing new species, their provenance and the means of their introduction (wind, animals, water and human agency).
- It is seen to be necessary to integrate the interests of different stakeholders, even if almost all of them practise farming and livestock keeping in differing proportions.
- A clear interest has been demonstrated for each village in active biodiversity management, appropriate technical practices, and the responsibilities of stakeholders.

Five components have implications for practice:

- knowledge;
- institutional development;
- sustainability;
- hierarchies and interaction; and
- scaling up.

Knowledge

It is clear from all five villages that the stakeholders' perceptions of ecosystem resources — the goods and services they supply — and their capacity to appraise those resources and manage them with a view to their long-term sustainability is substantial, relevant, and based on local cumulative experience. In these respects, local knowledge rightly takes its place alongside the science-based, external knowledge that has traditionally driven development interventions by governments and donors. The term “local” is preferable to “indigenous,” since it shifts emphasis away from traditional and static knowledge to adaptive and dynamic information, based on interaction with new aspects and cumulative experience of local ecosystems. Donors and researchers have a duty to try to make local experiential knowledge more visible to policy makers, not as a relic from the past requiring modernisation, but fully participatory and deserving of full recognition and legitimacy.

Institutional development

Some enhancement of existing institutional arrangements will be necessary to achieve the objectives of equitable sharing of ecosystem access and benefits among stakeholders. This does not mean that the existing hierarchy of governance institutions in either country needs to be replaced; still less that parallel and competitive institutions should be created, as was done, for example, by the World Bank's agricultural development projects in Nigeria. But as presently configured, institutional systems fail both to give adequate priority to ecosystem management, and to support grass-roots autonomy in place of the dependency on government that resulted from the oil boom in Nigeria and the proliferation of donor-supported development projects in Niger.

Creative thinking and action are needed in order to realise the potential of human and social capital. Areas needing attention include the working of land and resource tenure in an ecosystem stakeholder context; means of access to rotating credit; negotiation processes for sharing access entitlements and benefits; facilitating women's self-mobilisation in environmental decision-making; facilitating networks of small-scale, volunteer associations based on ecosystem stakeholder interests; ways of exercising demand on service providers (for advice, technologies, inputs, market access); and

creating awareness of new opportunities. Developmental work is needed on scaling up the findings of the present study to address the realities of complex and interlocking institutions and groups of stakeholders with different and unequal powers.

Sustainability

This issue, along with ecosystem degradation, has been over-simplified by scientists and policy makers. The restoration of pristine ecosystems in an area that is ever more densely populated, extremely poor, and environmentally at risk is not a relevant target. This is implicitly recognised in the objectives of the EA. Nevertheless, degradation continues to be understood in many scientific and policy circles in terms of equilibrium assumptions. Policy must become more nuanced and realistic, learning from the real managers of the ecosystems and taking the best from scientific research. The work reported in this study indicates quite clearly that local people understand the symptoms and causes of degradation and know how to reverse them given the right resources.

Two examples illustrate this:

1. Tree planting is rapidly becoming the vogue in response to increased scarcity of harvested products, timber, and fuel as well as environmental benefits (a transition that has been reported on quite a dramatic scale in parts of Niger), evidently confirming that normal rules of supply and demand apply in the environmental sector.
2. Soil fertility, when no longer sustainable through fallowing, can be restored to acceptable levels by manuring and inorganic fertilizers.

The struggle of poor people to reverse the effects of degradation clearly points to poverty as the constraint, and to the importance of macro-economic policy and global drivers of poverty. Development strategy needs to take account of people's confidence that, with adequate rainfall and effective measures in place to reduce the constraints they have identified, the ecosystems can remain productive in the long term. There is an urgent need to transfer the ownership of sustainability from external agencies to local institutions.

Hierarchies and interaction

In the Kano villages, four interdependent levels of ecosystem interaction from local to national were identified. This underlies the economic drivers of change as the incentives to manage or mismanage ecosystems are largely mediated through markets, which are also organised hierarchically. Hierarchical areas were also matched with existing management (governance or supervisory) institutions. The significance that this has for any intervention in ecosystem management is that policy needs to address the

different levels and not restrict itself to the notion that ecosystems are local and closed systems. This is an idea that tends to creep over from the old ecology of “fortress conservation” where users were excluded. This again underlines the necessity of paying attention to the macro-economic environment of ecosystem management.

Any area-based development faces the risk that unless the policy environments are effective, real and sustainable, changes will be hard to accomplish at the local level. The linkages between local and national policy institutions and processes should receive careful attention. Without an effective and modernised lobby for the semi-arid north, Nigeria in particular may be prone to overlook needs specific to these ecosystems.

Scaling up

Although these five small communities are fairly representative of the semi-arid zone of northern Nigeria and Niger, they did not provide the opportunity to include a wider variety of stakeholders, ecosystem resources and management institutions.

Broadening the spatial scope of the research is necessary in order to identify more varied stakeholder groups, including those with a deep but indirect interest in ecosystem resources, community-based organisations and international donor agencies. A wider spatial coverage would also facilitate the identification of more diverse ecosystem management institutions. Especially in the context of action research, all levels of government should be directly involved in the participatory framework that is necessary for devising better ways of ecosystem management for sustainable use. It is hoped that the SCNN project will in due course scale up the findings of this study to the shared catchments and eventually to the transborder region as a whole.

Acronyms

EA	Ecosystem Approach
GEF	Global Environment Facility
IUCN	International Union for the Conservation of Nature
NNJC	Niger-Nigeria Joint Commission
PDRAA	Projet de développement rural de la région d’Aguié
SCNN	Integrated Ecosystem Management in Shared Catchments between Niger and Nigeria

Endnote

1. This chapter is a shortened version of a much fuller report by the same authors, available on the IUCN Commission on Ecosystem Management website.

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Acknowledgements

The authors acknowledge the support of their respective institutions. We had helpful comments on drafts by Adam Manvell and others. Beryl Turner kindly provided cartography. Finally, we recognise our debt to the villagers of Dan Kulu, Serken Hausa, and Magami in Maradi Region of Niger, Dagaceri in Jigawa State of Nigeria and Tumbau (Gamji Tara) in Kano State, whose experience, knowledge, perseverance, and friendship provide the foundations for our understanding and interpretation.



Mekong Delta: Tram Chim National Park

The Ecosystem Approach methodology

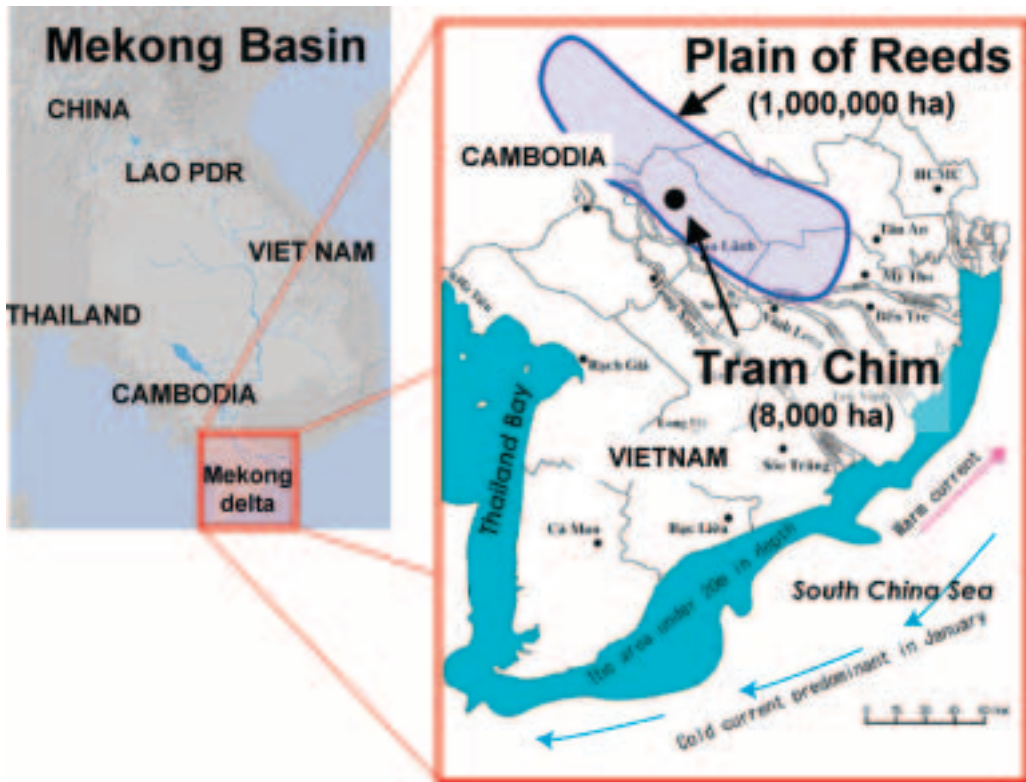
3

Martin van der Schans and Nguyen Huu Thien

The goal of the case study

Tram Chim National Park (TCNP) is a 7,500-hectare remnant of the once-vast Dong Thap Moi (Plain of Reeds: map 1). It is surrounded by more than 42,000 people living in five villages and a district town. It was designated as a national park in 1998 to preserve a small area as a miniature of the original ecosystem and its historic value as a revolutionary hide-out during the American war. Tram (*Melaleuca cajuputi*, a freshwater mangrove tree species), Chim (birds) and fish are abundant, but the biodiversity value of the grassland landscape and associated bird communities is probably the highest, particularly the dry-season populations of the endangered Eastern Sarus crane (*Grus antigone sharpii*).

Map 1. Dong Thap Moi (Plain of Reeds)



Source: Mekong Wetlands and Biodiversity Project

The landscape is largely defined by hydrology and soil type. Dong Thap Moi comprises a 700,000-ha depression (0.5 — 2 metre a.m.s.l.) in the northwest part of the Mekong Delta. Prior to canalisation, the marsh lands and the forest were inundated annually from July until December to a depth of three meters and would then drain slowly during the dry season. This has dramatically changed the hydrology of the whole plain and degraded many natural wetland habitats.

The aim of this case study is to compare the past and current ecosystem management practices in Tram Chim to the 12 principles and five steps of the Ecosystem Approach (EA) (Shepherd 2004). The study focuses on the main challenges to the restoration efforts of the Tram Chim wetland ecosystem.

All information presented here is based on observations and reports compiled during the implementation of the Mekong Wetlands Biodiversity Programme (MWBP), particularly those activities related to the development of an integrated strategy for the management of fire and water. In addition, in July and September 2005 and in April 2006 interviews were conducted with the staff of the national park, local authorities and local people who use the park resources. A review of the literature was undertaken and final results were also presented at a validation workshop in the University of Can Tho, Mekong, in April 2006.

The area, the stakeholders and limits to participation

Wetland reclamation and conservation efforts in the area

Before 1950: Early settlement and colonisation

The original Plain of Reeds, of which Tram Chim is now one of the last remnants of natural landscape, was a vast depression area of 700,000 hectares in Vietnam, with a smaller part in Cambodia. Located in the Mekong Delta, it was an area with little settlement. Several hundred years ago, only a few farmers settled along the natural high levees along the Mekong where they could live on the high ground, cultivate crops, and live on seasonally harvested wetland resources in the Plain of Reeds, mainly in the dry season. Most of the vast plain was a wild area.

1950–1975: Revolutionary hide-outs

This vast wilderness area became an important refuge for guerrilla forces during the conflicts with French colonialists and later with the U.S. Many of the top leaders in the Vietnamese party spent time hiding in the delta's Melaleuca forests. In an effort to destroy the guerrilla stronghold, the American Corps of Engineers dug large canals such as Dong Tien and Phu Hiep to drain the wetlands and dropped napalm to burn the vegetation. As a result, the landscape of the Plain of Reeds was severely damaged. This was the beginning of the change of the hydrology regime of the Plain of Reeds (Biggs 2005; Beilfuss 1991).

1975–present: large-scale land reclamation, resettlements, and wetland restoration efforts

After the war, the area received a large influx of migrants to reclaim the wild area for cultivation. In need of food and foreign exchange, the new government initiated a large-scale reclamation programme in the Mekong Delta and a programme to exploit the Plain of Reeds. These efforts brought great gains in food production —turning Vietnam from a rice importer into the world's third largest rice exporter — but they have been at the expense of natural wetlands productivity.

Concurrently with the exploitation of the Plain of Reeds, provincial leaders such as Muoi Nhe, who was raised and fought in the war in the area and remembered how the Plain of Reeds used to support tremendous biodiversity, saw the need to conserve parts of the area to preserve its memory and to conserve the remaining biodiversity. Tram Chim was zoned for this purpose, initially as a 5,200-ha forestry enterprise for the harvest of fish and Melaleuca trees.

1990s: strict conservation regime

Following the rediscovery of the Sarus cranes in 1986, national scientists and, later, international organisations (such as The International Crane Foundation, the Brehm Fund and IUCN) took an increasing interest in the protected area. The provincial authority established Tram Chim as a provincial nature reserve. In 1994, it was recognized as a national reserve and in became a national park by a decision of the Prime Minister. Since Tram Chim is a national park under the Special Use Forest system, the conservation regime applied there has involved a strict protectionist approach that totally excludes the local community.

While earlier, the prompt action to establish the park and the strict protection applied to it helped to keep Tram Chim from being converted into agriculture, the exclusion of the local community has become problematic and the park-and-people conflict has become more intense.

Primary stakeholders

Tram Chim was designated a national park by the Vietnamese central government. It falls under the Special Use Forest (SUF) system of the Ministry of Agriculture and Rural Development (MARD).

The direct users are illegal and are mainly local people from the surrounding six communes. The population of the area continues to rise, augmented by seasonal migrants. Despite development programmes implemented by the government and NGOs, many people in the area remain poor. Those with land live on rice cultivation, but many people have to try to live from casual wage labour, fishing, gathering fuelwood and wild-life hunting. Rice yields in the area are low, and many of the first wave of immigrants were driven off the land by falling yields on the acid sulphate soils, which are also difficult to cultivate.

Local people with the longest residence in the area feel they have the strongest customary right to resources. More recent settlers also feel they have right to fish in the park since fish are considered an open-access resource. It is not currently known how many local people use park resources. Park staff estimate that 80% of the people who enter the park illegally belong to the poorest groups.



Managing sluice gates in TCNP
Photo: Tram Chim National Park

Other direct users of ecosystem services are tourists and sport fishermen from Ho Chi Minh City.

Secondary stakeholders

Commune level

The People's Committee and the local police and judicial bodies are responsible for control and for prosecuting violators of the park, although in practice this does not receive a lot of attention.

Responsibility for management is via a management board. The board is put in place by the province, although it also receives instructions and funding sources from a range of organisations, each responsible for different components of the ecosystem. The management board has only limited authority to make independent decisions.

Provincial level

There is no effective mechanism for integrating and bringing coherence to provincial policies and activities regarding TCNP. Provincial departments do not consider the park a priority.

The Provincial People's Committee (the executive body of the province) is responsible for the overall management of TCNP and the installation of its management board. The Provincial People's Committee (PPC) occasionally consults provincial line departments about sectoral issues concerning TCNP. These are the most important of these departments:

- the Department of Agriculture and Rural Development (DARD), which is responsible for forests, water management and the development of the surrounding area);
- the Department of Science and Technology (DOST);
- the Department of Natural Resources and Environment (DONRE), which is responsible for monitoring and biodiversity conservation); and
- the Trade and Tourism Department (TT), which has supported the development of basic tourist infrastructure at TCNP and commissioned its master plan.

The provincial departments most involved in firefighting and protection are the Forest Protection Department (FPD, a sub-unit of DARD), the Police Fire Department and the provincial military (who are called in if there is an emergency requiring extra workers).

National level

The most important national stakeholder is MARD, which has overall responsibility for managing the SUF system and for reviewing budget allocations and investment plans for them through the Forest Inventory and Planning Institute. MARD is also important for its work in the area outside the park since it has initiated most of the reclamation, resettlement and agricultural development programmes there.

The Ministry of Natural Resources and Environment (MONRE) is responsible for biodiversity issues and wetland management. It is the focal point for the Ramsar Convention on Wetlands and the Convention on Biological Diversity (CBD) and for coordinating the implementation of the National Biodiversity Action Plan. The Ministry of Trade and Tourism initiates tourism development, but has so far not been very active in TCNP. The Ministry of Planning and Investment negotiates budget allocations for protected areas with sectoral ministries and provinces.

Ecosystem structure and function

The threat of water

Biodiversity

Semi-natural wetlands in Tram Chim are a combination of open swamp, seasonally inundated grasslands and Melaleuca forest, most of the latter planted. Of the grassland communities, those dominated by *Eleocharis dulcis* and wild rice (*Oryza rufipogon*) have highest conservation value.

The site has 198 species of birds, including large populations of waterbirds, 15 of which are globally endangered, threatened or near-threatened. Of particular importance is the Eastern sub-species of the Sarus crane (*Grus antigone sharpii*), which spends the dry season in the park. They inhabit shallow wetlands and burned-over wet grasslands. The birds are omnivorous; their diet including grains, tubers and corms of aquatic and marsh plants, green shoots of grasses, snails and insects. During the dry season the birds feed intensively on the grassland sedge *Eleocharis ochrostachys*. Breeding occurs during the rainy season when the cranes migrate to large forested areas in the central highlands of Vietnam, Cambodia and southern Lao PDR (Nguyen 2005). Other endangered bird species recorded at TCNP include the Bengal Florican (*Houbaropsis bengalensis*), Darter (*Anhinga melanogaster*) and Asian Golden Weaver (*Ploceus hypoxanthus*) (Ramsar information sheet).

The park has an increasing abundance of egrets, kites and other species associated with long-term inundated wetlands. Economically important fish species include Giant Snakehead, Climbing Perch and other resident (black) fish species (personal observation).

Agricultural land outside the park is mainly restricted to rice cultivation due to the soil's high acidity. There are also small commercial Melaleuca plantations but these have become less economically important since

sale prices are low and the use of fossil fuels for cooking is increasing. Settlement areas include houses and roads. Other associated land uses are the numerous drainage and transportation canals that intersect the area, and their associated dykes.



Sarus cranes.

Photo: Tram Chim National Park

Hydrology/wetland restoration

The original Plain of Reeds was a relatively closed system. The hydrological regime was characterized by a seasonal inundation of water caused by the overflowing of the Mekong River basin and high rainfall from July to November. When the Mekong water receded (from December to April/May), water in the plain dispersed slowly through the thick vegetation mat, by means of evaporation, and through the few small natural drainage streams until the onset of rains, when there was only a little standing water left in a few places. Most of the soil remained moist. The hydrological rhythm of this system supported the ecosystem and biodiversity of the Plain of Reeds.

By the 1980s the whole hydrological regime had changed due to the construction of drainage canals for agricultural development and the consequent removal of dense vegetation mats. Floodwaters now flow in from the Mekong river and drain out from the plain more rapidly, causing dry-season water levels to drop up to one meter below their natural level, and making the area more prone to fire and increased acid run-off.

Dykes were constructed in 1985 to block the excessive drainage of floodwaters from the wetland. Although this prevented local people from harvesting the rejuvenated forest, it maintained sufficient moisture to protect the *Melaleuca* forest against fires. The natural flora started to recover immediately from the dormant seed bed, and fauna returned, including the Sarus crane in 1986.

When the area was protected it was necessary to install a system of dykes and sluice gates to mimic the original hydrological regime. The gates were installed in 1992 with financial and technical support from the International Crane Foundation (ICF) and the Brehm Fund. To follow the original drainage pattern, the sluice gates were located where natural streams would have intersected the ring dykes. Recommendations for target water levels and sluice operations were formulated by ICF based on a hydrological study and information about the native vegetation.

The dykes, however, also restricted the flushing of organic materials and the exchange of detritus and suspended nutrients with the surrounding area except during high floods when they overflowed. In addition, the permanent impoundment of the area caused stress to the macro fauna and generated hydrogen sulphide in the upper organic strata (Beilfuss 1992: 32).

Management: the threat of fire

Current management of the park, and of many other forested wetlands in the Mekong Delta, is primarily driven by fear of uncontrolled fire in the Melaleuca forest. This is despite the fact that historically there were fires in the grasslands¹ and Melaleuca is a very fire-adapted species.

National parks in Viet Nam are by law considered as Special Use Forest (SUF), even when forest is only a small part of their ecosystem. Funding for the park is also dependent on the area covered by forests on a per-hectare basis, so if a proportion is lost through fire, the park's annual budget is reduced (Phien, pers. comm.).

SUF legislation strictly prohibits forest fires and makes the managers of the protected area and chairs of the PPC personally responsible (and liable to dismissal), as happened after a big fire in U Minh Thuong National Park in the Mekong Delta, which received much media coverage. By contrast, MONRE has far weaker enforcement mechanisms for biodiversity legislation.

TCNP has a high incidence of unwanted fires: some are accidental but the park management believes that the majority are caused by local arsonists out of resentment at being restricted from using the park's resources. For this reason, park management has aimed to keep water levels far above ICF targets to reduce the risk of fire. In addition a system of canals and ponds were constructed throughout the park to make more water available for fighting fires and to act as fire-breaks. The canals also divide the park into Melaleuca and fish-production sections

Although the high water levels did reduce the immediate risk of fire, the overall effectiveness of these measures is highly debatable.

- Most fires occurred in locations far away from the canals.
- Because of high rates of leakage and evaporation, fires have occurred even inside the ponds.
- The canals have contributed to the increased drainage of the area, which increases the risk of fire.
- The high water levels actually increase the long-term fire risk. The biomass builds up year after year, and the high soil moisture also causes the Melaleuca trees to grow more slowly, but with more aerial roots and low twigs. The root system also creates good fuels that burn easily. As a result, low ground fires can easily move to the treetops where they are difficult to control.
- Although the canals at the boundary make it more difficult for people to enter the park, the canals that lead to its centre make it easier for poachers and arsonists to penetrate deep into the park.

High water levels

The high water levels also cause a range of negative impacts on the ecosystem related to species composition and landscape.

Change of species composition

- Large areas of grassland died off under prolonged inundation and became bare land.
- *Eleocharis* tubers, the main foods of Sarus cranes, the flagship species of the park, are very sensitive to water level changes and high water levels inhibit their production. Large areas have now been taken over by other grassland species such as *Panicum repens*.
- Overall, the higher water levels have caused a decrease in native avifauna associated with the area's natural hydrology such as Sarus cranes, Bengal floricans, Painted storks and other large, non-heron waterbirds. These species are more specialised and more rare and thus contribute to a more individual habitat. Less specialised and more common species have benefited from the higher water levels, including egrets, large herons, little cormorants and purple swamp hens (TCNP and ICF bird census; Birdlife and FIPI 2004).
- The disturbed bare soils on newly constructed dykes provide favourable habitat for invasive alien species (especially *Mimosa pigra*); 25% of the total area is now infested (N.V. Hung, pers. comm.).
- The newly constructed canals created a good passage for the invasion of *Mimosa pigra*, as notorious invasive alien plants that invade disturbed areas.



Canals and *Melaleuca* in the park.

Photo: Martin van der Schans

Landscape

- The canals spoil the landscape and obstruct the view of tourists travelling by boat.
- Habitats are fragmented.

The current management objective — keeping water levels high and digging canals to reduce the risk of fire — makes it impossible for the park to attain its original objective of restoring a remnant of the original Plain of Reeds with the associated species

composition. The Melaleuca forests do not represent the key biodiversity values of the park, which are found in the grassland communities. The root causes for the fear of fire are not ecological but are related to policy and management. Since the central government has not put in place policies for wetlands, wetland ecosystems have been considered and treated as forests. For the general public and the media, the concept of forest is readily understood, but the concept of a wetlands ecosystem is not.

It is important to realise that because TCNP does not have peat soil, it is different from other Mekong delta parks that do, such as U Minh Thuong, and requires different fire management. A fire which got out of control in TCNP in 2005 ran quickly through the forest, but most of the trees survived and the fire cleared a lot of low biomass. This indicates that prescribed burning might be used as a tool in appropriate weather conditions. However, it is commonly believed among politicians and in the media in Viet Nam that all forest fires are bad. A protected area manager has little personal incentive to protect important biodiversity features and endangered species, and his or her job is at risk if there is a fire.

Top-down system

The stakeholders with the most influence on the choices made for the park are probably those who cause fires and the PPC. The park management board, for fear of censure, asks permission for every small activity, even the timing of the opening and closing of sluice gates. Another example is the design of spillways to enhance the exchange of water through the high dyke. From an ecological perspective it is better to have a structure with a height-adjustable sill to allow for adaptive management. The management board prefers a fixed sill since it does not require official permission, which they fear may be delayed.

Sectoral approach

Whenever a decision needs to be made, the PPC asks advice from the relevant line department. In the case of water levels, it will talk to DARD for advice on what to do. Fire management plans are formulated by the Forest Protection Unit of the park and are sent to the FPD and the provincial fire-committee, which is headed by the vice-chair of the PPC. Most of the time these plans favour minimizing fire risk. Until very recently these different provincial departments did not even sit together around a table, let alone coordinate any mechanism for all stakeholders to come together. Thus, when DARD is talking about fire management, DONRE has no opportunity to make an input from the biodiversity perspective.

Sectoral funding

TCNP receives funding mainly from MARD based on the area of forest coverage (the area of Melaleuca in the park excluding the grassland area). Funding from MARD, however, is only in theory. Actual government funding comes from the PPC through its finance department. Certain expenditures can be deducted from the provincial budget contribution to the national government. There are other funding sources within the government, such as Programme 661 (which paid for the five million-ha reforestation). But the PPC also needs to contribute its own core funding. Money for the park is a big burden for the province since not all costs are reimbursed by the central government. At the beginning of the year the PPC allocates an overall amount of money to the park. In order to have access to it, the park has to write requests and submit them to the PPC, which then seeks advice from provincial line agencies.

Economic analysis: Local livelihoods, state policies

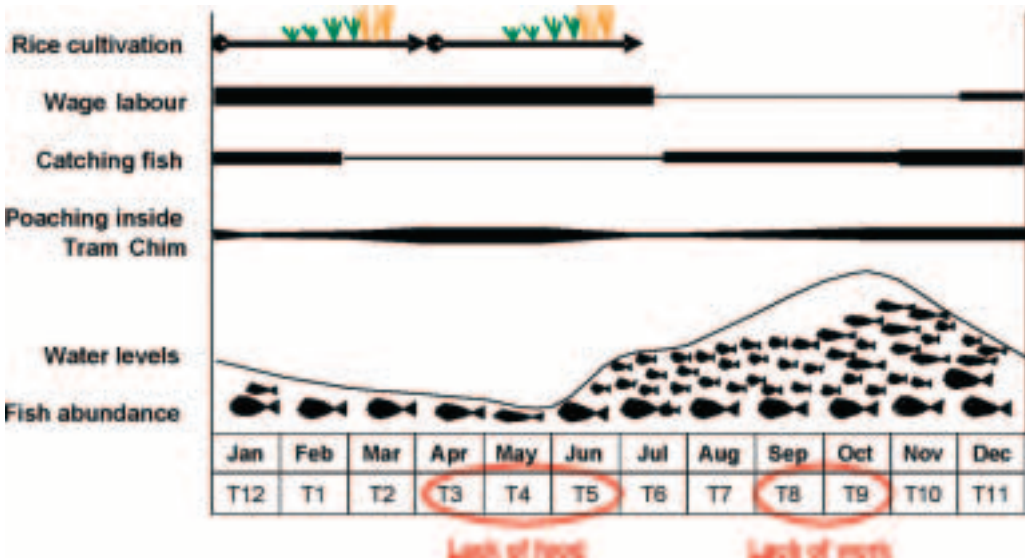
Conservation regime

A strict conservation regime has been applied by government since the inception of Tram Chim in the 1980s. It focuses on the economic productivity of plantation and fisheries enterprises and allows limited use by local people except in a few selected areas where they were encouraged to plant. This protectionist approach was the dominant production forest and conservation paradigm at the time, not just in Vietnam. The approach was applied even more stringently after Tram Chim was declared a national park, despite much discussion at national government level about involving local people and sharing benefits.

