Managing the Commons:
Conservation of Biodiversity

Leticia Merino and Jim Robson
(editors)

Consejo Civil Mexicano para la Silvicultura Sostenible A.C. / The Christensen Fund
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Foreword

Elinor Ostrom

Writing a foreword for this excellent set of referencing tools is a pleasure for me. It brings back pleasant and intense memories of the Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP) held in Oaxaca, Mexico, in August of 2004. These meetings were well attended by scholars from all parts of the world, by policymakers, by volunteers and staff from many countries, by members of Indigenous communities, and by students. The multi-lingual, disciplinary exchanges that occurred within the sessions, and on the fabulous grounds where the meetings were held, were intense, fun, and exciting. We all came away enriched by new findings and motivated to do even better work in the future.

So many edited books by academics are focused primarily on scientific topics of interest primarily to one discipline. These four volumes dramatically differ from most post-conference publications. The volumes are written by scholars who address broad issues of interest across scientific disciplines that are of major interest to citizens and policymakers in all parts of the world. If scientists are to have any impact on the policy world, efforts like this are essential to provide readable syntheses that document important findings and their policy implications.

In this volume on *Conservation of Biodiversity*, Berkes and Turner focus on how community-based conservation and management systems contribute to the preservation and development of useful Indigenous knowledge, how this important source of knowledge is undergoing both productive and unproductive transformations, and how institutions and knowledge co-evolve over time when local communities have considerable autonomy. Alcorn and coauthors address how local communities working with local governments have been empowered to conserve biodiversity in Pando, Bolivia. They use the single case to illustrate a broader set of design issues. In the third article, Ross and Innes provide a framework for examining some of the cooperative management techniques related to the Great Barrier Reef World Heritage Area in Australia. This is an innovative effort to integrate Indigenous rights and the management of an incredible environmental resource. To conclude the volume, Molnar provides a useful synthesis of what is new and what is old in the current debates about the role of communities and conservation.

We all are inundated with too many publications that swamp our inbox (both electronic and paper) and have to make tough choices as to which we can read. These volumes already provide excellent summaries of an immense body of research—and they are written by authorities who know the field well. My recommendation is to put these volumes where you will be sure to read them!

A Word from the Editors

This volume is one of four books that have been put together as a follow-up to the Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP), which took place from August 9–13, 2004, in Oaxaca, southern Mexico.

A brief analysis of the conference showed that this was the best-attended and most geographically diverse IASCP Conference to date, helping to attest to the global importance of IASCP and the relevance of the themes under discussion. The conference brought together a new configuration of knowledge across disciplinary, institutional, regional and generational lines. It produced analyses of direct and contemporary relevance for policy-makers and political establishments, and it introduced new topics for specific debate and discussion at an IASCP event.

With such advances having been made, as the organizers of IASCP2004 we felt it extremely important that a concerted effort be undertaken to follow-up on the conference with a series of short, mid and long-term post-conference projects. This set of four publications is the result of the long-term project of producing a series of cutting edge "referencing tools", based around what were regarded as the most interesting and pertinent conference themes under discussion in Oaxaca. Our hope is that these publications will: encourage the exchange of knowledge among diverse disciplines, regions, areas of study, and resource types; promote policies and institutional designs that strengthen sustainable development and sustainable resource management strategies; and promote a more permanent structure of Common Resource studies in Spanish and across Latin America.

As mentioned, these four "referencing tools" cover what we believe to be some of the most interesting, relevant topics / themes that came out of conference discussions. These are: Payment for Environmental Services; Conservation of Biological Diversity; Markets, Commodity Chains and Certification; and, Indigenous Rights, Economic Development and Identity. We believe that these are critical themes for contemporary policy making; and that CPR theory and research provides an important fresh perspective for the governance of natural resources for this new century.

These themes were chosen based on an analysis of the panel reports from the conference, the thematic summaries given at the closing ceremony, and participant feedback and evaluations. We believe them to be of fundamental importance for many of the problems and challenges related to the management of natural resources, and the work presented here is a glimpse of the richness and relevance of some of the most interesting re-

search currently being carried out within the field of CPR study.

Within each volume, the first section provides introductory information on the theme under discussion, its relevance within CPR study, a run down of the most pertinent issues under that theme discussed at the IASCP2004 conference, and an introduction to the three featured articles. The featured articles are not simple reproductions of the papers that were presented during the conference but have been modified to produce texts that are clear and concise, not overly technical, and accessible enough for them to be used and understood by a wide range of actors. In addition, the articles in each publication are conceptually and thematically inter-linked so as to compliment each other as part of the same referencing tool. The final section of each volume looks at the key emerging issues from each article, and tries to draw out a set of principal conclusions and recommendations that can provide pointers for future research and policy-making.

Acknowledgements

The following texts are very much the result of an important investment in collective action, and we would like to take this opportunity to thank all those who've been responsible for bringing this project to fruition.

Firstly, we would like to say a very special thank you to our fantastic group of thematic experts who were involved in (i) the evaluation and selection of papers earmarked for inclusion in these books and (ii) responsible for the excellent thematic introductions and concluding sections which book-end each one of these publications. These individuals are: David Bray, Daniel Klooster, Augusta Molnar, Peggy Smith, Heidi Wittmer, Susan Kandel and Hernan Rosa (PRISMA), Vincenzo Lauriola, and Victoria Edwards. Without their advice, generous support, punctuality, and expert comments these books would never have come about or certainly wouldn't be as good as they are. We also greatly appreciate Elinor Ostrom for her support of this project and for providing these publications with their Foreword, which introduces each one of these volumes so beautifully.

Next, our thanks go out to all the authors of the featured articles for their continued support for the project, collaborative spirit, and willingness to be flexible when it came to meddling with their manuscripts! We would also like to say thank you to those who very kindly provided us with photos and other images to help spruce up the publications.

On the editorial side of things, we have a number of people to thank who were indispensable when it came to editing and translating texts, and helping with the design and format of these books. Firstly, we very much appreciate the work of Ma. Teresa Ruiz Ramírez, who, as well as translating a number of the articles, was also responsible for coordinating the translation and editing of all texts in Spanish, along with her team of translators: José Ignacio Rodríguez Martínez, Adriana Villagra Peña, Fátima Andreu Marín, and Ayari Pasquier Merino. Teresa and her team worked very hard to ensure that the versions in Spanish were as faithful as possible to their counterparts in English. For the design and formatting of these books, we have to thank Raúl Marco del Pont Lalli, head of publications at the Government of Mexico's Instituto Nacional de Ecologia (INE), who has been responsible for putting these texts together into such attractive volumes.

Last but not least, we must thank our sponsors, the Ford Foundation (Deborah Barry, Program Officer), the Christensen Fund (Enrique Salmon, Program Officer), the Instituto Nacional de Ecologia (INE), and the Consejo Civil para la Silvicultura Sostenible (CCMSS) (Sergio Madrid, Executive Director), for their support—both financial and administrative—which has been absolutely crucial. These organizations supported IASCP2004 from the very beginning and so their involvement has been fundamental to the success of all our conference-related work over the last few years.

Work that stretches back from early 2003 right through to this latest project—the post-conference publications—some three years later.

A final word of thanks is left for Michelle Curtain, IASCP's Executive Director, and Alyne Delaney, Assistant Editor of the Association's quarterly publication, the CPR Digest, for their help in advertising these books and getting them out to as wide an audience as possible.

Enjoy!

Leticia Merino Pérez & Jim Robson

Abbreviations

AMDEPANDO	Asociación de Municipios de Pando (Association of Municipal Governments of Pando)
ANMI	Área Natural Bajo Manejo Integrado (Natural Area Under Integrated Management)
CBD	Convention on Biological Diversity
CCUC	Centro para la Comprensión y el Cambio Cultural (Center for Cultural Understanding and Change)
CEO	Chief Executive Officer
CIDOB	Confederación de Pueblos Indígenas de Bolivia (Confederation of Bolivian Indigenous Peoples)
CIPA	Centro para la Investigación y Preservación del Amazonas (Center for Investigation and Preservation of the Amazon)
CPR	Common-pool Resource
CRC Reef	Co-operative Reef Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FES	Función Económica y Social (Economic and Social Function)
GBRMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
GIS	Geographic Information Systems
GPS	Global Positioning System
IASCP	International Association for the Study of Common Property
INRA	Instituto Nacional de la Reforma Agraria (National Institute of Agrarian Reform)

INRA Law	Ley del Servicio Nacional de la Reforma Agraria (Law of National Service of Agrarian Reform)
MAS	Movimiento al Socialismo (Movement for Socialism)
MEA	Millennium Ecosystem Assessment
NGO	Non-governmental Organization
OTB	Organización Territorial de Base (Grassroots Territorial Organization)
POP	Plan de Ordenamiento Predial (Land Use Plan)
RBI	Rapid Biodiversity Inventories
RIPUI	Recolección de Información sobre Usos Potenciales e Integrados (The Recollection of Information about Potentials and Integrated Uses)
TCO	Tierras Comunitarias de Origen (Lands of Community Origin)
TEK	Traditional Ecological Knowledge
UAFB	Union Amazonica Filadelfia-Bolpebra (Filadelfia-Bolpebra Amazon Union)
UAP	Universidad Amazónica de Pando (Amazonian University of Pando)

Managing the Commons: Conservation of Biodiversity

Thematic Introduction

Victoria M. Edwards OBE

The rapid loss of genetic, species and ecosystem diversity is recognized as one of the world's most pressing environmental problems. Changes in important components of biological diversity have been more rapid in the past 50 years than at any time in human history. The recent findings of the Millennium Ecosystem Assessment (MEA) indicate that these rates will continue, or accelerate, in the future. Based on current trends, an estimated 34,000 plant and 5,200 animal species—including one in eight of the world's bird species—face extinction. However, while the loss of individual species draws much attention, it is the fragmentation, degradation, and outright loss of forests, wetlands, grasslands, coral reefs, and other ecosystems that poses the greatest threat to biological diversity. Around 45% of the world's original forests have disappeared, most in the last 100 years. 20% of known coral reefs have been destroyed and another 20% degraded in the past few decades. Some 50% of coastal mangroves have already been lost, 35% in the last two decades (MEA 2005).

Genetic erosion, the decline and extinction of species and the degradation of ecosystems will reduce the ability of biodiversity to support national development and to sustain future human well-being at a global level. Loss of biodiversity not only reduces the productive value of ecosystems, but subsequently destabilises them, weakening their functional value. Weakened ecosystems are less able to deal with natural disasters, such as floods and droughts, and with human-caused stresses, such as pollution and climate change. In addition, loss of plants and animals eats away at our cultural identities and our spiritual well being.

The Convention on Biological Diversity (CBD), created at the Earth Summit in Rio de Janeiro in 1992, currently has 188 members, reflecting nearly universal participation. The CBD has three main objectives:

- The conservation of biodiversity;
- The sustainable use of its components; and,
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The CBD's primary aim is to encourage and enable all countries to conserve biodiversity and to use its components sustainably in support of national development. At the national level, most countries have developed National Biodiversity Strategies and Action Plans. Nevertheless, biodiversity continues to be lost at an unprecedented rate.

A Strategic Plan, endorsed by Heads of Government at the 2002 World Summit on Sustainable Development in Johannesburg

and by the United Nations General Assembly, commits countries to a significant reduction in the current rate of biodiversity loss at the global, regional, and national level by 2010. The Strategic Plan addresses issues of global leadership and cooperation, national implementation, capacity-building and stakeholder engagement.

A particular challenge in the conservation of biological diversity comes from the fact that the areas with the greatest biological diversity are frequently those with the least economic means to implement conservation programmes, and within such countries, the greatest biodiversity tends to be found in the most remote regions. Conservation policy has long since recognised the social and economic needs of the world's finest natural areas and policy makers are seeking to provide long term income streams and support social cohesion through the active but sustainable use of resources.

Conservation and Common Property Resources

In attempts to improve the conservation of biodiversity, analysis has focused on the role of institutions. Whilst the engagement of local people ("host communities/indigenous populations") has been recognized as critical to the success of conservation efforts, only recently has the inclusion of local institutions in the governance of natural resources been acknowledged.

In most cases, the resources in question comprise a common pool resource (CPR), where several resource 'users' might draw from the resource. CPRs are characterized by being 'non-exclusive' (where it is impossible, or at least very costly, to exclude additional users) and of high 'rivalry' (consumption by one user reduces the quantity or quality available to other users).

Common reliance on the ecosystem does not necessarily result in cooperation between the users in conserving the resource. Indeed, Hardin's 'Tragedy of the Commons' (1968) has become a strong symbol of the problems of common pool resources. However, absent from Hardin's theory is the recognition that individuals can, and indeed do, design and enforce rules which govern their individual and collective choices and can minimise such degradation.

In 'pure' common property situations, the rights to the resource will be shared co-equally and are exclusive to a well-defined set of people (Singh 1994). However, in reality, the ecosystem that supports a community might be used variously in common, without comprising pure common property, but comprise a mixture of rights, including public and/or private property rights, and where 'open access' may be assumed by some users.

IASCP2004, Oaxaca, Mexico

The Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP), which took place in Oaxaca, Mexico, during August 2004, carried a conference stream on the theme of "Conservation of Biodiversity and Commons Management." The papers were as diverse as the authors and their countries of origin and research. Subjects tackled all concepts of conservation management and a myriad of the associated challenges. Nevertheless, there were certain threads running throughout this theme.

First, several papers focused on the necessity to derive income streams from conserved natural resources. Sessions contained papers on marketing conservation indirectly, such as through ecotourism ventures, and also marketing direct products of conserved areas, including how to achieve a premium through the marketing of products, labelling, green markets, etc. This led to discussion of the need for economic valuation as a base for future policy design and, more generally, the role of the market in conservation. Some delegates remained suspicious of market mechanisms, given that market failure has been seen

to generate environmental problems. Others explained environmental problems as a result of the market's dominance over ethical concerns, rather than failure per se. Second, papers analysed the context within which conservation initiatives are established, including migration, demographic and generational differences and the perceptions, interests and conflicts present in different scenarios. Third, there was a collection of papers on conservation strategies and alternative institutional arrangements for conservation management, including co-management and different legal instruments for recognising and strengthening local institutions.

