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Securing Protected Areas in the Face of Global Change

Key Lessons Learned from Case Studies and Field Learning Sites in Protected Areas

Edited by Peter Shadie and Minna Epps



A Report by the Ecosystems, Protected Areas and People project

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Foreword

Protected areas have proven themselves to be an effective tool for the conservation of biodiversity in situ. However, conserving biodiversity, even in protected areas, is a challenging assignment for most countries around the world where numerous threats and pressures impact on the values of these special areas. Developing country governments in particular are facing expanding demands for health care, nutrition, housing, education, security and other development needs, all of which call upon limited resources. Local communities are losing access to traditional resources and fail to share in the benefits from the goods and services produced in these areas. On top of these challenges, the world is facing changes in climate and sea level, increasing numbers of invasive species, and fragmentation of forests. People are demanding more food and fibre, while human settlement patterns press protected area boundaries. New institutional policies, such as decentralization of resource management call for new social arrangements among communities and government bureaus. All these “factors of global change” cause increasing uncertainty for the future of biodiversity and the vital ecosystem goods and services provided by protected areas.

Today, an impressive 12 percent of the planet’s terrestrial areas are formally under some form of protection. The world has mobilized around the idea of protected areas with the global estate increasing in just over 40 years from an area the equivalent of the United Kingdom to an area the size of South America. Although securing areas for community benefit and resource security is not a new idea, the modern concept of a protected area is usually attributed to the 1872 creation of Yellowstone National Park in the USA. Traditionally, these areas were associated with larger, often uninhabited areas established for their scenic or wilderness qualities - National Parks. Today, many models of protected areas have emerged to include private reserves and community based protected areas often established by indigenous communities.

Despite the impressive global growth in protected areas many of these places continue to face mounting stress from a range of biophysical, socioeconomic, and global institutional changes. These changes are inevitable and bring a mixed blessing of both ‘headaches’ and ‘bright ideas’ to those charged with the management of protected areas. Protected area planners and managers will have to adapt to global change factors if they are to ensure adequate protection of global biodiversity and the retention of values. To do this, managers need better information on global changes and how these translate into local impact. They need to understand, anticipate and assess the impact of global change trends, then adapt and adopt innovative approaches and solutions to deal with them.


The Ecosystems, Protected Areas and People (EPP) project responds to the challenges above by supporting protected area managers in their efforts to modify their strategies, policies and practices in the face of global change. The EPP project included several components: Technical expert working groups, case studies, global and regional workshops, field learning sites and the creation of a Protected Area Learning Network (PALNet). PALNet is a web-based network (see: www.parksnet.org) where managers and communities are actively experimenting with innovative and creative options for addressing the challenges and opportunities brought by global change.

Each of the field learning sites is dealing with a number of protected area ‘change factors’. Nine field learning sites were located in diverse parts of the world: Cameroon, Costa Rica, Cuba, Ecuador, Nepal, Southern Africa, the Philippines, and Yemen. Lessons learned from these sites are synthesized and documented in multiple formats and have been posted on PALNet. All field learning sites have explicitly analyzed protected area management responses to global change impacts over a period of time. These lessons learned are

further supplemented by the seven case studies which have successfully broadened our understanding of the approaches and experiences in coping with change.

This synthesis of lessons learned briefly summarizes the learning across all field learning sites and case studies. It allows a scan of the learning from the EPP project and invites readers to investigate areas of interest in more depth. The synthesis builds on earlier work carried out in relation to the global change publication 'Securing Protected Areas in the Face of Global Change' which examined global change more generally as it affects protected areas. It also links to the influence of the EPP project on workshops staged for the 2003 Vth IUCN World Parks Congress and on the strategies and work of the World Commission on Protected Areas (WCPA) and Convention on Biological Diversity (CBD).

It is only through facilitating open sharing and the evolution of ideas that we can adjust to the rapidly changing world as it affects protected areas and the critical values that they preserve for all humankind.

A handwritten signature in black ink, consisting of a series of loops and a final dot.

Peter Shadie, Coordinator

IUCN Regional Protected Areas Programme, Asia

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Over the life of the EPP Project many people have contributed toward this work and the other outputs of the project. Special praise needs to go to Dr. Kenton Miller for his foresight in conceiving and realizing the EPP Project.

The work is made possible through the financial support of UNEP/GEF as principal funders of the EPP project.