Livelihoods and resource use by local people

Livelihood activities around TCNP are typical for those in the Mekong Delta (DFID 2000). The main income sources for the better-off households are paddy rice and commercial agriculture. Figure 1 shows the seasonality of livelihood activities in relation to the availability of natural resources. During the dry season people cultivate their land or try to find jobs as wage labourers on other people’s lands.

Figure 1. Seasonal calendar of natural resources and livelihoods around TCNP



Lack of land is seen as the main cause of poverty and poor households have difficulty meeting their daily needs. The poor depend on casual wage labour in the paddy fields and on the harvesting of wild resources, especially fish. Being located in an “ocean of rice,” where natural wetland resources — especially fishery resources — have been almost depleted, puts great pressure on the resources inside the park. Melaleuca plantations outside the park are no longer an attractive investment, since prices for timber and fuelwood are declining. An increasing number of people are involved in small trading/services, livestock-raising and aquaculture in backyards or in cages in the canal system (MWBP 2005, fishing interviews 2006).

Livelihood strategies are closely linked to land holdings, which in turn are largely defined by the timing of in-migration to and settlement in the area. Table 1 shows that Phu Duc and Tram Chim have relatively low poverty rates; they are also the oldest settlements. Phu Duc was established in 1960 and most of the families in the village have lived in the area for generations. People managed to acquire land when it was still available and are experienced in farming the acid-sulphate soils. They are also the people that now have the longest customary claims to the resources of the protected area. The dykes and canals at the boundary were some of the first infrastructure constructed in the area, long before TCNP was established, so it made sense for people to settle in that area.

Table 1. Characteristics of communes around TCNP

commune	area (ha)	population	no. of HH	poverty rate (%)
Tram Chim	1,169	8,840	2,070	9
Phu Tho	6,054	10,124	2,154	12
Phu Thanh B	4,966	3,077	633	71
Phu Hiep	4,842	7,109	1,573	41
Phu Duc	5,041	6,026	1,318	6
Tan Cong Sinh	7,746	4,346	1,001	17
total	29,818	39,522	8,749	20

Source: TNCP 2002

During the 1980s the government started large-scale land reclamation and resettlement programmes around TCNP. Tam Nong District was selected as a New Economic Zone and population redistribution area (Thanh 2003: 76). Many people who moved to the area saw their crops fail due to their inexperience in farming on acid sulphate soils and sold out in the early 1990s to a second wave of immigrants. Some people came to the area because of the abundance of natural resources; others were attracted by the jobs available when the dykes and canals were constructed in the late 1990s and stayed on. The population density in the district (212 pp/km²) is much lower than the provincial average (506 pp/km²), even considering that the area is

partly covered by the protected area (Statistical Bureau of Dong Thap Province 2004). The province continues to consider it a logical place to resettle people even though there is already a high degree of landlessness and it will increase park conflicts.

Many people have been moved to new settlements consisting of small clusters of concrete houses. The houses are constructed by the government on levees and other artificially raised areas to protect them from flooding. Most people in these locations are very poor and are heavily reliant on the wetland for their livelihood needs. However, the new locations are no longer on stilts directly over a stream and are inconvenient for aquaculture, cropping and other backyard activities. They are also too small

to generate local markets or to supply towns. People living in these settlements around TCNP have little option but to enter the park for livelihood reasons. Other people come to the park on a seasonal basis as labourers (March–May); professional fishermen with larger boats come during the flood season (September–November) to benefit from the park's resources.



Landless households at the edge of the park.

Photo: Martin van der Schans

Utilising resources from the PA

The main park resources used by local people are fish. Among the poor, recently arrived landless people and migrants depend most on the park's resources since they have few alternative livelihood sources. There are two periods during the year when poor people find it particularly difficult to meet family needs. During the peak of the flood season there are no labouring jobs. People who do not live on the highest dykes face inconvenience due to the flooding of houses and roads. From March to May very little water is left outside the park, making it difficult to find aquatic food there. These are the same times of year when park rangers report the highest number of illegal entries. Staff state that the maximum number of people entering the park is 50–100 a day, but this figure probably excludes night poachers. From a conservation perspective, dry-season poaching is more critical, since this is the period when there is a high incidence of fire, and when most species with high biodiversity value and sensitivity to disturbance, such as the Sarus cranes, are in the area.

Using the results of D.V. Ni's survey of dietary habits and food purchases in TCNP's surrounding communities, with data from the seasonal calendar above, it is reasonable to estimate that the annual fish catch from TCNP has a monetary value of at least USD 340,000.²

Some livelihood improvement projects have aimed to reduce pressure on the park by encouraging people to make a living from fish-ponds or livestock keeping (pigs, cows and goats). However, many of these enterprises also indirectly depend on park resources since it is common practice to feed small fish to aquaculture fish, and to feed grasses gathered from the park to livestock.

Local people have to pay 100,000 VND/ha/year (USD6/ha) for permission to cut grass in the park. The fee limits the number of would-be users and is considered to be part of the contribution of local people to park conservation.

Access to the PA

In principle, the Vietnamese SUF system treats national parks as exclusion zones which local people are not allowed to use or enter. In practice, however, TCNP is a semi-open system. People gain access through a range of means:

- Tourists (HCMC fishing club) — usually more than 20 per day — come for sport fishing, targeting mainly trophy species such as snakehead. This provides official income for the park since the tourists need to purchase tickets, rent boats (USD 25/day) and rooms to stay in. However, the income from tourism is currently not sufficient to cover the operational costs of the park's tourism centre.
- Professional local fishermen purchase wet-season fishing rights at sluice-gates and on canal sections at the end of the dry season through an informal auction system.
- Local people, especially livestock keepers, may pay a modest fee to cut grasses for feeding livestock. Park management uses this as a tool, permitted under the national legal system, to remove biomass and hence reduce the risk of fire.
- Park rangers catch fish during or after working hours to meet food needs. This is tolerated by the park's management as long as volumes are low and local people do not complain. Rangers and park staff allow their acquaintances to fish in the park.
- When local people come into the park to help extinguish fires, they are allowed to catch fish afterwards as compensation.
- Poachers operate in the park in small groups, and occasionally in gangs of up to 50 people. They may fight with rangers to the point of bloodshed.

The park does not have the capacity to completely ban illegal use. There is a “black book” in which poachers are registered if they are caught inside the park and reported to the local authorities. But it is the policy of the local commune and district government not to pursue poor violators.

As things stand there is no incentive for people who enter the park to be careful with resources. They have no ownership so it is in their personal interest to catch as many fish as possible while they can. Local fishermen report that the small-mesh fishnets used at the sluice-gates in particular causes a high mortality of juveniles that would



otherwise enter the park where they could grow larger. Poachers know that they must catch fish quickly before the rangers come, so this encourages more destructive fishing practices such as the use of electric shocks. Poachers also know that when there is a fire, they are safe because the rangers are busy elsewhere, and this is believed to have been one of the drivers for arson. The park has therefore adapted its strategy so when there is a fire only some rangers fight it while the others start to patrol intensively on the dyke.

“Poachers” and their fishing gear.

Photo: Martin van der Schans

Most local people have been hostile to the park for at least a decade. Interviews

conducted by N.H. Thien (1995) and Vu Thi Nhung (2004) revealed the following statistics:

- most people did not know why the reserve was established (1995: 92%; 2004: 90%);
- most think the reserve does no good for local people (1995: 97%; 2004: 94%), and were surprised when asked whether there could be a link between conservation and income;³
- a large minority of the population would like to see the reserve converted to rice fields since many people do not have enough land (1995: 47%; 2004: 42%).

The government has since increased its education and awareness programmes but there has not been any monitoring of their impact on attitudes. The current way in which the PA engages with the community is by organising education meetings where people are paid a token to listen to presentations about the value of the park and its functions. There are also local volunteer fire brigades.

Wider interactions between the park and adjacent ecosystems

Ecosystem impacts of flood control measures

When TCNP was established in the 1980s, a series of low-elevation dykes with sluice gates were constructed around each of the management zones of TCNP to retain water and mimic the original water regime. Originally the dykes had a maximum elevation of 1.5 to 2.0 m above ground level so that they could allow seasonal floodwater to flow into the park to fulfil its natural functions:

- support for the area's distinctive wetland vegetation communities and associated fauna;
- the facilitation of fish migration to the Plain of Reeds;
- the exchange of dissolved and suspended nutrients and detritus;
- the removal of biomass; and
- the limiting of sedimentation.

In 2001, the dykes were raised to four m above ground level in order to improve the transportation of tourists around the park and to enhance park staff's ability to patrol the area.⁴ The dykes are now above the annual peak flood level so that the exchange of water is limited to the sluices. This has had both structural and ecological impacts:

1. The higher dykes are subject to greater pressure from the surrounding water during the wet season making them subject to more damage. Maintenance costs are high as a result. In 2005 the dykes were damaged due to the impact of high water levels in combination with waves.

There is a reduced abundance of fish, both inside and outside the park. Migratory (white) fish migrate passively with the flow from the Mekong River during the beginning of the flooding season but now have reduced entry to the park due to the reduction of water exchange. Local fishermen also state that they catch less resident (black) fish species outside the park since these fish do not migrate through the sluices gates. The park has thus lost part of its role as a nursery ground for fish that helps to support local livelihoods in the surrounding area.

2. Since floodwaters can now only enter the park through the sluice gates, and in much smaller quantities, there is a reduction of sheet flow inside the park. This has several subsidiary effects:
 - The exchange of dissolved and suspended nutrients and detritus between the park and surrounding area has been reduced.
 - It is believed that by impeding the export of organic material from the park there is an increase in the risk of destructive fire. In the past, sheet flow would remove fallen leaves and branches from the Melaleuca forest within

the park. Reduced sheet flow means that litter is retained on the ground, providing a ready supply of fuel in the dry season.

- The extent and quality of the natural habitat has been reduced. Flow velocities are lower in inundated areas while stronger currents in the canals excavated in the park mean that some species can no longer reach their natural habitat in TCNP.
- Changes in sedimentation patterns have taken place. Although the Plain of Reeds was not subject to high sedimentation rates, sheet flow ensured that sediment was deposited across the area. The restriction of water exchanges through the sluices in the surrounding dykes has probably resulted in less sediment entering the park and caused highly localised sediment deposition in the areas immediately adjacent to these structures.
- It can be reasonably expected that given the sensitive nature of wetland ecosystem dynamics (e.g. Mitsch and Gosselink 2000; Thompson and Finlayson 2002), these changes have in turn affected other species that are part of the complex food web of the park and the surrounding area.

The annual flooding and drying cycle plays a key role in maintaining ecosystem functions, both in TCNP and the wider Mekong Delta. TCNP is a microcosm of the land use changes in the wider Delta ecosystem and of their impacts on the ecosystem. Figure 2 illustrates some of the other impacts of land-use intensification and upstream developments on the ecosystem in the Mekong delta.

Figure 2. Floodplain modifications and their impacts on the ecosystem

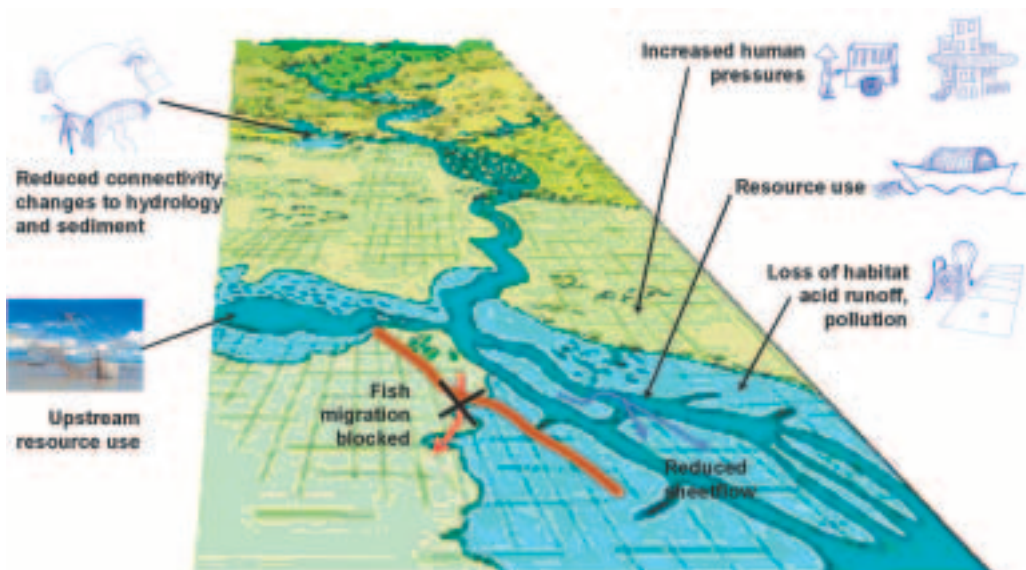


Figure drawn by Martin van der Schans

Land-use intensification/absence of buffer zone

When the park was designated as a production area, land was still available to create a buffer zone but the original production objective did not require such an area. Later, when conservation became a more important issue, it was too late, since all land outside the area was already privately owned and was under intensive rice cultivation. The original investment plan for TCNP used a zoning approach where each of the park zones A1 to A5 was assigned a conservation objective, and a 20,000 ha buffer zone was planned. The buffer zone exists only on paper, however.

Land-use practices in the area around the park take no note of the park, and there is no transition-buffer zone. Although the government intended to encourage less intensive land use around the park, this was never implemented by the line agencies responsible for agriculture development, because no coordination or cooperation mechanisms were in place. There is no joint management board involving park and sectoral line agencies to make possible such coherent planning.

There are problems that could be mitigated by means of a buffer zone, but it is difficult to see how they can now be dealt with; for instance, at TCNP the heavy use of pesticides in surrounding rice-fields affects the park ecosystem.

The potential for adaptive management over time

Setting targets and monitoring

The main threat to natural wetlands in the Mekong Delta is conversion to rice-fields or shrimp farms (Torell and Salamanca 2003). Central government puts pressure on local governments to meet development targets. Since no figure has been put on the economic value of wetland services, in order to meet targets the districts are left with little option but to convert natural wetland ecosystems into rice fields or other land uses with productivity that can be measured more easily such as rice and aquaculture.

There are methodological difficulties to measuring the value of wild fisheries and the contribution they make to the income of part-time fishermen throughout the Mekong Delta⁵ (DFID 2000). However, The Viet Nam National Development Goals for 2006 now include environmental goals; this may provide an opportunity for managers to pay more attention to ecosystem targets in their planning. That would depend on their being able to develop a simple methodology for deriving measurable benefits from wetlands. Applying the Ecosystem Approach requires regular monitoring of park/outside-park interactions, and monitoring of the livelihoods and wealth levels of those living around the park will also be vital.

There are no financial means to institutionalise monitoring of the overall park operations. Most biodiversity monitoring is project based and is conducted with foreign donor funding in collaboration with local research institutes. The park has little ownership over the results and methods, locations and parameters are unfortunately not comparable over time. Park management lacks the data to show if and how the park is supporting the economy and livelihoods of people in the surrounding area.

Also, in protected areas with a high incidence of fire, management has no incentive to lower water tables to improve the ecology since they will find it difficult if not impossible to prove that any positive ecological results result from a fire, or to be rewarded for it.

Water levels and policies

Lower water levels are possible if two steps are taken:

- additional measures are taken to reduce the risk of fire, such as having grasses cut, and performing prescribed burning (as per the MWBP fire-water strategy);
- if national policy accepts that the park can conduct prescribed burning inside the Melaleuca to manage the risk of fire, and that there may be an occasional wildfire;

Fortunately, in 2006 the central government issued Decision 186, which replaced Decision 08 governing the management of protected areas, and which states that the hydrology of Special Forests on Wetlands must be managed to meet the needs of wetlands ecosystems. However, the spirit of the new decision has not been very well reflected on the ground as yet.

The current operation of the sluices is driven both by the higher water levels target and ecological targets. In terms of ecological effects, for instance, the gates are opened at the beginning of the flooding season once the water is above the level of the surrounding fields, and the sediment load is reduced. In practice, however, gates are sometimes opened too early as a result of provincial-level interference or the long lead-in period required for getting provincial approval for being opened.

Gates are closed in December after most fish have migrated back to the main river. Perhaps it would be better for the park if there were a set of marked water-level targets pre-approved by the province, so that sluice gates could immediately be operated when water reached those levels without having to wait for provincial permission. Although strict targets may be sub-optimal from an ecological perspective — since they do not adhere to the natural cycle of dry years followed by wet years — they are more suitable from the management point of view. Projects like MWBP can take the lead on this.



Monitoring water levels.

Photo: Martin van der Schans

Co-management options

The main management problem for the park is the regular arson attacks. These attacks are the result of not internalizing costs and benefits within the ecosystem; local people do not benefit from the park, yet they bear the costs of not having legal access to the park.⁶ There are only 50 guards and they cannot cope with the large numbers of people who enter illegally. The solution to date — keeping water levels so high that fires cannot take place — is ecologically so unsound that it undermines the fundamental rationale for the park. If the park is not managed appropriately for its purpose, the economic losses to people then far outweigh its potential benefits.

Co-management is sometimes considered as a possible solution for the sustainable management of protected areas (e.g. World Parks Congress 2003). In the case of TCNP there are two reasons for sharing the benefits of park resources with local people:

- to improve the status of the ecosystem through more sustainable use; and
- to improve the livelihoods of poor people.

The main conservation concerns over allowing more people inside the park are 1) the possible disturbance to birds, especially cranes; and 2) over-harvesting. The first can be managed by excluding people from bird-feeding areas during the daytime. As for the second, most fish species do not have a high conservation value. The few that do are found in the centre (zone A1), and no one, including rangers, is allowed to catch them. The main importance of fish to conservation is as food for the birds and for generating park revenue from sports fishermen.

For TCNP — and many other protected areas in the Mekong Delta — there are a number of barriers to co-management to consider:

- institutional barriers;
- organisational barriers;
- physical barriers; and
- attitudes.

Institutional barriers

MONRE Decision 109 calls for sustainable use, and for the participation of local people in the management of wetlands, but does not refer to protected areas. The former national policy on Special Use Forest, Decision 08, dictated that local people were not allowed to enter or use park resources. The new Decision 186, replacing Decision 08, states that sustainable use of resources in Special Use Forests on wetlands could be organized; however, its application on the ground has been limited.

In general the political system of Viet Nam does not allow for much flexibility based on different ecosystem needs: there is an assumption that a uniform application of policy must take place. Still less does it encourage local-level managers to innovate or to challenge the boundaries of what is allowed.

Organisational barriers

There are no community groups or other organisations through which people can directly participate in the management and sharing of resources. The political system of Viet Nam expects local people to participate indirectly through mass organisations like the Farmers' Union and the Women's Union. But these organisations do not have the mandate or the expertise to become involved in PA management.

Given the absence of such institutions, the park currently has a poor relationship with the local communities. The original MWBP proposed that local people conduct a

community natural resource assessment in order to develop a resource-use plan, but a good deal of institutional clarification would be needed first.

Physical barriers

There are a few technical solutions for increasing fish productivity, such as increasing the size of net mesh at the sluice gates and constructing spillways to increase the movement of fish inside and outside the park. But all in all the use of fish resources cannot be increased by much.

Through a grant from the Global Environment Facility, implemented with the Universities of Ho Chi Minh City and Can Tho, arrangements have been made to allow local people to cut *Mimosa pigra* (an alien invasive species) in the park and use it for various livelihood activities, such as feeding goats, growing mushrooms and composting. Such initiatives would in no way compensate people if all fishing were banned, however.

Attitudes

There is a resistance to co-management from the staff of the park's Forest Protection Unit as it would mean more work and more responsibility. There is also the fear that allowing more people in the park might create more opportunity for fire.

Looking for a way of selecting users fairly

The key dilemma is whether to allow local people to fish or not and, if so, using what criteria. If people are granted the right to fish though a form of co-management, only a proportion of would-be users can be accommodated because of limited fish numbers. Many poor households would be excluded. There is also the possibility of conflict between the resident community and seasonal migrants. How can an appropriate number of poor people be selected? How can their equipment be limited?

Another proposed way of preventing overuse is simply to limit the kinds of fishing gear that may be used, and to seize and destroy all other forms of gear. This has been the most common solution tried elsewhere, and it can be a relatively effective way of defining a pro-poor policy.



Consultation with local fishermen about the incidence of fish species in the park at different points in the year.

Photo: Martin van der Schans

Finally there is the option of continuing the current practice, accepting a certain level of resource use, conflict with guards and arson incidents. This is probably the simplest option given available ranger capacity, but it will tend to lead to a continuing desire by park managers to keep water levels too high.

Managing the park within the wider landscape

The MWBP supported the construction of two spillways in the dyke as a pilot. One spillway proved to be effective, but the other was rendered useless because the guards made an extra opening in it for fishing. A plan has also been developed with TCNP to construct a series of additional spillways to increase part of the sheet flow in order to restore ecosystem functions:

- spillways will be constructed upstream and downstream of the park, so that sheet flow can wash away the acids from the whole park;
- spillways will have a height-adjustable sill so that sediment-rich water can be kept out at the beginning of flood season and the sill can be lowered to maximise the influx of migratory fish to the safe habitat of TCNP early in their life cycle.

If these measures are successful, they will need to be endorsed and agreed to at higher (provincial and national) levels of government in due course.

Societal choice

Management of a protected area and the surrounding area is a matter of different societal choices taken by different stakeholders, depending on the nature and scale of the issue. Societal choice does not mean that every stakeholder has to be consulted or has to agree to every decision. The designation of PAs requires consultation and an appropriate decision-making process, but it is generally considered the right of the national or provincial government to make a decision based on national priorities that go beyond local interests and that may need to comply with international obligations.

There is a potential pitfall to societal choice if people do not have appropriate information about the long-term values or need for conservation and therefore cannot participate. EA Principles 2 and 11 are thus prerequisites for Principle 1. Appropriate mechanisms should be in place to implement the decisions properly so that the park can meet its biodiversity objectives without causing hardship to local stakeholders. Park management should involve local stakeholders whenever possible. Societal choice also involves choosing appropriate conservation objectives.

Fitting ecosystem management to ecosystem purpose

TCNP, and indeed several other PAs in the Mekong Delta, were originally established with a production objective in mind. Canals were dug to protect the forest and rationalize its exploitation and it was accepted that local people could live right up to the boundary without any buffer zone.

As the objectives of TCNP and other protected areas have shifted towards the conservation of valuable species and landscapes, however, the existing canal system and boundaries are no longer appropriate for achieving the revised objective. Management has to acknowledge that it will be impossible to fully restore the original ecosystem in miniature due to the impact of surrounding land-use changes. The conservation objectives for the park need to incorporate the fact that TCNP is an artificial wetland and needs to be managed as such.

Wetlands should be treated as wetlands

Arson by local communities and strict national policies on fire exclusion are the key drivers for high water levels in TCNP. The main management objective of TCNP and other PAs in the Mekong Delta has become merely preventing fire, rather than protecting endangered species and the overall status of the ecosystem.⁷

The uniform fire policies are based on enterprise forestry approaches and therefore focus only on the negative impacts of fire in certain ecosystems such as highland forest and peat lands. In the case of TCNP, however, the forest is only one of the ecosystem components and can adapt easily to fire. Uniform application of fire policies causes some ecosystems to suffer; policies should instead also focus on the potential positive role of fire in certain ecosystems. There need to be separate policies for fire in non-peat wetland, and perhaps also other ecosystems (EA Principle 5: manage ecosystem within limits of functioning). Other aspects of wetland management, such as community participation, were also not allowed under the SUF system.

Is co-management the solution?

The poor relationship between the park and the surrounding communities is the key driver for arson. Nearby Lang Sen nature reserve has similar grassland and Melaleuca but rarely experiences fires as a result of its better relationship with the local people; this is partly due to much lower population numbers.

Low-level theft may — in cases with high population density — be the least bad option from a conservation point of view. The PA does not have enough resources to share with all people in need, and more open access will also make it more attractive to rich people to get involved and take over the benefit sharing. People must see the benefits of the PA and feel confident in their ability to participate for a more open approach like co-management to be successful.

Political context for implementing the Ecosystem Approach

The EA assumes that the managers of a given ecosystem are able to make rational decisions based on their understanding of the situation. In top-down systems like that in Viet Nam, however, this is not the case. The political context influences the scope for ecosystem management. Certain decisions are very sensitive and PA managers will not implement them unless there is a go-ahead from the national level. Politicians may have different perceptions of the ecosystem situation and priorities.

Sectoral management approach

Current governance of the PA and surrounding area is highly sectoral. Most government units are only concerned with the issues related to their own responsibility: FPD mainly cares about forests and DARD about maximizing agriculture productivity in the buffer zone.

Thus one agency is trying to protect the park while another agency resettles large numbers of people in the immediate surroundings. Achieving more coherence between different sectors requires a coordination mechanism between stakeholders through which they can sit around the table occasionally and conduct joint planning.

In cases like TCNP, where the protected area is relatively small and is in interaction with the surrounding area, the landscape needs to be managed as a mosaic of property rights.

Monitoring wetland targets

In general, there is a need for policy and economic planning targets to be more tailored to the specific needs of wetlands and to take its values into account. There was little incentive for conservation for the provinces since it did not show up in their performance indicators. These indicators focus on economic and social aspects and do not capture, for example, wild captive fisheries in freshwaters; this is partly due to methodological difficulties.

Targets need to be set for different components of the ecosystem. The TCNP manager, for example, is in great trouble if there is a fire in the Melaleuca forest — even though it will regenerate quickly — but he or she is not rewarded if the other aspects of the ecosystem are in healthy condition or punished if, for example, the numbers of cranes or the cranes' habitat are threatened. This is again partly the result of sectoral divisions; FPD is responsible for fire management and forest cover, so targets and monitoring efforts focus on these parameters — which are relatively easy to measure. Biodiversity or economic benefits that people get from the park fall under different departments or ministries and are more difficult to quantify.

The Ecosystem Approach can provide a framework for evaluation and monitoring. The EA can be used for planning activities (e.g. the fire-water strategy) and for ex-post analysis to evaluate and draw lessons learned from past ecosystem management practices — even if they were not intended to implement the EA.

Between 2005 and 2006 the MWBP developed a fire-water management strategy for TCNP. Improved management practices were identified and partly implemented. This has resulted in restoration of part of the grasslands. Design of the fire and water initiative was expressly informed by the EA. This is reflected in the conceptual model of the wetland ecosystem that helped planners to understand the key ecosystem components and their interactions. The model helped formulate the design of the field research, and scenario analysis provided insight into the consequences of different fire and water management regimes. The different consequences, or range of possible futures, can be used to formulate sound and realistic conservation objectives. It is not the role of scientists to select the “best” conservation objectives, but to set out practical options. The fire-water initiative attempted to involve as many different sectors and their associated knowledge systems (local knowledge from poachers, scientific knowledge, gut-feelings of managers) as possible, and to increase participation in this very complex and sensitive issue.

The EA has enabled the partners to identify the range of management dilemmas. These highlight different aspects that help managers to make the necessary decisions, make policy-makers aware of discrepancies in policy, and help other stakeholders understand what they can do to solve the problem.

The EA presupposes more freedom than ecosystem managers have in most countries. In Viet Nam, although PA managers are aware that some of their decisions are suboptimal from an ecological or economic perspective, they know that the system is very rigid in disallowing local deviations. It does not encourage managers to ask permission for new activities since that might imply criticism of the political system.

It is often stated that it is important to work both at the local level to improve management capacity and to test new approaches and at the national level to bring about the necessary policy changes that enable and encourage further improvements at the local level.

This has been possible in the case of TCNP. As a result of fieldwork at the site and follow-up workshops with Mekong Delta PA managers in Can Tho in 2006, it was possible to invite a group of policy-makers to visit Tram Chim and see for themselves the stark alternatives facing the park. Funds were eventually raised for a national-level workshop on policy related to wetlands and the Ecosystem Approach, which was held in January 2008. The changes needed in wetlands management, identified through the use of the EA, were acknowledged. Staff in MONRE, MARD and VEPA have been producing a policy-makers' brief which argues for the changes needed, and outlines the opportunities for making them during 2008. These proposals were also presented at CBD COP 9 in Bonn, in May 2008.