Generally, there was widespread recognition that effective conservation depends not only on bio-physical factors, but must also take into account: (i) social change, such as human development, attitudes and perceptions, and demographics; (ii) the political economy of an area; and (iii) the existing institutional framework, in the form of current laws and legal instruments of change.

An important theoretical proposal, and one that was developed in a number of papers, was the need for more adaptive systems of resource management. These aim to establish clear rules to guide the evolution and development of management systems and achieve stability in the process. This contrasts with the more conventional focus that aims to maintain compliance with certain norms for the administration of parks and other protected areas. Adaptive management, more than searching for technical perfection, would stay within the middle ground, and thereby reconcile technical aspects with diverse social interests, through rules of negotiation and transparent decision-making.

Another dominant theme was the role of communities in conservation. The authors of several works insisted that local communities themselves can carry out conservation work or act as stewards of areas of high biological importance. Others argued that we should abandon the discussion about whether conservation must be centred around local communities or national and regional entities. Indeed, debate at the conference raised the issue of whether realistically we can place the onus of responsibility to maintain species and habitat solely on local communities or solely on government agencies. A number of conference presentations proposed schemes that promote co-responsibility for conservation and a more equitable distribution of associated costs. They proposed this through a variety of practical implementation measures, including 'Fair Trade', labeling schemes, denomination of origin schemes, direct payment for environmental services, and ecotourism. In all such cases, it was deemed that government support was indispensable to success. There seemed a consensus of opinion that, in practice, many different arrangements have been established, with advantages in terms of institutional efficiency, reduced transaction costs, greater protection of Indigenous and local community rights, and, of course, improvement of biodiversity conservation.

A clear message from the papers presented was that new legal frameworks are needed in many cases to adequately incorporate community-based CPR self management schemes. Indeed, in some cases, it appears necessary to carry out a major revision of legal frameworks. For example, in a presentation on Brazil, it was mentioned that the country's laws recognize both private and public rights, but there exists no normative framework for defending the collective rights of Indigenous and other local communities. This clearly puts such groups in a precarious position having to defend, for example, intellectual property rights over traditional knowledge, without any legal back-up or support.

A point of debate that subsequently arose was whether a deficient legal framework was preferable to a regime that essentially lacks any proper judicial framework. In any event, there was consensus that in order to form institutions at a local level, greater sensitivity to local processes was necessary. Many acknowledged that international, multilateral and non-governmental organizations consistently failed to

recognize the importance of local institutions, both formal and informal, and a reorientation of conservation policies was needed that was much more sensitive to local processes. As part of that work, it was generally agreed that schemes should advance the participatory and democratic nature of future conservation initiatives. One reason why schemes might have trouble in focusing on local processes might stem from the fact that conservation problems correspond across many different scales –from plot, zone, ecosystem, region, to nation. Papers recognized the need to address conservation problems at an appropriate scale and acknowledged the difficulties of transferring local problem definition to ecosystem or national policy. Indeed, discussion issued the general warning against extrapolating individual case study experiences to more mainstream generic analysis.

On a related note, it seems that context matters. A point of consensus in discussion following the papers was the importance of historical analysis. Delegates stressed that historical analysis of the origin of a problem or issue, and the development of relations between actors, was important.

Selected Articles

This publication has selected three of the conference papers as indicative of the type and quality of work being carried out in this area of research. The articles, which feature empirical work from Australia, North America and South America, focus on community involvement in conservation management. Whilst each has a different focus, together they provide a compelling argument for the inclusion of a local/Indigenous element in any conservation scheme. Specifically, they:

- Acknowledge the importance of local knowledge and how it might feed into conservation management;
- Provide guidance on how to build local social capital and citizen participation; and
- Establish useful frameworks for developing co-management institutions.

The first article by Fikret Berkes and Nancy Turner addresses the question of how new knowledge relevant to conservation is created, and how existing knowledge develops or evolves. This is of particular relevance in the advocacy of adaptive co-management techniques, where management power and responsibility is shared between governments and local people and in which institutional arrangements and ecological knowledge are tested and revised in an ongoing process of trial and error (Folke *et al.* 2002). The article reviews two conceptualised mechanisms for the development of conservation knowledge—the 'depletion crisis model' (where resource users become aware of the concept of conservation as a consequence of resource limitation) and the 'ecological understanding model' (where resource users' environmental knowledge becomes increasingly sophisticated over time through interaction with the ecosystem in which they live). With examples from marine conservation in the Pacific and hunters in northern Canada, the article presents a compelling case for the further inclusion of local people in conservation schemes: "Evidence suggests that humans living in close proximity to their environments are capable of observing, identifying, monitoring and reacting to variations in resource availability, ecological relationships and biological responses to particular circumstances". The article stresses the fact that "a knowledge base takes a long time to develop and practices based on such knowledge even longer" and that such practices subsequently become grounded in institutions.

The second article, by Janis Alcorn and seven colleagues, provides valuable analysis of a specific project in which the authors were involved in Pando, Bolivia. It reports, in detail, on a single conservation initiative that seeks to build "local social capital and citizen participation into local government and regional planning". The article emphasises the need for strong institutions that enable peo-

ple to work together for common goals. In an area that had been characterised by top-down imposed protected areas in the 1990s, strong local opposition had arisen to initiatives to protect the region's biodiversity. This project, in contrast, recognised local communities as key constituencies in conservation. Through a variety of methods, the conservation team were able to build effective local institutions for long term conservation. The article provides detailed information on the methods of engaging the local community and articulates key principles for designing a framework for biodiversity conservation anywhere in the world.

The third and final article, by Helen Ross and James Innes, provides the results of a co-management research project in the Great Barrier Reef World Heritage Area. The article presents a framework, or 'guide', devised to help parties designing and negotiating a co-management scheme. In true co-management style, the research project itself is managed by a committee of Indigenous partners, the Great Barrier Reef Marine Park Authority and researchers. The Committee takes all of the decisions jointly and interprets the research results jointly. Similar to the Alcorn *et al.* piece, this article provides useful evaluation of the research process and so comprises a helpful resource to those academics and practitioners developing and analysing co-management initiatives. In particular, it identifies the need, in designing paradigms for management, for parties to focus their efforts on areas of potential common interest through the concept of the 'design space' that lies between Indigenous and agency considerations.

Concluding Remarks

There is much to gain from the analysis and evaluation contained in these three articles. Their overall message, that we should listen to local people and respect their laws and customs in our aspirations to devise effective conservation mechanisms, is crucial. Apart from the social and political necessity of incorporating existing common property institutions into new conservation arrangements, there is a practical conservation imperative. First, communal management of resources provides continuity over time, which purely public or private approaches struggle to achieve. Second, local institutions, both formal and informal, are valuable means of passing on knowledge and understanding of an area, its limitations, its capabilities and its conservation demands. Finally, in the race to reverse the destruction of biodiversity, we need to immediately create more flexible institutions that will enable adaptive management techniques to thrive, and which will respond quickly to indications of environmental stress. Time is of the essence.

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Knowledge, Learning and the Resilience of Social-Ecological Systems

Fikret Berkes and
Nancy Turner

Introduction

There has been a resurgence of interest in community-based conservation and resource management systems, using customary practices and local knowledge, in many parts of the world, including Oceanea (Johannes 1998), New Zealand (Taiepa *et al*. 1997), Indonesia (Alcorn *et al*. 2003), Alaska (Hunn *et al*. 2003) and elsewhere. Although considerable attention has focused on the role of local and traditional knowledge in conservation, we know little about how conservation knowledge develops among Indigenous groups and other rural communities. The question on the creation and development of knowledge is important in regard to the nature of community-based conservation and resource management. A debate has developed between two schools of thought on the question of whether local management is, in fact, conservation.

On the one hand, we have available detailed descriptions of a great many Indigenous knowledge and conservation systems (Berkes 1999; Turner *et al*. 2003; Blackburn and Anderson 1993; Boyd 1999; Deur and Turner, in press). There is an increasingly comprehensive appreciation of traditional ecological knowledge and ethnoecology, as systems of local and Indigenous conservation (Berkes *et al*. 2000; Turner *et al*. 2000). Also available is a large literature base analyzing the conditions under which the 'tragedy of the commons' may be avoided, and local common property institutions may develop for resource management (Ostrom 1990; Ostrom *et al*. 1999).

On the other hand, many authors have questioned whether these systems could be considered to represent 'conservation' and whether users of customary resources can be entrusted with their management. In particular, some see conservation as an incidental by-product of what might be optimal foraging strategies (Alvard 1993; Aswani 1998), whilst others argue that the evidence on the effectiveness of Indigenous conservation is weak if conservation is defined in terms of the two criteria of effect and design (Smith and Wishnie 2000).

Using these criteria of effect and design, Johannes (2002) observed that some groups have conservation practices and some do not, but generalizations are difficult to make and space and time considerations become important. A group that may undertake conservation practice for a particular area or resource may not for another resource or area. A society that conserved resources at one stage in their history may not have done so at another stage. It is significant that much of the evidence cited by critics of Indigenous conservation is archaeological or ethnohistoric

in nature (Krech 1999; Smith and Wishnie 2000). This suggests that the evolutionary aspects of conservation knowledge should be examined.

Also relevant to the debate are discussions over the necessity of developing place-based, participatory models to approach sustainability. For example, Folke *et al.* (2002) suggest that many of our environmental problems are, in fact, complex systems problems that may require alternative approaches, such as adaptive management and resilience thinking. They see co-management (or the sharing of management power and responsibility between governments and local people) as necessary to produce flexible, multi-level governance systems in which institutional arrangements and ecological knowledge are tested and revised in an ongoing process of trial and error. Folke *et al.* (2002) call this arrangement adaptive co-management, an important policy measure for building resilience (shock-absorbing capability) towards sustainability in a world of uncertainty and transformations.

All of these considerations indicate that it is important to understand the nature of traditional knowledge as the basis of conservation in Indigenous societies and other resource-dependent groups. This article addresses the question of how new knowledge relevant to conservation is created, and how existing knowledge develops or evolves.

We start by reviewing, in the next section, two broadly conceptualized mechanisms for the development of conservation knowledge, what may be called the *depletion crisis* model and the *ecological understanding* model. The following section turns to the notion of adaptive co-management as a way to integrate these two models of knowledge development. The final section explores the interrelationships among knowledge, self-organization, disturbance and diversity for building adaptive capacity and resilience.

Two Models for the Evolution of Conservation Knowledge

How does conservation and management knowledge develop? One position represented in the literature is that the development of conservation depends, first and foremost, on learning that resources are depletable. Various authors have pointed out that the concept and practice of conservation can arise only from an experience of resource limitation (Hill 1996). Such learning typically follows a resource crisis (Johannes 2002). We term this mechanism the *depletion crisis* model. The second position puts relatively more weight on the elaboration of environmental knowledge by a group, leading to increasingly more sophisticated understanding of the ecosystem in which they dwell. We term this mechanism the *ecological understanding* model (Turner and Berkes, in press).

It is said that people living on islands discover their environmental limits more easily than do continental peoples. Johannes (2002) argues that this is only because they exceeded those limits more easily. Perhaps the best way to discover the limits, such as the sustainable yield of a resource, is by exceeding them. In fact, one of the central tenets of adaptive management is to structure management probes for learning, that is, to create perturbations that can give back signals (Carpenter and Gunderson 2001).

Johannes points out that almost all the basic marine conservation measures devised in the West in the 1900s (e.g., closed fishing areas, closed seasons, allowing escapement, ban on harvesting immature individuals…) were in use in the tropical Pacific centuries ago (Johannes 1978; Johannes 2002). "For the Pacific islanders to have devised and employed deliberate conservation measures, first they had to learn that their natural resources were limited. They could have only done so by depleting them" (Johannes 2002: 3).

The actual depletion events or crises are not easy to record. It is possible to deplete various shallow water marine species in specific areas, but unlike some terrestrial resources, it is very difficult, if not impossible, to exterminate them. Marine fish and invertebrates produce

many larvae, and currents distribute them over thousands of square kilometers. Some Pacific island societies did not learn until historic times that their resources were depletable. Some groups lived in areas where marine resources always exceeded their ability to harvest them. Johannes (2002) gives the example of Torres Strait islanders, a population of, until recently, less than 5,000 people surrounded by 30,000 sq km of shallow, productive marine waters. Their marine resources were effectively "unlimited", and the islanders show no evidence of having possessed a traditional marine conservation ethic (Johannes and MacFarlane 1991). Similarly, Hill's (1996) study of the Ache people of Paraguay shows that under conditions of resource abundance or a high degree of hunter mobility that allows resource regeneration, a group may never develop the concept of conservation.

The Case of the Caribou

There are two recorded resource depletion events from the Hudson Bay area of the Canadian north, and they provide interesting lessons regarding the development of conservation and management knowledge. One concerns the depletion of caribou in the Quebec-Ungava peninsula, and the other concerns the local extinction of caribou in the Belcher Islands.

According to narratives by Chisasibi Cree elders, a disaster occurred in the early 1900s at Limestone Falls, near the centre of the Quebec-Ungava peninsula (Berkes 1999, Chapter 6). Equipped with repeating rifles that had just become available, hunters abandoned their hunting restraints and conventional ethics of respect for the animals, and slaughtered large numbers of caribou at the river crossing point. The caribou had already been on the decline along the Hudson Bay coast. Following the event at Limestone Falls, the herd disappeared altogether from the lands hunted by the Cree, and did not re-appear until the 1980s. The Cree believe that all changes occur in cycles, and the elders at that time had predicted that the caribou would return one day.