Introduction

Protected Areas

Protected areas (PAs) are special places established in recognition of their significant environmental, biological, spiritual and cultural values. More and more PAs are being created with social and economic objectives as well as environmental ones. Today many kinds of PAs exist based on different objectives of management and a range of protection regimes which apply through national and/or international laws and regulations and increasingly, local community customary and traditional laws. The definition of PAs used in this report is that of The World Conservation Union (IUCN) defined as *an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*.

International commitments to the development of networks of PAs date from the Stockholm Declaration 1972, which endorsed the protection of representative examples of all major ecosystem types as a fundamental requirement of national conservation programmes. Since then, the protection of representative ecosystems has become a core principle of conservation biology, supported by key UN resolutions. International agreements and conventions such as the Convention on Biological Diversity (CBD)¹, the World Heritage Convention (WHC)² and the Ramsar Convention on Wetlands³ have more recently strengthened and specified the global commitment to create representative networks of well managed PAs as a contribution to biodiversity conservation and a platform for sustainable development.

In 2007, the World Database on Protected Areas (WDPA)⁴ recorded 106,926 PAs worldwide covering 19.6 million km² or



A butterfly in La Fortuna - Los Lagos, Costa Rica © Joëlle Dufour, 2007 – IUCN

12 percent of the planet's surface area. These figures include all nationally designated PAs and do not include private reserves or community conservation areas. Once these figures are included, the total number and area of PAs might increase considerably⁵. Despite this impressive global growth in PAs a recent UNEP-WCMC assessment of the extent of marine PAs revealed that as little as 0.5 percent of the world's marine habitats are protected. Many other gaps in the global PAs system are evident at biome, ecosystem, habitat and species protection levels which argue for a strategic approach to developing more comprehensive protection.

There are currently six IUCN PAs management categories⁶, which seek to categorize all PAs complying with the IUCN definition according to the objectives of management. The IUCN categories are increasingly being used as a tool to develop more flexible PAs that encompass an array of uses and

⁵ Lockwood, M. Worboys, G. and Kothari, A. (eds.) 2006. Managing Protected Areas; A global Guide. Earthscan.UK

⁶ The IUCN six categories of protected areas:

- I. Strict nature reserve/wilderness area: protected area managed mainly for science or wilderness protection
- II. National Park: protected area managed mainly for ecosystem protection and recreation
- III. Natural Monument: protected area managed mainly for conservation of specific natural features
- IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation.
- VI. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

¹ www.cbd.int/

² www.whc.unesco.org/

³ www.ramsar.org/

⁴ www.unep-wcmc.org/wdpa/

accommodate different degrees of human intervention. The category system is also being used to support management planning through zoning and the development of management policies.

As elaborated below many PAs face a range of negative and sometimes positive impacts from factors, many of which, appear to be outside the control of managers. They include such things as encroachment, habitat fragmentation, poaching, inappropriate development, invasive species, climate change and sea level rise, mining and overuse through tourism.

Coping with a Rapidly Changing World: Global change factors and impacts on protected area management

In theory nearly 12 percent of the planet’s terrestrial areas are formally under some form of protection, in practice however, the viability of many ecosystems is still under threat. Traditionally, PAs were associated with larger, often uninhabited areas established for their scenic or wilderness qualities - National Parks. Today, many models of PAs have emerged to include private reserves and community-based PAs often established by indigenous communities.

A global awakening of the need to preserve and protect the ecosystems that provide essential goods and services to mankind has resulted in a six-fold increase in PAs in the last few decades⁷. Despite this awakening, ecological functions are being stressed by various types of biophysical, socioeconomic, and global institutional changes (See Table 1 Global change factors). These are large-scale and long-term changes in our physical environment and in its governance. Factors such as climate change, habitat fragmentation and land conversion, over-harvesting and infrastructure development due to exponential population growth, and increasing demand for goods and services are threatening PAs. Alterations and disruptions of habitats have caused unsustainable imbalances in ecosystems that affect their productivity and long-term sustainability.