Acronyms

CARE	International relief and development organisations
CPC	Commune People Committee
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOST	Department of Science and Technology
DPC	District People's Committee
EA	Ecosystem Approach
FPD	Forest Protection Department
FU	Farmers' Union
HCMC	Ho Chi Minh City
ICF	International Crane Foundation
IUCN	The World Conservation Union
MARD	Ministry of Agriculture and Rural Development
masl	Metres above sea level
MONRE	Ministry of Natural Resources and Environment
MRC	Mekong River Commission
MWBP	Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme
PA	Protected Area
PPC	Provincial People's Committee
Sub-FIPI	Sub-Institute of Forest Inventory and Planning
SUF	Special Use Forest
TCNP	Tram Chim National Park
TT	Ministry of Trading and Tourism
UNDP	United National Development Programme
WU	Women's Union
WWF	World Wildlife Fund
YU	Youth Union

Endnotes

1. Fire-ash has been recorded in Holocene alluvial soil formations that are less than 10,000 years old.
2. The average total fish catch in the Tram Chim area weighed about two tonnes, depending on the month. During months 8–10 fishing took place mainly outside the park, and from 11–7 it was mainly inside the park. If each kg of fish is worth about 10,000 VND (varying from 5,000-15,000 VND), the total value of a day's catch is 20 million VND (USD 1,500) (calculation source: D.V. Ni, May 2006). Assuming that only 25 percent of fish are caught inside the park for three months/91 days (at 375 USD per day = 34,125) and that for nine months/ 274 days 75% of the value per day comes from the park (1,125 x 274 = 308,250) the total annual value of fish from TCNP is USD 342,375.
3. The only exception seems to be some fishermen and traders who see the potential role of TCNP as a regional nursing ground for aquatic species (authors' own observation).

4. It is also common for people to gain personal financial benefits from such construction projects. The total cost of dyke construction was estimated at USD 1,000,000 yet no EIA was conducted.
5. But see the calculation in note 2.
6. Local officials are also aware that the park has caused them to lose out on development funds. The World Bank recently allocated district development funds to a selection of poor districts but not to those containing a protected area, in case such funds harmed the protected area.
7. Selection of water levels is also an important tool to reach conservation objectives. It is up to Viet Nam to decide whether it prefers to have a TCNP with seasonally inundated grasses and associated rare bird species, or whether it prefers to keep water levels high and accept a slowly deteriorating ecosystem.

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Acknowledgements

Thanks are due to the staff of TCNP; officials in Dong Thap Province; district and commune leadership and the staff of the MWBP. We also acknowledge the assistance of UNDP, IUCN, the Mekong River Commission and the Global Environmental Facility. Finally, many thanks go to the Government of the Netherlands, who supported the main author in the field.



Northern Congo: the case of CIB

Applying the Ecosystem Approach
in the context of a logging concession



Martijn ter Heegde and Simon Rietbergen

The goal of the case study

In 1995 a team assembled by IUCN went to the Congolaise Industrielle des Bois (CIB) concession in Northern Congo, at the company's request, to undertake a study of CIB's ability to practise sustainable forest management and to suggest actions the company needed to take to make it eligible for certification. The resulting baseline reports, and others, provide a good range of data about both company and location, and the steps the company has taken over the intervening years are well-documented. It was partly for this reason that the location was chosen as one of several funded by IUCN-CEM with an explicit mandate to test the "five steps" methodology for the application of the ecosystem approach (see Chapter 1).

To conduct an ecosystem approach study that begins with a forest ecosystem used for forest exploitation that is operated by one single company is in some ways rather different from studying a protected area. Yet there are some interesting parallels: the concession's very large size, the presence of powerful stakeholders and the fact that CIB, as the single operator, has worked in the area for a long time.

CIB has operated in northern Congo for more than 30 years.¹ The area is one of the least disturbed expanses of tropical forests left in the Congo Basin, with very low population pressure. The area is home to Babendjele/Mbenzélé and Bangombé pygmies, whose livelihoods depend on the forests. There are also strong conservation interests in the region, in particular because of the presence of important populations of great apes (gorilla/*G. gorilla gorilla* and chimpanzee/*Pan troglodytes*), forest elephant (*Loxodonta cyclotis*) and bongo (*Tragelaphus euryceros*). This has given rise to the creation of the Nouabalé-Ndoki National Park (NNNP) in Congo and of other parks over the border in Cameroon (Lobeke) and the Central African Republic (Ndoki), together called the Sangha Tri-National Forest Landscape.

The company first adopted the goal of certification of the sustainability of its forest management practices more than ten years ago, well before the Republic of the Congo had introduced its most recent forest legislation. Indeed, the interaction between CIB, the largest forest company in the country, and the national government of Congo has contributed to making the Forest Code of the country operational and has made the company an industry leader. CIB had its Forest Stewardship Council (FSC) pre-audit in 1999 and held a KEURHOUT² certificate between 1999 and 2002. In March 2004 CIB formally declared its intention to seek FSC certification for its forest concessions; the company's Kabo Forest Management Unit (FMU) was granted an FSC certificate in May 2006.

The efforts of CIB to achieve certification of its Kabo concession represent not only important changes in the company's management practices, but also a major opportunity to learn about approaches to conservation and local livelihoods which are exceptional in the Congo Basin region as a whole.

This chapter looks at the process of change in managing a forest concession and at how different stakeholders participated, negotiated and benefited from these changes. It is important to note that in this case, while the IUCN researcher applied the ecosystem approach as a retrospective analysis, CIB itself does not use the concept explicitly.

The Republic of Congo is situated on the equator in Central Africa. It has almost three million inhabitants and covers an area of 342,000 km². Some 22 million km² of the country are covered by forest, mostly in the north and southwest. The FMUs operated by CIB are located in the north of Congo, in the Sangha and Likouala départements. CIB operates in an area abutting the national boundaries of Cameroon and the Central African Republic (CAR), with its FMUs mostly located north and east of the Sangha River. In all, the area managed by CIB totals 1,300,000 hectares of tropical lowland forest and swampland, an area covering nearly four percent of the country and the size of Northern Ireland. CIB's main bases, the towns of Pokola and Kabo, have both grown up around CIB's sawmills and buildings inside its allocated territory. The company also has three forest camps. CIB's FMUs lie adjacent to several protected areas, both inside and outside the Congo.

As Map 1 shows, the CIB FMUs are tightly packed into the northwest of the Congo and interlock with a series of Protected Areas (PAs) on their borders.³ CIB's FMUs lie adjacent to NNNP in Congo, Lobéké National Park (LNP) just over the border in Cameroon, and Ndoki National Park (NNP) across the border in CAR. The Lac Télé Communal Reserve (Congo's only Ramsar Convention on Wetlands site) is located to the southeast, less than 50 km from the Toukalaka FMU.

As this case study shows, much effort over the last decade has been invested in working to treat CIB's FMUs and NNNP as a single ecosystem, with complementary management zones, so that wildlife management and forest exploitation are integrated.

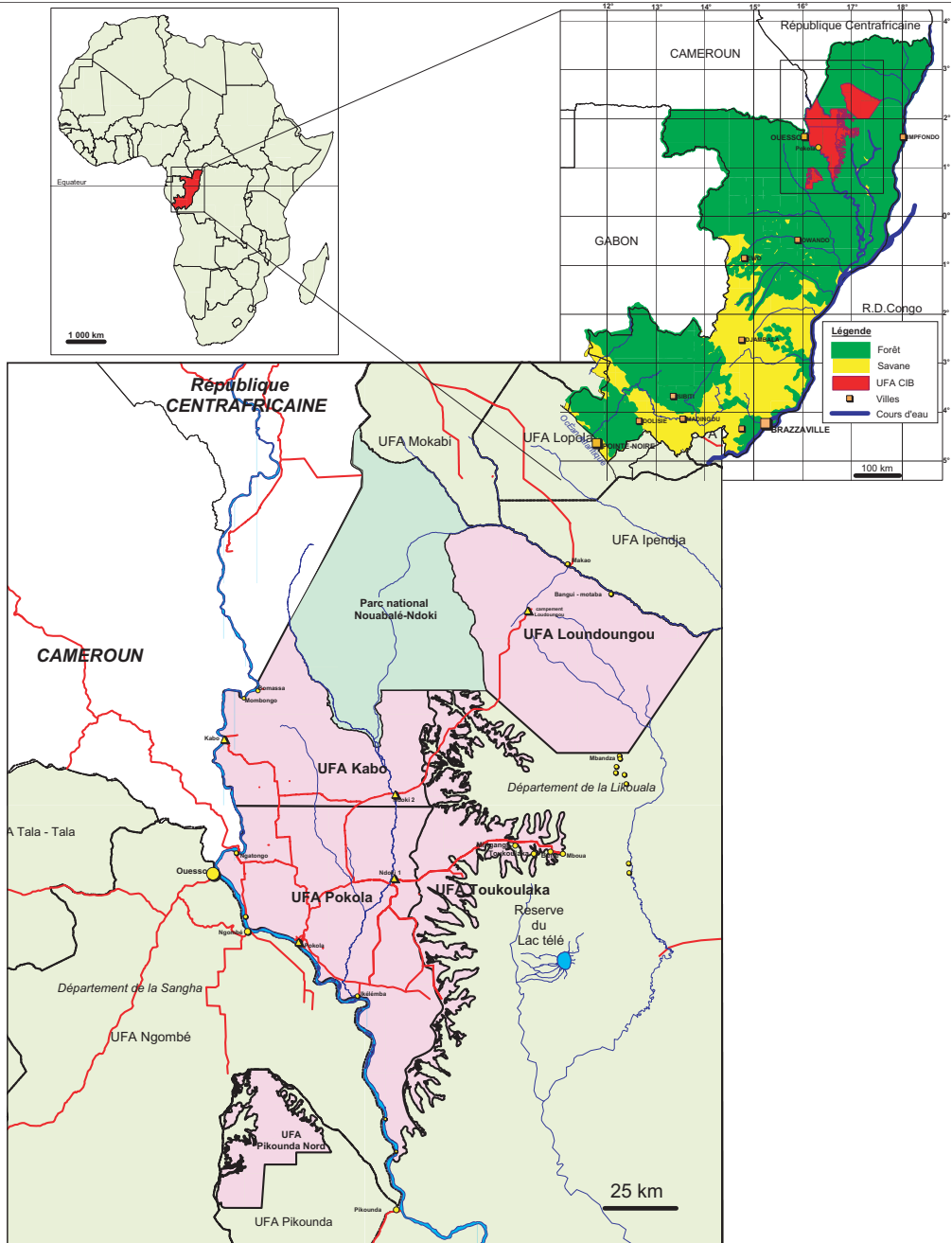
Because of the region's location, much of its economic activity transcends national boundaries. CIB uses a road link to Cameroon to export some of its timber and to import fuel and food. Local people buy food from Cameroon and sell bush meat and ivory to Cameroon and the CAR, and poachers and diamond miners are known to move across the national boundaries with ease.

The Wildlife Conservation Society (WCS) has been active in the establishment and management of NNNP and in improving wildlife management in the CIB FMUs. The WCS sees the NNNP and its work with the CIB FMUs as part of a wider intervention strategy across Northern Congo and the Sangha Tri-National Forest Landscape. The landscape is legally recognised by the three countries concerned, and WCS, WWF and GTZ manage parts of it for conservation. In due course, it may become possible to manage this still larger ecosystem coherently.

The enormous conservation value of the CIB FMUs has been recognized by all stakeholders: CIB has opted to have the whole of its concession area (1.3 million ha) labelled High-Conservation Value Forest, which implies a high degree of precaution in setting timber harvest levels and in dealing with other environmental issues. Over-

all, about 30% of the concession area has been excluded from timber harvesting, and part of the Kabo FMU has been ceded to NNNP by CIB. Another possible addition to NNNP is presently under discussion with WCS.

Map 1: The location of CIB's Forest Management Units



Source: CIB

Cellule Aménagement - CIB

The CIB concession areas in Northern Congo have different values for different stakeholders. For the State, they represent a steady source of tax and export revenues. For CIB they represent valuable commercial timber and an opportunity to build an environmentally sustainable and financially profitable timber industry. For the pygmies and other local groups, the forest is their home, with all the livelihood, cultural and spiritual implications that that word carries. For other local populations, they represent cash and non-cash income in the form of meat and non-timber forest products (NTFPs) from the forest, food from land cleared for farming, and employment opportunities in logging and timber processing. For conservation organisations and indirectly for people who will never visit the area, they represent a relatively undisturbed ecosystem containing great apes, forest elephants and bongos.

Local stakeholders

According to CIB figures, some 17,000 people live inside CIB bases, including the town of Pokola. An additional 10,000 inhabitants live outside the bases, half of whom are pygmies or semi-nomadic people.⁴ The total population of the concession is thus approximately 27,000 people. The resulting population density of about two people per square km is extremely low compared to most countries, but is nevertheless higher than in the rest of the sparsely populated north of Congo. In a socio-economic study prepared for CIB's Kabo management plan (PROGEPP 2005a), Jean-Michel Pierre proposes the following population divisions:

1. the semi-nomadic (pygmy) population, who have an informal exchange relationship with the Bantou⁵ and Oubangui ethno-linguistic groups;
2. the resident Bantou and Oubangui ethno-linguistic groups;
3. the CIB workers and their families (including a substantial group of some 50 expatriate workers and their families as well as people from other parts of Congo); and
4. those attracted to the CIB camps, notably Pokola and Kabo, for a range of reasons (such as business opportunities, and/or the presence of health care and educational facilities).

These four different populations are primary stakeholders in CIB forest concessions. The most vulnerable stakeholders are the first two categories, whose presence predates CIB's activities. These groups, apart from those who have found jobs at CIB,⁶ are economically almost totally dependent on the forest resource. For them the forest is not merely an economic base but also a place of cultural and religious significance where relatives are buried and rituals performed.

The legal instruments that recognize the rights of different user groups in the forests of Congo are still evolving. The *Forest Law* has been in existence for five years, but in 2006 CIB was the first forest company to develop an approved management plan as set out under the law. National-level principles, criteria and indicators for sustainable forest management were adopted in 2005 and the *Wildlife Law* is being modified. These laws are usually unknown to ordinary people; even where people are aware of them, the laws are felt to have less legitimacy than local socio-cultural norms and protocols. There is a perception among some local people that official regulations, particularly those concerning hunting, have been influenced by foreigners who value animals more than local people.

Interestingly, the user rights within forest concessions that are recognized by the Congolese Forest Code (Law No 16-2000 of 20-11-2000) concern all local populations (of Congolese or foreign nationality). The law recognises the following user rights only on the basis of residential status and accords no special rights to autochthonous populations:

- the use of woody products (including woody products other than timber) for domestic use;
- hunting, fishing and gathering products within the limits provided by the law; and
- establishing farm lands and beehives, grazing cattle and collecting fodder.

The law further stipulates that these user rights are exclusively for the fulfilment of the personal needs of its beneficiaries and that the products thus obtained cannot be sold commercially. CIB, however, has gone beyond Congolese law as it stands. The company's policy distinguishes between primary stakeholders in terms of forest resource-use rights. It allocates special hunting areas to locally-born people in category 1 above and secondary hunting rights (also in demarcated areas) to categories 2, 3 and 4.

The State as a stakeholder

Legally speaking, all forest concessions in Northern Congo are situated in forest land reserved by the State. The State concedes timber harvest rights to timber companies, imposes taxes, enforces relevant laws, and decides how the revenues accruing to government will be spent. The rights and responsibilities of CIB are clear under the *Forest Law*, which provides for a detailed list of company obligations⁷ to be agreed to by the Government of Congo for each concession. These obligations are also confirmed in the management plan that has to be established and formally adopted for each forest concession. Management plans set out rules that guarantee the economic, social and ecological sustainability of the activities of the legal actors (those who are legitimate and legally recognized by the State) concerning the FMUs' natural resources (PROGEPP 2005a).

In practice, the severe operational limitations imposed on government structures in the north of Congo, with its low population densities and lack of major urban centres, make it difficult to enforce the letter of the law. The road and urban infrastructure established by CIB is essential in providing an enabling environment for government intervention.

Decentralisation has formally taken place in the Congo, and legal provisions transfer responsibility for water, forests and hunting to local authorities. However, the Government of Congo continues to regard forests (included those allocated to CIB) — and the substantial income derived from forest concessions through taxation — as central to the country's national development strategy, and therefore the prerogative of the central State (Charbonnier 2006). There are considerable tensions between the State's focus on using forests and timber processing as engines of economic development and its duty to enforce environmental legislation. For instance, the government wants CIB to construct an industrial processing site in Likouala in its Loundoungou FMU in order to generate employment and services in this département, and to link the site to the national road network. Apart from the fact that the proposed processing site makes no economic sense for CIB, it would also be located relatively close to NNNP. In combination with the planned road from Pokola to Makao in the north of Loundoungou, which will eventually link up with Bangui in CAR, this road would dramatically increase the access of private vehicles to the forest and wildlife of northern Congo, and would make it much harder to enforce wildlife laws in the CIB concession area and to prevent a quantum leap in bush-meat extraction.

The Wildlife Conservation Society as a stakeholder

Some important measures have been taken to protect the natural ecosystem. The interests of the nature conservation community, particularly those of WCS, have been served first and foremost by the *Projet de Gestion des Ecosystèmes Périphériques au Parc National Nouabalé-Ndoki* (PROGEPP), a partnership between WCS, CIB and the Government of Congo (through the Ministry of Forestry Development and the Environment, or MEFE) for the management of the periphery of NNNP. A key element of the partnership is USLAB (*Unités de Surveillance et de Lutte Anti-braconnage*), which are surveillance and anti-poaching units. While WCS is not in full agreement with CIB on all issues, its longstanding collaboration with the company has helped it to achieve its wildlife management objectives for the region. It has also provided essential input to the management plan for the Kabo FMU, which is now certified by FSC.⁸

CIB as a stakeholder

One of the largest timber companies operating in the Republic of Congo, CIB has managed to stay operational almost constantly over the last 20 years despite major shocks both in the Congo and in the external commercial environment. These changes include the shift from log export to predominantly value-adding at source through the export of sawn and moulded timber, and more recently, the changes in management practice to meet the demand for management plans by the Congolese government and the FSC criteria for the certification of forest management. The company has survived by responding in an increasingly proactive way to management and marketing challenges. Economies of scale have also enabled it to undertake the complex preparatory work needed to address these challenges.⁹

The number of CIB employees has risen from 695 in 1995 (IUCN 1997) to more than 2,000 in 2006. The Congolese workforce is well organized through trade unions, and the law requires the preferential treatment of Congolese and, more particularly, local populations. The north of Congo is an area with few opportunities for training, however, and many of the qualifications CIB seeks can only be found in other parts of the

Congo. CIB has consequently established training centres in Pokola and Kabo to train staff. Over time, CIB has invested significantly in improving the social infrastructure in its timber concessions. It has built housing for its staff and their dependants as well as schools, churches, a hospital, a clinic and medical dispensaries. Access to water and electricity has recently been improved, and brick houses are being built to replace workers' wooden houses. Staff and dependants also have access to free health care and education. This level of service provision is exceptional not just in the region, but in the country as a whole.



CIB concessions from the air.

Photo: CIB

Structure and function

North Congo contains over 17 million ha of humid tropical forest. The population density is very low and there are still only small areas of agriculture.

These lowland forests contain vast areas of swamp forest, flooded for much of the year, alternating with slightly higher, well-drained upland forests. The forest has a semi-open, irregular tree canopy. Much sunlight penetrates through to the ground level, rapidly creating dense ground vegetation in clearings. The gentle relief means that soil erosion is limited. Clay soils cover 75% of the area; sandy, nutrient-poor soils cover the rest (CIB and the Government of Congo-MEFE 2006). Almost all of the timber harvested is from “non-pioneer” tree species that need extensive light to grow into the canopy. The fact that these tree species do not regenerate well in unlogged forests suggests that they may be the result of widespread earlier human disturbance, most likely farming by shifting cultivators when the forest was drier and burned more easily (IUCN 1997).

African tropical forests have the greatest large-mammal diversity on earth. There are 50 species of mammal living in the Sangha region where the CIB concessions are located, including the forest elephant (*Loxodonta cyclotis*), the western lowland gorilla (*Gorilla gorilla gorilla*), the chimpanzee (*Pan troglodytes*) and the bongo (*Tragelaphus euryceros*). The most common mammals are duikers, with six species found in the northern Congo. There are also several hundred bird species.

CIB concessions have two main impacts on this kind of ecosystem. First, logging affects species composition (the frequency distributions and the size classes of the trees in the forest). Second, the concession affects wildlife, both directly by driving some animal species away from areas where logging is taking place, and indirectly by providing both the demand for bush meat (through the numbers of people who come to live at CIB population centres and camps) and a access to it (through the opening of roads deep into the forest). In 1995, none of these impacts had been measured in any way, but by the time CIB received its FSC certificate this year, good-quality research had been undertaken on most of these effects, and there was a much better understanding of their implications.

Forest structure

In 1995 no post-harvest inventories had been undertaken, and it was impossible at that stage to study the longer-term impact of logging on forest composition. The KABO forest management plan (CIB and the Government of Congo-MEFE 2006) now has much useful new data on the impact of forest exploitation on the structure of the forest. These are some of the more interesting findings:

- In unexploited areas the understorey is composed mainly of bushes. Exploited areas that have been opened up develop a dense understorey vegetation of herbaceous plants and lianas (section 5.1.2).
- Exploitation changes the distribution of tree diameters to some extent, with exploited areas showing a higher proportion of trees with diameters of 20–40 cm, and a lower proportion with diameters of 40–80 cm and above 80 cm. Overall standing volume is not markedly affected by exploitation, however (section 9).
- Of the most important species currently exploited (*Sapelli*, *Sipo*, *Tiama*, *Ayous* and *Iroko*), the first three have trees growing in all age classes, and the large-diameter trees harvested will be successfully succeeded by younger trees. The species which are progressing predictably in this way constitute a third of the FMU's trees. Although the heavy exploitation of *Sapelli* and *Sipo* was negatively (but anecdotally) noted in 1995 (IUCN 1997), the trees are regenerating sufficiently well to assure good population renewal for the future. They are found everywhere in the FMU.
- For about 10% of sampled species, population renewal for the future is less assured, either because they regenerate irregularly (e.g. *Ayous*) or unpredictably (e.g. *Iroko*). However, *Ayous* is growing spectacularly well in areas that were harvested long ago, benefitting from openings in the canopy for the setting of seed and the growth of young trees. Although *Ayous* is not found in all localities, it is currently the main species harvested in terms of volume.

Wildlife

The main species that attract the attention of the conservation world are chimpanzees, gorillas and elephants. Research is summarized here from a useful report by Poulsen, Clark and Malonga (PROGEPP 2005b).¹⁰

Chimpanzee density in the whole area is low by the standards of some other parts of north Congo. Numbers within Kabo are highest in never-exploited areas, and vary by the length of time the area has been exploited, with the proviso that chimpanzees prefer open forest with clearings to dense rainforest, and remote hunting areas to hunting areas near human habitation. Their average density is 0.29 chimpanzees per km².

Gorillas prefer dense forest to either open forest or evergreen *Gilbertiodendron* forest. Gorilla density is high by comparison with other north Congo sites, and the variability of their presence is dictated more by habitat type than by hunting zone. Their average density is 1.36 gorillas per km².

Elephants prefer dense forest, followed by open forest and then evergreen *Gilbertiodendron* forest. Elephants become more and more abundant as the distance from roads and human settlement increases. They are most abundant in never-logged areas, and

least abundant in areas logged in the last five to ten years or logged 31–40 years ago (perhaps because the forest has since then become over-dense).¹¹ Overall, elephant density is about the same in Kabo FMU as it is in NNNP.

These findings make it clear that a good variety of different types of forest in no-hunting habitats is important for these key species, and that natural clearings (often with small lakes in them and known as bai and eyanga) are also vital. Specific measures to guarantee protection of these key environments have been included in the management plan for the Kabo FMU. From the point of view of hunting, duikers constitute 80% of the number of animals taken for bush meat. It is important to keep their numbers up (by protecting and rotating no-hunting zones) in order to afford protection to the more rare and threatened species that might otherwise be hunted for meat.

The final report of the IUCN team that reviewed forest management practices in the CIB concessions in 1995 provides a baseline against which to measure what CIB has achieved. Among other things the study looked at CIB operations and practices through the lens of the International Tropical Timber Organization (ITTO) and Forest Stewardship Council (FSC) principles, criteria and indicators for sustainable forest management. At the time CIB was already expressing an interest in forest certification, seeing it as essential for the company's long-term future.

In 1995, CIB's timber harvest relied on about five tree species. The Kabo FMU management plan prescribes a more balanced harvest of a much larger number—more than 20—of species. This presents a significant marketing challenge, not least because, for many of the additional, lower-value timber species, CIB has to compete with timber companies involved in unsustainable or even illegal harvesting practices that operate nearer the African coast and have much lower production costs as a consequence. The combination of forest certification, with increased value-added production, helps give CIB access to an export market in which it can still compete and is thus crucial for the company's future.

The situation in 1995

The 1995 IUCN study (IUCN 1997) expressed broad concerns about several factors:

- the dependence of CIB on harvesting a limited number of tree species and the lack of knowledge about their regeneration;
- the severe poaching taking place inside CIB concessions;
- the lack of knowledge about the dynamics of the local ecosystem (for example, the effect of elephants);
- the potential for conflict between Pokola's growing migrant population and the area's indigenous population; and
- the breakdown of tenure systems and resource access rights among the indigenous groups in the CIB concessions.

Some of the research recently conducted has, as we have seen, now given answers to some of these questions.

Table 1 provides a comparison of the quality of CIB's forest management practices at the time of the 1995 baseline, summarized according to the forest management principles laid down by FSC and ITTO.

Table 1. Comparison of FSC principles and forest management practices, 1995

FSC Principle		Report findings
<p>FSC Principle 2 Tenure, use-rights and responsibilities</p> <p>FSC Principle 3 Indigenous people's rights</p>	<p>The legal and customary rights of indigenous peoples to own use and manage their lands, territories and resources shall be recognized and respected.</p> <p>Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations.</p>	<p>Since the game of particular areas actually belongs to the Pygmies and Bantu whose home range it is, under customary tenure arrangements, more recognition of this should be built into exploitation practices...plans which envisage the placing of sustainable hunting in particular areas exclusively in the hands of those with traditional rights to it, should be actively supported by CIB.</p> <p>Sacred areas in both swamp forest and upland forest should be mapped during the annual timber cruise and thereafter respected, i.e. no tree should be cut in sacred areas...Pygmies in whose home range prospecting is taking place should take part in the work in that block and advise on such areas.</p> <p>The team recommended the investigation of possible further ways in which compensation in the form of concrete benefits (e.g. priority hunting rights for game for Pokola village) might be offered.</p>
<p>FSC Principle 4 Community relations and workers' rights</p>	<p>Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.</p> <p>The communities within or adjacent to the forest management area should be given opportunities for employment, training, and other services.</p>	<p>The study team felt that this principle had not been met. While 60 pygmies were employed at CIB (8.5% of employees), this did not begin to represent their numbers in the concession. The team recommended that efforts be made to include more of them in felling and prospecting teams. Conditions were, if anything, even less satisfactory for local Bantou inhabitants of the area, who formed only 10% or less of the work force.</p>
<p>FSC Principle 5 Benefits from the forest</p>	<p>Forest management should strive to strengthen and diversify the local economy, avoiding dependence on a single forest product.</p>	<p>The team recommended that CIB, government extension services and donors support efforts to diversify the local economy, in particular to encourage the development of small-animal husbandry and/or fish ponds, and the diversification of vegetable and other agricultural production. They also recommended that activities that decreased dependence on bush meat for animal protein receive special attention.</p>

FSC Principle 6 Environmental impact	See especially 6.2: Inappropriate hunting, fishing, trapping and collecting shall be controlled.	The recommendation by the team was) that, in addition to dealing with hunting from the supply side, the demand side be more rigorously dealt with. Since the concession cannot help making hunting easier through the opening of logging roads, it has a corresponding duty to give material support to a programme which would distinguish between the provisioning of Pokola village (mainly with fresh bush meat from nearby and on a modest scale), and the preservation and sale of bush meat destined for areas farther away. In addition to supporting a programme that aimed to limit commercial hunting, the team recommended that a more proactive approach be taken to remind CIB employees of their duties to the company (in terms of abiding by the law) in return for the benefits they receive.
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Source: IUCN 1997, pp. 57–62

The team also proposed two recommendations outside of the principle and criteria framework:

- to enhance the capacity of officials who are responsible for enforcing the forest law; and
- to review and modernize the national legal framework (forest law and regulations) covering forest conservation and management (including exploitation) to bring them into line with contemporary best practice.