In the winter of 1982/83, large numbers of caribou appeared for the first time in the lands of the Chisasibi Cree, validating the elders' predictions. The first large caribou hunt of the century took place the following winter, but the result (according to Chisasibi elders) was disastrous. Large numbers were taken, not necessarily a bad thing, but many hunters were shooting wildly and without restraint, killing more than they could carry. According to the Cree worldview, hunters and animals have a reciprocal relationship based on respect, and Chisasibi elders were worried that hunters' behaviour signaled a lack of respect for the caribou.

Chippewan indian skinning caribou, 1882 . ArchiviaNet

The following winter, there were very few caribou and many hunters were left empty-handed. Meetings were called and two of the most respected elders stepped forward and told the story of the disastrous hunt in Limestone Falls, refreshing oral history. The caribou had disappeared for generations because the hunters had shown no respect. Now that the caribou were back, as their grandfathers had predicted, the hunters had better take good care of them if the caribou were to stay.

By violating traditional ethics, they were about to lose the caribou once again.

The elders' words had a profound effect on the younger hunters, and the following winter's hunt was a very different affair. Monitored by the senior hunters, the hunt was carried out in a controlled and responsible way, in accordance with traditional standards. There was little waste and no wild shooting; the harvest was carried away efficiently and wastes were cleaned up promptly. In the subsequent years, caribou kept coming. Hunters' observations of tracks indicated that by 1990, the caribou had reoccupied most of its former range along the Hudson and James Bays (Berkes 1999).

A number of interesting points come out of this story. Note that the convincing point is oral history and Cree ethics, not government regulations and penalties. Government managers, much to their credit, stayed out of trying to regulate the hunt and left it to the Cree to deal with the situation under their co-management agreement (Drolet *et al*. 1987). Elders play the key role in the story. They are the holders of the knowledge and the keepers of the ethics, and span the generations to provide feedback. They are not creating new knowledge. Rather, they are adapting knowledge to the current circumstance of hunting with overly efficient (and potentially destructive) technology, and providing culturally relevant meaning for the Cree to continue to live with their resources.

The second story also concerns caribou and the setting is Belcher Islands, eastern Hudson Bay, home of the Inuit of Sanikiluaq. The Belcher Island Inuit are unique as the only Canadian Inuit group to wear bird skin parkas. The traditional material for parkas in Belcher Islands, as elsewhere in the Arctic, used to be caribou skin. Caribou were plentiful in the area until about 1880 when freezing rain glazed the islands with ice, causing the caribou to starve (Nakashima 1991:108). There is some controversy over the date but not over the cause of caribou disappearance; caribou dieoffs following freezing rain events have been known from various areas in the Arctic.

The Belcher Island Inuit started making inner and outer coats of eider skin and pants of seal skin. They developed an elaborate knowledge of the use of the skin and feathers of the eider duck (*Somateria molissima*), a large-sized species that does not migrate south but actually over-winters in Hudson Bay. Eiders provided the material to produce light, warm and waterproof (but not very durable) parkas that replaced caribou skin (Nakashima 1991). The fact that caribou were scarce along the Hudson Bay coast for much of a century meant that caribou did not recolonize Belcher Islands, nor were caribou skins available in large numbers by trade from nearby Inuit or Cree groups.

The obvious question to ask is whether the Belcher Island Inuit knew how to make eider skin parkas before the caribou crisis, or whether it was the crisis itself that forced the creation of new knowledge to make this unusual kind of winter clothing. Nakashima (1991) is silent on this question, but he did (pers. comm.) offer that the knowledge of bird skin implements, such as bags made of loon skin, is common across the Arctic. Even though there is no evidence that the Belcher Island Inuit ever used eider skin parkas before the caribou crisis, it is likely that considerable knowledge of the eiders and other birds did exist among them. When the crisis struck, they likely built upon their existing knowledge, showing ingenious adaptation to turn eider duck parka making into a very fine art that persisted well into the middle of the twentieth century (Nakashima 1991).

Returning to the question of how new knowledge relevant to management is created, and how existing knowledge develops or evolves, the first case provides evidence that a resource crisis is important. The crisis becomes a trigger point regarding the redesign of the conservation system. For the Cree of Chisasibi, the disappearance of the caribou in the 1910s was linked to the last big, wasteful hunt. The lesson of the transgression, once

learned, survived for generations in Cree oral history, and it was revived precisely at the right time to redesign the hunting system when the caribou returned in the 1980s. The lesson delivered by the elders (don't kill too many; don't waste) followed the validation of the elders' prediction of the return of the caribou, and it was too powerful to take lightly, even by the most skeptical young hunter.

The second case has little to do with conservation but is relevant to the question of knowledge creation. As far as we know, the Inuit did not make bird skin parkas before the caribou crisis, but they certainly knew something about bird skin processing and use. The loss of the caribou resource and thus skins for clothing must have been a shock. The shock must have triggered an intense period of experimenting and rapid learning, and the Inuit probably did not have more than two or three years before the available caribou skins ran out. Emerging out of that learning process was an elaborate system of eider duck skin parka making, unparalleled in the circumpolar Arctic, refined by building layers upon layers of knowledge.

The Ecological Understanding Model

Learning conservation through the hard lessons of crises arising from resource depletion is not, however, the only way that humans have developed conservation practices with regards resource use and management. There are compelling reasons to think that much of conservation-oriented knowledge accrues through ecological understanding over time, and there are many possible mechanisms for such understanding to develop.

Based mainly (but not exclusively) on the Indigenous peoples of the North American Pacific Northwest, we have considered the development of conservation techniques and prescriptions based on the various components of Traditional Ecological Knowledge (TEK) systems (see Turner and Berkes, in press). Ecological Understanding is the term we use to refer to a suite of attributes embodied within traditional ecological knowledge systems, including:

- Incremental learning of individuals and groups and elaboration of environmental knowledge as a result of detailed observation and experience of variations in nature and leading to a sophisticated understanding of the ecosystem in which they dwell;
- Development of concomitant belief systems that help avert serious resource depletion and promote conserving approaches;
- Creating and perpetuating ways of encoding, communicating and disseminating both the practical aspects of such incremental learning and adaptive response and the ideologies and belief systems associated with it; and
- Development of institutions that consolidate environmental knowledge and practice, or development of rules by which members of a society deal with their environment and resources.

Evidence suggests that humans living in close proximity to their environments are capable of observing, identifying, monitoring and reacting to variations in resource availability, ecological relationships and biological responses to particular circumstances. Such knowledge can be acquired in the same ways as other important knowledge for survival, such as that related to food and medicine. Plant resource management and conservation practices that could have developed incrementally include burning and clearing, pruning, coppicing, tilling, replanting and transplanting, partial harvesting of individual trees and shrubs, selective harvesting for size and life cycle stage, and rotational harvesting through annual or multi-year cycles, as well as genetic selection for maximum productivity or other desirable traits (Anderson 2005; Deur and Turner, in press).

A conserving philosophy or belief system includes such elements as respect, acknowledged kinship with all other lifeforms, and

prohibitions against waste. It may well be that resource depletion—or a series of resource depletions—somewhere at some time in the past did prompt the development of such belief systems in Indigenous societies of northwestern North America. However, on a broad scale, and over a long time frame, a belief system, in turn, helps prevent overharvesting or wanton destruction of other lifeforms, whether conservation per se is the intended result or not. Such conserving worldviews are embodied and communicated through many traditional stories, ceremonies and social institutions of Indigenous peoples, and hence, through observation, practice, teachings and institutional mechanisms, "soft lessons" of conservation can be gained.

Adaptive Co-management: Integrating the Two Models

The creation of conservation knowledge does not necessarily depend on crises and depletions, but such catastrophic learning probably does have a role to play. It may help speed up knowledge creation and the adaptation of existing knowledge, as in the eider parka case, and may be important in how well lessons may be learned and remembered, as in the Cree caribou case. The two models of knowledge creation probably work together, and hence it may be useful to think of a way in which these two mechanisms (the depletion crisis model and the ecological understanding model) may be integrated.

The concept of adaptive co-management may be useful for such an integration. Adaptive co-management may be defined as a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of learning-by-doing (Folke *et al.* 2002: 20). Adaptive co-management combines the dynamic learning characteristic of adaptive management with the linkage characteristic of cooperative management. The concept is similar to what Norgaard (1994) has called the co-evolution of people with their environment. The key point has to do with feedback learning: there has to be some kind of perturbation to produce a change from which people can learn (Carpenter and Gunderson 2001).

Conservation does not come "naturally"; it has to be learned. As Dasmann (1988), among others, has pointed out, a distinction must be made between invaders and natives. When humans invade a new and unfamiliar ecosystem, their initial impact may be huge, as with ancient Polynesians. But this initial relationship may change as the people develop a knowledge base, learn from their mistakes, and come to terms with the limits of their new environment. Long-settled natives tend to co-evolve with their environment, often achieving a certain level of symbiosis. This does not happen over short periods, nor is it a permanent state. Each major environmental or social perturbation alters the balance, and a new relationship with the environment develops based on learning-by-doing, or adaptive management. The necessary base of knowledge may take a long time to develop, and practices based on such knowledge even longer. Practices will be grounded in institutions, as in land and marine tenure systems (Johannes 1978).

Indigenous resource management systems are not mere traditions but adaptive responses that have evolved over time. These adaptations may involve the evolution of similar systems in diverse areas and cultures, as in the case of shifting agriculture found in virtually all tropical forest areas of the world. Or they may involve the elaboration of one basic model of management into a diversity of variations, as one finds, for example, in the reef and lagoon tenure systems of Oceania (Johannes 1978). They may involve the combination of traditional approaches and contemporary commercial pressures, into a new synthesis (Beaucage *et al.* 1997; Johannes 1998).

They may involve the major transformation of the landscape from one production system to another, as in the evolution of irrigated rice systems in Southeast Asia. Over

some 400 years, irrigated rice culture developed from less intensive to more intensive modes of agriculture; productivity increased through the building of dikes, terraces and canals; and this technology was developed in a two-way feedback relationship between the new production system and social institutions (Geertz 1963).

Knowledge, Self-organization, Disturbance and Diversity

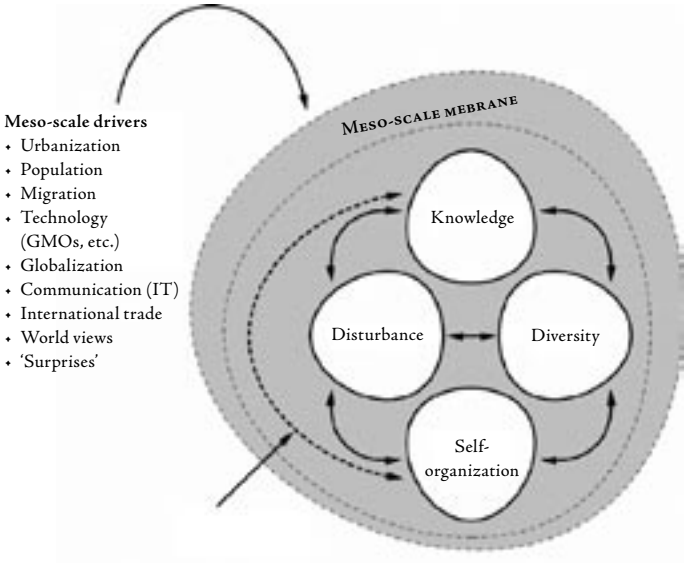
Many resource conservation problems require approaches suitable for dealing with complex systems, such as adaptive management and resilience thinking. Folke *et al*. (2002) argue for flexible, multi-level governance systems in which institutional arrangements and ecological knowledge are tested and revised in an ongoing process of trial-and-error. Such governance systems and the process of learning and testing knowledge iteratively are seen as important for building resilience towards sustainability in a world of uncertainty and transformations.

Resilience is a measure of the amount of change the system can undergo and still retain the same controls on function and structure, that is, a system's shock-absorbing capability. This capability, in turn, depends on the degree to which the system is capable of self-organization, and the ability to build and increase the capacity for learning and adapting.

The process of adaptive co-management involves iterative knowledge development, contributing to self-organization and learning. Thus, it has the potential to increase the shock-absorbing capability of common property systems (and other integrated social-ecological systems), making them more robust to change. The capacity to elaborate ecosystem knowledge and to learn from management mistakes provides a buffer that protects the system from the failure of subsequent management actions based on incomplete knowledge and understanding.

To analyze the crucial role of knowledge development, one may consider the interrelationships of disturbance, diversity, self-organization and knowledge (Figure 1). Starting with one of the key considerations of adaptive management, we assume that disturbance and change are ever-present, both in the ecologi-

Figure 1: The interplay between disturbance and diversity, and their relationship to knowledge systems and self-organization



Source: Folke, Colding and Berkes (2003).

cal system and in the social system (Holling 2001; Gunderson and Holling 2002). Periods of change caused by disturbance or crisis events are followed by periods of renewal and reorganization.