These changes are inevitable and the challenges to protect vulnerable ecosystems and biodiversity hotspots and endangered species are plentiful and daunting. Despite a sky-rocketing expansion of PAs during the last three to four decades, many PAs have not succeeded in conserving the numerous values that they provide. Equally, global change impacts and trends have not been sufficiently incorporated in

Table 1. Global change factors

Socioeconomic	Biophysical	Institutional
<ul style="list-style-type: none"> • Population growth (mostly in high-biodiversity developing tropical countries) • Human settlement patterns • Global economic growth • Consumption and production patterns • Appropriation of net primary productivity • Alteration of freshwater 	<ul style="list-style-type: none"> • Climate change • Habitat conversion and fragmentation • Alterations of hydrological cycles • Invasive alien species • Biodiversity loss 	<ul style="list-style-type: none"> • Emerging transcendent global norms (human rights and equality, democracy, accountability and global cooperation) • New forms of governance (proliferation of NGO’s and decentralisation) • Advances in communication technologies • Access to information

⁷ Barber, C. V., Miller, K. R. and Boness, M. 2004. Securing Protected Areas in the Face of Global Change: Issues and Strategies. IUCN Gland, Switzerland, and Cambridge, UK

the planning, design and management of PAs. The number of PAs shows no sign of abating and will continue to grow responding to the need for more comprehensive protection. PA planners and managers will have to accommodate both the positive and negative aspects of global change to ensure adequate protection of global biodiversity. These adaptive management approaches are evolving as our values and perceptions of ecosystems change, and as our knowledge of how to protect biodiversity, and how to manage PAs in a changing world increases.

Global change factors have and will continue to pose significant challenges to PA planners and managers, as well as decision-makers influencing the balance between conservation and socioeconomic development. There is also an on-going debate on what PAs should protect. PA values are shifting and new methods of setting priorities are constantly emerging which include both ecological considerations as well as socioeconomic and political considerations. Specific measures need to be taken to address global change factors in PA planning.

Once a decision has been made on what needs to be protected, and where, the next question is: whose responsibility is it? Today there are many governance and management options being practiced, such as decentralized, co-managed, and community managed PAs. This is a result of many factors: land tenure, ownership, recognition that conservation is not the job of governments alone, a growing culture of stewardship and the need for resource security. The establishment of PAs often affects the livelihoods and interests of many people and institutions and it is widely recognized that local participation is a key ingredient for successful PA management⁸. Local communities within and around PAs are often directly dependent on the goods and services provided by the PA good governance is therefore

essential if benefits are to be equitably shared. In order to adhere to these preconditions for successfully achieving PA objectives, capacities need to be built and new skills developed to address global change factors in an adaptive management approach. Lessons learned from experiences around the globe need to be drawn out and shared to strengthen management approaches, and for these to be supported by legal, policy frameworks, incentive measures and education and awareness programmes.

Learning from our successes and failures will further strengthen capacity both at the institutional level and at the site level. Modern technological advances are facilitating the communication of lessons learned and raising public environmental awareness, particularly at the site level. Technology now makes lateral or peer to peer learning a much easier prospect.

The aim of this report is to synthesize lessons learned from seven case studies and nine field learning sites established in a range of PAs around the globe under the UNEP/GEF/IUCN Ecosystems Protected Areas and People (EPP) project. The case studies and field learning sites explore associated issues and options in dealing with PA management in the light of global change.

Ecosystems Protected Areas and People Project

To address the global changes that PAs face today with various degrees of uncertainties IUCN's Global Protected Areas Programme⁹ and WCPA¹⁰ established the EPP initiative in 2003 with the financial support of UNEP/GEF and various contributing funding partners. The EPP aims to strengthen the PA management community to enable managers to adapt their strategies, policies and practices to the threats and opportunities of global change thereby supporting local,

8 Barber, C. V., Miller, K. R. and Boness, M. 2004. Securing Protected Areas in the Face of Global Change: Issues and Strategies. IUCN Gland, Switzerland, and Cambridge, UK

9 www.iucn.org/places/asia/ecosys_livelihoods/protected_areas.htm

10 www.iucn.org/themes/wcpa/



Baby Olive Ridley Sea Turtle on a beach of Ostional National Wildlife Refuge, Costa Rica © Joëlle Dufour, 2007 — IUCN

national, and global communities in securing biodiversity and ecosystem services. The primary stakeholders are government agencies, NGOs, local and indigenous communities that have responsibility for managing PAs. The overall goal of the project is that areas of high global biodiversity value in developing countries will be managed adaptively to cope with the challenges, and capture the benefits from global change. The project has focused on five main components to develop the capacity for managing their areas in the face of global change: technical expert groups, global and regional workshops, seven case studies, nine field learning sites, and PALNet.