Overall the team noted: “CIB seems to have done a good job of meeting the legal requirements governing their concession, and in the past this was enough. But post-1992 and the Rio Conference, standards have formally risen and all forest managers are now being asked to consider internalizing externalities more responsibly. The thrust of new international criteria, and of all the certification schemes, is not so much to set a pass-or-fail test, as to provide a measure against which the starting point and subsequent improvements can be measured, and process begun.”

The report goes on to say, “There is no doubt that CIB’s forest harvest operations are better managed, more accountable, and more economically sustainable than those of many of its competitors...However it is also the case that if the company seeks to enter the elite club of those who have earned a green label, it will have to aim much higher than its competitors, in those predominantly environmental aspects of its operation to which it has not as yet given much attention” (IUCN 1997, pp. 57–62).

Changes in management goals and practices by 2006

By 2006 CIB had become one of the first large forestry companies in Central Africa to have its forest management practices certified. What changed over the intervening decade? Management by CIB certainly changed in major ways, not only in operational terms but also as far as increased partnerships between CIB and others are concerned.

Between 1995 and 2006 CIB increased its FMUs from one to three; a fourth was added by the creation of Toukalaka FMU from Kabo and Pokola FMUs. It also acquired the Pikounda Forest Exploitation Unit. CIB's total area of timber concessions is now 1,300,000 hectares, almost triple what it had in 1995.

CIB became the largest forest concessionaire in the Republic of Congo and a direct neighbour to several PAs. NNNP (currently bordered on two sides by CIB's FMUs) was created in 1993. In 1999 WCS, CIB, MEFE and Congo Safaris¹² signed an agreement protocol on a program to implement and manage the conservation aspects of the Pokola, Kabo and Loundoungou FMUs; in 2001 the program was expanded and modified. In 2004 NNNP produced its first five-year management plan.

CIB's official decision to pursue certification came just after the introduction of a new Forest Code in Congo in 2000. To be in line with both certification and national legislation CIB had to address a number of issues, most importantly the production and acceptance by the state of management plans for its various FMUs.

The production of management plans for the CIB FMUs has been a long process. In 2000, CIB created a Management Unit responsible for cartography; forest resource inventories; socio-economic studies; the planning of exploitation; wildlife management; reduced impact logging; follow up and control; and preparation for FSC certification. The team consists of seven professional foresters, including three foreigners, and between 30 and as many as 110 others.¹³

From 2000–2006, while pre-management plan activities were being carried out, PROGEPP became an important vehicle for changing forest management practices, especially those affecting wildlife. It is hard to overstate PROGEPP's importance to CIB. The fulfilment of the company's obligations to bring its practices in line with the new *Forest Law* and to have its FMUs certified were heavily dependent on its ability to reduce illegal hunting and trapping activities. WCS provided leadership early on, and assured effective technical, administrative and financial management.

PROGEPP has had several achievements (SECO 2004):

- A system of ecoguards (USLAB) was recruited exclusively among local communities. They benefit from rigorous, efficient training and assure ongoing surveillance of CIB's FMUs.

- CIB adopted an internal regulation aimed at the reduction of the commercialisation of bush meat. It restricts the transport of bush meat (legally hunted) inside the concessions and applies sanctions where necessary. The internal regulation applies in the field and reinforces national legislation.
- The delimitation, discussion, adoption and implementation of the hunting zone plan permits regulated access to the resource by all local actors, reduces penetration by commercial hunters and reinforces community rights to wildlife.
- The zoning of wildlife use was integrated into the CIB management plan.
- A significant reduction of hunting pressures, especially in the case of protected species, was based on the strict application of the law (concerning protected species, use of firearms, wire snares for trapping, etc.).

PROGEPP initiated studies on socio-economic and biodiversity topics, which were essential precursors of management plans for the CIB FMUs. And by reducing illegal wildlife harvesting practices in the CIB FMUs, PROGEPP has also made a significant contribution to the conservation of NNNP.

Both WCS-PROGEPP headquarters and NNNP headquarters are inside the Kabo FMU, which contains some highly biodiverse areas.¹⁴ WCS has a number of ongoing research activities inside Kabo FMU. CIB ceded the Goulougo triangle (see Map 2) from the Kabo FMU to NNNP in 2001,¹⁵ which can be seen as proof of an ongoing dialogue and of the harmonisation of conservation and exploitation goals in the management of CIB's FMUs.

From 2001–2006 PROGEPP initiated major management interventions. By addressing the issue of poaching, and by subsequently establishing zones for controlled hunting, PROGEPP progressed beyond its immediate conservation agenda to become a high-profile partnership that is generally considered a model for the region. Its uniting of timber harvesting and sustainable use of wildlife and conservation moved it towards a form of integrated ecosystem management that is still very rare. CIB has demonstrated its commitment to the partnership by allocating increased funding to the second phase of PROGEPP, and continues to provide funding for the operations of the ecoguards put in place in the first phase of PROGEPP.

The CIB management team is ultimately the only body responsible for the management of CIB's FMUs. Although the company produced the Kabo FMU management plan using PROGEPP studies and consulting with WCS staff on the draft plan (as per the FSC certification process concerning stakeholder involvement), it did not incorporate all of the proposals put forward by PROGEPP. The main disagreement concerns the Bomassa triangle within Kabo FMU (Map 2), an area of exceptional biodiversity that WCS would like to see added to NNNP immediately. As a compromise, CIB has proposed a one-off cut in the Bomassa triangle and no subsequent logging, and has declared two areas within it conservation zones in the Kabo management plan.

CIB does not want to cede the triangle because to do so would jeopardize the management cycle and calculations in the Kabo management plan — and because it believes its measures offer sufficient protection. CIB is also concerned about the substantial human population in the Bomassa triangle (several hundreds, many of whom work for WCS) and what their fate would be if the triangle were integrated into the park.

There is also some disagreement on the practical management measures needed, and the logic behind these measures, particularly concerning hunting. For instance, WCS has unresolved differences with CIB over the acceptability of traditional hunting practices by pygmies, and these views have coloured recent tensions between the ecoguards, USLAB and pygmies.¹⁶

The Kabo management plan contains a number of community development measures, based on expert inputs provided as part of the FSC certification process and by previous studies and consultations with local populations. These measures are a clear expression of the formal recognition of local people's rights, as published in CIB's 2005 policy statement. They include the demarcation of agro-forestry zones, and of use-right zones that extend beyond them, for the populations of the Kabo and Ndoki2 CIB camps, for the Bomassa/Boncoin (local and pygmy populations) and for the Lemé (local and pygmy populations). The agro-forestry zones are for agriculture — both current and potential — and for forest areas allocated and demarcated for the woody products needed by the local population.

The management plan explains the size of these zones, and the logic guiding the calculations. In the case of Kabo and Lemé the agro-forestry zones actually exceed the calculations substantially, as a precautionary measure. As Charbonnier shows in his study, the possibilities of legalising the occupation of an agricultural plot are rarely exercised and the agricultural plots of Kabo are much smaller and less numerous than those around Pokola (Charbonnier 2006).

One of the more recent threats to agriculture in the area around Kabo camp are foraging elephants, which encroach more and more on the camp. The management plan notes that, “administrative decisions should be taken to resolve the problem of the destruction of agricultural crops by elephants. The animals concerned should be removed, or if the need arises, shot, following legal procedures.”

The management plan will encourage local food production through agriculture and cattle rearing. A local development fund will be instituted and financed by CIB for the benefit of the local populations.

The management of wildlife is also part of the Kabo Management Plan. After noting the widespread use of illegal firearms and snares, and the importance of hunting as

part of the cultural practice of the pygmy populations, the management plan states two major aims:

- assuring the sustainability of subsistence hunting for indigenous populations; and
- protecting wildlife populations that represent the ecosystems as a whole, paying particular attention to large mammals.

Wildlife management will have several specific objectives:

- to maintain the biological diversity and the protection of forest ecosystems representative of the FMUs;
- to protect species threatened by poaching;
- to assure the sustainability of the wildlife resources exploited by local populations as a primary source of protein; and
- to reduce the indirect impacts of exploitation on NNNP.

Hunting areas have now also been divided into one of three zones:

- community hunting zones (near human settlements);
- indigenous peoples' hunting zones (away from villages or camps);
- areas where it is illegal to hunt (those bordering on NNNP and NNP in the CAR and the Mombongo area);

In the community hunting zones, hunting is permitted by villagers, pygmies, CIB camp inhabitants and CIB employee hunting committees. CIB employee committees have rotating access to their zone, and are equipped with hunting licences and firearms. Only pygmies can hunt in the indigenous hunting zones.

The zones are monitored by USLAB. USLAB operates within the framework of the Congolese law and has several duties: surveillance of hunting activities within the FMUs conceded to CIB and the forest exploitation areas; implementation of anti-poaching measures; wildlife monitoring and management; and monitoring for weapons, munitions and bush meat on all the logging roads and tracks within Kabo FMU. Some USLAB personnel staff permanent control posts on roads; others operate in mobile brigades. The total number of USLAB ecoguards and MEFE staff is now around 41 across all CIB FMUs. The number of 12-calibre guns in circulation has gone down from 369 in 2000 to 77 in 2004.

CIB is now also protecting forest graveyard sites, sacred trees and the key trees that support caterpillar populations (a vital NTFP for some local groups). These sites are physically demarcated on the ground and digitally recorded, using GPS equipment, by local people. The data are transferred onto CIB maps and sites excluded from exploitation.

These are some of the measures described in the new Kabo concession management plan. As a recent socio-economic study notes, “the major difficulty is...to get the formal legal framework to fit with the social practices of diverse stakeholders, and to find ways of applying these rules with the resources at the disposal of the State” (PROGEPP 2005).

CIB brought in a number of new partners, and located other funding for some components of the management of its forest concessions. A World Bank project encourages community involvement and communication by community radio. A CIB-*Fonds Français pour l'Environnement Mondial* (FFEM) project implemented by Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and Nature+ (a Belgian NGO) works on agroforestry development to limit deforestation and to develop a better understanding of the management of tropical forests. Many other scientific partners, donors and NGOs participate in similar activities.



Marking a food tree for protection.

Photo: Tropical Forest Trust

The success of PROGEPP is evident in a number of fields and the Kabo management plan has raised several important conservation-related issues.

- CIB now has several conservation zones that comprise about 30% of its concessions. These include the zones created within Kabo in the Djéké triangle, Wali Bai and Mombongo, where no logging will take place and where the user rights of immediately neighbouring communities will be the only accepted use.
- The immediate peripheries of NNNP in Congo and NNP in the CAR will be protected from logging, with no user rights allowed by the Kabo management plan.
- The whole Bomassa triangle will become a conservation zone in 2010, after the end of the exploitation of Forest Production Unit 1 (MEFE service note).
- Around major open areas (such as the bais) a peripheral zone will be instituted and both bais and peripheral zones will be excluded from timber harvesting.¹⁷

The indirect impact of CIB's presence and the large influx of population (especially to Pokola), already apparent in 1995, have become even more important. Pokola is now a medium-sized town. Services such as health and education are offered by CIB and are concentrated in their camps and in Pokola. These sites represent the large majority

of human inhabitants in the area but not all. Those not living in CIB camps or Pokola — many of whom are pygmies — may not be able to obtain these services due to lack of transport or money.

The influx of large numbers of migrants has made the local populations minorities in their own area. The migrant populations have not become part of the local society but have formed a new society; this has come about over the course of the last 10–20 years. The traditional structures of authority have been eroded by the affluence of migrants and have lost most of their power.

The government has so far failed to implement its law on decentralization, which is especially important for Pokola. Pokola should by now, as an “urban community of medium size,” have a mayor who directs the village committee and reports to the sous-préfet of Mokéko, near Ouesso. Currently, however, there is only a village committee, which is ill-equipped to deal with the realities of managing a town of thousands of inhabitants (Charbonnier 2006). In practice Pokola’s only operational and credible structure of authority is CIB. CIB has a hierarchy

that is well known, and it makes daily decisions that affect the lives of most inhabitants of Pokola and the rest of the human population of the area. Indeed, a quartier within Pokola has been named after the CIB Director-General.

Local populations, along with non-local resident populations, have benefited from employment opportunities, services such as electricity and water, and improved road access offered by CIB. There have been negative effects as well:

- They were already engaged in unfavourable trade relations with the resident Bantou and Oubangui ethno-linguistic groups, and now have similarly unfavourable relationships with CIB employees and others (PROGEPP 2005).
- Many more people now carry out economic activities (hunting and gathering) within the same areas as the pygmies.
- Traditional hunting and gathering livelihoods have become more difficult because of competing activities such as farming plots, logging and pressure on forest resources (collecting NTFPs, fishing, etc.)



Aerial view of the Pokola complex

Photo: CIB

There have been some gains, however:

- 160 people already have employment with CIB,¹⁸ and many more are organising to gain better access to housing, health care and employment.
- All people now have secure and exclusive use rights to large areas of good-quality forest as a result of CIB's 2005 policy on traditional user rights.
- A savings bank will be established so that a proportion of CIB salaries can be saved. This will also benefit women.

The Kabo FMU management plan has sought to address issues of inequality between populations, both actual and potential, in several ways:

- Demarcating agro-forestry zones.
- Demarcating hunting zones.
- Creating a development fund to contribute to local development and reduce poverty. The fund, intended to benefit all people within the FMUs, is derived from a special 200-franc tax on every sq. m of commercial volume exploited within the FMUs. (It supplements the area tax already paid by CIB, which the law prescribes for the effective financing of local development under Law 16-2000 art. 92 and decree 2002-438.) It will finance projects that support economic diversification and be managed by a committee composed of forestry ministry representatives, the prefecture and local authorities, CIB, local NGOs and local populations. The fund's management procedures have yet to be specified.
- Offering the local populations access to CIB dispensaries until appropriate government structures are put in place, and assisting where necessary in vaccination and health care campaigns for the local population.
- Offering logistical support for school construction following government support for initiatives favouring the schooling of semi-nomadic children. CIB supports a hostel for semi-nomadic children in Pokola. This initiative by a private foundation aims to train semi-nomadic children in basic skills and help them to value their own culture.

Following the *Forest Law* (article 45) the activities authorized in the national forest domain should be realised through rational management of forest resources, based on sustainable management of forest ecosystems; guaranteed sustained forest production while ensuring the conservation of the environment, especially its biological diversity; and meeting the needs of local populations. The management plan should therefore reconcile the optimal exploitation of resources, the preservation of ecosystems and development. It should also be a tool for reference and management that establishes a medium-term action programme. The plan should be realistic and applicable — socially, technically and financially — without compromising the durability and the financial profitability of the company.

Socio-economic and market analysis and political and policy context

The CIB FMUs in Northern Congo now have a population in the tens of thousands. For the local populations, the current management practices of CIB mean an important break with the past. In 1995 much forestry and wildlife legislation was not applied and forest management practices took no account of livelihoods and cultural practices. The Kabo FMU's management plan sees CIB actively planning development-related activities and regulating people's livelihoods within the limits of the law.

At the time of the 1995 IUCN study (IUCN 1997) people's livelihoods included small-scale agriculture, fishing and the gathering of NTFPs, all mainly for home consumption. They also relied on hunting wildlife, both for bush meat and for ivory for commercial sale. At the time, the region was very isolated apart from the CIB road-ferry link at Ngatongo and numerous rivers. Even then, however, the bush meat trade was a threat to the ecosystem's biodiversity and illegal hunting was increasing rapidly.

By 2006 CIB had many more stakeholders to deal with, a much larger population at Pokola and three other FMUs. There was also a new Forest Code, although the management of forests in the Republic of Congo is still evolving, and some aspects of the current legislation are only now being tested in the field. The management of the FMUs is the responsibility of CIB, with the government verifying respect for Congolese legislation. Where its involvement is required, the community is consulted by the CIB management team.

The management team has in fact become the chief actor addressing the different needs of different stakeholders, and harmonizing their livelihoods with the sustainable management of forest concessions. CIB's operations in Northern Congo have directly created 2000 jobs, which have brought in employees and their families from far beyond the Sangha and Likouala départements. Many other people have migrated to Pokola and Kabo looking for jobs or business opportunities. The migrant population of Kabo and Pokola is mainly Congolese, although there are also many individuals from the DRC, Cameroon and Rwanda.

Those not working for CIB offer goods and services to CIB's salaried employees, and the company settlements have become the economic engines of Northern Congo. Pokola — and, to a lesser extent, Kabo — has electricity, water, clinics and schools, unlike anywhere else in Northern Congo. (Ouessou, the largest nearby town, has no electricity and very few generators.) The CIB-constructed road/ferry link to Cameroon has made Pokola into a major centre for the importation of Cameroonian goods, some even destined for the distant Brazzaville market in the south.

Pokola's population doubled in the years between 1999 and 2004 to 13,000 inhabitants, and Kabo camp grew as well. Pokola is now the second biggest town in the area. Natives in the area and migrants to the area do not necessarily have the same interests and traditional authorities have become less and less relevant in Pokola.

The Kabo management plan provides for the creation of new local management structures and conflict resolution mechanisms. Various stakeholders (local government, local people's representatives and MEFE, CIB and NGO representatives) will have specific new roles, such as monitoring the use of agroforestry zones. None of them, however, will have overall management responsibility. That is still in the hands of CIB.

CIB's desire to certify its FMUs and to meet the requirements of certification means that it has sought new forest-related and people-related knowledge. It has mapped and analyzed farmers' practices and worked with CIRAD to regulate and improve these practices; it has found ways to mark and exclude from logging the key sacred and NTFP-gathering forest areas of the pygmies; and it has identified key nature conservation areas such as *bais* and excluded them from logging.

Policy

Although some outstanding issues of indigenous rights are still unrecognized under Congolese law, CIB has gone beyond what it was legally required to do. The Development Fund proposed in the management plan may go some way further to meet the objectives of local people. Elites and government officials will inevitably try to pursue their own interests, however, and development funds will be the object of political competition. Strong and continued facilitation will be necessary to ensure that less-favoured local indigenous groups benefit from the fund.

Overall, the partnerships where CIB is involved attract the most attention, as is the case with PROGEPP. The costs of many such partnerships and projects are largely borne by CIB, with outside funding making a smaller contribution.

Although the CIB FMUs are relatively remote, there is a constant flow of goods and people in and out of the area. The presence of thousands of people who do not produce food means brisk business for the producers/collectors of agricultural crops, fish, bush meat, caterpillars and palm wine.



Demarcating key pygmy cultural sites.

Photo: Tropical Forest Trusts

Among the main beneficiaries of CIB's presence are the Cameroonians who sell fuel to the company and import meat and vegetables to sell in Pokola. Dependence on Cameroon is the result of the isolation of the north of Congo from the south; CIB is oriented to the port of Douala in Cameroon and relies on many Cameroonian goods



A farming plot near Pokola; banana and pineapple are visible.

Photo: Martijn ter Heegde

and services. Congolese labour unions are well organized and the law protects Congolese employment by obliging CIB to hire Congolese if they have the qualifications. The market has evolved dramatically over the last decade, though, and many shops in Pokola are owned by West Africans and Cameroonians.

Agricultural activities in the region show considerable change, even if the farmed areas are small as a percentage of the total area (about 0.1%). Traditionally they were small-scale and local, but with the expansion of Pokola and Kabo, immigrants have started

farming activities, though most lack the know-how and capital for quick success. The exception is a small community of Rwandan market gardeners (Charbonnier 2006).

CIRAD focuses on the sustainable management of the forest and farmland within CIB's FMUs. Sustainable agriculture is encouraged in areas that have already been cleared, as a way of stabilising the extension of production zones. Farmers have no difficulty in selling their produce in Pokola; the main obstacles are weak tenure rights and the absence of transportation.

As northern Congo has been opened up for timber harvesting over the last ten years, the importance of hunting has increased greatly. Since 1999 the WCS-CIB-MEFE partnership has aimed, through PROGEPP, to halt illegal hunting and apply the relevant wildlife legislation. The hunting of protected species (such as elephants and great apes) with the products often transported out by water, has been greatly reduced but not totally eliminated (see Table 2).

The USLAB ecoguards have been strongly supported by WCS and CIB. There are ecoguard posts on most of the major thoroughfares and CIB has internal regulations that forbid the transport of bush meat on company lorries. CIB employees still hunt, but are now organized and equipped with hunting licences and legal weapons. Hunting trips are made on a rotating basis and hunters are accompanied by ecoguards. Local populations still hunt legally in accordance with their user rights and wildlife legislation. The measures taken appear to have curtailed the commercial illegal trade in bush meat, as intended.

**Table 2: Number and activities of ecoguards since 1999
(in the FMUs managed by CIB)**

	1999	2000	2001	2002	2003	2004
FMU*	K	K, P	K, P	K, P	K, P, L	K, P, L
Number of MEFE officials	3	4	5	6	5	5
Number of ecoguards	10	20	20	20	37	36
Number of days on patrol	130	1,329	1,611	1,756	2,346	2,765
Number of seized traps/snares	6,005	7,773	11,454	78,881	18597	23,041
Number of seized guns (12-calibre)	50	369	236	92	85	77

*K: Kabo; P: Pokola; L: Loundoungou

Source: *PROGEPP 2005b*

Nevertheless, three outstanding problems appear likely to persist:

1. There is an acute demand for bush meat and unending pressure on the CIB FMUs. Local Bantou populations use pygmies to hunt for them, highlighting deeply embedded economic realities and power relations in the area. The pressure on PROGEPP to deal with this problem has led to strong support for the USLAB ecoguards from all parties, but has also led to serious human rights abuses, particularly of pygmies.
2. User rights in the Republic of Congo are awarded through residence, which means that an ever-increasing number of people in CIB's FMUs are acquiring hunters' user rights. Resources previously (before 1999) used by less than 10,000 people are now used by close to 18,000 people (2004 figures, CIB). The establishment of exclusive hunting zones for the original inhabitants of the region under the Kabo FMU management plan has limited the damage there, but the use of the wider ecosystem has changed and the longer-term impacts of an increasing human population are difficult to establish.
3. The tracking of transboundary bush meat transportation for sale in Cameroon and the CAR is a major outstanding problem.

CIB's management has had to adapt in many ways over the last decade.

- There has been a change of scale as the company has taken on additional FMUs and these have attracted more people.
- The external legal environment has changed as a result of the Congolese government's developing a new Forest Code.
- CIB's own drive for FSC certification has caused it to look in more detail at environmental and social sustainability, to develop closer links with other organisations such as WCS, and to help set up PROGEPP.
- CIB has had to become more and more involved in livelihood issues.
- CIB has developed the Congo's first forest management plan.

The Congolese government has only a modest presence in Northern Congo, and the Ministry of Forests as a whole is understaffed and lacks resources. The Ministry relies on CIB and WCS to provide most PROGEPP resources, and on CIB and other forestry companies to undertake activities such as the development of national principles, criteria and indicators for sustainable forest management.

The Ministry recently lost its right to collect and redistribute forest revenues, a task which has been passed to the Treasury. As a result, most of the income generated by CIB for the Republic of Congo (through taxation and employment) has no impact on sustainable forest management, although SFM is now enshrined in Congolese law and has become the subject of increasing regional cooperation. The Government of Congo's revenues from CIB's operations are split between the central government and the Likouala and Sangha départements. The use of these funds is not audited or publicised and it is difficult to determine how they are spent.

Many national and international NGOs have become active participants in forest management practices. Some local communities have also been able to participate in forest management decisions. In the case of CIB community involvement is apparent in various ways. Forest certification is still new in Central Africa and many stakeholders have little understanding of it. Above all, there is no particular role for the state in forest certification, which marks a change from past practice.

In the 1995 IUCN study (IUCN 1997), CIB was criticised for its lack of understanding of forest dynamics and of the region's broader socio-economic characteristics. As previous sections have shown, since then the CIB FMUs have been the subject of many studies and an important body of knowledge has been established. The short-to-medium term will see even more information becoming available through the current work on the different FMU management plans.

The generation and management of knowledge has in fact become an important aspect of CIB forest management practices. It is enshrined in the Kabo Management

Plan and is integral to CIB FSC certification. This is in marked contrast with the past. CIB's current use of a mechanism based on the ISO 14001 standards allows for adaptive management and constant improvement. With the management plans of CIB's other FMUs in process — and plans for the certification of these FMUs as well — CIB is dealing with much new information and many new procedures. Synergy between different kinds of information is now developing as well.

The research that has been encouraged and undertaken by CIB over the last ten years has increased knowledge of the forest ecosystem, wildlife and human populations to an extent probably greater than that of any other forest in Central Africa. National institutions as the Pilot Unit for Management, Reforestation and Agroforestry (*Unité Pilote d'Aménagement, de Reboisement et d'Agroforesterie*, or UPARA) and the Unit for Research on the Productivity of Industrial Plantations (*Unité de Recherche sur la Productivité des Plantations Industrielles* or UR2PI) have benefited from their collaboration with CIB. WCS continues to benefit from CIB's hospitality in Kabo and Bomassa, and its ecosystem proposals for NNNP would be impossible without CIB-maintained access by air or road.

There are four threats to the sustainable management of CIB's FMUs:

- CIB's own operations;
- the large populations of non-CIB employees living in Pokola and Kabo;
- government decisions affecting the CIB FMUs; and
- transboundary markets and economies.

CIB has been addressing those threats that can be addressed by its own operations and has been rewarded with an FSC certificate. It has fought unintended and unwanted changes (increases in population and severe poaching) through a whole host of changes in management such as the PROGEPP collaboration and the Kabo Management Plan.

The three other categories of threats are much more difficult to address. Some are outside the company's purview, but are potentially very damaging to the sustainable management of the FMUs. Chief among these is probably the evolution of Pokola as a regional commercial hub, drawing in more and more people. This in turn necessitates the clearing of more forest plots for agriculture and generates more demand for hunted products, unless measures are taken to provide alternative sources of food.

Institutionally, there is a vacuum at several levels. The Congo's new decentralization law has not yet been translated into practical reality sub-nationally, and there are too few local-level official structures to deal with the increasingly numerous and diverse populations living in the CIB FMUs. Similarly, there is no effective transboundary

cooperation, among states or NGOs, to halt illegal transboundary hunting and other commercial activities.¹⁹

CIB's presence in the area has had positive consequences as well. Unlike other logging companies, CIB has invested heavily in measures to diminish the negative impact of the population on the environment. It has made sure that its workers understand wildlife regulations, and has instituted sanctions in case of infraction. The company takes some of the pressure off hunting by importing and subsidizing beef, chicken and fish, and by installing freezer warehouses; it also has an effective system to collect and dispose of urban waste. It has attempted to introduce sustainable agriculture and limit forest clearance through the CIB-FFEM project on forest dynamics and agroforestry and it works actively with WCS and MEFE to protect wildlife through PROGEPP.

Until now, there have been several reasons why PROGEPP roadblocks²⁰ and surveillance of illegal hunting have had some success:

- there are still no roads leading out of the CIB FMUs;
- CIB forbids the transportation of bush meat aboard its vehicles; and
- almost no one else possesses motorized vehicles.

There are imminent threats to this situation, however, the most important of which is the possible linking of Pokola to the national and trans-national road network. CIB wants to divert much of the trade which now flows through its own company town at Pokola to Ouesso, the regional capital, by building a road from its ferry-crossing at Ngatongo to Ouesso. This road, which would link the concessions to the outside world, could have an extremely detrimental effect on CIB's ability to manage the concessions in a socially and environmentally responsible way.



The CIB ferry crossing at Ngatongo.

Photo: CIB

Government decentralization will bring change to the area, the extent of which is hard to gauge. CIB may be less free than in the past to manage activities within its own FMUs as it wishes. There are signs that the government gives primacy to short-term political and economic issues over long-term sustainable forest management issues.

CIB became part of another company (DLH) in 2006 and may now need to modify its own management structures to adapt to the tremendous changes in scale and to the breadth of the responsibilities it now takes responsibility for, for the social and environmental as well as economic health of its FMUs.