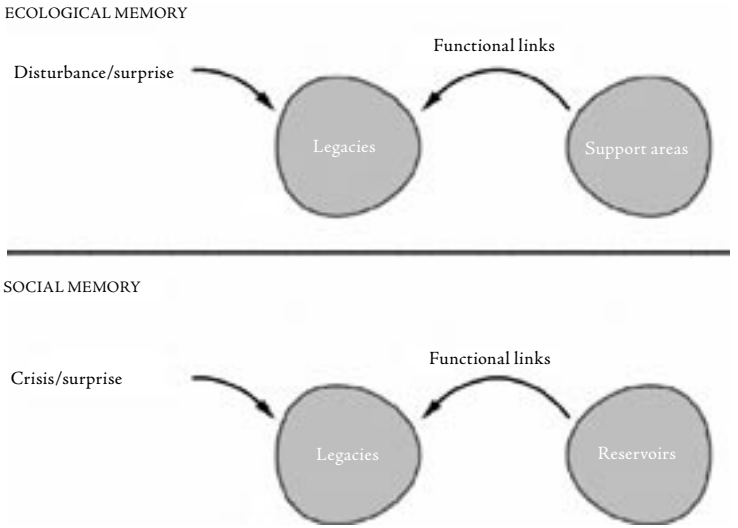
Disturbance is what initiates cycles of adaptive renewal. This renewal is based on a diversity of information in the system, both social and ecological, referred to as memory (Figure 2). Renewal is also in part based on innovation and novelty, made possible by taking advantage of the opportunities created by change (Holling 2001; Gunderson and Holling 2002). Thus, the interplay between disturbance, and the capacity to respond to and shape change, is what makes renewal and reorganization possible in the adaptive renewal cycle. The concept of adaptive renewal cycle implies that people learn to adapt to natural disturbances, developing a knowledge base to deal with change.

Conclusions

Learning and adapting based on an accumulation of ecological knowledge, sometimes following a perturbation such as a resource crisis, and the ability to reorganize or self-organize seem to be the major ingredients of developing conservation-oriented practices. These are exactly the same ingredients that confer resilience for the long-term survival of common property systems and other social-ecological systems. Such a view of the development of conservation is consistent with historical evidence, and provides insights on the question of how new knowledge relevant to conservation is created, and how existing knowledge develops or evolves.

Creating and perpetuating ways of encoding, communicating and disseminating both the practical aspects of such incremental learning and adaptive responses and the ideologies and belief systems associated with them is as important today as in the past. In many cases, the opportunities for children to spend time with and learn from parents, grandparents and others knowledgeable about conservation practices and beliefs, have been diminished, as have their opportunities for direct interaction with habitats and resources. This is a serious issue that needs to be addressed if traditional knowledge is not to be lost. This kind of knowledge cannot mastered from books.

Figure 2. Components of memory for the reorganization phase of the adaptive renewal cycle



Source: Folke, Colding and Berkes (2003).

James Bay Cree people of Wemindji, Quebec, Canada, on a summer camping trip. Photo: Courtesy of Fikret Berkes.

The ability or capacity to learn from small and incremental lessons, and from the experiences of others, potentially enables people to develop sustainable practices and ecological understandings without always having to respond to and learn from crisis situations. Not only an event itself, but any inferences, extrapolations or interpretations people draw from it, can be enfolded into an enriched, elaborated system of knowledge and practice. Over time, even within one lifetime, experiences of others blend with personal knowledge and observations, compounding and accumulating to bring enhanced knowledge and wisdom (Turner and Berkes, in press).

One key insight regarding the debate on Indigenous conservation is that a distinction should be made between "invaders" and "natives". When humans invade a new and unfamiliar ecosystem, their initial impact on the environment may be substantial. But this initial relationship may change as the people develop a knowledge base, learn from their mistakes, and come to terms with the limits of their new environment. This may be the case in New Zealand (Taiepa *et a*l. 1997; Moller *et al*. 2004) and part of Oceania (Johannes 2002). It may explain the observed sequence of knowledge development in groups that are new to an area, as in the case of the Brazilian Amazon (Muchagata and Brown 2000). Such considerations supplement common property analysis by enriching the historical and political context of the commons case.

A similar model of knowledge development may also apply to groups undergoing a social or technological transformation, as in the 1910s caribou depletion case when the repeating rifle came into use. The dynamics of such cases may be thought of as adaptive co-management, or the co-evolution of social groups with their environment, as in Geertz' (1963) rice farmers. Such transformations are not likely to happen over short periods, and feedback learning often requires learning from mistakes. A knowledge base takes a long time to develop, and practices based on such knowledge even longer. Practices, in turn, come to be grounded in institutions, and self-interest is brought into check by a variety of social norms and institutions.

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Designing Alternative Frameworks for Conserving Biodiversity with Communities and Local Governments: A Case from Pando, Bolivia

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Introduction

Biodiversity is claimed as a local, regional, national, and international common property. For the past decade, the roles of international, national and local institutions in biodiversity conservation have been evaluated and hotly debated from different perspectives. Many conservationists promote rigid protection under centralized state agencies and institutions, citing the risks of relying on complicated communities with many different interests. Yet state agencies lack the resources, the cross-scale institutional links, and the transparency needed for implementing policies and enforcing regulations. And in most countries these same agencies lack the legitimacy to negotiate with powerful actors in broader society. As a result, despite the continuing global expansion of protected areas, paper parks are the rule (cf. Parks Watch reports).

Acknowledging the importance of the on-the-ground-actors (generally termed "local people") whose day-to-day decisions affect conservation outcomes, conservationists added community-based conservation projects to their portfolio (Alcorn 2005). These, however, are generally local project add-ons with short lifes, and often have minimal impact on reversing the continuing loss of biodiversity driven by forces beyond the control of individual communities. Attention to national policies and programs promoting broader institutional reforms, with economic and tenurial benefits for communities who manage wildlife, enjoyed success in Africa where large animals offer special opportunities for financial benefits. Around the world, communities have demanded the rights to manage and protect their own forests and biodiversity reserves. However, outside of Africa (cf. Hume and Murphree 2001), few conservation programs have taken advantage of institutional and governance reforms as a means to support conservation. New approaches are needed if the goals under global commitments to the Convention on Biological Diversity (CBD) are to be met.

Herein, we report on an initiative that offers one possible methodological approach and institutional framework to address the difficult dilemma of constructing functional cross-scale linkages for conserving globally important resources without simply shifting the costs of "prohibition" to local residents who depend on the resources for their daily living and identities. This approach builds local social capital and citizen participation into local government and regional planning. While this case responds to the specific policies of Bolivia, it offers principles that can be followed to take advantage of the specific policy situations in other countries.

Background

Bolivia is among the world's top ten mega-diversity countries. Bolivia is also a world leader in terms of decentralization and environmental policy (Steinberg 2001). Bolivia offers an intriguing legal framework for land tenure with common property. The land tenure framework lays an attractive foundation for ground-up conservation and development initiatives that respect local peoples' decision-making rights. It also offers the territorial basis for a vision of active citizen participation both in local government and in natural resources management at landscape scales. The RIPUI-ANMI initiative in Pando takes advantage of this situation, and provides a replicable, flexible model for conservation in dynamic corridors that are lightly populated.

Pando is Bolivia's northernmost department,[1] (see map) covering 63,827 square kilometers[2]—an area larger than Costa Rica. Pando is home to some 53,000[3] people, with a population density of less than one person per square kilometer outside of the small capital city of Cobija. Communities are scattered among ranches and brazilnut "barracas".[4] Pando is 90 percent forested, with few roads and many rivers.

The case study area is the westernmost side of the Department of Pando,[5] in the two municipios of Filadelfia and Bolpebra –where Bolivia borders Brazil and Peru. Filadelfia and Bolpebra are governed by an elected county executive and council. The Department of Pando is governed by an appointed Prefect and Council.[6] Under the decentralization law, both municipio and department governments ("prefecturas") receive funding from national government which they program into their own budgets.

Map of Bolivia and Pando. Source: http://www.mapsofworld.com/bolivia/bolivia-political-map.html.

The corridor created by these two municipios extends from a single Indigenous territory (the Yaminahua-Machineri TCO) on the Acre River bordering Brazil, southward through the Manuripi Wildlife Reserve which is occupied by communities and individual property owners. The corridor borders the Madidi National Park in the department of La Paz to the south, and Peru to the west.

[1] A department is similar to a 'state' unit in the US but without the level of independence of a state.
[2] Data from http://pasture.ecn.purdue.edu/~agenhtml/agenmc/bolivia/bolivia/bosize.html. March 2004.
[3] Informe de Desarrollo Humano en el Norte Amazónico Boliviano. United Nations Development Program. 2003. p 50. Although it is difficult to accurately determine a precise number, many claim that Pando as much as doubles its population during the *zafra* period of brazilnut harvest. During this time most *barracas* receive migrant families on their land. The migrant families commonly do not receive food from the barraqueros, relying almost entirely on hunting for their sustenance. Most *zafreros* arrive with their families, some clothes, and a shotgun to hunt for food.
[4] Historically *barracas* were estates managed for cattle production, rubber tapping and brazilnut collection by seasonal laborers in debt peonage and by enslaved communities (*comunidades cautivas*) living on *barraca* lands. In the 1980s, the *barraca* system of labor exploitation largely ended, although some comunidades cautivas remain and debt peonage remains common.
[5] A municipio is a local government unit, similar to a county unit in the US.
[6] In early 2005, the central government, in response to popular pressure, agreed to hold popular elections for the Prefect (governor) in August 2005.

The area is a high biodiversity zone, habitat to 14 species of primates as well as a wide diversity of other animals, fish, birds, insects, and plants of the lowland Amazon forest.

Typical Pandinos are notably proud to be Amazonians, and proud that so much of Pando remains forested. Looking at a satellite image of the region, Pando stands out as a solid green block among vast patchworks of deforestation in Madre de Díos to the west (Peru), Acre to the north (Brazil), and Rondônia to the east (Brazil). Pandinos admire Brazil as their wealthy, modern neighbor, although many also appreciate the negative side of the vast deforestation in Acre. Some believe that in order to achieve the better life that Brazilians seem to enjoy—with access to health care, markets for their products and electricity—Pandinos must cut down their forest and raise cattle. Rural residents do not count on development projects to bring benefits, and are suspicious that non-governmental organizations (NGOs) and government projects use rural people as a basis for accessing funds that in the end do not benefit communities.

The challenge for conservation initiatives is to build on existing local interest in planned development with conservation, in ways that enable Pandinos to maintain and improve their quality of life without destroying their forests and rivers. One key need, in this context, is strong institutions that enable people to work together for common goals. Our team has worked on the assumption that certain conditions are essential for realizing sustainable conservation in Pando: (1) awareness and pride in the quality of life provided by living in the midst of rich biodiversity, (2) strong social capital organized at various levels with cross-scale links, (3) opportunities for development that support conservation, and (4) a regional common property management institutional framework whereby people can act together for the common good.

The Policy Framework in Bolivia

Bolivia's Law of Popular Participation—creating institutions for local democracy

In 1994, Bolivia passed an influential and groundbreaking new law called the Law of Popular Participation. This law, together with the Law of Local Government (Ley de Municipios), gave rural communities more say in local government.

As is common in many Latin American countries, Bolivian Indigenous and campesino communities have their own community organizations that play important roles in the community decision-making processes and represent the communities in front of larger regional and national level organizations. The community members directly elect their leaders. In Bolivia, these rural community organizations are commonly referred to as grassroots territorial organizations, or OTBs (Organización territorial de base). National level campesino and Indigenous organizations base much of their strength and legitimacy on the fact that they represent communities, and are elected by OTBs. The campesino federations are some of the strongest representative organizations in Bolivia. They have a national level organization, department level organizations elected by community-members, and 'sub-central' grassroots organizations at a county (municipio) level. Indigenous organizations likewise have federations for representing their voices at various political levels.

In many rural communities in Latin America, the local governments respond primarily to their wealthier constituents. The Bolivian Law of Popular Participation flipped this power structure on its head. It essentially declared the OTBs and other grassroots community organizations as legitimate representatives of the population, and obligated the local government to respond to them. The Law states specifically that the OTBs have the right to propose, request, control, and supervise public services according to the needs of the communities in areas of education, health, sports, irrigation, and other types of

development.[7] It furthermore created vigilance committees, elected by the communities, to oversee the local government, with the ability to eventually, if necessary, freeze or cut off local government's funding. The Law of Popular Participation is forcing rural local governments to respond to the needs of all of their constituents, starting with Indigenous and campesino communities.

The Environmental Protection Law likewise requires full public participation in decision-making. There is no Biodiversity or Protected Areas Law; to date all drafts have come into conflict with the Popular Participation and Environmental Protection laws, and as such have failed to move forward.

Tenure and Common Property in Pando

Under Bolivian law, Pando enjoys a strong legal basis for private community-based land titles and a good basis for building a regional sense of common property.

Land titling in Bolivia is the responsibility of the National Institute of Agrarian Reform (INRA), which functions according to the Law of National Service of Agrarian Reform, commonly referred to as the INRA Law (Ley INRA), passed in October 1996, and its Regulations, decreed May 5th, 2000. According to the INRA Law, INRA has a period of ten years to complete the land titling across Bolivia (having started in October 1996).

The INRA Law organizes rural properties into several categories,[8] one of which is community property, which is inalienable, indivisible, and collectively owned. Community property is governed by an assembly of heads of household. This Assembly creates and enforces statutes and regulations. It can vote to expel a member and redistribute his/her land. The INRA Law specifically states that titles will be first awarded to those that live on the land, with preference given first to Indigenous peoples' communities and campesino communities.

For individual landowners in Pando, and for all landowners in most of the rest of the country, the standard is fifty hectares per family. Following a campesino march from Pando to the capital La Paz in 2000, demanding more land per Pandino family to support brazilnut production,[9] an amendment to the INRA Regulations was passed by Supreme Decree stating that in the Department of Pando the minimum titled area per family in Indigenous or campesino communities was to be five-hundred hectares.[10]

The INRA Law stipulates that landowners (community or individual) must show the use of their land (economic and social function or Función Economica y Social (FES)) in order to gain, and maintain, rights to their land. The INRA Law further stipulates that, "the economic and social function is the sustainable use of the land in cattle grazing, forestry, and other activities of productive character, such as conservation and protection of biodiversity, research, and ecotourism."[11] Use is understood as residency, traditional use or exploitation of the land and natural resources, destined for families' well-being or development.[12] For individual landowners, the FES scoring is used by INRA to justify any lands over fifty hectares to be titled. For example, for cattle ranchers, the number of cattle is used as the determining factor. In addition, the law requires that POPs (ten year land use plans or Planes de Ordenamiento Prediales) must be drawn up

[7] Article 7. Law of Popular Participation. Law 1551, passed April 20, 1994.