The most significant and lasting impact of the EPP project is perhaps that it has catalyzed local level networks focused on learning from experimenting with creative approaches to PA management. In this sense the lasting value of the EPP project lay less in what was done at the field learning sites and the case studies but more in how this transferable knowledge was extracted and shared.

Field Learning Sites

In many ways the EPP Project has supplemented field projects already underway. A major component of the EPP project was to develop a network of field learning sites. Field learning sites were chosen on the basis of innovative work already being carried out. The project sought to extract and share the lessons learned from this innovation and allow the learning sites to continue to experiment and exchange knowledge. Research conducted in nine learning sites worldwide focused on the perceptions, impacts, lessons learned and management guidelines that resulted from dealing with global change impacts. Global change, as it is understood in the EPP project, captures a wide range of change; ecological-biophysical, social and institutional all driven by complex dynamics, which have consequences for PAs. The network of field learning sites is experimenting with ways to adapt to challenges from, or to capture opportunities presented by global change factors.

Case Studies

Another important component of the initiative was to commission case studies to augment the learning on global change factors developed through the field learning sites. This proved to be a very effective and successful way to broaden and synthesize experience and learning derived from global experiences on targeted global change factors. Several case studies focused on in-depth analysis of learning at specific sites whilst others assembled learning from worldwide examples. Each case study focused on one or more of the factors of change, and was selected based on the degree of innovation by stakeholders, and the extent to which the results are replicable.

Knowledge Management and Information Sharing

Conservation information is complex and messages therefore difficult to convey. There are thousands of eco-regions, with an equal number of threats and pressures, and with hundreds of physical characteristics all with different laws and regulations in a constantly changing world.

Knowledge often consists of habits and cultural traits that are not always easy to recognize. To add to the complexity, conservation knowledge is particularly fragmented and often viewed as very contextual. The world of conservation is therefore faced with having to convert a wide range of individual and site specific knowledge to generically useful information made readily available through different means of promotion to a wide variety of audiences.

Despite communications being central to successfully achieving conservation goals it usually receives relatively low priority. To leverage the experience and knowledge of site staff and partners and make it usable, PALNet was established. PALNet is an interactive web-based tool which enables organizations responsible for PA policy and management to share lessons learned in coping with global change factors.

PALNet responds to the need to tailor learning and knowledge at different levels. Policy makers, for example, need access to different learning to that of PA field managers. The project has revealed the complexities of knowledge management and that learning exchanges need to be customized to very local levels¹¹.

PALNet

PALNet is a web-based network where managers and communities are actively experimenting with innovative and creative options for addressing the challenges and opportunities brought by global changes. PALNet aims to harness the work of technical working groups of experts that analyze lessons learned from literature, case studies and field learning sites, prepare guidelines and options for adapting to global change that will reach primary stakeholders through the PALNet website¹². The website facilitates the exchange of experiences among those responsible for PA policy and

management¹³. Face-to-face training workshops have been held to engage primary project stakeholders in the continuing improvement of PALNet, in learning to utilize its features, and in gathering, synthesizing, and sharing the lessons being learned.

PALNet has created user spaces for field learning sites and case studies to maintain dialogues and networks beyond the scope of the EPP project as a way for PA site managers to:

- Contribute to an interactive and collaborative knowledge system;
- Share lessons learned and help on-going practitioner networks of local, national, global conservation leaders on specific themes;
- Call on other users/experts for advice in PA management; and
- Showcase project success and individual programmes, projects, and PAs to a global audience and provide access to cutting edge approaches.

The articulation of lessons learned and provision of tools developed from case studies and field learning sites in a concise manner makes PALNet valuable to local managers. A growing body of content has been uploaded onto PALNet and links between the website and other databases and knowledge providers have been made to increase its scope. The aim has been to make the site self-sustainable through user interaction, a 'gateway' to PA learning and a place where dialogues can be maintained through local forums to keep encouraging innovative approaches to PA management.

11 The Regional Protected Areas Programme, IUCN Asia Office, and the Ecosystems, Protected Areas and People (EPP) organized a workshop to evaluate the EPP Project in the context of the future capacity and knowledge management needs of protected area managers around the world.