Moving from sustained yield forestry to ecosystem management

This case study documents the process by which CIB, driven by the desire for FSC certification, took a series of steps over a decade that deepened its sense of its own responsibilities towards the forest areas in which it had concessions and towards the broader ecosystem. Coincidentally, in the same period, its concession area tripled and many more people moved into the area, making the issues which it was required to address to obtain certification a good deal more complex.

These steps took it from the narrow concept of sustained-yield forestry²¹ towards an ambition to undertake genuine sustainable forest management.²² CIB developed a symbiotic and complementary relationship with WCS, the managers of the adjacent NNNP, and formed a new body, PROGEPP. PROGEPP is charged with managing sustainable use within the area which was simultaneously the park's buffer zone and CIB's Kabo FMU. Following research which generated much new data on both the forests themselves and on the people and animals living in them, CIB was able to draw up a forest management plan and set new interventions in motion. It finally obtained its FSC certificate in March 2006.

The larger area that CIB began to manage from 1995 to 2006 was the result of further concessions being allocated, not of new ecosystem management processes or decisions. At the same time, however, as a result of changing activities and goals, and of CIB's interaction with WCS, the company acquired an ecosystem vision of its forests.

Underestimated issues

In moving towards a more ecosystem-oriented approach to management over the past decade, three issues have demanded a great deal of time:

1. stakeholders and institutions, both development and harmonization;
2. dealing with population growth and other issues generated by the much augmented size of CIB's management area, and
3. generating and acting upon a great deal of new information.

Stakeholders and institutions

The main institutional challenges have arisen because different stakeholders have different priorities, but must work together.

- The government's main interest has been the generation of tax revenues and the financing, through CIB's presence, of its development agenda for the area. It has no interest in certification or sustainable forest management per se. WCS is interested in CIB's desire for certification only insofar as this induces the company to collaborate in the protection of wildlife, and in the suppression of

bush meat hunting. Interests have diverged over particular areas which WCS would like to include in the NNNP. WCS had less interest in the socio-economic issues that CIB had to deal with to obtain certification, and there have been conflicts between the two over the extent and rigour with which hunters are checked by ecoguards.

- Many recent immigrants are traders and farmers rather than CIB employees or members of the Bantou or Pygmy local populations. They have a limited stake in the management of the area as a whole but are numerically important and influential.
- Because Pokola has become a regional trading hub, increasing numbers of transient traders from Cameroon and CAR pass through the area.
- The locally born population has benefited less than the immigrants and this trend is expected to continue, even though CIB has demarcated specific hunting areas exclusively for them and provided a proportion of them with employment.

The stakeholder who has taken on most of the responsibility of working with all the others, and of developing new arrangements and new institutions, has been CIB. Its incentive is the desire to build a sustainable long-term timber industry and to obtain the FSC certificate that can help it move towards that long-term objective. WCS also played an important role, with CIB, in the development of PROGEPP.

Reduction of the impact of hunting on the ecosystem has been effected through the ecoguards, through banning the use of CIB lorries for bush-meat transportation, supplying subsidized Cameroonian meat chicken and fish to Pokola market and dividing the forest into no-hunting zones and zones for specific categories of users.

Population growth in the Pokola area

CIB has responded to the massive immigration into Pokola, and the impact of this on the ecosystem, by engaging researchers to help develop sustainable agriculture, and by the zonation of hunting. Practical ways of diverting the market to the nearby town of Ouessou (through new road links which bypass Pokola) are planned.

Generating and acting on information

Studies were commissioned on several subjects: forest regeneration; key animal species in the forest and the impact on them of logging and of human settlement; and socio-economic issues. These were part of the final push for the development of the Kabo management plan and will have an impact on future forest management. They have only recently become available.

Issues still outstanding

CIB is used to having great autonomy in northern Congo. Within its own boundaries it has effectively had a quasi-governmental role in decision-making and in the provision of housing and all social benefits. Although its instincts are benevolent, it is not accustomed to sharing power. If Congolese decentralization becomes more of a reality, local-level government may challenge CIB's freedom to manage as it chooses.

Although FSC has accepted that prior informed consent has been accorded by CIB to local populations, village and settlement-level institutions still need strengthening. This is necessary so that the various inhabitants of CIB settlements have equitable access to benefits such as the development funds allocated by CIB.

The behaviour of USLAB ecoguards towards local people, especially pygmy communities, shows that real participation or collaboration between USLAB/PROGEPP and local people has still to be developed. Recruitment to the ranks of USLAB and the development of the monitoring of poaching by a wider range of the local population still lies in the future.

An effective conflict-resolution mechanism still needs to be developed.

All these issues will need to be worked on further as CIB moves from its currently certified concession at Kabo (50,000 ha) to gradual certification of the whole area (three million ha).

Could an application of the ecosystem approach have made useful contributions over the last decade? Since 1995, CIB has focused its activities on achieving sustainable forest management as defined by FSC's certification requirements. The shift to a wider understanding of forest dynamics and on the rights of forest peoples has been driven by the desire to meet these requirements.

What an ecosystem management framework would have added to the picture is a better sense of who the other stakeholders were, the power relationships which drove them, and a better understanding of market forces and where they were likely to take CIB and Pokola. The certification process is too narrowly defined to incorporate these factors.

The ecosystem approach also demands a variety of disciplinary specialists from the start. Here, a logging company and a conservation organization worked together for a long time before they brought in the services of social scientists, who were needed earlier. Key data were missing, but the specialists originally recruited were not aware of this. The development of equitable benefit-sharing institutions would probably have happened earlier if they had been.

CIB has been seriously challenged by the whole certification process, which has taken much time and effort — and investment — in order to achieve success in Kabo. Although the ecosystem approach does generate a broader understanding of institutional, commercial and regional issues that affect the immediate ecosystem, it does not currently reward good practice at the end of a process of improvement as simply as certification does. Thus encouragement to adopt an ecosystem approach to the evolution of the concession would have been unlikely to have immediate results.

This case study suggests that there may be scope for adding a more explicit ecosystem dimension to the certification process in the case of the sustainable management of production forests. Although establishing a separate route to sustainability is redundant, the ecosystem approach could provide guidance on issues beyond the site-based biodiversity and social responsibility issues addressed by FSC certification.

Acronyms

CAR	Central African Republic
CEM	Commission for Ecosystem Management, IUCN
CIB	<i>Congolaise Industrielle des Bois</i>
CIRAD	<i>Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France</i>
DRC	Democratic Republic of the Congo
FFEM	<i>Fonds Français pour l'Environnement Mondial</i>
FMU	Forest Management Unit
FSC	Forest Stewardship Council
GTZ	<i>Gesellschaft für Technische Zusammenarbeit</i> (German aid agency)
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
MEFE	<i>Ministère de l'Economie Forestière et de l'Environnement</i> (Ministry of Forestry Development and the Environment)
NGO	Non-governmental organization
NNNP	Nouabalé-Ndoki National Park
OCDH	<i>L' Observatoire Congolais des Droits de l'Homme</i> (Congo Human Rights Observatory)
PA	Protected Area
PROGEPP	<i>Projet de Gestion des Ecosystèmes Périphériques au Parc National Nouabalé-Ndoki</i> (a partnership between WCS, CIB and the Congolese Ministry of Forestry Development and the Environment)
USLAB	<i>Unités de Surveillance et de Lutte Anti-braconnage</i> (Surveillance and Anti-Poaching Units)
WCS	Wildlife Conservation Society, USA
WWF	Worldwide Fund for Nature

Endnotes

1. The case study is concerned with forest concessions operated and managed by the *Congolaise Industrielle des Bois* (CIB), now owned by the Swiss based Timber Group (in 2006 the Timber Group merged with Dalhoff Larsen & Horneman A/S). The group has operated forest concessions in the Northern Congo since 1969.
2. The Keurhout Foundation is a Dutch certification organisation. When it certified CIB, the company had not yet produced a management plan. Since the management plan had still not been produced three years later, CIB lost its certificate and with it, its access to a market for CIB products in the Netherlands.
3. The boundaries of FMUs in Congo were fixed by the government in the past, but they continue to evolve as Département boundaries change or new protected areas are created.
4. This is the term now used in the CIB management plan for Kabo FMUs, and refers to the Babendjele/Mbenzélé and Bangombé groups, often referred to by others as pygmies.
5. “Bantu” is normally a generic term which applies to tens of millions of Africans who speak the Bantu languages. In north Congo it has a specific local meaning, which is why the French spelling of the word has been retained.
6. Out of about 2,000 people employed by CIB, around 160 are pygmies.
7. This so-called “*Cahier de charges*” includes obligations for the company to establish social infrastructure such as schools, hospitals, clinics, medical dispensaries and churches, as well as roads and timber-processing facilities.
8. The exclusion of the Bomassa triangle from the Kabo FMU and its addition to NNNP (see map 2), which is desired by WCS, are among the main points of disagreement with CIB.
9. CIB’s size and scale seem to have been instrumental in its survival. Most of the other FMUs in the region, except one operated by IFO/Danzer, are moribund.
10. Hypothesized animal numbers per block sampled were based on counts of chimpanzee and gorilla “nests” and on piles of elephant dung, using standard formulae.
11. Local scientists and pygmy individuals noted in 1995 that understorey vegetation is much denser in forests where elephants are not present in high enough numbers to keep it open with their foraging and physical passage through it. This change might over time lead to major changes in the regeneration of over-storey species. Elephants often go as far as 50 km from areas being logged.
12. This safari operator organized trophy hunting in the area in the late 1990s. The operator later withdrew from the area and from the collaboration.
13. When socio-economic or other studies are undertaken, many additional temporary staff are hired.
14. Kabo contains many of the large clearings (known as bai) valued by larger mammals, and is also home to many great apes.
15. This was after studies proved the exceptional value of the area (particularly its chimpanzee population).

16. In October 2005 a report from a Congolese human-rights NGO cited testimonies of pygmy Babendjele people being abused by USLAB ecoguards, who took legitimate hunting equipment from them and invaded their homes to perform searches. The report calls the ecoguards a “private militia” (they are armed and have uniforms) and accuses them of carrying out torture and racial discrimination against the pygmies. CIB has now established a partnership with OCDH. (*Abus de pouvoir, tortures et mauvais traitements : Les Ecogardes terrorisent les communautés pygmées dans la Sangha.* L’Observatoire Congolaise des Droits de l’Homme (OCDH), October 2005.) WCS has reputedly been less willing to accept criticism of the USLAB system.
17. For the larger baies, the Kabo FMU management plan stipulates buffer zones 100 m wide.
18. This represents only 8% of all employees, down from 8.5% in 1995.
19. NNNP management plan cites the case of opportunistic diamond exploitation in the CAR that produced poaching in the north of the park.
20. It is already common practice to circumvent some of these roadblocks. Babendjele have pointed out some of the paths being used by DRC immigrants to bypass them (J. Lewis personal communication). Waterways also offer opportunities for illegal activities.
21. This concept was drawn originally from temperate forestry, which aims to exploit no more than will be replaced by the forest’s own processes of regeneration. It was, in turn, an advance on the earliest types of commercial exploitation which saw forests as little more than timber “mines.”
22. Sustainable forest management goes beyond an interest in the replaceability of forest timber towards trying to manage in such a way that all the forest’s attributes, including environmental and social values, are also conserved.

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Acknowledgements

Many thanks to all CIB staff, WCS staff, MEFE staff and CIRAD/Nature+ staff for their time and availability. Special thanks to Lucas Vanderwalt, Philippe Auzel, Jean-Marie Mevellec, Denis Dechenaud, Achille Tsieta, Bruno Charbonnier, Jean-François Gillet, Dominique Paget, John Poulsen, Connie Clark, Marcellin Agnagna, Paul Elkan, Antoine Moukassa and Ivan Muir.



Bocas del Toro archipelago, Panama

The Ecosystem Approach and rapid social change

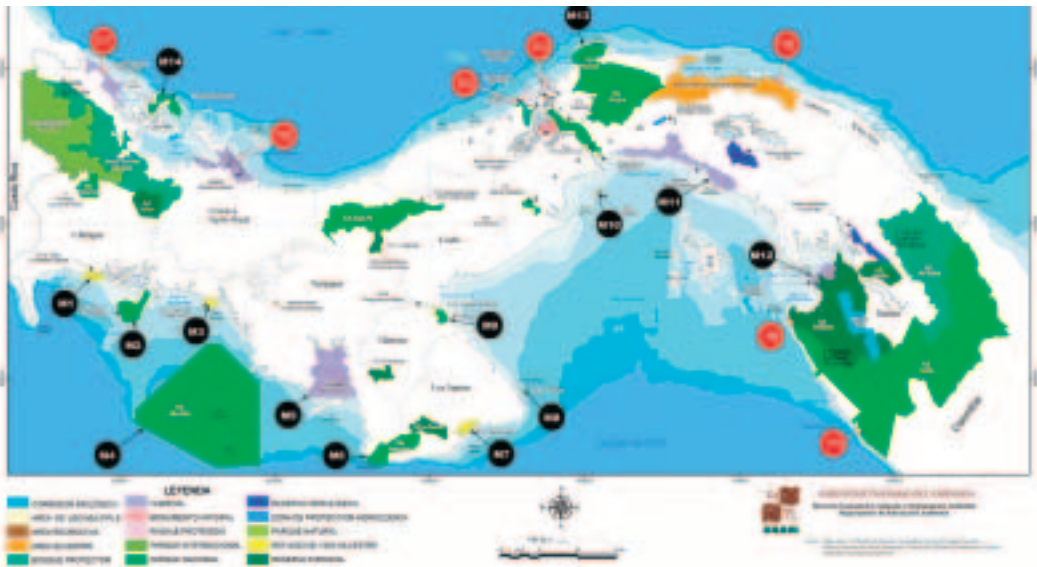
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Nestor Windevoxhel and Martijn ter Heegde

The resource and the ecosystem

Bocas del Toro¹ is an archipelago of islands and reefs on the Caribbean coast of Panama in the extreme northeast of the country, not far from the border with Costa Rica (Map 1). The area is characterized by two large lagoons: the smaller Almirante and the larger Chiriqui. The islands face the Caribbean Sea on one side and the Cordillera Central mountain range on the other, which rises to above 2000 metres. Several rivers flow from the mountains into the sea near the archipelago, the largest of these being the Changuinola and Sixaola rivers.

Map 1. Panama



The bays, lagoons and islands of Bocas del Toro are the apparent result of inundations after the last ice age, prior to which the whole area was dry land. Some of the higher areas in the Cayo Zapatillas area have been colonized by low-elevation coral reefs that form an underwater extension of the Punta Valiente peninsula. The islands are located on an upward moving tectonic plate.² The earthquake that occurred in Costa Rica on April 22, 1991 (7.6 on the Richter scale) had some serious consequences in the Bocas del Toro area: some islands sank into the lagoons and there were several tsunamis in the area. A nearby mainland wetland was severely inundated as well.

Coastal floodplains are found on the mainland to the northwest of the Almirante lagoon, fed by the Changuinola and Sixaola Rivers. Such floodplains are not found inland from the Chiriqui lagoon, where there are fewer sandy deposits and where mangroves dominate. The islands are covered mostly by secondary forest, although some small patches of primary forest still exist.

The wildlife on the islands consists of a number of smaller mammals and a wide range of amphibians.

From the point of view of biodiversity, the coastal and marine ecosystems of the archipelago are of much greater importance than the terrestrial ones. Because most of the archipelago is sheltered from the direct impact of the Caribbean Sea, there is an abundance of coral reefs, mangrove forests and sea grasses, which thrive in the calmer waters. The Bocas del Toro and Almirante archipelagos have a diversity of soft corals of regional significance and some of the greatest diversity of sea sponges in the world, and the beaches are used as breeding grounds by threatened marine turtles. In addition, the archipelago harbours dolphins, crocodiles, manatees and migratory birds.

In recognition of the importance of the biodiversity in the archipelago, the Government of Panama created the Isla Bastimentos National Marine Park (IBNMP) in 1988.³ It encompasses over 13,000 hectares, covering part of Bastimentos island, other islands and keys, coral reefs and mangrove forests.

On the mainland near the Bocas del Toro archipelago are two important protected wetlands, Damani-Guariviara and San San Pond Sak, the latter recognized under the Ramsar Convention on Wetlands. These wetlands filter sediments from the water flowing into the Caribbean, keep coastal waters clear and increase the productivity of coral reefs and sea grass.

There are four more protected areas on the nearby mainland: the large Parque Internacional La Amistad (PILA, 407,000 ha), shared by Costa Rica and Panama and encompassing tropical forest on the mountain slopes of the Cordillera Central; the Palo Seco Forest Reserve (160,000 ha) and two small protected areas around volcanoes. The large mainland PAs, particularly Palo Seco and PILA, control the watersheds that are important to Bocas del Toro and the two wetlands in the area. The government has made IBNMP part of the Biosphere Reserve La Amistad, which also encompasses the PILA and San San Pond Sak sites.

Natural diversity has made the archipelago the focus of many research and conservation projects. The Smithsonian Institution maintains a large research facility in Bocas del Toro; a number of conservation NGOs, including *Fundación Promar* and The Nature Conservancy (TNC) have worked in the archipelago for over a decade. TNC's PROARCA programme, funded by the United States Agency for International Development (USAID), considers the Bocas del Toro archipelago part of the bi-national site, Cahuita-Rio Cañas. Cahuita lies to the northwest of Bocas del Toro in Costa Rica, and Rio Cañas lies to the southeast. This larger area contains several important coastal and marine ecosystems, including turtle-breeding beaches and coastal flats where manatees thrive.

The archipelago is a municipality or district of 43,505 ha, and is part of a much larger province (also called Bocas del Toro), which has 89,300 inhabitants. Bocas del Toro was the first province of the independent Republic of Panama. Numerous consulates were located there in the early 20th century as a result of the large operations of the American United Fruit Company and other plantations on the mainland near the archipelago. The islands have a population of some 10,000 inhabitants (2000 census), largely concentrated in the town of Bocas del Toro on Colón island. Apart from the town of Bocas del Toro, the province counts three more urban centres: the two coastal towns of Chiriqui Grande and Almirante on the nearby mainland; and Changuinola, a larger inland town a little farther away.

The area is home to several indigenous groups. The Ngöbe-Buglé (Guaymí) group are Panama's largest indigenous group and have been allocated a comarca nearby. (A comarca is an area that the Panamanian government has handed over to an indigenous group for limited self-rule.) The members of this group who live in the archipelago depend on fishing for domestic consumption and sale, and on small-scale agriculture. The Teribe are a smaller indigenous group living on the mainland. Immigrants from many areas have come to Bocas del Toro archipelago over the years and the area has significant black Caribbean populations. These groups also fish and farm for domestic consumption and sale.

Given the large influx of migrants over the course of the 20th century, the population was probably fairly small a hundred years ago. Most evidence seems to indicate that the Ngöbe-Buglé emigrated from their mainland core area to the archipelago only relatively recently.

The Bocas del Toro archipelago and the nearby mainland have attracted the interest of different people over the centuries. Christopher Columbus landed there. English privateers used its sheltered harbours and hunted turtles for food in the 16th and 17th centuries. The United Fruit Company (UFC) destroyed much native vegetation in the late 19th and early 20th century to create banana plantations; other companies converted native forest to coconut plantations. Forests were logged for mahogany and converted to cattle ranches. Large tracts of mangrove forest were removed by UFC to create the town of Bocas del Toro and a channel was blasted through the coral reef and in the ocean floor so that bananas could be exported from the Almirante harbour.

The situation in the Bocas del Toro archipelago is even more critical today. First, over-fishing for commercial purposes brought the livelihoods of local people to the brink of collapse; then, very recently, the Panamanian government has begun to encourage large-scale tourism in the area, in particular the construction of resorts by U.S. investment groups for American retirees. What was once a remote area now has two scheduled flights a day from Panama City. The previous economy, based on farming and artisanal fishing, has been all but overwhelmed.

Goal of the case study

The archipelago was selected for an Ecosystem Approach case study for three reasons:

1. a long-term international nature conservation project had worked with local communities to engage them more actively in the management of their fisheries;
2. local NGOs had been involved in the facilitation of community-level action and could engage with the case-study writers; and
3. research data on marine biodiversity and marine resource use in the area had been gathered over a long period.

The original aim of the case study was to apply the principles of the Ecosystem Approach to the management of the area. If such management could be made to work in the Bocas del Toro archipelago, it would improve conservation outcomes and reduce the government's high enforcement cost to maintain the existing management model. It might also lead to increased formal recognition of local communities' rights to manage the natural resources on which their livelihoods depend.

Both TNC and IUCN were working in Bocas del Toro as part of sub-regional conservation initiatives. TNC is responsible for PRO-ARCA, a sub-regional program financed by USAID; the regional IUCN office in Costa Rica runs the Alianzas conservation programme. The area is also home to a number of NGOs representing different local interest groups.

The local fishermen, with the support of TNC/PROARCA, had organized themselves both locally and more widely. This was intended to both conserve the marine ecosystem and promote sustainable fishing practices. The fishermen wanted to create zoning arrangements so they could manage the ecosystem themselves, with zones set aside for conservation and sustainable use. The conservation zones would be an important test for community capacity and determination, and might usefully complement the IBNMP, which does not have sufficient resources for management and enforcement.

IUCN Alianzas and TNC/PROARCA decided to support the fishermen's initiative, and IUCN in particular was eager to test the applicability of the Ecosystem Approach as a framework for assisting one of the communities in developing and implementing new management practices.



San Cristobal, the fishing village selected for the original conservation initiative.

Photo: Julio Barquero

This ambition was not realized, for reasons which this chapter will investigate. Nonetheless, subsequent analysis using Ecosystem Approach concepts has shed light on the case of Bocas del Toro. The ecological importance of Bocas del Toro — and the current rapid development of new economic activities that depend on and affect the archipelago's natural resources — has shown how complex attempts at ecosystem management can be.

Ecosystem definition

Although the Bocas del Toro archipelago, as a group of islands, seems to constitute a clear-cut geographical unit, many of the archipelago's features are also found in adjacent areas. Map 2 shows how the protected areas surrounding the archipelago are interlinked and how a small coastal strip and most of the archipelago's islands fall outside the protected areas. While environmentally speaking the archipelago may be part of a larger landscape, economic considerations have led the government of Panama to identify most of the archipelago and the nearby coastal strip as areas for development and thus exclude them from protected-area status. Not all areas of high ecological value are protected.

Map 2. Protected areas in the archipelago



In terms of cultural boundaries, most native inhabitants belong to the Ngöbe-Buglé group. Although this group has been given a comarca, the Bocas del Toro archipelago has been excluded from it. This is no doubt because Bocas del Toro has become one of Panama's prime locations for the development of resorts, an activity increasingly promoted by the government.

Stakeholder involvement

The archipelago is home to a wide range of stakeholders. The state has no history of opposing economically profitable activities in the face of environmental or long-term sustainable development considerations, and the opportunities presented by Bocas del Toro have attracted outsiders whose economic activities have generally been very damaging to the islands' ecology. Outsiders have also marginalized local people in terms of decision-making about the archipelago's resources and management.

Land tenure in the Bocas del Toro archipelago is a patchwork. Large tracts of the islands, the sea, lagoons and rivers and IBNMP are state property. Some of the locals have been able to buy plots for their own use, and an increasing number of foreigners are also buying plots on the islands.

The state is the most powerful stakeholder in Bocas del Toro, but the state-owned parts of the archipelago are managed by different state agencies with different priorities. Autoridad Nacional del Ambiente (ANAM), the national environmental authority, is responsible for managing IBNMP, but the surrounding sea and lagoons are managed by the Autoridad Marina de Panama (AMP), the country's marine authority. On the islands, the Instituto Panameño de Turismo (IPAT), the national tourism agency, plays an important role in actively promoting tourism, working in concert with powerful private-sector operators. The kind of resort development being promoted is a threat to IBNMP, but ANAM and AMP have a weak local presence.⁴



Sloth.

Iker Lasa

Though local government has attempted to strengthen its participation in the management of the natural resources, it is limited by the Panamanian authority structure, which gives ANAM the preëminent role, but does not give it insufficient finances to carry out its duties.

The state generates income in Bocas del Toro through taxes levied on tourism and the sale of permits to resorts. ANAM collects a small entry fee (USD10 for foreigners) for IBNMP. All of this locally generated revenue goes into central state coffers, and local branches of ANAM in the area appear to be cash-starved. The effectiveness of government institutions is further hampered by the corruption of officials.

Local people are also important stakeholders in Bocas del Toro. There is a sense of pride in their uniqueness among the inhabitants in Bocas Del Toro, since the area is clearly different from most of Panama. The local community is very diverse, consisting of indigenous Ngöbe-Buglé people and descendants of many migrants, the most notable of which are those who came from the Caribbean islands to work on the banana plantations.

Today these populations still exist but inter-ethnic mixing has taken place. The Ngöbe-Buglé are the largest indigenous group in Panama, with some 120,000 people, but they are not very politically active or organized. They have accepted immigration into their area and in fact Afro-Caribbean communities have easily acquired access to fishing grounds and land in the area.

A number of archaeological finds testify to a long-term human presence on the islands, but it is not clear how long the Ngöbe-Buglé have lived there. Most members of the group still live on the mainland and in the past coastal areas were vulnerable to

raids by pirates and Misquito Indians from the north. Some researchers hold that the Ngöbe-Buglé did not come to live on the islands until the 19th century, just before the massive influx of outsiders.

The access of the local inhabitants to natural resources is pretty much unrestricted. The most important official restriction concerns the protected areas, most particularly IBMNP, but in practice no enforcement takes place and local fishermen are known to continue operations inside the park. Government measures have been able to reverse destructive practices, but overall the livelihoods of the local people are rarely subjected to government policies.

Fishing and farming provide almost the only income for local communities. Work in mainland banana plantations is less important for many people on the islands than it was in the past.

The importance of cattle ranching and the banana industry is still evident on the mainland where both activities occupy large areas of land. Historically ranchers have always had substantial power, and in fact many of them are wealthy businessmen from Panama City or other parts of the country. In the islands neither activity takes place any longer, but the deforestation caused by cattle ranchers in the past, for example on San Cristobal Island, is still visible.

Recently tourism has provided some income from work in construction, the sale of land and some odd jobs. Tourism also represents a new market for products, although it has not yet proved to be an important new source of income for local people. The tourism industry is also just beginning to be an important stakeholder. Much of the appeal of Bocas del Toro as a tourism destination lies in its natural beauty and in the charm and relaxed demeanour of the local people. Many tourist operators stress the importance of these qualities, and some seek to minimize the environmental impact of their business by using solar energy or by working with local community guides. Other tourism operations, such as building on reefs, are clearly unsustainable. And even those tourist operators with good intentions to limit the damage they do are constrained by their limited knowledge of the local ecosystem and its fragility.

Probably the most ambitious tourism development is what the Panamanian government calls residential tourism, which involves the construction of medium or large resorts with golf courses, pools and marinas catering to retirees from the U.S. The operators are obviously powerful, judging from their purchases of very large areas of land, or even entire islands, and from the fact that they sometimes operate in violation of Panamanian law with impunity.

The expatriate community in Bocas del Toro is growing but is not yet very organized as a group. Their impact may increase in the future if those who have paid for a piece of paradise decide they want to help to protect it.

Bocas del Toro is also an important area for scientific research and nature conservation. The diversity, size and quality of the marine ecosystem are reasons why organizations including the Smithsonian Tropical Research Institute and TNC are present in the area. Access for researchers is easy and facilities in the area are exceptional. Of these various organisations, however, only TNC has a permanent employee in Bocas del Toro. The Smithsonian Tropical Research Institute has a large facility in Bocas del Toro town but focuses mainly on pure research.

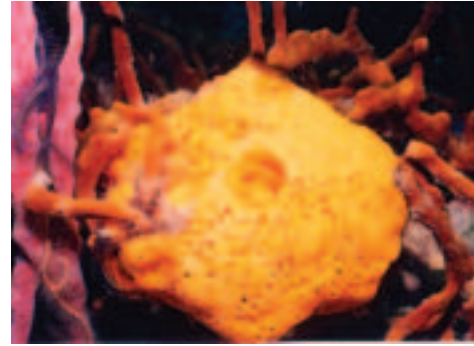
Both IUCN and TNC work closely with local government and civil society stakeholders in the area. While the creation of the IBNMP is an achievement, effective conservation management and enforcement have been weak, and the management practices of other actors in the area have been very detrimental environmentally.