[8] Ley INRA, Título III, Capítulo I. Law 1715, October 18, 1996.

[9] Brazil nut trees occur at a low density of from one to seven trees per hectare; hence large extensions of land are necessary to make a living from brazilnut collection.

[10] Supreme Decree No. 25848 of July 18, 2000.

[11] INRA Law. Article 2.II.

[12] INRA Regulations. Chapter III, Section I, Article 237 and 238. Supreme Decree No. 25763, May 5, 2000.

and approved by the Secretary of Agriculture in order to maintain a title.

Although the INRA Law is clear that the FES refers to many more uses than just those that require clearing of the land, a common perception in practice is that in order to comply with the FES, landowners must clear the forest, and either plant crops or graze cattle.[13] Until recently, zoning for conservation and/or protection of biodiversity was disregarded by both landowners and INRA as fulfilling FES requirements.

An Opportunity to Nurture New Grassroots-based Institutions for Conservation

During the 1990s, several rapid biodiversity inventories were carried out in Pando, including the areas around the Tahuamanu river in Bolpebra and Filadelfia municipios (The Field Museum 1999). The rapid inventories revealed the high levels of biodiversity in the region. When the Field Museum looked into the possibility of working with various government and nongovernment actors to create protected areas to protect the biodiversity of the region, strong local opposition surfaced. The rural populace in the region has had previous negative experiences with top-down imposed protected areas, and would not accept another protected area declared by the central government in La Paz. The Field Museum and Conservation International unsuccessfully attempted to negotiate conservation concessions with large concessionaires who hold uncertain rights to large areas in Pando, overlain over communities.

By 2002, the only national protected area in western Pando–Manuripi Reserve (created in 1973 as one of Bolivia's first protected areas)—had been formally reduced in size and status to recognize its transformation into ranches and agricultural lands in the thirty years since its creation. Over half of the current area of Manuripi is under communities and barraca estates.

An initial assessment in April 2003, by Alcorn and Zarzycki, concluded that in order to declare any kind of protected area, it was essential to: collaborate with communities; build a strong, 'from the ground-up' grassroots conservation plan that included local actors' interests and respected their autonomy and decision-making rights; and nurture the establishment of a locally-controlled institution for managing the area and enforcing regulations.

Communities were viewed as a key constituency. The major voting block in western Pando lies solidly within the communities—hence, the choice for conservation lies in their hands. They elect the municipio governments which, under the Law of Municipios and Law of Decentralization, have broad powers to control landuse. The municipio governments of Pando all belong to the Asociacion de Municipios de Pando (AMDEPANDO), which provides assistance and training; AMDEPANDO in turn belongs to the National Federation of Municipio Governments.

Although Pando is largely cut off from the rest of the country, national level politics have an important impact on local rural power dynamics. The majority of campesinos belong to a campesino federation. The two national level campesino federations are present in Pando, and the rivalry reflects relations at the national level. In Pando, the campesino federation that links to the MAS party and Evo Morales is strong. While some community members express distress at the ways in which local federations are manipulated by political powers outside of Pando, the federations wield considerable power. Hence, the campesino federation was also identified as a key stakeholder.

At the same time, individual landowners, despite their much smaller numbers, were likewise recognized as an important constituency for the RIPUI–ANMI initiative.

[13] The POP regulations were written for ecological zones outside Amazonia, and require management strategies, such as windbreaks every 100 meters, which are inappropriate and even destructive for Amazonian lands.

The government is responsive to lobbying by both the relatively large rural poor population and the powerful few. Communities and campesino federations are important players, but they only control one-third of the land of the two municipios despite including, by far, the largest voting population (approximately 1,500 people). Some 169 private landowners have traditionally used the other two-thirds of the land of the two municipios as barraca estates, but they did not receive titles to these lands as part of the recent land reform. Many barraqueros received only fifty hectares of land, even though they had traditionally used and claimed hundreds or thousands of hectares. In some cases, cattle ranchers received more land because the economic and social function (FES) regulations rewarded them for having cut down forest. The lands "lost" by the individual landowners were shifted into another category—"fiscal lands".

The municipio governments were also identified as key players, as they are the existing elected authorities for managing land use and biodiversity in response to community and national interests. Twenty percent of the fiscal lands (which cover ten percent of the land area of the two municipios) can be claimed by municipio government as municipio reserves. The remaining fiscal land can either be put under some kind of concession for timber or nontimber products (brazil nuts) or given out to colonists,[14] but in all cases the municipio government has the legal authority to play a key role in the enforcement of land use regulations.

Seeking a new way to protect the region's biodiversity, in June 2003, the Field Museum and its collaborators—Center for Investigation and Preservation of the Amazon (CIPA) of the Amazonian University of Pando (UAP), Fundacion Yangareko, Fundación Pando, and the municipio governments of Filadelfia and Bolpebra—chose to pursue a strategy to promote conservation collaboration between local communities, individual landowners, and municipio governments. The RIPUI-ANMI initiative was in turn designed as the strategic method for stimulating the development of a new framework for grassroots-driven conservation.

The RIPUI–ANMI Initiative

Key Principles

The RIPUI-ANMI initiative was designed and adaptively managed according to certain Key Principles that we recommend for designing frameworks for conserving biodiversity in collaboration between local civil society and local government anywhere in the world. These are:

1. Cross-scale links. Nurture bridges to communities through activities that promote discussion and self-reflection. Create trust and communication mechanisms in the process of assessing community characteristics and trends. In this case, bridges were built through RIPUI, a participatory self-diagnostic facilitated by trained community members ("facilitators").
2. Transparency. Be open with the pro-conservation agenda and be clear about what conservation agents cannot do for communities and local government.
3. Celebration of values. Nurture and celebrate existing values and care for forests, plants and animals in the local landscape. Create events that allow community members who share these values to step forth.
4. Integrated planning. Provide immediate benefits through assistance with community land use planning which also contributes data that when aggregated provides the basis for corridor assessment and planning.
5. Inclusion. Engage private landowners and assist their sectors to support a matrix of

[14] One of the interests of the national campesino organizations is finding new lands to settle displaced campesino families or to resettle families from overpopulated areas. Spontaneous colonization continues —three new communities formed in the two municipios, and petitioned INRA for land titles in 2004.

land uses that together support biodiversity maintenance. Engage communities through their local governing bodies and through their federations.

6. Clear roles and responsibilities for regulation and enforcement. Assist local governments to build instruments and capacity to manage biodiversity by working with all sectors to regulate development through their responsibilities for land use planning.
7. Resilience. Keep system open and maintain information flow so decision makers committed to conservation can be flexible for responding to changes in politicians, policies and actors.

The RIPUI Method - Facilitating Movement Toward ANMI

RIPUI (Recoleccion de Informacion sobre Potenciales y Usos Integrados or Collection of Information about Potentials and Integrated Uses) is a new method derived from a sociologists' tool called "asset mapping".[15]

The RIPUI included five principal phases:

1 Interviews and focus groups led by designated community members, during which the communities worked through a self-diagnostic of identity, land use, organizational strengths, and plans for their future;
2 Participatory land-use planning and mapping required under Bolivian law (Planes de Ordenamiento Predial) and the establishment of community-based resource management rules and enforcement mechanisms, as well as community-owned conservation areas;
3 Interviews with individual landowners in the two municipalities about their land use and vision of the future;
4 Preparation and analysis of data, followed by presentation to communities and municipal governments; and,
5 Follow up discussions with communities, municipal governments, and other civil society organizations regarding options for declaring an ANMI (Área Natural de Manejo Integrado).[16]

Interviews and Focus Groups in the Communities

Twenty-nine of the thirty seven communities[17] in Filadelfia and Bolpebra chose to participate in RIPUI. The main reason for reduced participation was residents' mistrust of external actors, including government, non-governmental organizations, and institutions interested in development and/or conservation. Another reason was that those communities practicing illegal logging feared that a self-diagnostic of the communities would expose the practice and the community would be forced to stop logging, and might subsequently face punitive legal action.

After initial meetings of OTBs in which RIPUI was explained in detail and community assemblies voted whether to participate in RIPUI or not, participating communities elected a facilitator from among their fellow community-members to lead the three month process. The communal facilitator attended a three day training session to learn the participatory methodology and the objectives presented in an illustrated guide-book. This was an unusual process for

[15] See www.fieldmuseum.org for definition and discussion of "asset mapping" method. Essentially the method views communities through a lens that identifies local strengths instead of viewing the community as impoverished and incapable of changing without external assistance.

[16] ANMI (Natural Area under Integrated Management) is a protected area category used in Bolivia, where local residents manage the area for conservation within their landuse patterns – rather like the Yorkshire Dales protected area in England or Arcardia National Park in USA.

[17] Several settlements of indentured workers (comunidades cautivas) chose to remain on their patron's land and not assert their rights to their own lands.

communities accustomed to the usual top-down methods of nongovernmental organizations, and the facilitators were initially uncertain when they realized their level of responsibility. The Bolivian trainer, Rafael Puentes, was a person with much experience in rural areas, and he motivated the facilitators and federation monitors (seguidores) by creating the shared sense of embarking on a journey of adventure and discovery, during which they would rely on each other for support.

In each community, following an initial meeting called by facilitators to plan the implementation with all of the community members present, the facilitators used interview schedules to record the answers of communities' leaders, founders of the community (or elders), the head of the local school, and the head of the health post, if there was one.

After the interviews, the facilitators organized focus groups to discuss aspects of life in their communities such as: population, cultural features (including history of the community, language, festivals, food, and communal identity), migrational patterns, land-use, economically productive and basic subsistence activities (including agriculture, cattle, logging, brazil nut gathering, hunting, fishing, and others), family income and expenditures, organizational strengths, links with other communities and municipal governments, and plans for the future of the community (including the preparation of strategic requests for the municipal governments and other actors).

The facilitators and the communities relied on a team from the local campesino federation who were hired to support the process (called monitors or seguidores). This team of eight local campesinos had previously worked with the same communities on the process of land demarcation with the National Institute of Agrarian Reform (INRA). They were assigned zones and provided motorcycles and other supplies in order to move throughout the area and form a living communication network among the facilitators, the communities, the project office in CIPA/UAP, and the Federation of Campesinos. Facilitators and the support team were paid for their work.

When facilitators were nearing completion of their activities, the project team organized

During the RIPUI self-assessment, community members elected facilitators to manage the focus groups, interviews, and mapping work.
Photo: Courtesy of Pedro Sarmientos, Yangareko.

Community members transferred land use information from sketch maps to satellite images to prepare their formal land use plans (POPs).
Photo: Courtesy of Pedro Sarmientos, Yangareko.

a series of regional meetings so communities could share their work with each other in order to help the facilitators fill gaps in the information and correct any mistakes. After the communities held their final meetings to validate and/or correct information, the entire package of satellite images, sketch maps, graphs, notes, tables, lists, and organizational charts were submitted for analysis and report production by the project team based at CIPA/UAP.

Communal Land-Use Planning, or POPs (Planes de Ordenamiento Predial)

In addition, the RIPUI project team incorporated small POP teams that consecutively visited each community[18] for five to seven days during the project period. The POP team included an agricultural engineer approved by the Agrarian Superintendent to carry-out POPs, the RIPUI "seguidores" from the campesino federation, and fifteen agroforestry and biology students of the Amazonian University of Pando (UAP) who assisted communities with the field work and used the work to meet part of their thesis requirements. The data was submitted to a GIS technician at UAP and to the agricultural engineer for processing into maps and the formal POP documents for approval by the communities themselves.

The process of carrying out a community POP consists of:

- A community-wide meeting to understand the process, draw sketch maps of the current land-use, and prepare a draft proposal for land-use for the next ten years;
- Field work with GPS to record types of terrain and soils, current land use, landscapes, altitudes, and fluvial features;
- Preparation of maps and written reports of the current land-use, and planned land-use for the coming ten years;
- Field soil studies (pH, texture, structure) to determine the potential of the soil;
- A visual inspection of the general characteristics of the land, vegetation, and forest;
- Validation of the maps and reports with the community; and
- Approval of the POPs by the central government's Agrarian Superintendent in accord with its regulations defining appropriate landuse.

The opportunity for developing a POP within the RIPUI was of great interest to communities, because POPs give communities greater tenurial security, and they would not normally be able to afford the cost of the approved technician required to do the work. From a conservation perspective, it is generally acknowledged that people with tenurial security are more likely to invest in long-term conservation of biodiversity rather than making short-term extraction in fears of losing rights over the resources. As well, the POPs consolidate landuse management units into larger scale landscapes, and prevent the division of the land into smaller and smaller *minifundios* (smallholdings).

Interviews with Rural Individual Landowners

A third element of the RIPUI was designed to involve the individual landowners. Within the municipalities of Bolpebra and Filadelfia are 169 registered individual landowners who have traditionally used the lands and forests of Pando. The RIPUI team included five interviewers trained and dedicated to conducting structured interviews with individual landowners regarding their land use, vision of the future for their property, conceptions of conservation, and concepts of and participation in the municipal governments. The interviewers had to travel to remote areas by boat in order to carry out interviews with the owner or the foreman living on the property. Each individ-

[18] The number of POPs completed was less because some communities were still petitioning for more land and did not want to do POPs until the titling process was re-opened to consider their demands for amplifying their areas under title.

ual landowner prepared a sketch map of their property showing the land use and approximate areas under different uses. The information was entered into data bases and the GIS at the university. This information was combined with landuse information from the POPs of the communities in order to prepare maps and reports on land use in the corridor.

Data Analysis and Presentation

Once the communities had sent their interviews, tables, sketch maps, diagrams, and notes back to the team based at the university, and the individual landowner surveyors had returned from the far reaches of Filadelfia and Bolpebra, the data were entered into databases and the UAP/CIPA GIS for analysis from January to March 2004.

The RIPUI information was organized into reports and presented to individual communities and the two municipio governments. These are the first documents ever produced describing these communities and municipios, and as such are greatly appreciated.

The RIPUI data confirm that the communities in Filadelfia and Bolpebra are very heterogeneous and most are quite small. Spanish and Portuguese are spoken by most community members. Some also speak Tacana, Aymara or Quichua. The communities are isolated by poor roads and long distances. The government provides schools and some health posts as the only basic services. There is no major town in either of the two municipios, and Cobija (capital of Pando), in the neighboring municipio, is the main destination visited by community members for purchasing and selling products.

In some of the older communities, people share a sense of community, carry out communal work regularly, have strong community government, and have written and enforce their statutes. Other communities were recently established in order to take advantage of getting 500 hectares per family instead of 50 hectares per family if they filed as individuals. At one extreme, there is a community all of whose members live in Cobija and visit the community's land on weekends; in others a quarter of members live in Cobija; and in others long-term residents who migrated from Brazil more than ten years ago live together with a mixture of Brazilian citizens who received no land at all. There are two communities that are Indigenous but have never petitioned for their TCO, instead opting to be titled as campesino communities. The average community territory is less than 10% cleared, with the remainder forested.

The majority of the community members in Filadelfia and Bolpebra feel that they are already practicing conservation. Almost all of the communities did not have access to markets for agricultural products and produced only enough food for their own consumption. Most families do not plant more than two or three hectares a year, and rotate their crops regularly. Community members commonly use an area of land for only three to five years before leaving it swidden for at least ten years. Considering that almost all of the communities in Filadelfia and Bolpebra enjoy lands with five hundred hectares per household, the actual impact on forest cover from food production in rural communities is minimal.

However, in some communities there is a notable impact on the local flora and fauna. For example, some communities describe reduced hunting options, reporting that "the animals have moved away", due in part to extensive hunting. Members of many communities often cut down and sell trees to logging companies during the months of September through December when there is often a lack of income and food reserves in the communities while fields are being cultivated.

In the RIPUI surveys, the overwhelming majority of individual landowners expressed interest in learning more about possible conservation strategies on their lands and commented that conservation is important to them.

The land ownership and legal instruments for land management are still in flux in

Pando. As the titling process moved forward, concurrent with the RIPUI, the national campesino federations entered into a serious debate with the barraqueros and INRA over the land of the barracas. The campesino federations regularly look for more lands to expand current campesino communities and relocate communities or families with little or no land to new areas. Their position in Pando was to oppose the barraqueros, whom they saw as individual landowners occupying huge areas of land. The campesino federations wanted to see the barraqueros' lands reduced to free up more land for campesino communities.

Recognizing the complaints of the barraquero families who have been exploiting rubber and brazil nuts for decades but received titles for only fifty hectares, the Prefectura (department government), some municipal governments, barraqueros' organizations, and the campesino federation joined together to propose a solution to the difficult predicament of the barraqueros. The current proposal is to create non-timber forest concessions to be granted to the barraqueros, covering what used to be their lands, and change the forestry law and regulations in order to allow commercialization of products from non-timber forest concessions. This would, in essence, give the barraqueros title to fifty hectares around their residences and concessions to continue collecting brazil nuts on what they previously considered their land (up to 15,000 ha). Under this scenario, the barraqueros would enjoy exclusive rights to the concessioned land, but would not hold permanent title to it.[19]

Promoting Citizen Concensus for an ANMI

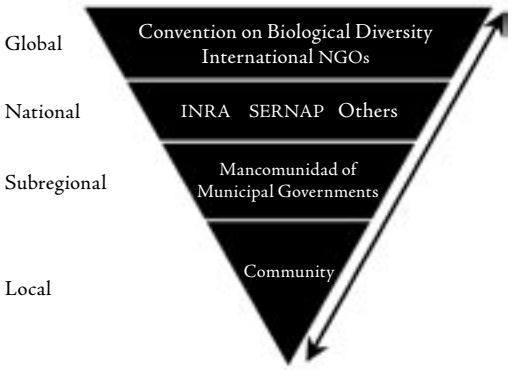
In view of the mobile population,[20] the shifting land tenure situation, and the serious conflicts between local residents mentioned above, in order to build consensus across scales, we embedded the RIPUI in a communication strategy to use communication tools and media guided by the following three objectives: 1) share clear information; 2) build strategic alliances among disparate actors, and 3) promote continuing public deliberation over an extended period.

At the community level, the very process of self-diagnosis, led and documented by a community member, created local communication flow under local ownership as it engaged individuals in thinking through their own values and desires. In addition to the focus groups addressing direct questions about what community members value, what species people use, what crops they grow, etc, the RIPUI included an exercise whereby community members created their own "shield" representing the things that they valued the most. Almost every community created a shield with the brazil nut tree, a representation of agriculture, and a scene with important natural resources on which they depend—fish, wildlife, and forest.

At the municipio level, as is normal in democracies, there were disparate perspectives and interests that needed to be brought into active debate during the RIPUI in order to evaluate and achieve consensus about declaring an ANMI. We used a variety of means to keep people aware of the RIPUI as it was carried out. We sponsored an artists' contest, used television and radio spots, and participated in a lot of local assemblies and meetings to encourage discussion about the future. We also created a documentary video about RIPUI, POP and ANMI that was shared widely to dispel fears and counterbalance those who promoted negative rumors by providing clear information. In the short video, people who were participating in the RIPUI, voiced their own perspectives about their

[19] Old inactive timber concessions are overlain over large parts of the two municipios. This conflict has not yet been resolved, but communities with POPs can block concessionaires from logging their forests.
[20] Residents of Filadelfia and Bolpebra municipios spend approximately one third of the year (December to March—the rainy season) collecting brazil nuts, one third of the year (April to July) doing migrant labor outside their communities, and one third of the year (Aug-Nov) planting and cultivating crops.

Interinstitutional cross-scale links



environment, their values and their futures. The video was widely praised as a uniting element that crossed scales, demonstrating the wider picture of shared values, pride in Pandino lifestyles, and desires for the future.

Communication between remote villages was very difficult, but the monitors (seguidores) on motorcycles were constantly traveling between communities, answering questions and sharing information. Their visibility, with bright yellow RIPUI caps and backpacks, kept the RIPUI discussions in the public eye. They also used the opportunities of visits to communities to encourage discussion of issues of interest to the federation, thus providing immediate benefits. Hence, the RIPUI monitors were not percieved as extractive agents but rather as persons collaborating in resolving campesino issues of a broader nature—thus linking conservation with other campesino concerns.

ANMI – The Resulting Institutions with Cross-scale Links

In June and July 2004, a series of public discussion forums were hosted in both municipios, giving conservation opponents and proponents an opportunity to voice their concerns. The team hosted these events, but did not direct them. The communities that had participated in RIPUI were strong proponents for the declaration of an ANMI and establishment of a mancomunidad management unit, based on their own self-diagnosis. They effectively responded to the rumors and concerns raised by opponents (largely by those few who had chosen not to participate in the RIPUI and those who were ideologically-driven to oppose what was perceived to be ecological imperialism).

The municipio councils and executives sought a mandate from the community based organizations (OTBs) to move forward with the declaration of an ANMI. In August 2004, responding to the mandate from the community organizations and the concurrence from barraquero associations, the two muncipio governments each voted municipio ordinances declaring an ANMI covering the entire territory of each municipio. And to jointly manage the ANMIs, the muncipio governments also formed a mancomunidad called the "Union Amazonica Filadelfia-

Communication was a key strategic element of the RIPUI. A short video of the process with local people as featured speakers was much appreciated. In the inset, seguidores created a living communication network between communities. Photos: Courtesy of Janis Alcorn and Pedro Sarmientos, Yangareko.

Bolpebra" (UAFB). The UAFB has its own Environmental Management Unit which functions as a united environmental unit for the two municipios.

The board of the UAFB is formed by the two municipio councils, with the executive of Filadelfia as President and the executive of Bolpebra as vice-president. As such, it creates a larger scale management unit that unites the two municipios. As is common in Bolivian local governance, a companion citizens' Vigilance Committee was also formed to ensure transparency and demand solutions to any perceived mismanagement. The mancomunidad is a parastatal which can seek and receive funds from nongovernment entities, including foreign donors, as well as from government sources, thus linking it to global scale institutions.

The advantages of the mancomunidad institution lie in its potential for resilience in response to the changing conditions in this frontier region, in its potential for being controlled by the key stakeholders (voters and constituents) to act in their interests, and in its private character overlain on top of its representative nature.

There are several bi-directional links between the mancomunidad and municipio governments on the one side and the communities and individual landowners at the more local level. As a result of the POP component of the RIPUI, each community has selected a local comittee to monitor and follow the implementation of POPs. These committees join together to represent their joint and individual interests to the mancomunidad's environmental unit. The RIPUI and POP have provided the municipio governments with the basic tools and information necessary for planning and managing land use, infrastructure, health and other development projects. The ANMI's landscape management plan can be built upon the individual community land use plans (POPs), which provide the basic information necessary for developing forest management plans for both timber and nontimber products. They can also incorporate the landuse information provided by the barraqueros during the RIPUI. This data is being aggregated into landscape level layers in the GIS as part of the RIPUI-ANMI initiative.

The individual POP committees in each community provide an ideal cross-scale link between municipio landscape level management to the local components of the landscape—matching the larger mancomunidad institution to the local management units. Local regulations about land use in each community are being developed and linked to municipio government and national regulations in order to facilitate enforcement.

CIPA in the Amazonian University of Pando (UAP) has the data necessary to create updated maps that monitor land use throughout the two municipalities, including land use in the communities, in the properties of individual landowners, and in the fiscal lands. The resulting mosaic is to be the basis for the zoning within the ANMI. The fiscal lands, community ecological service areas, and forest use zones are visualized as broad areas/corridors of conservation within the ANMI. The communities and private landowners will retain all rights to the land and their uses as under the law, and as guaranteed in their titles.

One of the many benefits of the ANMI is that by zoning the entire territory of the two municipios, the populace will be able to have greater control over the fiscal lands. By zoning the areas outside of their communities, and linking them to areas within their communities, the populace will have a well-founded reason to participate more actively in any discussions regarding what is to happen to the fiscal lands. No longer will the fiscal lands be seen as unused land, free for the taking.

The ANMI provides a local institution to take advantage of any conservation benefits that come up in the future. Should the idea of conservation concessions or payments for environmental services take hold in Bolivia, the municipios of Bolpebra and Filadelfia will

have conservation plans in place and the technical staff to implement such projects.

The ANMI and mancomunidad are at a very early stage now. The ANMI survived the election of new municipio council and executives in early 2005. The new authorities (as the board of the mancomunidad) sought guidance from their constituencies, and the communities gave their resounding support for continuing the ANMI initiative. As of early 2005, the team has been supporting the hiring and training of new UAFB staff to manage the ANMI as well as providing orientation and advice to decisions taken by the municipio authorities regarding pending development projects.

The UAFB mancomunidad is a very young player in a fast-changing frontier playing field of conflicting interests – typical of many high biodiversity zones. Traditional conservationists believe conservation can only be done through national agencies in alliances with extractive industries or large private landowners; they are skeptical that local government and poor rural communities can achieve conservation results.[21] What is needed now, in addition to long-term funding and unwavering conservationists' support for the UAFB mancomunidad, is long-term self-reflection and monitoring to document the trajectory and results of this innovative experiment.

Acknowledgements

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[21] External short-term project support to biodiversity conservation always varies over time – hence the need to strengthen local institutions for longterm conservation. In this case, skittish about the experiment with muncipal government level work, Field Museum decided to withdraw support to UAFB and return to a more traditional position of directing their own external team working at community level in March 2005. This sudden change of direction has, for the moment, weakened the position of conservationist perspectives within the UAFB. UAFB and Yangareko are now seeking other funding for UAFB.

A Framework for Designing Co-operative Management for the Great Barrier Reef World Heritage Area

Helen Ross and James Innes

Introduction

The Great Barrier Reef World Heritage Area (GBRWHA) is an iconic and vast marine national park, extending for 2000 kilometres along the northeast Australian coast and covering an area of approximately 365,000 square kilometres. Its ecosystems include 2,900 individual reefs, 600 islands and 300 coral cays, as well as a diversity of important habitats including coral reefs, sea grasses, mangroves, sponge gardens and muddy seabed communities (GBRMPA n.d.). It is home to many threatened species including dugong and turtle, and provides important nesting and breeding areas for these species, as well as seabirds and whales. It is managed as a 'multiple use' park, allowing conservation, commercial and recreational fishing, tourism, shipping and research, under a zoning system.

Its management involves two sets of property rights: Indigenous Australians' sea and coastal 'country' rights, based on customary ownership dating back thousands of years; alongside National and State shared governance as a multiple use protected area. There are approximately 70 traditional estates along the reef coast, each the responsibility of a different set of Traditional Owners. To Indigenous Australians, land and sea are seen as one, so that separation of their management is a conceptual oddity. Furthermore, to Indigenous people, natural resource management and cultural heritage management are inseparable. Land rights and native title rights over land[1] are now recognised under Australian law, but sea rights are barely recognised. Case law is slowly establishing certain Indigenous rights, such as in marine wildlife harvest.