TNC, IUCN and, to a lesser extent the Smithsonian, have some leverage in government circles but the economic agenda of the Government of Panama often prevails over conservation issues.

The climate in the area is wet, and rain can be expected throughout the year. There are two periods with less precipitation, in March and in late September and October, when only 131 mm of precipitation may be expected. In July and December-January the rains are intense and precipitation rises to 416 mm.

The prevailing ocean currents are from the northwest to southeast following the coast. The Sixaola and Changuinola rivers to the west of the archipelago lead through large coastal flats where they have deposited sediments, as well as farther along the coast. In the Chiriqui lagoon there are fewer sediments and mangroves tend to dominate.

The island vegetation originally consisted mainly of native evergreen, species-rich forests. Even today up to 155 plant species are found in remaining pockets of primary evergreen forest. In the north of Bastimentos Island a sweet-water lagoon is associated with unique types of vegetation. The numerous plots of native primary forest still found indicate its original extent. The mangrove forests are coastal or are cyclically flooded depending on the size of the island where they are located. Among the mangroves *Rhizophora mangle* is dominant in all environments, *Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erecta* and *Pelliciera rhizophorae* (tea mangrove) populations are also found. The latter is now very rare in the Caribbean.



Soft coral.
Iker Lasa

The plant families most commonly found in the native vegetation are *Rubiaceae*, *Araceae*, *Fabaceae*, *Melastomataceae*, *Cyperaceae*, *Piperaceae*, *Orchidiaceae* and *Poaceae*. Of those native species found, 48 are endangered and a further five plant species are listed as vulnerable in the IUCN Red List of Threatened Species. Eight local species of orchids and *Zamia skinneri* cannot be traded internationally without a special permit delivered under the Convention on International Trade in Endangered Species (CITES).

Significant populations of sea grass found on the ocean floor include *Thalassia testudinum*, *Syringodium filiforme* and the very rare *Halodule wrightii*. Sea-grass pastures are also home to populations of algae, molluscs, fish, lobster and crab, particularly juveniles. These pastures also provide habitat for anemones, starfish and sea cucumber.

The coral reefs in the archipelago are the most diverse of the area's ecosystems, containing up to 121 species of algae, 36 sea sponges, 160 fish species, 82 molluscs and many others. Coral reefs are unique and complex, and well-developed reefs reflect thousands of years of history. The coral situated windward of the Bocas del Toro ar-

chipelago is much less diverse and contains only some 8% of living coral, whereas the leeward reefs are more diverse and contain up to 32% of living coral. This seems to be largely due to the intense sedimentation on the windward side of the islands. In all, 57 types of stony coral have been registered in the Bocas del Toro archipelago, accounting for 89% of all species known in the Caribbean.

The archipelago is home to 123 species of fish plus 29 commercially interesting species; 41% of these fish species exist in only one environment. There have been 13 species of amphibians recorded and four species of marine turtles. Of the 29 species of reptiles and amphibians (frogs, lizards, turtles and snakes) found in the archipelago, 17 are currently endangered. Little is known of birdlife but at least 69 species are thought to exist, of which several are endangered. A further 75 species of mammals are documented, including bats, sloths and monkeys. Differences have been observed between mammals on the islands and others on the mainland.

Many studies have documented the crucial role played by coral reefs, sea grass and mangroves in providing shelter, breeding grounds and food for different types of fish and shellfish. Various studies have demonstrated the importance of sea grass in filtering out nitrates and other inorganic elements that might otherwise harm marine ecosystems and their components.

Filtration by sea grass, by keeping the water clear, also facilitates photosynthesis by coral reefs. Destruction of sea grass and mangroves increases sedimentation and hampers photosynthesis processes. On the mainland, the San San Pond Sak and Damani wetlands play equally crucial roles in trapping much of the sediment carried by the rivers in the area.

Background

Human presence on the islands dates back several hundred years, but it is probable that the current indigenous communities, of mainland origin, have not lived there very long. From 1502 to 1745, the islands were isolated from direct Spanish governance, but constituted an attractive occasional harbour for British and other ships. Initially ships' crews merely collected turtle shells, meat and eggs, caught fish and shellfish and cut timber for ship repairs. But some British settlement must have taken place, since the rearing of chickens and cattle on the islands was reported in 1745. This more permanent settlement led to some deforestation.

The first major transformation of the archipelago's landscape was the introduction of banana and coconut plantations in the mid-19th century. This gradually intensified over the next 50 years, and began to expand very rapidly in the early 20th century. Plantation expansion coincided with the increase of U.S. influence in the region. The U.S. supported the cause of Panamanian independence from Colombia — achieved in 1903 — and began the construction of the Panama Canal shortly afterwards.

In 1899 UFC took over most of the plantations in the area and established its base at Colón island. The company established the town of Bocas del Toro and built a well-equipped hospital on a nearby island for its use. Most banana plantations were established on the mainland; some were also established on the islands of Solarte and Bastimentos. Areas were also cleared for the cultivation of sugar cane and cocoa.

Plantation activities demanded quantities of labour that could not be readily found in the area. The companies brought in thousands of men from the West Indies, mostly Jamaica and Trinidad and Tobago. These new communities established themselves in Bocas del Toro town or on nearby islands, particularly the island of Bastimentos.

From 1914 a fungus infestation struck the banana plantations, precipitating a slow decline that lasted until the 1930s, when UFC greatly reduced its presence in the archipelago. The collapse of the plantations meant that those who had come from the West Indies had now to fend for themselves. Many of these migrants stayed and supported themselves through fishing and small-scale agriculture.

Between 1880 and 1930 the islands' natural resources were thus used but hardly managed. Local residents fished and farmed small plots while foreign plantation owners cultivated better and larger areas of land, on both the islands and on the adjacent mainland. The economic expansion fostered by the plantation economy on the mainland enabled local fishermen to sell their products with ease, and many of the more recent Caribbean immigrants also took up fishing as a result.

Fish marketing in the Bocas del Toro archipelago remained a predominantly local activity until the 1980s, when two things changed:

- a land-link to the archipelago (a road bridge to the mainland town of Chiriqui Grande) was built in 1981, facilitating for the first time the export of fish to Panama City and other urban centres by the fishermen of Bocas del Toro; and
- in the late 1980s, the government of Panama began the aggressive promotion of commercial fishing, hoping to turn the country into a major fish exporter.

The new policy caused a near fourfold increase in national revenues from fish exports between the 1980s and 2000, from 70 million USD in 1980 to over 270 million USD. But by the late 1990s Panamanian fishing stocks, including those in Bocas del Toro, were severely depressed. Fishing was very much concentrated on a few species (groupers, snappers, and lobsters) and new more intensive fishing techniques, such as large nets and poison, were being used in addition to diving and spear-fishing. Fishers were so focused on groupers, snappers and lobsters that these have now largely vanished, with serious consequences for the wider marine ecosystem.⁵

In recent times the Panamanian government has imposed regulations on many industries, not just the plantations but also fisheries. Some of these measures are clearly intended to reduce negative impacts on the environment. The national environmental authority, ANAM, is responsible for enforcing these regulations, but in Bocas del Toro oversight is patchy and violations of environmental regulations are common.

As this account makes clear, there has so far been very little formal “management” of the Bocas del Toro ecosystem, either by the government or by other groups. Natural resource extraction generally continued unchecked until stocks were exhausted – as happened with mahogany and turtles in the 17th and 18th centuries and sea cucumbers and lobsters more recently. The conversion of natural vegetation to large-scale plantation agriculture and pasture that started in the 19th and continued in the 20th centuries has been kept in check by pest and soil fertility problems rather than by any awareness of negative impacts on the local ecosystems and on the people that depend on them for their livelihoods. If biodiversity is still rich today, it is because of the archipelago’s limited suitability for large-scale fisheries or plantation agriculture⁶ and because of the vigorous regenerative power of its ecosystems, rather than any coherently implemented conservation strategy.

Current situation

But the Bocas del Toro archipelago is now at a turning point. A boom in tourism and residential resort development, which has met with few if any regulatory barriers so far, is leading to the rapid conversion of mangroves and other coastal ecosystems to land for buildings, golf courses, marinas and other tourist infrastructure. There are no

obvious physical or economic constraints to further tourism and residential resort expansion, and effective management of the archipelago's terrestrial and marine ecosystems — and the people that depend on them — is now very urgently required. There is no question that tourists come to Bocas del Toro because of its great natural beauty, and there would be serious negative consequences for the tourist industry if serious degradation of marine biodiversity were to take place.

So far, despite developments in the archipelago, local people's livelihoods have not improved and have scarcely changed. Few people have yet found employment in the tourism business.

The presence of IBNMP is only a partial solution. It excludes key areas of the Bocas del Toro ecosystem because it competes for its existence with various prior commercial activities.⁷

Park boundaries avoided human settlements but not local people's land use or user rights. The communities were not involved in the original decision-making processes that demarcated boundaries, and feel that interaction between community economic practices and the park was not sufficiently taken into consideration. Until recently the park had no management plan.

Regional programs

Higher-level regional programs do, however, take an interest in Bocas del Toro. The Alliance for Sustainable Development for Central America and the Central American-United States Joint Accord (CONCAUSA) developed agreements in 1994 based on a regional policy declaration and strategic framework. They endorsed the development of PROARCA, a joint program of USAID, the *Comision Centroamericana de Ambiente y Desarrollo* (CCAD) and Associates in Rural Development (ARD). The program consists of four parts, two of which are relevant to Bocas del Toro.

PROARCA/Costas is being carried out in partnership with CCAD with the support of USAID. PROARCA/Costas is being implemented by a team made up of three main partners — TNC, WWF, and the University of Rhode Island's (URI) Coastal Resources Center — as well as local NGOs in each of four high-priority geographic sites. Under WWF, the Biodiversity Support Program (BSP) also provides short-term technical assistance.

PROARCA-Costas has five objectives:

1. to improve the management and protection of coastal and marine resources at two sites (La Mosquitia and Gulf of Fonseca);

2. to develop local, national and regional policy recommendations, based on field activities, that support sustainable development and conservation of coastal and marine ecosystems in Central America;
3. to strengthen local, regional and national capacity for the conservation and sustainable development of critical coastal and marine ecosystems in governmental organizations, NGOs and local communities;
4. to improve the availability and accuracy of baseline information for marine and coastal resource management in Central America; and
5. to develop and implement a monitoring and evaluation system specifically designed to measure reductions in threats to critical marine and coastal ecosystems in Central America.

The Protected Areas and Environmental Marketing Component of the Regional Environmental Program for Central America (PROARCA/APM) is an initiative of CCAD and is supported financially by USAID. This five-year initiative is being executed by TNC, WWF and the Rainforest Alliance. Its general objective is to contribute

to improved environmental management in the Mesoamerican Biological Corridor, focusing on two components: improvement in the management and administration of protected areas; and environmental marketing of nature-friendly products and services in agriculture, forestry, tourism and marine production activities.

In Bocas del Toro TNC carries out much of the PROARCA-related work. PROARCA and TNC, along with other groups, have recently supported local communities more actively as they contribute to the development of a management plan for IBNMP. This participatory management plan was

first prepared for the period 1998–2000. It was accepted by ANAM three years later, but has not yet been put into action.

A rapid ecological survey was conducted in preparation for the management plan, and in the same period the local community proposed several additional “no-take” zones to the government of Panama. The attempted collaboration between conservation NGOs and local communities in Bocas del Toro highlighted their different overall objectives.



Meeting of Adepesco, the fishermen's umbrella group. Photo: Julio Barquero

The communities' desire to create new protected zones was a direct consequence of the substantial decrease of the fish stocks and the resulting loss of income. This explains their wish to set aside conservation areas and their creation of a number of local organizations in a short space of time. The coming into being of these organisations was of special interest considering the weak tradition of civil society organisation in Panama, a result perhaps not only of the loose traditional structures of the Ngöbe-Buglé group, but also of a recent past under a military regime that was inimical to civil-society groups.

Local organizations did spring up in Bocas del Toro, with the help of outsiders. One was ADESBO,⁸ the association for the sustainable development of Bocas del Toro, and another, more important, group was ADEPESCO,⁹ the association for fisheries development and conservation in the archipelago. ADEPESCO was fostered indirectly by PROARCA/Costas support for the Panamanian NGO CARIBARO,¹⁰ which helped create eleven village COLOCOPES¹¹ groups (local fishing and conservation committees).

The COLOCOPES groups formed ADEPESCO in 1999 as an umbrella organisation to protect the rights of the fishermen's groups within the archipelago and promote appropriate local sustainable development. One of ADEPESCO's first achievements was to have a set of rules for fishing adopted that allocated specific use areas to certain fishing groups. ADEPESCO looked set to develop into an institution which represented fishermen's views and could be relied on by external funders such as PROARCA. The organization's dual objectives were also important – conservation has been integrated with local development.

The desire of some communities to set apart and conserve certain areas of the archipelago was quickly set in motion. The basis for the reserves was a widespread awareness among fishermen that fishing stocks were dwindling and their livelihoods were in peril. They knew that sustainable management had to be preceded by restoration. The idea was suggested to PROARCA in 2003. Some of the communities were interested in creating no-take zones and access zones that were limited according to the ADEPESCO fishing rules. There seemed to be an interesting opportunity to support community conservation in the archipelago.

PROARCA and TNC decided to use the Ecosystem Approach as a framework, mainly because the Ecosystem Approach's 12 principles seemed to fit the situation in Bocas del Toro so well. This idea was presented to the national Panamanian government's authorities, ANAM and AMP. The idea of developing new kinds of management structures (and ultimately of legal mechanisms), which would devolve some management authority to the community or municipal level, rather than the national level, was explicit from the start. It was hoped that such an arrangement might produce a

practical complement to parks such as the IBMNP. It was hoped that both organisations would be interested in following a particular example to see how it turned out, and ANAM signed a collaboration protocol to this effect.

The idea was also discussed with the local municipal council, and with the two local organizations, ADESB0 and ADEPESCO. All parties had input into the design of the proposed program, and a set of criteria was developed with stakeholders through which a site for implementation was selected. After an unusually participatory and thorough consultation process, it was decided in due course that the case study would involve four factors:

- strengthening ADEPESCO through training;
- developing a monitoring protocol and monitoring three distinct zones: the no-take zone, the managed zone and a control zone;
- training community members in the monitoring of the marine ecosystem; and
- training community members in the application of the Ecosystem Approach.

The community chosen for implementation was San Cristobal, mainly because it was close to Bocas del Toro town, the municipal headquarters. It was also where two NGOs that TNC decided to use to support ADEPESCO had their offices.



Monitoring fish on the reef.

Julio Barquero

With IUCN and TNC/PROARCA funding, AMIPETAB¹² (the association of small and medium enterprises in tourism), a local NGO, was given the administrative and overall coordination of the project. PRO-MAR¹³ (the foundation for the protection of the sea), a national Panamanian NGO with a local office, was contracted for the technical monitoring.

The project began in 2003 with a stakeholder workshop where a jointly agreed plan was developed for monitoring. The representation of different stakeholders on the committee was organised, ADEPESCO was trained in communication, and a communication strategy was to be implemented by AMIPETAB. The intention was that regular radio programmes would keep local communities, and especially local fishermen, informed about the progress of the project.

In the second half of 2003, and for much of 2004, campaigning began to take place for town councillors and governors in Bocas del Toro town and province. Various local leaders launched their own campaigns, including the heads of both AMIPETAB and

the local PROMAR office, and they had very limited time for the implementation of the project. Eventually the head of AMIPETAB resigned from the NGO entirely to become involved in land sales and construction for tourism.

Despite all these difficulties, local and international NGO staff worked to demarcate zones for monitoring the reef with buoys, and the population structure of the fish and the coral were established along a baseline transect in each zone, together with the relationship between the coral and other sea-bottom plant communities. PROMAR collected the baseline monitoring data, and defined the methodology for follow-up monitoring. No analysis has been made of the raw data, however, and it has not been given to others for analysis. Local fishermen did not receive sufficient training to undertake subsequent monitoring alone and unsupervised.

The communities around San Cristobal, unsupported in their attempts to work on the restoration of their maritime livelihoods, were relieved to be able to sell their labour to local land-owners developing tourist infrastructure in the area as opportunities began to present themselves.

ADEPESCO also had internal problems. Members complained that their leaders were no longer fishermen and did not have their interests at heart. It was felt that the leaders were representing community views to the outside world which were not the fishermen's own views.

Throughout this period, TNC and PROARCA had continued to press their funded partners in the area to meet their obligations to provide reports on progress, and administrative and financial reports, but met with no success. Eventually TNC employed a consultant to analyse the reasons for the failure of the initiative.

There were several main findings:

- ADEPESCO had been effective in the past as an umbrella organisation for the tiny local COLOCOPES groups, but it was insufficiently experienced to manage complex institutional and technical inputs from AMIPETAB and PROMAR without external support.
- Stronger institutional links with the municipal authorities were needed from the start.
- TNC had placed the project process in the hands of AMIPETAB, but it was probably the wrong organisation for this. AMIPETAB had its own interests, which were linked much more to tourism than to fishing or conservation.
- In other cases TNC has established its own resident adviser for five years or so to help institutions to evolve and local people to take on new tasks, and this has been a more successful approach. There is a need in these situations for strong

leadership, and for an ability to facilitate communication between diverse stakeholder groups, who are likely to have differing initial goals. No such individual was in place in the case of Bocas del Toro.

During 2005 PROARCA/Costas and TNC decided that it was not possible to continue, and the second phase of the project was canceled. It was the view of these organisations that without fundamental restructuring, the project could not continue in the face of all the changes that had taken place. Unfortunately, neither the time or the financial resources were available to carry out this restructuring.

TNC's regional coordinator, in discussing the project and its disappointing and untimely end, suggests that far from seeing the collapse of the project as a failure of the ecosystem approach, it had shown him how an ecosystem approach analysis prior to the intervention by TNC and IUCN would have been ideal for understanding the processes and likely drivers of change in resource management in the islands.

From fruit plantations in the past to tourism today, potential investors have had little understanding of the environmental value of Bocas del Toro or of the balance that must be maintained, and have scarcely seen beyond its immediate commercial value. Mainland land use has had impacts on the archipelago's ecosystem for some time. Plantations and cattle ranches are mostly found on land converted from lowland forest alongside rivers. Deforestation has caused an increasing flow of sediment towards the rivers and on into the archipelago. Fertilizers and pesticides have also contaminated rivers and other water bodies. There is a rise in pollution from these in coastal areas.¹⁴

Perhaps even more damaging was the government-led drive for fish exports from the area in the late 1980s and early 1990s. In those years, groupers, snappers, lobsters and sea snails from Bocas del Toro were sold in Panama City and beyond, causing stocks of these species to decline steeply. The intensive exploitation of sea cucumber in the 1990s for export to Japan also had very serious consequences and almost extinguished the creature in the archipelago. The population did recover after a fishing ban for the species was imposed.

Tourism began to be significant only in 2000 but is already enormously influential. Tourism pressures are growing so rapidly that it is not clear whether or not the conservation value of Bocas del Toro's ecosystems will be recognised in time to be effectively protected. Local and international NGOs and researchers have been slow to see the challenge, and slower still to explain to local government and tourism investors that the very ecosystems which are so attractive for tourists are fragile and easy to destroy.

Decisions are currently being made without any overall sense of Bocas del Toro as a set of interlinked ecosystems within which conservation, sustainable use and sensitive tourism must take place in a complementary way. There is no effective zoning of the terrestrial and marine ecosystems, and apart from the loosely defined borders of the IBNMP, there are no limits defining development or conservation priorities. By complying with the necessary tourism regulations, development can take place practically anywhere in the archipelago outside the IBNMP.¹⁵

In the beginning many of the tourists were backpackers looking for an inexpensive tropical paradise. More recently the Government of Panama has begun to promote residential tourism, including large long-stay resorts and retirement condominiums in Bocas del Toro. Hotels and other tourist infrastructure are being built and expanded in Bocas del Toro town and in romantic locations such as over the water. Private holiday homes and villas are springing up. Two resorts have been built and others are planned. Each contains condominiums and villas as well as marinas, shops, swimming pools and planned golf courses. Any tourist development, especially the resorts, may threaten the archipelago.

The clearing of forest for tourist infrastructure diminishes the extent of habitats for local wildlife and creates an additional flow of sediment to the reefs. Development in and near the ocean is disturbing turtle-nesting beaches, increasing the flow of polluted waste water into the sea, and damaging reefs by allowing yachts to cast anchor on them and to disturb dolphins, crocodiles and fish.

Tourism is also affecting local livelihoods. Land and real estate prices have risen dramatically, making it attractive to sell property and difficult for a local person to buy. Tourist accommodation costs USD 10–12 a night at the bottom end, through USD 30–50 for a medium-priced hotel to up to USD 200 a night for a luxury hotel. A small waterfront property in Bocas del Toro town might sell for USD 150,000, while a resort condominium apartment might sell for USD 250,000. New forms of employment have arisen for labourers in the construction industry.



Fishermen are becoming tour guides.

Source: Julio Barquero

A fisherman with his own boat can charge up to USD 200 for a half-day boat trip sightseeing or fishing in the archipelago.

There is huge local demand for fish and shellfish and a very limited supply. A study by the consulting firm CEGESTI into the possibility of a fish-processing centre for ADEPESCO showed that the total yearly

revenue of such an enterprise would be no more than USD 188,000 (CEGESTI 2005) because resources are so depleted. Large lobsters are almost impossible to find, even though some local fishermen are resorting to desperate measures such as using potassium chloride to flush out lobsters from coral reefs so they can be caught. Despite unsatisfied demand, a fisherman earns less than a dollar per fish, or USD 3.75 for a lobster. It is not hard to see why Bocas del Toro fishermen are turning to other ways of making a living. Tourist demand is being met by bringing in fish and seafood from other parts of Panama.

According to TNC's regional director, the project began by focussing exclusively on how to build on the local community's desire to protect marine resources, as evinced through the participatory management plan developed with their inputs from 1998–2000. Bocas del Toro was just one part of the PROARCA Central America-wide Regional Plan for the Mesoamerican Biological Corridor, which involved improving the management of protected areas and environmentally sound marketing. The entire focus of the initiative was the monitoring of marine resources and support for the management of certain marine areas by fishermen.

Tourism

Tourism was established in Bocas del Toro without any consultation with local people. It has produced a rapid change in the social, economic and administrative dynamics of the situation which neither project managers and participants nor the Bocas del Toro authorities were prepared for.



Red frog. Photo: Nestor Windevoxhel

The tourism authority's policy document implied (unsurprisingly) that the environmental impact of tourism would be low. In reality it has been severe. Some of the species unique to the area (such as the red frog) are now under serious threat of extinction.

The TNC manager noted three key factors that were insufficiently understood or accounted for:

1. Externally driven change modified a very wide range of political, economic and cultural institutions in the area. Both road and airline links effectively drew Bocas del Toro much closer to the capital than it had ever been, and patterns of power changed as a result. The previous economy based on fishing and farming was overtaken by a much larger-scale economy funded almost entirely from beyond Bocas del Toro.
2. Before this change Bocas del Toro was a remote area. Small-scale processes were adequate for taking decisions about natural resource use in the area
3. With hindsight, two things were needed: a better initial economic and market analysis, and following that, an understanding that the conservation challenge was much broader than had been anticipated, and would from the start demand active engagement with local government (the municipality) and national level agencies.

The failure to understand and analyse the new market forces coming into play as tourism began to take off from 2000 onwards set the project off on the wrong foot. Rapidly growing tourism had not been factored into the project's plans. Its likely impact on land and marine resource conservation, and above all on the very fishermen the project was structured to work with, was not foreseen. Because there was no TNC project officer on the ground, the organization was slow to recognize the rapid changes being triggered by sudden tourist expansion in the area, including the shift from fishing to tourism-related employment among local men. The initial thrust of the project could not be corrected easily when the new issues became impossible to ignore.

The scale of the tourism challenge seems to have been the main factor behind the collapse not only of the two supporting NGOs (PROMAR and AMIPETAB), but also of the fishermen's umbrella organisation, ADEPESCO.

In retrospect, it is obvious that ADEPESCO could not possibly handle the sustainable management of marine resources under such changed conditions. It had been created as an organisation that regulated fishing and no-take zones among local fishing groups. The task expanded rapidly, however, until the organisation was faced with protecting marine resources from resort developers and other wealthy investors. Presumably overwhelmed by the scale of the task, and by the loss of guidance and leadership from PROMAR, ADEPESCO simply faded from the scene.

When TNC held its first stakeholder meetings in the Bocas del Toro archipelago, it was known that the islands and the marine ecosystem that surrounded them would eventually have to be managed in harmony. Farther away on the mainland, land use along rivers and in upland areas was already negatively affecting the reef areas of Bocas del Toro. Prior research was noting increases in algae levels and coral disease: indicators of too many nutrients and pollutants coming into the sea from land use on the islands and the mainland.

At a stakeholder meeting in 2003, however, the decision was made that the initial focus would be only on the marine ecosystem and the development of management plans for the creation of no-take zones and the rebuilding of fish stocks. This decision grew essentially out of the management plan developed with local people in 1998–2000, before the impact of tourism was apparent. The work was also what the fishermen with whom TNC was planning to work were most interested in.

It was decided to defer a connection between the problems of the Bocas del Toro archipelago and the challenges of managing land-use on the mainland until a later date.

This seems an entirely reasonable decision. Often it makes sense to start on smaller areas of a total landscape and then expand, especially in a region where appropriate management institutions were very thin on the ground and needed time to evolve. The ecosystem management principles which stress adaptive management over time would have led in due course to consideration of the impact of mainland ecosystems on the adjacent marine ecosystem.

Rethinking management goals and management area

Given the changes which had taken place between 2000 and 2003, an updated analysis of the baseline situation for any project within the archipelago was urgently needed; adaptive management had to begin immediately.

If that had happened, it would have identified the growing impact of tourist demand on marine resources for fish and shellfish, and on island land for roads, houses and resorts. It would have shown that there was a growing challenge, not only to IBNMP but to the conservation of the whole archipelago.

Within the short period of time between the initial needs assessment and data collection and the start of the project, the task had changed, and a rethinking of the scale at which the area should be managed was needed. An intervention could no longer focus purely on rebuilding the marine resource, still less on just one community of fishermen. What was needed was a way of assessing competing demands on the land and seascape and finding solutions through zoning and monitoring. In short, more

integrated land and marine management, through the active involvement of a wider range of stakeholders was urgently required. Above all, authoritative government involvement was essential.

Who needed to be involved?

As far as the marine environment is concerned, in planning and managing for new challenges the ultimate responsibility lies with AMP for all marine areas except IB-NMP, which falls under ANAM. On the islands, land use is the responsibility of the Municipality of Bocas del Toro, based on the island of Colón. Other key local stakeholders included local fishermen, farmers and other residents of the archipelago.

The main drivers of rapid change were located well outside the ecosystem. Boca del Toro was selected a few years ago by the powerful National Tourism Agency, IPAT, and the Government of Panama as one of three major tourism growth areas. No consultation with local government or other local stakeholders took place and neither they nor the conservation bodies in the area were ready for the rapid social, economic and administrative changes the policy was to bring.

PROARCA/Costas and their implementing agent, TNC, which had developed the original management plan, were potentially in the strongest position to argue for a reassessment of area problems and to work more directly with the municipality to find solutions.

The original focus of the PROARCA/Costas program included the following goals:

- the strengthening of local, national and regional capacity for the conservation and sustainable development of critical coastal and marine ecosystems among governmental organizations, NGOs and local communities;
- the development and implementation of a monitoring and evaluation system designed to measure reductions in threats to critical marine and coastal ecosystems;
- the development from this experience of policy recommendations for Central America more widely.

Monitoring was originally conceived of as relating to the marine resource, with a major focus on protected areas. There was an expectation that coastal ecosystems would also be addressed, as program goals show, but the monitoring of other activities on the archipelago's islands with direct and indirect impacts on marine biodiversity had probably not been foreseen.

What management and monitoring was in place?

Management

1. The municipality had the ultimate management responsibility for the area as a whole.
2. The municipality began zonation decisions of its own, spurred by the rapid changes which tourism was bringing to the archipelago.
3. The PROARCA/Costas program (including TNC) had a regional management, monitoring and capacity-building role on paper, but no staff on the ground in Bocas del Toro.
4. Community conservation areas, no-take zones and sustainable use zones were established by local fishermen in collaboration with NGOs, and with funding from TNC and IUCN. This zonation would presumably have evolved into active management if the institutions responsible for it had not collapsed.

Unfortunately, the relationship between the municipality and the conservation researchers and NGOs in the area was very poorly defined. TNC had made little attempt to bring the municipality into management planning, or even to inform them of proposed activities. It is not clear whether or not the municipality was aware of, or involved in the marine conservation management plan developed in 1998–2000. It was certainly not informed of the informal zonation which the fishermen had attempted to set in place through ADEPESCO, and as a result made no attempt to support it. Similarly, the zonation instituted by the municipality was not the result of discussion with conservation bodies or local stakeholders.

For a plan to emerge for the area which factored in sustainable tourism which protected local land and marine biodiversity (including IBMNP) for broader goals as well as for tourists, and which also assured local livelihoods as far as possible, an intensive period of planning and capacity building with local authorities would have been needed. For this, a permanent TNC presence on the ground would have been an absolute minimum requirement. In fact, what was suddenly needed was a different project, in a much larger management area than originally envisaged. Sometimes threats as well as opportunities can force a larger consideration of adjacent ecosystems.



Land being sold for condominiums.

Photo: Iker Lasa

Monitoring

The components of successful monitoring of some ecosystem components were certainly in place. Research on marine ecosystems, collected over many years by the Smithsonian Tropical Research Institute, had generated data on many fish species in the archipelago.

Boca del Toro's fishermen had good local knowledge of fish stocks and locations, derived from their lifetime expertise in the area. They know when fish are about to reproduce and are best not caught,¹⁶ and had noted a decline in average fish size over the preceding decade. The monitoring methods initiated by PROMAR in 2004–05 were intended to monitor reef health through gathering two further sets of data:

- the proportion of algae to coral (algae become more dominant when water is over-enriched and polluted by run-off); and
- the balance between herbivore and carnivore reef species.

Fishermen may not have known that these were key indicators for reef health, but they would have been able to undertake the monitoring, if they had been taught how and why these indicators were important.

The usefulness of the Ecosystem Approach

Bocas del Toro was a very difficult case, because adaptive change was needed almost at the outset of interventions. If the Ecosystem Approach had been applied with the analytical experience practitioners now have, it would have rapidly become evident to TNC and IUCN staff that the Bocas del Toro management area had to change, that a far wider range of stakeholders would have to be considered and worked with closely, and that a full economic analysis — not just of fishing futures but of all the other newly developing economic activities — would have to be undertaken. These issues were not apparent in 2000–01.

Management plan needs

For a successful outcome, more concerted management and the sharing of differing stakeholder knowledge was needed. PROARCA/Costas program goals do not seem to have been conveyed from researchers and conservation bodies to local government decision-makers. As a result, local government recognition that the adverse impact of tourism and infrastructure development projects needed to be confined by zoning was never combined with the relevant conservation knowledge.

What was needed was 1) a baseline against which change could be monitored; and 2) the building of a robust set of new stakeholder relationships. The expertise of the conservation organisations interested in the area might then have supported the municipality in its decision-making, and involved the tourism organisations which depend on the area's continuing beauty and diversity to attract visitors.

If a process had been in place which gradually brought the different parties present in the archipelago together — local communities, scientists, NGOs and local government — they could have formed a formidable partnership. The legitimacy for such an approach would come from the municipality, which has the oversight and decision-making authority as far as the commercial goals of developers and tourism bodies are concerned. It would be the job of PROARCA/Costas to bridge the gap between the scientific approach of outside researchers and the practical knowledge of local people, and to develop monitoring methods which met the information needs of both municipality and conservation bodies. The fact that Bocas del Toro Municipality has already embarked upon its own zoning program to tackle the rapid growth of tourism shows that there could have been opportunities for complementary planning, zoning and monitoring with conservation organisations.

In the event, the ecosystem approach in this case has been most useful as a retrospective analytical tool, enabling staff on the ground to better understand the information they should have acquired at an early stage, and the different trajectory that they would have chosen.

Acronyms

ADEPESCO	<i>Asociación para el Desarrollo Pesquero y Conservacionista del Archipiélago de Bocas del Toro</i> (Association for Fisheries Development and Conservation in the Archipelago of Bocas del Toro)
ADESBO	<i>Alianza para el Desarrollo Sostenible de Bocas del Toro</i> (Association for the Sustainable Development of Bocas del Toro)
AMIPETAB	<i>Asociación de Micro y Pequeños Empresarios Turísticos del Archipiélago de Bocas del Toro</i> (The Association of Small and Medium Enterprises in Tourism)
AMP	<i>Autoridad Marina de Panama</i> - the Marine Authority of Panama
ANAM	<i>Autoridad Nacional del Ambiente</i> - National Environmental Authority
ARD	Associates in Rural Development
BSP	Biodiversity Support Program
CCAD	<i>Comision Centroamericana de Ambiente y Desarrollo</i>
COLOCOPES	<i>Comités Locales Conservacionistas y Pesqueros</i> (Local fishing and conservation committees)
CONCAUSA	Central American-United States Joint Accord
GOs	Governmental Organisations
IBNMP	Isla Bastimentos National Marine Park
IPAT	<i>Instituto Panameño de Turismo</i> - National tourism agency
IUCN	World Conservation Union
NGOs	Non-governmental organizations
PILA	<i>Parque Internacional La Amistad</i>
PROARCA	Regional Environmental Program for Central America
PROARCA/Costas	Regional Environmental Program for Central America/Transboundary Coastal and Marine component
PROMAR	<i>Fundación para la Proteccion del Mar</i> (the Foundation for the Protection of the Sea)
TNC	The Nature Conservancy
URI	University of Rhode Island Coastal Resources Center
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature

Endnotes

1. Literally, Mouth of the Bull
2. Panama lies close to an area where four tectonic plates meet.
3. The park was established as Panama's first marine Protected Area by Panama's Director of Protected Areas, the process of its establishment being the subject of his Master's degree. The park was established with the knowledge of local communities, but without any attempt to seek their approval.
4. Although central authorities in Panama have primacy over local government, in Bocas del Toro — at the other end of the country from Panama City — ANAM and AMP have no presence.
5. Gabriel Jácome, pers. comm. Carnivores are essential to keep herbivores in check. Without them, the coral reef is too heavily grazed by the herbivores.
6. 80% of Bocas del Toro province is in soil classes VII and VIII, unsuitable for farming. Only 3% of the soils in the province belong to class II, and most of the "best" soils in the islands belong only to class III (CEGESTI 2005).
7. Similar arguments explain the existence of the Palo Seco Protection Forest, which has been excluded from the more strictly protected PILA with which it is contiguous, because the government plans to build hydro-electric dams and power plants in the area. This would be impossible in a national park.
8. *Alianza para el Desarrollo Sostenible de Bocas del Toro.*
9. *Asociación para el Desarrollo Pesquero y Conservacionista del Archipiélago de Bocas del Toro.*
10. Caribaro's primary interest is turtle protection. The NGO is known by the name that local indigenous people give to the Almirante lagoon.
11. *Comités Locales Conservacionistas y Pesqueros.*
12. *Asociación de Micro y Pequeños Empresarios Turísticos del Archipiélago de Bocas del Toro.*
13. *Fundación para la Protección del Mar.*
14. Lobsters in particular are exceedingly susceptible to death from marine pollution as a result of pesticides.
15. For instance, a new resort is being built right next to IBMNP. The Red Frog Beach resort (red frogs are among the rare amphibians found in Bocas del Toro) will contain two marinas and involves massive clearing of mangroves and hillside forest vegetation.
16. Groupers develop stripes at this time, for instance.

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Acknowledgements

The authors would like to thank Marieke Wit and all TNC/PROARCA staff and Bocas del Toro informants for their assistance, especially Julio Barquero, Iker Lasa, Ruben Navarro, Humberto Duguel and Gabriel Jácome. We are also grateful to the Mayor of Bocas del Toro, Eligio Binns, the community of Isla Tigre and the staff of ANCON Expeditions, Panama.



Indonesian Papua: Poverty and natural resources

Reconciling growth and social justice through an Ecosystem Approach



Martin Kayoi, Adrian Wells and Gill Shepherd

Forests and the poor in Indonesia

Indonesia's Poverty Reduction Strategy Paper (PRSP) was finally completed at the end of 2004, in time to influence the preparation of the nation's Medium-Term Plan 2004–2009. Of special relevance to this case study, the PRSP notes that the *Basic Agrarian Law No. 5* (1960) has in many cases been ignored by related sectoral laws and policies governing forestry, environment, water, and mining, severely limiting management opportunities for small-scale farmers and fishermen. This is compounded by land policies that have favoured land consolidation to facilitate investment without resolving underlying conflicts over ownership and use rights.

The PRSP calls for consistent application of the *Basic Agrarian Law No. 5* across natural resource sectors. It also urges acceleration of land titling and selective land reform and redistribution targeting the poor. It highlights the need to institutionalize forms of collective land management — for which no system of titling currently exists under the *Basic Agrarian Law No. 5* — and to involve the poor in spatial planning processes.¹

Indonesia's forests²

Indonesia has approximately 120.4 million hectares (ha) of forest, the largest area of tropical forest in the world. With a high degree of biodiversity, these forests are crucial to fulfilling the needs of current and future generations. For the last three decades, forest resources have been the main source of income for the development of the national economy, which has had a positive effect on foreign exchange earnings, national development and regional economic growth. In 2002, for instance, the export value of pulp was USD 706.8 million, and for all sawn wood was USD 363 million. This dynamic growth, however, has not been without its problems.

A key problem has been excessive forest timber exploitation as industrial demand began to exceed available supply. Forest destruction is evident by the rapidity of deforestation over the last ten years, amounting to 1.6 million ha per annum, or 2.8 million ha per annum over the last five years. This deforestation has many causes, including over-cutting and illegal logging, forest burning and clearing, occupation, land requirements for other sectoral development, and poor forest management. The Ministry of Forests (BPKH) attempted to address many of these issues in its 2001–04 work plan, but met with little success, according to its own evaluation.

These challenges have been compounded by the new role of BPKH since Indonesia's rapid decentralization in 1999. While decentralization has increased the authority of district governments, the consequent role of national bodies and programs remains contested, leading to added confusion over control and tenure. The ministry has continued to operate on the legal basis afforded by *Law No. 41 (1999) on Forests*, which assumes that forestry matters are basically managed from the centre. But this decree is

in conflict with Law No. 22 (1999), the government's decentralization decree (recently updated and replaced in 2004 by Law No. 32). BPKH has also developed its work program for 2005–09 based on the assumption that *Law No. 41 (1999) on Forests* is dominant. Some of the deforestation and associated problems noted by the ministry are the direct result of this contest for forest control — and its associated profits — between the centre and the districts.

A third problem associated with the dynamic growth in the forestry sector is that local people rarely get a share of benefits from their valuable local timber or mineral resources. Land in most forest areas was formally under state control, and millions of rural people living on customary forest lands in the Outer Islands are seen legally landless squatters. They have no security of access to land, a farmer's most essential resource. Although most people find ways to use forest resources to meet their livelihood needs, conflicts show that access to forest lands is a problem with periodically violent outcomes. In addition, there has been little policy effort to invest revenues in local livelihoods for the longer term. Instead, local people have suffered the environmental and social consequences of imposed developments without redress, and policy-makers have tended to give priority to short-term economic gains at the expense of natural forests.

The BPKH work plan for 2005–09 has some recognition of the correlation between forests and poor people, as it lists the economic empowerment of forest-dwelling communities as one of its five priorities. This is the first time the topic has been listed among BPKH's policy priorities; thus there is evidence of a new awareness that the ministry has some responsibility for the well-being of forest peoples. Nevertheless, given the relative power of the natural resource ministries that control most of Indonesia's land area, reform is unlikely without innovation and political pressure such as is currently being exerted by stakeholders in Indonesia's easternmost province, Papua (Map 1). This case study in the province of Papua, at the extreme end of the Indonesian archipelago, documents the process by which small beginnings have developed into a real opportunity for change in the forest sector.



A transect walk with women in the Baliem valley.
Photo: Gill Shepherd

Indonesia's Papua Province

Papua is typical of many resource-rich regions where high revenues have not translated into improved welfare for most of the rural population. Poor service delivery in rural

areas, weak revenue management, inequality and violence give Papua many of the characteristics of a fragile state (DFID 2005). Much of the current conflict centres on national policies governing land and natural resources, which effectively override underlying customary tenure in an effort to facilitate investment.

Map 1. Indonesian Papua
 Showing the Districts of Jayawijaya (highlands) and Jayapura (lowlands) in the east
 and Manokwari in the west



Government of Indonesia Election Map 2004; www.papuaweb.org/gb/peta/administrasi.html

The failure of government to demarcate customary rights and land use as the basis for designating forestry and mining concessions has exacerbated local people’s vulnerability and social exclusion. It is also a source of growing social tension that in fact undermines long-term investment by extractive industries. In areas such as Bintuni Bay, forestry land-use maps have demarcated virtually no land for community management, but have instead assigned all land either to commercial concessions or protected areas (PAs). In the absence of negotiated land settlements, many concessionaires are now struggling to provide compensation to customary owners. Although customary land tenure had been perceived as an obstacle to growth, the fact that neither investors nor communities are benefiting from the status quo is leading to a growing consensus within Papua that legal recognition of customary land systems is now a prerequisite.

The granting of special autonomy to Papua province in 2001 provided an opportunity to include rural communities in the management and exploitation of the province's vast natural resource wealth. Despite delays in implementation, the forest sector is now at the forefront of efforts to secure recognition of customary rights and develop a more just allocation of land and resources under special autonomy in Papua. No other sector has seen such a convergence of stakeholders — spanning customary communities, unions, industry and local government — arguing in favor of legal recognition for customary land and resource rights.

This case study examines the role of the Papuan Provincial Forestry Office (PFO) in shaping proposed reforms through participatory analyses of customary livelihood and land-use systems. These analyses clearly showed how the forest sector was exacerbating vulnerability among local communities by taking away secure access to land and resources. The PFO's ability to demonstrate a link between endemic poverty, existing law and policy governing forest land allocation — and the opportunities that were seen to come from a more holistic approach — have been essential in securing the support of the central government for reform. This case study also demonstrates the importance of four factors in bringing about change:

1. building strong coalitions at the local level;
2. linking powerful constituency-based organizations with key reformists within government;
3. political as well as technical engagement; and
4. advocacy grounded in sound legal and policy analysis.

The PFO has always had the task of implementing the Ministry of Forests' allocation of forest land between conservation forest, production forest and conversion forest. Now it is taking land designation a step further, in consultation with many local parties, so that community forest and community agricultural land are included and some of the broader categories are more finely tuned on the ground. The aim is to restructure land use so that livelihoods are protected and enhanced within smaller ecosystems at the local level, while ensuring that production and conservation areas encounter less friction with local people. The goal is a series of nested ecosystems for the whole of Papua Province. As the PFO head pointed out in his presentation to the World Conservation Congress in Bangkok in 2004, this represents a systematic and large-scale application of the ecosystem approach (EA).

High growth, high poverty

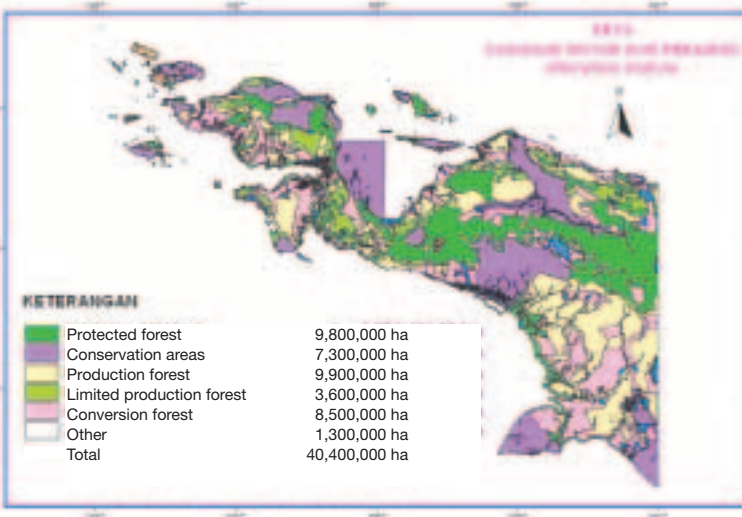
Papua's economy is potentially one of Indonesia's fastest growing. It has enjoyed a ten percent growth rate for the past ten years, fuelled by the forestry and mining sectors. The province provides much of the timber for wood-processing industries in Indonesia, and substantial new investments in oil, plantation agriculture, and hydro-power are planned, although poverty remains a serious problem. Levels of rural poverty, at around 45 percent, are the highest in Indonesia, according to national poverty standards (BPS 2003). One-third of Papuan children do not go to school, and nine out of ten villages do not have a health centre, doctor or midwife (DTE 2005).

While in the 1980s Papua remitted nearly 50 percent of its total regional product to other parts of Indonesia, the standard of living fell by 15 percent over the same period (Booth 2000). This decrease reflects the policies governing natural resource sectors that have displaced and marginalized local communities. In 2003 national poverty data showed that rural poverty rates in Papua were in fact higher inside the national forest estate than outside it (CESS-ODI 2005).

Livelihoods and legal uncertainty over land and resource rights

The proportion of Papua designated as national forest estate is 80%, spanning approximately 39 million ha: 52 percent of this constitutes production forest for commercial licensing, while 44 percent is designated for conservation and protection (Map 2). As national forest estate, this vast land area is effectively state land and none of it has been formally designated for community management. This is despite the fact that the vast majority of Papua's population live in and around forests, and are substantially dependent on forest resources for subsistence and income generation.

Map 2. The Ministry of Forests' classification of Papua's forest lands



Map Department,
Ministry of Forests,
Jakarta, 2002

In 2004 and 2005, with funding from the Department for International Development (DFID) Multistakeholder Forestry Programme, the Papuan PFO conducted research in five locations in the province to assess forest livelihoods and land use. Using the Forests-Poverty toolkit,³ the fieldwork suggested that an average of 40 percent of cash needs and 30 percent of subsistence needs are met by forests. Levels of dependency are greater for settlements closer to forest areas and farther from towns. They also vary with a person's age and gender. Forest dependency is particularly high for young unmarried men not yet entitled to their own agricultural land. Cash has growing importance, and timber constitutes one of the only reliable sources of cash in remote areas. Women are generally somewhat less dependent on forests (around 30 percent), except in the case of mangrove forests, where their dependence is very high. Generally, women use forests for subsistence through the collection of firewood, fruit and wild vegetables.

The current system of forest-land allocation ignores strong customary-tenure systems that characterize almost all areas of Papua. Though often seen as merely collective, these are in fact complex, flexible systems of rights and obligations that operate at individual, family, clan and tribal levels (Fingleton 2005). The 1960 *Basic Agrarian Law* stated that indigenous law should be recognized, but only where it does not contradict national and state interests. Subsequent forest law has consequently construed customary rights as an obstacle to the development and sustainable management of forest resources. In fact, *Law No. 41 (1999) on Forests* classifies customary forest (hutan adat) merely as state forest. This is in itself contentious, as the jurisdiction of BPKH extends only to the regulation and management of forests, and not to ownership or control over the issuing of land tenure rights (Contreras-Hermosilla and Fay 2005).

The failure to demarcate and give legal recognition to indigenous lands, including the individual and collective entitlements that flow from traditional law and customs, underpins increasing conflict between extractive industries and local communities. Without formal tenurial recognition, rural communities in Papua possess no clear rights to free and prior informed consent over the allocation of customary lands to concessions, and lack a solid legal basis on which to hold companies accountable for unpaid timber royalties.⁴ Nor can they seek restitution for damage to their lands as a result of logging and road building.

Previous deliberate attempts to dismantle customary structures and impose other protocols has further weakened the capacity of community institutions to negotiate effectively with the government and investors. This is especially the case in the lowlands, where interaction with the outside world — on very unequal terms — goes back many years.

While many rural Papuans welcome external investment, a lack of secure land and resource rights leaves them highly vulnerable (Box 1).

As the PRSP notes, more attention needs to be paid to forms of collective land management for which no system of titling currently exists under the *Basic Agrarian Law No. 5*. Furthermore, local communities need to be more involved in spatial planning processes in order to secure a more just approach to forest management rights in Papua.

Box 1

Vulnerability to land-use change

Participatory rural appraisal (PRA) work by the PFO demonstrates that, in livelihood terms, access to land and natural resources cannot be replaced. Without legal certainty over their customary land and forest management rights, Papuan communities are at real risk of being made poorer by governmental land allocations over which they have little if any control.

In many areas, legal processes for gazettement of forest lands, including boundary delineation in consultation with local communities, have not been undertaken. Nor are clear standards or procedures in place that take adequate account of community land-use systems. In the central highlands, substantial areas of agricultural land, as well as forests on which communities depend on for small-scale timber harvesting, now fall within the boundaries of Lorentz National Park. In Jayapura, the community spoke of forced eviction from areas designated for transmigrant settlers (who, uniquely in Papua, were given title to the land they were allocated). They also suffered damage to sago plots and agricultural and hunting areas as a result of commercial logging operations and its associated infrastructure development.

In Bintuni Bay, where company-community conflict has been at its most violent, initial assessments by the forestry office also pointed to a critical lack of institutional mechanisms to guarantee the transparent, fair and equitable distribution of funds and development support under company-community agreements. Government has shown limited interest in being an adjudicator; communities have brought complaints to sub district officers without success and have been violently suppressed where they have taken direct action.

Source: Field research carried out by PFO, with Adrian Wells and Gill Shepherd, 2004 and 2005

Contested decentralization

Despite the grant of special autonomy to Papua in 2001, the legal uncertainty faced by rural Papuans has been exacerbated by an ongoing struggle between the provincial and central governments over the power to regulate customary rights in forest management. *Law 21 (2001) on Special Autonomy* was a response to political unrest fuelled by land and resource conflict in Papua. The law devolves substantial powers to the provincial government to create, implement and enforce its own laws. It mandates the province to increase the welfare of Papuan people through the recognition of customary rights and greater legal certainty for investment (Article 38, paragraphs 1 and 2). It also states that customary communities should have maximum opportunities to benefit from community-based economic development (Article 42, paragraph 4).

Implementation of special autonomy has, however, been plagued by national-level foot-dragging since its inception in 2001. In particular, delays in establishing the necessary legislative structures, including the Papuan People's Council (MRP), have prevented the province from passing special regional regulations governing customary rights and natural resource management. It was only in December 2004 that the necessary implementing regulation for the establishment of the MRP was issued and that work on other enabling special regulations was able to begin.

In the meantime, the province remains subject to the central government's interpretation of *Law No. 41 (1999) on Forests*. This has restricted the province from effectively regulating customary rights in forests. Critically, the BPKH in Jakarta has not yet issued Implementing Regulations (PP) governing decentralization of the sector and customary rights under Articles 66 and 67 of Law 41 (1999). The ministry has also restricted local government powers to license logging operations, other than for local community subsistence needs. Customary community timber harvesting licenses (IPKMAs), issued by the provincial government of Papua in 2002 in response to growing social unrest, were declared illegal by the minister of forests in March 2005. The declaration effectively criminalized rural communities in Papua and left them in a legal vacuum.



Explaining the allocation of land between forest and agriculture in the Baliem Valley.

Photo: Gill Shepherd

The coalition for policy reform

Ironically, failure to settle indigenous peoples' land claims has now begun to undermine the very investment that national forest laws have sought to secure by overriding customary tenure. According to the Papuan branch of the Association of Indonesian Forest Industries (APHI), the high cost of tackling escalating conflict is discouraging long-term investment in sustainable forest management and related value-adding local processing.

Rural communities, industry and the provincial authorities are, therefore, beginning to work together (Box 2): rural Papuans want to own and manage their forests themselves, and industry wants less conflict. The withdrawal of community logging rights by the BPKH in March 2005 only served to galvanize this coalition of interests. The provincial government in Papua is prepared to meet demands both to increase welfare and to create a more secure investment environment in Papua.

Box 2

The search for social justice and the rule of law: converging agendas

The Papuan Customary Council (DAP), as a representative of Papuan communities with strong democratic legitimacy, argues for "the right to a livelihood." At the heart of this is customary land tenure. DAP is also calling for respect of fundamental human rights principles of participation, democratic accountability, equality, nondiscrimination and the right to a voice in land-use decision making, e.g. for the renegotiation of designated forest boundaries and functions (conservation, production and conversion).

The Papuan branch of APHI is equally concerned about obtaining legal certainty for its members. The association argues that the refusal of the Ministry of Forests to recognize customary ownership within the national forest estate hampers its ability to resolve conflict. The association wants clarification of the powers of the province in forest management, recognition of customary tenure and a better investment climate for sustainable forest management and local value-added processing.

Separately, the governor of Papua (in his speech of July 5, 2005, to the Ecoforestry Forum) has called for certification of customary tenure to provide legal certainty for investors; more clarity over whom to compensate for natural resource exploitation and land-use change; and a better and legally more secure bargaining position for communities.

Research for DFID by Maria Latumahina with Adrian Wells

The PFO has taken the lead in dialogue with the central government. This is in response to attempts to override its authority in the issuance of community logging licences and in the face of strong pressure from customary representatives to grant rights to local communities over forest management. Drawing on the results of earlier research by the PFO with community-level PRAs, PFO tabled a set of proposals on sector restructuring and community-based management.

Civil society and private-sector organizations have drawn on these proposals to strengthen their own advocacy. Through their constituencies, they have gained the political support of the Provincial Parliament and Commission IV of the National Parliament (which is responsible for natural resources) and the attention of the president's office. By highlighting the withdrawal of IPKMA licensing rights as an example of the failure to implement special autonomy, they have made an explicit link between the resolution of community forest management rights and the future political stability of Papua.

While initially the BPKH offered no alternative to its suspension of IPKMAs, political pressure from Papuan stakeholders encouraged the ministry to identify more options for reform. On August 19, 2005, the minister mandated a joint task force of provincial and ministerial representatives to identify a workable alternative to IPKMA and report back by the end of March 2006. This was an important opportunity for Papuan stakeholders to consolidate and promote their own agenda for forest-sector reform in the province. Considerable progress has been made since then but the policy has not yet changed.

Multistakeholder policy in Papua

Papuan stakeholders have essentially been calling for registration of collective title over clan territories by the National Land Agency. Since most of Papua's rural population depends on the rights and obligations that flow from customary tenure, there is a strong rationale for working with, as opposed to supplanting, customary land governance (Box 3).

As steps toward this, Papuan stakeholders have identified three priorities to achieve sustainable forest management and poverty reduction:

1. a more just allocation of forest resources between communities and large-scale commercial concessionaires, including the allocation of areas for direct community management, based on participatory mapping of customary lands;
2. clarifying the rules for forest management, including more provisions for small-scale community logging and clearly defined rights and responsibilities with respect to compensation and community development in areas assigned to external investors; and

3. institutional support, including recognition of customary and village-level decision-making structures; support to community economic institutions; stronger vertical integration between community-based producers and small- and medium-scale processing industries; and stronger regulatory and service provision functions for local government.

Box 3

Customary land tenure

Is customary land tenure a viable basis for growth and poverty reduction? The case for upholding customary land tenure, as opposed to private individual rights, lies in the ability of this system to provide community members with secure access to farmland and natural resources and an institutional framework to resolve disputes.

PRA work by the PFO showed that, far from constituting open-access areas, customary territories in fact consist of nested rights and responsibilities at individual, family, clan and tribal levels. These are defined in oral history and regularly reconfirmed in exchanges of goods between communities and individuals. Not only are such systems extremely resilient, but they are also highly flexible, providing individuals a wide range of primary and secondary rights that reflect and support diverse, risk-averse livelihood strategies.

Helen Hughes (2004), referring to Papua New Guinea (PNG), argues that secure investment and business development require customary tenure to be supplanted by private individual titling. She believes that this will simplify arrangements for purchase and enable individuals to save and raise capital.