There has been an extended history of intermittent talks and some initiatives towards co-management (George *et al*. 2004). When the marine park was established in 1975, the enabling act provided for public involvement, but made no reference to Indigenous people. Indigenous people were first recognised in a zoning plan in 1983, then from 1985 to 1993 a series of workshops and reports on Indigenous involvement and use of the GBRWHA noted the paucity of Indigenous involvement in the park's management. An Indigenous person was appointed to the Consultative Committee in 1988, and another to the Board in 1996. 1992 was a turning point, with an Indigenous employment strategy that saw the

[1] Land rights' refers to land conferred by statute into Indigenous ownership, under Land Rights Acts (variously named) in each state. 'Native title' refers to a system by which a national Native Title Act 1993 attempts to recognise and give statutory force to customary law. See www.nntt.gov.au for further information.

first Indigenous staff member appointed, Indigenous people being involved in developing the 25-year strategic plan, Aboriginal community involvement in a turtle and dugong strategy, and the issue of hunting permits for these species. A second turning point came in 1997. After a number of years of difficult dialogue with the Great Barrier Reef Marine Park Authority (GBRMPA), Indigenous people left a meeting about dugong and turtle in frustration, saying they would return to GBRMPA to say how they wanted to be involved in turtle, dugong and marine management issues. From then on, for several years, the impetus became Indigenous. Some 32 Traditional Owner groups for areas south of Cooktown formed the Southern Great Barrier Reef Sea Forum, received federal funding to help organise themselves, and worked with a research partner, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to produce a researched statement of their aspirations (Sea Forum 1999). Also in 1997, the Ministerial Council for the Great Barrier Reef directed GBRMPA staff to consider a co-management approach—apparently favouring shared management of the hunting of marine species over a more comprehensive concept.

Sea Forum's 1999 discussion paper sought negotiation of a 'framework agreement' towards co-management, intended to establish a broad general level of agreement over the entire area south of Cooktown, to be followed by negotiation of more specific regional and local estate level agreements with the Traditional Owners responsible for each area. They also sought attention to priority issues including dugong, community capacity building and community planning.

CRC Reef Co-management Research Project

Our co-management research project was established by the Co-operative Reef Research Centre (CRC Reef), a Commonwealth-supported research partnership involving academic, government and industry partners, during the period when the Southern Great Barrier Reef Sea Forum was preparing its initiative and GBRMPA and its Commonwealth and State government parent bodies began considering it. The aims of the first-stage project were:

- To provide co-management information and relationship-building support to GBRMPA and Indigenous Traditional Owners; and
- To help develop a framework for co-management suited to Indigenous management and the potential later participation of other stakeholder groups.

The first project consisted of three interlinked activities:

- A 'key issues' report designed to familiarise the parties and other readers with the concept of co-management and opportunities for the Great Barrier Reef (George *et al*. 2004);
- A set of case studies conducted by Traditional Owner groups and their organizations to illustrate the potential for local and regional co-management arrangements, and document some Traditional Owner aspirations and abilities; and
- The framework reported in this paper - a guide for parties designing a co-management scheme.

Our team consisted of an academic (Helen Ross) and a member of GBRMPA's staff (James Innes), joined by a Traditional Owner hired part-time as a team member under project funds (Melissa George). At the outset, roles were negotiated with Sea Forum and their scientific advisers. It was agreed that CSIRO would continue to assist Sea Forum, while we would focus on facilitating the interaction between the different parties.

Both the first and second stages of our project have been administered under a 'co-managed research' process (Innes and Ross 2001), though with slightly differing research

team and committee membership. The research is managed by a committee consisting of Indigenous partners, GBRMPA and the researchers, which takes all decisions and interprets the research results jointly, and allows the research program to evolve and thereby cater for changing information needs. This provides a forum for shared learning and relationship building, and preparation for future co-management of the reef or its species. It has proved a powerful process, evaluated very positively by all parties at the end of the first stage. The Indigenous committee members commented that this was their first experience of research conducted to benefit them, not 'on' them. They valued the extent of Indigenous participation, including the role and effectiveness of the Indigenous team member and the opportunity to conduct their own case studies (Ross *et al*. 2004). They also appreciated the relaxed timelines, given the many other demands on their time. All parties valued the relationships built during the process.

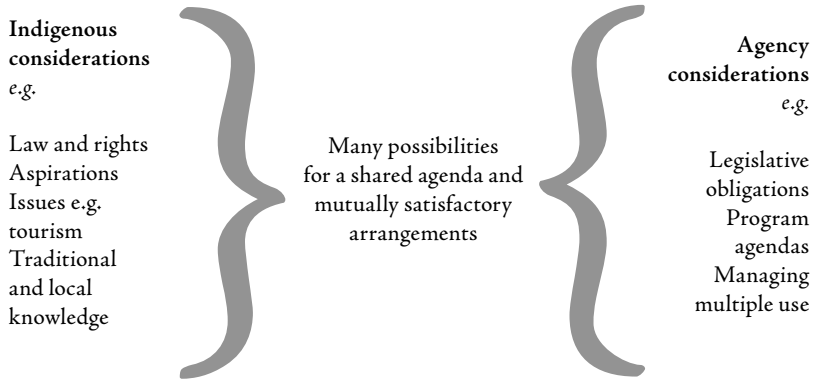
A second project has started while we are still in the process of publishing results from the first (Robinson *et al*., in press). Since the prospect of negotiating co-management on a reef-wide basis was eventually rejected by the Commonwealth government late in 2002, the attention has shifted to specific-purpose partnerships rather than the broad-scale co-management envisaged by Sea Forum. The second project therefore looks at proposed and incipient co-management at smaller scales; the practicalities and realities for all parties in agreeing upon and conducting co-management; and how to use adaptive management with co-management, to build co-management iteratively through experience and increasing capacity (Robinson *et al*. in press, Ross *et al*. 2004).

Co-management Framework

Our framework is intended to simplify the task of designing or negotiating co-management agreements. It uses the logic of 'win-win' negotiation (Fisher and Ury 1981), focusing on developing common interests for mutual advantage. It also draws on Cornelius and Faire's (1989) method of 'needs mapping', which focuses on identifying parties' underlying needs and concerns.

The central concept is that of a 'design (or negotiation) space' (see Figure 1). It is common in cross-cultural discussions for the parties to lack appreciation, initially, of one another's' beliefs, forms of organization, modes of communication, and expectations. Time can be spent fruitfully in reaching a respectful mutual understanding of these matters, or it can be wasted in contesting the unchangeable and either party trying to drag

Figure 1: The shared space concept

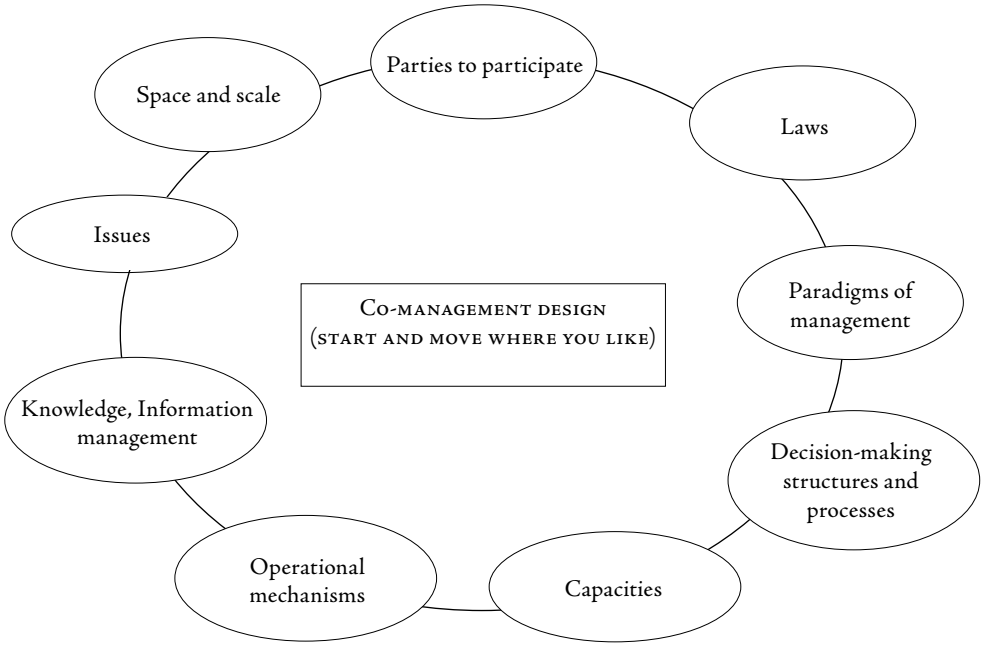


the other into its own frame of reference or way of doing things. The 'space' concept advocates a better understanding of the key features of each party's beliefs, circumstances and interests, and treats them as a 'given'—and does not try to change them. For a range of factors that we have identified as necessary to successful co-management in the context of the Great Barrier Reef, we advocate treating the non-negotiable 'givens' as parameters, outlining a flexible shared space where common interests can be developed. We invite users to explore one another's parameters in the interests of relationship building and mutual understanding, but not to waste time or jeopardise the relationships by contesting them. We encourage them to concentrate on the opportunities and challenges available in the metaphorical 'space'.

The framework thus focuses on productive areas and reduces time wastage on non-negotiable issues. We hope it will also mobilise creative tension—inviting new solutions.

The framework consists of the set of elements that form part of a co-management design (see Figure 2). These are derived from a literature review (George *et al*. 2004), the project case studies (Ross *et al*. 2004), and the authors' previous experience. Literature on community-based planning (Lea and Wolfe 1993) recognizes that communities tend to approach planning in a non-linear way, following the same steps as in formal planning guides but usually starting in quite a different place, following the steps in quite a different order, and revisiting them repeatedly. Our framework thus allows parties to start wherever they like within the framework, and to move among the factors at their own pace. They will discover linkages between factors, for instance that the space and scale factors and paradigms of management both affect the necessary decision-making structures.

Figure 2: The elements of the framework



Space and scale

We will now illustrate how the framework works, with reference to space and scale, then paradigms of management. Recall that the Great Barrier Reef Marine Park Authority and the agencies contributing to the 'day-to-day management' (Queensland Environmental Protection Agency, with the Department of Primary Industries and Fisheries, the Maritime Safety Authority, and Coastwatch)

have jurisdiction over the entire marine park.[2] Meanwhile there are over 70 Indigenous Traditional Owner groups, whose culture treats each owner group as sovereign and independent. The locus of decision-making for each party thus rests at very different scales.

Formerly, non-Indigenous Australians assumed that Indigenous people should match their own scale of operating, through representatives or a representative organization. Customary law, however, has no provision for Traditional Owner groups to speak on behalf of one another or other traditional country, making representative forms of governance culturally problematic. Queensland Traditional Owners, with state government support, are now experimenting with new institutional arrangements that enables them to make shared decisions and speak collectively with governments, without compromising their customary law.

The framework asks the parties to consider 'what area are we talking about?' (e.g., the entire reef or a small set of Traditional Owner estates, preferably shown on a map), then 'how large or small is it?' and 'what does that mean for the management of the area?' If a single Traditional Owner estate is under discussion, how could GBRMPA work with that group? Will there be difficulties if GBRMPA eventually has to manage over 70 different co-management regimes, a different one for each estate? What does it mean for Traditional Owner groups—that do not separate their land from sea resources—when different government agencies handle marine and land areas separately? If the area under discussion is the entire reef, how can over 70 Traditional Owner groups collaborate in decision-making in a way that avoids conflict with customary law? Our framework provides no answers to these questions: it merely structures the discussion around key considerations. Our key issues paper (George *et al*. 2004) offers some models that have been tried in other places.

Management Paradigms

Under the customary Indigenous paradigm for environmental management, Traditional Owner responsibilities come from Aboriginal 'Law', a comprehensive concept roughly synonymous with religion. The Law is non-negotiable. Traditional Owners have paramount responsibility for the land and the people on it, both residents and temporary visitors. Management is holistic: it does not separate land from sea, nor cultural, social and economic considerations from environmental ones. The one system of governance, through Traditional Owners, covers all issues that might arise. The knowledge base for the management of traditional country is Traditional Ecological Knowledge (TEK), coming from the Law, as well as observation and long-term experience. Meanwhile government agencies have quite a different paradigm of management. Their responsibilities are defined by legislation, then by government policies, the decisions of Ministers or Boards, and in turn senior officers. Responsibility occurs under hierarchical structures, with Ministers (or Boards) and CEOs having important roles. While generally stable, these are far more changeable than Indigenous Law. Management responsibilities are divided by function. Marine areas are managed separately from those on land, and different agencies or sections within agencies generally handle conservation, fishing, and Indigenous affairs (GBRMPA does have holistic responsibility for the Great Barrier Reef World Heritage Area, but sectoral agencies also have roles – requiring considerable liaison in the administration of each function). The knowledge base comes from science, though also from experience and precedent.

The parameters for the design space for 'paradigms of management' are thus incommensurate, and not easily changed. The space between the parameters suggests that a new

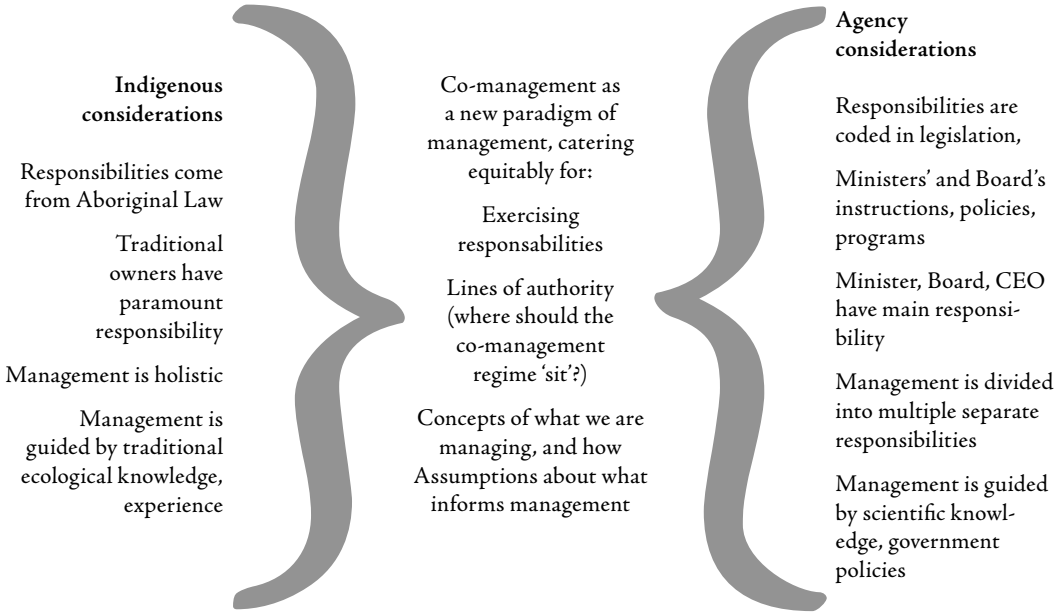
[2] With minor differences in boundaries since there are areas of state-managed marine park beyond the World Heritage Area.

paradigm of management (co-management) is required, in a form compatible with both parties' wider responsibilities. Questions to be faced in the design of the regime are:

- How can the parties exercise their responsibilities (customary law, legislative and organizational requirements) through a co-management regime?
- How can they reconcile their concepts of what they are managing, and how they are managing it?
- What structures and lines of authority will satisfy both parties? (This takes them to the 'decision-making structures and processes' part of the framework.)
- How should the decision-making be informed? (This requires a link to the knowledge and information-management part of the framework).

This design space is illustrated in Figure 3.

Figure 3: Design space for paradigms of management



Conclusions

The framework is designed to accommodate any form of co-management, including regional aspects, species and habitat, or a combination of two or more of these forms (George *et al*. 2004). It can also be used at any scale, from Reef-wide to local. It could well be used with nested arrangements, where for instance a species management arrangement is nested within a regional arrangement.

It brings negotiation theory to co-management. The main features of the framework are:

1. A set of factors that need to be addressed, in any order. Since many of these affect one another, they should be revisited iteratively until a coherent regime is agreed upon.
2. The concept of a 'design space', which lies between parameters that are created for each party by their given (features at least open to amendment) legal and cultural characteristics.

The framework thus offers partners a defined set of factors to consider for an effective and mutually acceptable regime, providing a clear scope for discussions. The 'space' concept concentrates on the possible, by encouraging

the parties to focus on their areas of potential common interest, and to be creative about finding solutions that accommodate their sometimes divergent needs. The framework also focuses on processes as much as desired outcomes, in that the parties need to show respectful consideration of one another's situations and understandings in order to identify the parameters defining the space, then 'invent options for mutual gain' (Fisher and Ury 1981) to fill that space productively. Relationship building and maintenance of those relationships must underpin the process. It is needed before discussions commence, during them, and throughout implementation of a co-management regime. The importance placed by Indigenous Australians on 'respect' provides an invaluable foundation for designing co-management, focusing the parties on listening to one another, respecting one another's points of view, and appreciating their needs and contributions.

Currently, co-management remains high on the agenda for many Traditional Owner groups in the Great Barrier Reef region, who see it as one way to help meet their aspirations with regards the management of their country and recognition of their cultural heritage (Robinson *et al*. in press). Government agencies, meanwhile, prefer the very similar concept of 'partnerships'. Reef-wide co-management is not currently a prospect, but a web of smaller-scale partnerships, particularly focused on conservation issues, could well develop. This creates a challenge for governments as they try to accommodate new, emerging governance arrangements alongside existing arrangements, as well as competing sectoral demands. The negotiation space offers one way of reconciling Indigenous aspirations with the challenges faced by governments to deliver the outcomes their enabling legislation requires.

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Managing the Commons: Conservation of Biodiversity

Emerging Issues, Conclusions and Recommendations

Augusta Molnar

The articles in this publication present a range of cases in which local conservation initiatives are embedded in community economic and livelihood systems and provide new models for the conservation of forests, arctic, and marine resources. These models are embedded in a broader multi-level governance system in such a way that local initiatives are a prime driver of the conservation model and so that "institutional arrangements and ecologic knowledge are tested and revised in an on-going process of trial and error" (Berkes and Turner, this volume).

There are a number of key issues raised by the articles that mirror current debates on the role of communities in conservation and of people in protected areas management and other conservation models. Current conservation models for high-priority conservation resources, where there is considerable human-nature interaction (forests, marine and reef systems, and grasslands or mountain and arctic ecosystems) emerge from a recognition that effective conservation depends upon multiple factors—biophysical, demographic, economic, political, legal, social and cultural. Rather that promoting rigid protection of landscapes under centralized state agencies and institutions, community models seek to incorporate the Indigenous knowledge and perspectives of local people, to set up a negotiated framework for adaptive management, flexible to local innovation and experimentation and adapting technical and regulatory norms to varied conditions within a high priority conservation area and to changing political and economic circumstances over time.

Interestingly, these models are being applied in situations of extreme conflict, as in the Bolivian Amazon frontier case, and in situations of complex demographics and economic change, as in the Great Barrier Reef case. At the same time, both of these case study countries have very forward-looking legal frameworks for community conservation and local participation, compared to the situation in most countries. Bolivia is a recognized model of forest sector reform which linked forest law and regulations to land legislation, devolved administrative and fiscal responsibility to municipalities, recognition of Indigenous lands, a law of popular participation, and new space for community management of state forests that were formerly under poorly managed, private concessions (Contreras and Vargas 2001). Limitations have been local capacity and scarce resources, and the lack of models to extend land rights to the traditional extractors of Brazil nuts and other non-timber forest products.

Australia has a strong legal and policy framework for the participation of private landowners and customary rights holders in resource management planning and process-

es and legislation recognizing the emergent valuation of environmental goods and services through payment schemes or new market creation (Scherr and McNeely 2002). Indigenous rights to sea resources have not been established under this framework and the case study in this section is one step towards defining such rights. Canada, the main focus for the other article featured in this publication, has increasingly recognized the customary territorial and use rights of Indigenous peoples and provided political space in these examples to local authorities to address the resource crises (Berkes and Turner, this volume).

This changing lens on conservation looks more systematically at: (a) what factors determine whether communities work to conserve their resource base and how this evolves over time; (b) how legal and regulatory frameworks and norms need to change to incorporate collective rights of Indigenous and other local communities over both private or corporate resources, and over public natural or fiscal resources; (c) which institutional arrangements and planning models favor multi-stakeholder processes and support local innovation and learning; and (d) how effective conservation measures can be when the conservation of natural areas is integrated into community resource management strategies across different size landscapes.

The language of community-led or integrated conservation models is also different. New terms reflect an opening of institutional space to explore new relationships in which local people are more central actors. These include: those of "sharing power" or "learning by doing in co-management of natural resources" (Borrini-Feyerabend; Pimbert; Farvar; Kothari; and Renard 2004); "environmentality" or "a process by which local people develop a more conscious environmental outlook as an outcome of a power shift in which regulations are shaped by local practice" (Agrawal 2005); "participatory conservation research" (Laird 2002) or "civic science" in which local people are partners in research and research agendas (Aspen Institute 2002); and "framework agreements" (Ross and Innes 2005) or "middle ground" (Colchester and Mackay 2004) in which agreements are defined as open-ended and allow for renegotiation through time.

The key issues reflected in these articles are:

a What are the frameworks or processes that lead to effective conservation outcomes?
b What is the appropriate relationship among multi-level institutions between local people, communities, local and regional governments, private sector, and central authorities?
c To what extent are communities effective "environmentalists" and what are the factors needed for them to contribute positively?
d What changes are needed in legal and policy frameworks and norms to support these new models? And finally,
e How can progress or impacts be monitored and evaluated effectively?

The case of Pando, Bolivia (Alcorn *et al.*) is the construction of an integrated landscape of conservation and development from below—through agreements negotiated and constructed at the municipal level and with sets of producers. This is institutionalized in a locally managed protected area category particular to Bolivia, Natural Area under Integrated Management (ANMI), managed by a union of two municipalities and establishing agreed zoning and rules of management and use that cover both private and public lands. Private landowners not only agree to these zoning rules, but government is bound by zoning of fiscal lands also.

The case of the Great Barrier Reef Marine Park Authority (GBRMPA) in Australia is one in which communities with customary rights and lands within the reef system have taken a pivotal role in defining the rules of engagement and management options and participate as key partners in a framework

agreement which includes multi-level stakeholders and institutions. The influence of the customary right holders has not only been in bringing traditional knowledge and values to the framework, but also in shaping the style of engagement. As in traditional negotiating processes, the parties to the agreement are able to start where they like within the framework parameters, discussing issues at different spaces and scales and linking planning decision-making structures to issues of management paradigms or local capacity, rather than moving in a linear fashion through the planning process.

The cases of caribou hunting management in the Hudson Bay area in Canada look at the different responses of two communities, the Chisasibi Cree and the Belcher Islanders, to declining herds in their hunting regions. These responses are of two kinds. In the first instance, the Cree community implements a set of internal rules and regulations around the hunt in response to the near loss of the caribou herd in their vicinity because of overhunting, a response legitimated by the evidence that the elders bring to bear that the caribou disappeared in the past and will not return unless the community changes its practices. In the second, a community that loses access to caribou herds changes technology and its economic base, and adapts to a different hunting resource, eider ducks. A new ecological balance is established but without rescuing the elements of the original wildlife and habitat.

There are some important approaches that have proved effective in these cases and some clear lessons learned with wider application:

Partnership with outside technical specialists. In the Great Barrier Reef and in Pando, outside partners have proved instrumental in helping local government and communities to assess their options and the resource threats. In the case of Bolivia, the University of Pando team supported by the Field Museum of Chicago, who assisted in analyzing the interests and concerns of the different stakeholders, in evaluating legal options, and in preparing a zoning of the area that could be the basis of a new legal entity to govern the area of integrated management. In the case of Australia, 32 traditional owner groups were able to get funding to have collaborative research carried out with the Commonwealth Scientific and Industrial Research Organization and formed a partnership with both academic and protected area staff to develop co-management options.

Value of resource mapping and zoning to provide a framework for negotiation and planning. Co-management in all cases is strengthened by the development of maps which reflect the realities of the various stakeholders and which are not confined to the official parameters of action. Agency officials in the Bolivian, Canadian, and Australian cases have been able to act locally with flexibility within the given legal framework. A shared understanding of the conservation challenges and the potential Indigenous responses is more solid when based on the mapping of the overall resource situation and local use patterns. Would the response of the Belcher Islanders have been different if they could have seen how their own access to caribou related to the overall wildlife distribution and hunting pressures in the Hudson Bay region as a whole?

Respect for customary governance and processes. The GBRMPA operated from a shared space concept that provided both Indigenous actors and the government agencies a common ground for interaction without demanding that either governance system be dominant. The Canadian authorities enabled the Cree to find an internal solution to control the negative behavior of young hunters by keeping the legal right to enforce environmental soundness but letting the customary process operate on its own. The municipalities in Bolivia negotiated a management plan in a frontier situation in which many of the existing land uses and activities were not legal, but focused on creating a positive future for the region without resorting to law enforcement.

Many of the conservation solutions are strategies that traditional peoples have applied in

history and are not new. Berkes and Turner have documented that many of the resource management recommendations currently in use in conservation have been part of traditional peoples' response to disturbance and change, which appear to have been more effective when adequate knowledge and understanding could be brought to bear through a management learning process. Many of the conservation practices applied in the Great Barrier Reef area were known traditionally—closure, seasonal restrictions, and quotas. Bolivian settlers and extractors had long practiced self-restraint in their agricultural systems to avoid clearing forest unnecessarily. These are what Berkes and Turner call the "soft lessons" of conservation.

The Future of Co-management and Community Conservation. The extent of on-going community conservation in marine, grassland, and forest areas worldwide has been increasingly documented in recent years (Borrini *et al*.; Barry *et al*.; Molnar *et al*.; Oviedo 2003). Conservatively speaking, there are at least 370 million hectares of forests and agroforests protected by communities outside of public protected areas systems. Livelihood dependence is quite high in many public protected areas, with vast gaps between the legal status and management practices of those areas and the patterns of historical and actual rights or use or the conservation potential. Rights-based approaches are providing new legitimacy for recognizing the land and resource rights of many of those resident peoples.

These changes are reflected in a fundamental rethinking currently underway among many conservation agencies and technical organizations with regard the concept of firm, legal conservation boundaries for the rigid protection of resources with histories of multiple use. Reflecting on the co-management processes underway in other countries and regions, these cases raise some interesting opportunities. Clearly the lessons cannot be easily transferred to regions with poor governance and outmoded legislation and policy. The cases presented could not have been successful where the rules of engagement had no legal basis and where government and conservation agencies were unwilling to explore new models and incorporate new information and institutional arrangements.

What has been learned. First, collaborative construction of conservation areas has important advantages, particularly in areas of conflict. Second, it builds on the learned experience of the resident population, enables a framework for negotiation in which stakeholders feel themselves to be partners in the process, rather than bound simply by law. Third, it fosters a culture of stewardship around ecological knowledge or "environmentality". Fourth, scientific research with regards biophysical resource and management options is enriched by civic science and local knowledge and collaboration, and leads to a richer model of learning. And finally, fifth, these frameworks are highly consistent with the process of rights recognition and decentralization of governance that is underway in many developing countries.

These cases reflect the lessons emerging from a number of ongoing experiments by empowered local people that were enabled by new institutional arrangements and institutional space, created by moving away from models of centralized authorities and control. Until now, Indigenous peoples and local communities have been engaging through relatively ad hoc and informal strategies, without much assistance from researchers and practitioners to develop more systematic and considered approaches to the challenges ahead. Clearly donors and conservation agents have a role to play by supporting capacity building among these local actors and enabling a more systematic sharing of learning among those actors on the ground.

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