This view has been opposed by Fingleton (2005), who argues that individual community members could lose important land and resource entitlements. He shows how agricultural productivity in PNG has increased under customary tenure and declined where private titles have been issued. Fingleton argues that customary land systems are sufficiently flexible to guarantee a flow of benefits to local communities, and that safeguards could be introduced through a two-tier registration system, with ownership accorded under group titles and leases granted to individual users. This is likely the most viable option for future land registration in Indonesian Papua; authority for determining and administering individual rights under a collective clan title would rest with customary institutions.

Customary institutions have been systematically weakened by government in the past, so a good understanding is needed of where they will still work and where they will not.

Recalculating forest potential

The PFO is in the process of recalculating forest potential. This means optimizing the economic, environmental and social potential of individual forest management units (KPH) by judging the most positive, productive and non-contentious ways in which each might be used so that their total benefit is greater than the sum of the individual units.

The process of recalculating forest potential draws on participatory mapping and the resource inventories of customary territories (Box 4). It involves customary land owners to distinguish between areas best suited to large-scale investment and those best managed by communities directly (e.g. for small-scale logging). It is a way of reconciling customary tenure with the forest land-use boundaries and management categories designated by government. For those areas assigned to large-scale investment, the process will also help clarify to whom investors must pay compensation in respect to underlying customary rights. Short of titling customary lands — an action which lies outside the remit of the PFO — such a process gives practical recognition to indigenous tenure.

The need to recalculate forest potential is especially urgent given the lack of reliable data on commercial forest potential in the province. Planning decisions are currently based on satellite imagery and very limited ground estimation of standing timber volumes and usually fail to consider other forest values (such as non-timber forest products (NTFPs) and environmental values). No account is taken of customary ownership or forest use for agriculture, hunting, forest foods or sources of cash. This has led to complaints from industry that many currently designated concession areas are uneconomic to log. Companies often struggle to meet projected cutting targets given lower-than-expected standing volumes and escalating conflict with local communities.

As a first step in recalculating forest potential, the PFO undertook a preliminary technical analysis of 69 timber concessions, some as large as 600,000 ha. It proposed removing those areas with limited potential for industrial timber extraction (e.g. in areas of steep terrain).⁵ It also suggested removing areas that could be better used for direct community management, subject to mapping (Box 4) and overlays of customary land use and ownership. This would leave more compact, economically viable units for future investment, while securing management areas for local people.



Fencing to keep pigs out of cultivated areas, high in the Baliem valley.

Photo: Adrian Wells

The intention is to apply the same approach to other forest management categories, including conservation areas. To this end, the Forest Office's PRA assessments have begun to identify basic criteria for reallocation of forest boundaries. These include assessment of customary land use. In some areas this consists of clearly defined agricultural and forest-use zones, as well as the specific livelihood practices of vulnerable groups, including women and young, unmarried men (e.g. secure access to NTFPs and small-scale logging opportunities). Another criterion is the requirement to leave sufficient land in reserve for future agricultural expansion (in light of population growth and the growing importance of cash crops such as cocoa). These criteria will provide the basis for technical and implementing guidelines to support negotiated land-use planning.

KPH as a framework for land reallocation

The ministry has identified the allocation of Forest Management Units (KPH) as a priority for the current administration. The intention is to devolve management authority to the lowest possible level and to increase service provision to concessionaires and local communities within each management unit. The allocation of KPH must take into account ecological, social and economic factors, as well as administrative boundaries and local communities.



Sweet potato cultivation, Baliem valley.

Photo: Adrian Wells

The PFO sees this as an important opportunity, as it provides a framework for systematically delineating areas as distinct units for large-scale investment, conservation and direct community management. Of particular relevance is the guidance to Article 17 of *Law No. 41 (1999) on Forests*. This envisages the development of separate Community Forest Management Units within the national forest estate. These would be sub-units of larger watershed-based FMUs.

Crucially, Law 41 (1999) conceives of KPH not only as locations, but as organizations with responsibility for long-term management. In the context of Community Forest Management Units (KPH-HKMs), this has the potential to grant communities management authority that is similar to rights under customary ownership. This is of major significance to communities in Papua who, so far, have been perceived as mere licensees on state land. The PFO is therefore proposing the allocation of KPH-HKMs as distinct territorial entities and as possible replacements for one-year IPKMAAs.

Box 4**Participatory mapping**

A consortium of Papuan civil society and local government partners, with the support of DFID, has been mapping customary territories and land-use systems. The process has received technical support from the local planning unit of BPKH. A new methodology for large-scale mapping, which combines satellite imagery with ground-level sketch maps, has greatly increased the speed of the process and the extent of community participation.

In Jayapura, participatory mapping has been completed for Kemtuk (100,000 ha) and Nambuong (57,000 ha). In Jayawijaya, mapping of the Lorentz National Park (LNP) Buffer Zone is underway in the Baliem Valley under the leadership of the District Forestry Office. The communities in these areas see participatory mapping as a political tool for protecting their social, economic and cultural rights and their customary territories. They also see it as a process that will lead to more participatory planning and to fairer and more equitable compensation.

In Kemtuk and Nambuong, with mapping complete, the communities are eager to assess the existing land-use and resource potential within their mapped territories for community-based forest management and external investment. They also wish to map the internal boundaries between clans within each customary territory to provide a basis for benefit sharing. The communities also hope to estimate potential land requirements 20 to 30 years in the future (to take account of population growth) and, if necessary, to make new agreements over the internal allocation of land and resources to anticipate future needs and avoid conflict.

One of the most interesting findings has resulted from overlaying the Ministry of Forests' own Forest Land capability maps for Papua (see Map 2) with the participatory maps already produced. The opportunity for a more fine-grained type of forest management within Forest Management Units instantly becomes clear. For instance, in some parts of Jayapura District, forest classified for conversion to oil-palm plantations can be seen to be of fundamental importance for sago palm, tree-crop agriculture, fishing and hunting. In other areas high-quality old growth forest, much valued for hunting and low-volume logging, has been targeted for conversion.

In Jayawijaya, local stakeholders are evaluating existing land-use and resource potentials within mapped areas of the LNP Buffer Zone. This will provide input to boundary negotiations and zoning of the national park. It will also enable local communities to make the case for small-scale community logging as a component of the park's management plan.

Source: Papua Provincial Forestry Office, Maria Latumahina (DFID)

This offers a solution to two significant failures of the IPKMA licensing system:

1. The lack of spatial criteria to guide the allocation of IPKMAs has resulted in overlaps between community logging and large-scale investors and PA authorities. KPH-HKMs are based on the prior demarcation of areas best suited to community management.
2. One-year IPKMAs offered no incentive for sustainable forest management, but KPH-HKMs offer sufficient security for long-term investment.

To date, the BPKH has designated 77 KPH in Papua, which are based in key watersheds and cover some 21 million ha. However, no attempt has been made within each unit to differentiate areas for direct community management from those for large-scale investment. Nor has the institutional mechanism for managing the units been defined. The Papua PFO intends to establish watershed management bodies for each of these KPH to act as regulatory structures and service providers under local government authority. The forestry office proposes that these incorporate representatives of customary land groups to oversee land allocation, licensing and company-community partnerships. Additionally, it proposes subdividing each forest management unit into large- and small-scale territorial units for external investment and direct community management respectively, including for KPH-HKMs. This would build on the province's own preliminary assessment of 69 concession areas, and on the participatory mapping of customary territories and land use that has already taken place. Papua thus offers a practical vision of how a more equitable form of forest management unit land allocation (KPH) might operate in practice; no clear concept yet exists at the ministerial level.

Rules for Community Forest Management Units

A review of the IPKMA system by the Papua Forestry Office in 2004 concluded that there should be a stronger legal basis for community logging and an improved model for community logging, including changes to the size of areas licensed. This would allow for selective logging and rotation and strengthened management criteria. During the course of PRA work with communities in Jayapura and Bintuni Bay, more specific improvements were identified that KPH-HKMs will need to address if they are to provide a workable alternative. Improvements include the need to specify management criteria for selective cutting by communities that factor in the existing customary regulations on forest management. These regulations bind community members internally and fit with government regulations. Preliminary assessment suggests that this would not be difficult.

Other improvements are needed as well:

- Customary institutions need to be supported as a source of management authority. The successful licensing of community logging will depend on institutional capacity building.
- Administrative and technical licensing criteria for community logging licenses need to be simplified. This includes eliminating the substantial up-front requirements imposed on large concession companies, such as a bank deposit; the need for applicants to cover the costs of initial surveys by government officials, and a highly complex management plan.
- Licensed areas and timber volumes should be limited to what local communities are capable of managing sustainably.
- Subsidies or access to credit is required to cover start-up costs to prevent the take-over of community logging systems by external syndicates.



Timber mill in the Jayapura lowlands.

Photo: Gill Shepherd

Building on these suggestions, the Papua PFO is developing possible scenarios for community logging. Drawing on experience with portable sawmills in PNG and the Solomon Islands (Box 5), the forestry office envisages KPH-HKMs of up to 1,500 ha, managed under cutting cycles of 30 ha per year over 35 years. This is significantly less than the huge 1,000 ha-per-year areas previously licensed as IPKMAs.

Additional planning is needed, however, to reconcile the extensive nature of ecoforestry in PNG and the Solomons with the more intensive management objectives of

the Indonesian selective cutting system (TPTI) as currently applied to production forest. Ecoforestry maintains standing timber volume by cutting below the mean annual increment in any one year. TPTI, in contrast, removes all standing trees at least 50 centimeters in diameter within any one cutting block, which is then, in principle, left for 35 years or replanted with different species.

Box 5

Possible harvesting rates for KPH-HKM

Assuming an average standing timber volume of 20 cubic m per ha of 50 cm and up, and the processing capacity of a portable Lucas mill at 1.2 cubic m of sawn timber per day, or 600 cubic m of round logs per year, the PFO estimates that a KPH-HKM would support a harvesting rate of 200 trees or 30 ha per year on a 35-year cutting cycle. This would require an area of 1,050 ha, or, assuming a 70 percent effectiveness rate: 1,500 ha. In fact, Greenpeace assumes that a financially viable community Lucas mill operation requires a minimum of 750 cubic m of round wood, with an output of 3 to 5 cubic m per day of operation. This is still within the management capacities of local communities, unlike the IPKMA system, which is not.

Sources: Presentation of the Papua Forestry Office head to the Minister of Forests, August 19, 2005; and Greenpeace, "Sharing the Melanesian Community Forest Experience," July 2005, by Grant Rosoman and Patrick Anderson.

Rules for large-scale investors

Stakeholder discussions facilitated by the PFO made it clear that the division of large watershed-based management units (KPH) into community and commercial management areas should not diminish customary rights. Customary land owners would retain the right to participate in all decisions of the watershed management authority. Underlying customary tenure would therefore still be binding on areas assigned to large-scale investment. Customary tenure would include continued security of access for hunting and gathering (which cannot easily be replaced in livelihood terms) and compensation for resources extracted.

Although current arrangements for the negotiation, delivery and oversight of compensation and community development require a substantial overhaul, there is an emerging body of good practice on which to draw that can help shape new policy. For instance, the *PT Bintuni Utama Murni Wood Industries* (BUMWI) concession in Bintuni Bay is working with community leaders to develop a rotating scheme for distribution of benefits among villages. The proposed reallocation of forest lands will not diminish the rights of concession holders with valid licences, and they will retain the right to reject proposed changes to concession boundaries. The Papuan branch of the APhi strongly supports the reallocation process.

Strengthening the role and inclusiveness of community institutions

Customary authorities and their legitimate representative organizations at district and provincial levels have vital work to do in establishing internal rules for conflict resolution and resource management, and in providing effective oversight of community economic activities. Support for the development of community economic institutions can be a useful means of revitalizing the role of customary authorities. The experience of the NGO Yayasan Bina Adat Walesi (YBAW) in the central highlands of Baliem Valley has convinced the PFO of the importance of traditional leadership in mediating development processes, and of the potential for treating community-based land and forest management as an integral component of the LNP management plan.

Reforms to forest management proposed by the PFO envisage community institutional support at a scale greater than has hitherto been possible. The establishment of the Papuan Civil Society Support Foundation (PCSSF) in 2006, an umbrella fund for delivering small grants to community groups, is a major step forward. The intention is for PCSSF to work as an intermediary in coordinating and channeling government and donor investment in community development and civic engagement and to help develop community learning centres.

Building vertical integration between community producers and the private sector

There is broad agreement in Papua that the forestry sector needs to be restructured, and this goal aligns well with national-level policy on revitalizing the productive sectors (forestry, fisheries and agriculture). Reallocating the forest estate between large-scale and community-based forest managers has implications for the scale and form of timber production. With the support of the APHI, the PFO hopes to link forest land reallocation with a comprehensive review of processing capacity within the province. This should help enhance sustainability and local value-adding capacity.

Some complex issues arise from the fact that, whereas current industrial capacity is largely geared to exports, urban growth within Papua is almost entirely dependent on informal timber supplies from local communities. Large-scale industrial capacity will require substantial rationalization to be able to deliver a sustainable supply of raw material from redesignated concession areas. A greater emphasis is needed on linking KPH-HKMs with enhanced small- and medium-scale processing and targeting local markets. Linking KPH-HKMs with local business also demands adequate safeguards to prevent the take-over of community production by external interests, as has happened in the past.

The PRA research work done by the Papua PFO noted the need for binding legal agreements between community producers and private-sector partners that would set out the rights and responsibilities of each party. The forestry office would need

to be consulted before any such agreements could be legally concluded. Customary institutions also need to be involved in facilitating and overseeing agreements.

Roles and responsibilities among government levels

Restructuring the Papuan forestry sector involves a repositioning of government. The redesignation of KPH implies a transfer of key management functions to communities and to the private sector, which are currently regarded only as licensees within the national forest estate. Devolving management functions to communities and the private sector requires government to be more strategic in policy setting and regulation, as well as in facilitation, service provision and monitoring. This makes it even more important to clarify the distribution of regulatory and administrative authority for forests between central and regional governments in general, and under special autonomy in particular.

Hunter returning home from the forest, Jayapura.

Photo: Gill Shepherd

responsibilities for supporting and monitoring community-based forest management between the provincial and district levels. Finally, the macro-micro distribution of functions between province, districts, and the communities are poorly defined and are significantly under-resourced for service provision and monitoring. District governments need to develop more effective service delivery systems with communities, focusing on regulatory and policy frameworks for integrating community land-use systems and designated forest boundaries and functions.

More effective service delivery at the district level

In practice, responsibility for participatory mapping and support to community logging systems will fall to the district level. This will require substantial resources, including funding and personnel, which could be achieved through reassigning excess capacity within the PFO to district forestry offices. The provincial forestry head is currently considering such reassignment. It will also require the district to be more proactive in community institutional strengthening to become better able to plan and manage and engage with the government and the private sector. This entails working across sectors at the district level, linking forestry extension with delivery of other basic services, including infrastructure development, health and education.

Policy setting, regulation and monitoring at the provincial level

The province has been proactive in creating a policy framework for restructuring the Papuan forestry sector. There are several priorities for the Papua Forestry Office:

- to secure an enabling legal framework for these policy objectives through support to the Provincial Parliament in formulating provincial regulations under special autonomy to regulate customary rights and resource management;
- to work with the BPKH to clarify the devolution of management authority within the framework of KPH;
- to establish suitable criteria for forest allocation, licensing, management, company–community partnerships and workable mechanisms for monitoring practices in the field. This could include piloting the allocation and management of new KPH; and
- to develop guidelines and secure adequate resources for implementation by the districts, including (where possible) new budget lines under the Special Autonomy Fund and fiscal reform of the forest sector to allow Rehabilitation Funds and other forest-based income to be used for key activities, including participatory mapping of customary lands.

Developing new policy will, in turn, the involvement of other provincial-level institutions, including the Provincial Parliament. In addition to legislative functions, this body is responsible for public oversight of provincial executive agencies and for ensuring that forest-sector revenues are adequately reinvested in service delivery to communities living in and near forest areas.

The BPKH as a standard setter

Devolution of regulatory and administrative authority for forest management to the provincial government of Papua has important implications for the future role of the BPKH in Jakarta. A new focus on its function as a standard setter for sustainable forest management would include providing technical and financial support to regional governments for the application of criteria and indicators for forest management and for forest mapping, monitoring and verification.

Enabling legislation

The PFO and other Papuan stakeholders now hope to secure a legal mandate to pursue the proposed reforms. *Law 21 (2001) on Special Autonomy* mandates the development of PP for the protection of indigenous rights and the economic empowerment of customary communities. Work has also begun on the development of a draft regulation on sustainable forest management based on customary law communities. In line with Law 21, this will constitute a special regional regulation, or *perdasus*, which requires the approval of Papua's highest legislative body, the MRP.

The proposed special regulation on sustainable forest management puts relevant provisions of *Law No. 41 (1999) on Forests* into the context of special autonomy. It mandates the redesignation of the forest estate; this is based on participatory mapping of customary territories, including the constitution of KPH-HKMs. These will vest rights and responsibilities in customary authorities as long-term forest managers. Responsibilities will include the preparation of management plans and oversight of small-scale logging operations. Safeguards are proposed to prevent the take-over of KPH-HKMs, as happened with the previous system of one-year IPKMAs.

The draft regulation on sustainable forest management also contains four important guarantees of the rights of customary communities:

1. It requires disclosure (including prior notice) of public decisions affecting land and resource allocation.
2. Since there is currently no effective forest sector regulator in Papua, the special regulation mandates an ombudsman to investigate public complaints, an independent auditor of forest-sector operations, and third-party arbitration.
3. In empowering customary owners as forest managers, the draft regulation mandates the creation of a forest management association composed of customary authorities, through which to channel technical support and capacity building.
4. To enhance economic opportunities for customary communities in value-added processing, the proposed regulation envisages a cap on log exports and large-scale processing capacity.

The proposed regulation can, however, regulate only those aspects of forest management that relate to the provisions of *Law 21 (2001) on Special Autonomy* on the protection and economic empowerment of customary law communities. In all other aspects of forest-sector planning and management, the regulation gives way to *Law No. 41 (1999) on Forests*, *Law 32 (2004) on Decentralization*, and to related implementing measures. The draft regulation was submitted for public consultation in May 2006. Within several months the draft had received the backing of the governor of Papua and was being examined by the Minister of forests regarding its compatibility with *Law No. 41 (1999) on Forests*.

Conclusions

Papuan stakeholders have developed a radical agenda for reform within the forestry sector in response to years of conflict. Thinking in a bold way, the PFO has been a key agent of change in defining the policy agenda for sector reform and in developing enabling legalization.

Community-level consultations, funded by DFID with additional technical assistance from IUCN's Commission on Ecosystem Management (CEM), proved to be an important catalyst in shaping proposed reforms. The support of central government (in particular the designation of a joint ministerial-provincial task force) in large part reflects the ability of Papuan civil society, as well as reformists within the provincial administration, to develop technically credible alternatives to existing laws and policies governing forests. It also reflects their ability to mobilize the political support of powerful, constituency-based organizations with the potential to affect outcomes on the ground (such as DAP, the Woodworkers Union and the APhi).

Crucially, this coalition of actors is beginning to overturn existing assumptions that indigenous land governance must necessarily be swept aside to facilitate growth. Instead, they have successfully argued that the demarcation and registration of customary tenure and land use is essential to poverty reduction, sustainable forest management, and a more secure investment environment. The support of the major logging companies demonstrates that corporate social responsibility (of growing importance in Papua) must necessarily extend beyond site-based management to corporate support for broader structural reforms.

The challenge now is to maintain this momentum, and to complete and implement the proposed special regional regulation on sustainable forest management based on customary law communities. The political will to do so ultimately depends on continued pressure from local communities. This requires legal-rights education at the grassroots level to raise awareness of the provisions of the special regulation and the opportunities it presents to secure local peoples' rights. Ongoing efforts by Papuan civil society groups to enhance transparency in public expenditure management are essential in securing these commitments.



Village among the mangroves of the Kaitero river, Bintuni Bay Mankwari.

Photo: Gill Shepherd

The success of the proposed special regulation on sustainable forest management also requires the continued support and engagement of the central government. This needs intensive facilitation in two important respects:

1. Following the withdrawal of IPKMAs by the BPKH, the powers of the province to license community logging are still contested. This is currently the subject of intensive negotiations as the ministry works to revise the principal implementing regulation under *Law No. 41 (1999) on Forests*. Resolution of this issue requires continued advocacy on the part of Papuan civil society representatives, and efforts to build trust in the capacity of the provincial administration. It may also require judicial interpretation of existing laws and regulations on forests, decentralization, and special autonomy, and how these may be coordinated.
2. Although the proposed special regulation mandates the mapping of customary territories, it cannot confer a title for land. Land administration remains under the authority of the National Land Agency (BPN) and the land register does not currently accommodate customary claims. The BPKH's Land Tenure Working Group is currently supporting efforts to secure legal recognition of customary maps in Genyem (Jayapura), but while this may be an important step toward registration of customary title, it does not provide the same level of security as land ownership. Reforming the registration system means working beyond the BPKH to engage the National Land Agency, the National Land Commission and National Parliament.

The agenda is ambitious, and continued dialogue between the central government and stakeholders on the ground is necessary for long-term commitment. Failure would mean a growing sense of social and economic exclusion among rural communities,

worsening political violence, and the certain knowledge that Papua's forests will be badly managed and will disappear with the rapidity of other forests in Indonesia.

Papua and the Ecosystem Approach

This case study highlights the importance of institutional arrangements in determining the outcomes of forest management. Government, civil society and the private sector in Indonesian Papua have been working to develop clearer and fairer rules governing the allocation and management of forest lands.

These efforts challenge long-held assumptions that customary tenure constitutes an obstacle to economic development, and that the objectives of large-scale investment and conservation are incompatible with local community-controlled resources.



Canoes in the Kaitero river, Bintuni Bay.
Photo: Gill Shepherd

The failure to give legal recognition to customary rights in Indonesian Papua has fuelled escalating conflict to the point of undermining long-term investment. It also leaves rural communities vulnerable in the face of externally imposed land-use decisions. Despite massive resource wealth, rural Papua suffers the highest rates of material deprivation in Indonesia. There is now broad consensus that both poverty reduction and investor security in Indonesian Papua critically depend on efforts to map, protect and work with customary tenure, and that forest ecosystems will benefit from clarification of these issues.

Papua province is currently at the forefront of reforms to the legal and institutional framework governing customary rights and forest management in Indonesia. This reflects the opportunities for innovation presented by decentralization and, in particular, by the granting of special autonomy to the province in 2001. These proposals have been framed as a draft provincial regulation on Sustainable Forest Management Based on Customary Law Communities, within *Law 21 (2001) on Special Autonomy (OTSUS)* for Papua. Once passed, this regulation will set an important precedent for reforms to forest management across Indonesia. It also speaks to provisions of the Poverty Reduction Strategy Paper (PRSP) on collective land management and the involvement of the poor in spatial planning processes.

The political will to implement these proposals depends on continued pressure from local communities. This will require a substantial effort to raise awareness of the regulation's provisions and the opportunities it presents to secure peoples' rights. Long-term investment is needed in community institutional support, the mapping of customary lands, technical support to implementing agencies and effective oversight. The success of these reforms also depends on the resolution of tensions with the central government over the powers of the province to license community logging. The results will benefit both poor people and forest ecosystems in Papua, not through tenure change alone, but through the intensive data gathering, mapping, institutional development and integration and technical redesign that the process has generated.

The determination to address the potential redesignation of all forest land-use types in a watershed context, and the commitment to working with all actively involved forest land-use stakeholders in an intricate multi-step process of reform, demonstrates a bold application of the Ecosystem Approach in a politically charged context.

It is rare for such an approach to begin at the level of an enormous province, rather than more locally, and for the drivers at its inception to be poverty and political conflict rather than a concern with land degradation or biodiversity loss. It became clear, however, that the latter issues could not be addressed until the former have been dealt with. In this case, social justice and the Ecosystem Approach are close partners.

Acronyms

APIHI	Association of Indonesian Forest Industries (Asosiasi Pengusaha Hutan Indonesia)
BPKH	Ministry of Forests
BPS	Central Statistics Bureau (Biro Pusat Statistik)
CESS	Centre for Economic and Social Studies
DAP	Papuan Customary Council (Dewan Adat Papua)
DFID	Department for International Development
DTE	<i>Down to Earth</i> Journal, Delhi, India
IUCN-CEM	IUCN Commission on Ecosystem Management
IPKMA	customary community timber harvesting license (<i>Ijin Pemungutan Kayu Masyarakat Adat</i>)
KPH	Forest Management Units (<i>Kesatuan Pengelolaan Hutan</i>)
KPH-HKM	community forestry management unit (<i>Kesatuan Pengelolaan Hutan – Hutan Kemasarakatan</i>)
MRP	Papuan People’s Council (<i>Majlis Rakyat Papua</i>)
NGO	non-governmental organization
NTFP	non-timber forest product
ODI	Overseas Development Institute
PCSSF	Papuan Civil Society Support Foundation
Perdasus	special regional regulation (<i>Peraturan Daerah Khusus</i>)
PERDU	<i>Pengembangan Masyarakat dan Konservasi Sumberdaya Alam</i> /The Institute for Community Development and Natural Resources Conservation in West Papua
PFO	Provincial Forest Office
PNG	Papua New Guinea
PP	Implementing Regulations (<i>Keputusan Pemerintah</i>)
PRA	participatory rural appraisal
PRSP	Poverty Reduction Strategy Paper
RJM	Medium Term Plan (<i>Rencana Jangka Menengah</i>)
OTSUS	Special Autonomy (<i>Otonomi Khusus</i>)
SP	Woodworkers Union (<i>Serikat Pekerja</i>)
TPTI	Indonesian selective cutting system (<i>Tebang Pilih Tanam Indonesia</i>)
YBAW	Foundation for the Customary Development of Walesi (<i>Yayasan Bina Adat Walesi</i>)

Endnotes

1. The *Basic Agrarian Law No. 5* governs the entire land base of Indonesia and provides for private ownership (*hak milik*), as well as six forms of usufruct on land under state control. Regulation 24 (1997) establishes the procedural framework governing these various categories of rights, including customary lands (*tanah adat*), where these rights existed prior to the enactment of the *Basic Agrarian Law No. 5* and state land (*tanah negara*). There has been little political will to give recognition to customary claims, with the exception of Ministerial Decision 5, 1999 of the Agrarian Department, which established procedures for the grant of private communal land title. This information is drawn from Contreras-Hermosilla and Fay (2005).
2. This section is based on the Ministry of Forests web site (www.dephut.or.id) and on Wollenberg et al. (2004).
3. The Forests-Poverty Toolkit uses modified forest-focussed PRA techniques to identify levels of forest dependence among richer and poorer local people and as they affect men and women. The toolkit gathers data on trends in land and forest-use, labour availability changes, etc over the past 30 years or so and helps villagers to identify what they think are the key forest problems in their area, and their potential solutions. The toolkit was originally piloted in Papua by the authors of this case study and their colleagues, and was further developed by Gill Shepherd for the World Bank PROFOR Forestry Programme. The original version can be downloaded from the PROFOR website at www.profor.info/toolkits.html. An updated version can be requested from gillsshepherd@compuserve.com.
4. The Gubernatorial Decree SK 148, 2004. Concessionaires in Papua are required to pay timber royalties to local communities as a form of compensation. These are paid at a set rate per cubic metre extracted.
5. Pemerintah Provinsi Papua Dinas Kehutanan. (2003). *Penyusunan Model Pembangunan Hutan Produksi Alam Provinsi Papua*, Pt. Alas Consultants.

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Acknowledgements

Grateful thanks go to the Papua provincial- and district-level forestry officials we worked with, and to the Ministry of Forests officials we worked with in Jakarta. We would also like to thank the NGOs YBAW and PERDU, the staff of the DFID Multistakeholder Forestry Programme, especially Nonette Royo and the Participatory Mapping team, and Maria Latumahina, now leading the Papuan Civil Society Support Foundation. Finally we are grateful to the chiefs, village leaders and villagers with whom we worked in Jayawijaya, Jayapura and Bintuni Bay.



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