12 www.parksnet.org/

13 Hard copies were prepared specifically designed for those stakeholders not engaged through the electronic information system.

Lessons Learned

Lessons learned through the EPP project have emerged at two levels: examinations of the approaches adopted at specific sites to cope with global change and more generic problem-solving tools which can be applied to different contexts around the world. The value of the project has been to allow PA managers to scan across a wide range of approaches before delving in more detail into those which can be of greatest relevance in their own situation. Here the aim is for PALNet to play an on-going role in generating and sharing fresh lessons learned among the PA community.

The synthesis draws out a diverse mix of lessons learned, recommendations and guidance derived from very different sites and case studies (see lessons learned matrix on page 47). This is reflected in the varied formats and articulation of approaches which follow. This diversity is one of the main strengths of the EPP project. It is stressed that the details below are a brief summary of more in depth field learning site and case study reports which are available on PALNet.

Field Learning Sites

Korup National Park, Waza National Park and Dja Wildlife Reserve, Congo Basin, Cameroon

Congo Basin Co-Management Network (CBCMN) is a network of professional stakeholders involved in facilitation of co-management processes, training, research, and decision-making processes on natural resource management policies. This field learning site focused on the impact of co-management in PA management in three sites in Cameroon, Korup National Park, Waza National Park and Dja Wildlife Reserve.

Cameroon enjoys a remarkable ecological, cultural, and anthropological diversity. This diversity has led to it being

nicknamed 'Miniature Africa'. Nearly 90 percent of African ecosystems are represented there and are divided into vast Sahelian, Sudanese, forest, mountain, marine, and coastal zones. The three sites in this study have shown how institutional changes in management were driven by socioeconomic and biological factors eventually resulting in a more-or-less coherent response of collaborative management. The label 'co-management' however is not consistent between the three sites. Rather the aim was to show how different approaches to address institutional challenges within the mould of co-management have impacted the management of the three sites through the eyes of key stakeholders.

There are many lessons learned from the sites to be documented and shared. Despite the many shortcomings of the projects or programmes in the three sites, they were incredibly valuable and courageous initiatives. The larger interventions in all three sites started before or around the time of the Rio Earth Summit in 1992. The conditions were extremely complicated and the expectations from most stakeholders high. The changes challenging the management of all three sites remains, and solutions are still needed. The sharing of the lessons learned from all three sites is a great step ahead.

The lessons learned from the three sites focus on resettlement, community involvement, rural development and natural resource management, as well as institutional management.

Lessons Learned from Korup National Park

Resettlement

People do not value things that they have not invested in; ownership needs to be continually reinforced. The rigid approach to policy implementation did not foster ownership of the stakeholders and undermined confidence between stakeholders. Agreements should therefore be written and

then signed off by all stakeholders, including negotiations for voluntary resettlement. The differences in authority levels amongst members of the various commissions did not allow village representatives to fully express their opinions during negotiations. It would therefore be advisable for the park manager to lead the process. In addition, a sustainable livelihood mechanism should be in place before physical movement of human beings.

Community involvement in park management is achieved through:

- Involving communities in activities that bring them short-term gains;
- Using indigenous approaches to nature conservation and complementing these with a new orientation;
- Being flexible by exchanging and examining each others approaches and methodologies; and
- Building relations with local communities and maintaining regular communication.

Rural Development and Natural Resources Management

Community participation in conservation activities was a challenge, since the communities rely heavily on natural resources for their livelihoods and conservation is still perceived as restrictive. When the objective of creating a community based natural resource management structure is not based on the community's conviction, the structure depends on the existence of the institution that initiated it. A reliance on local materials in rural development inputs is not sustainable and leaves the community with the feeling that nothing has been done. In Korup National Park, rural development activities were perceived as trade-offs for the communities' support to conservation and this gave the people the impression that there were hidden interests in the conservation of the Korup National Park. Another observation that emerged was that the villagers continue to go back to the Korup National Park for the exploitation of natural resources. The main challenge for conservation

education is that conservation messages are most often conflicting with the interests of the local people, making it difficult for the people to associate with the message. It is therefore essential that capacity building for natural resource management structures should include development of income generating mechanisms, not necessarily based on natural resources. This could be achieved through:

- Using local people as conservation education staff, which creates a positive atmosphere for sensitization;
- Sustaining sensitization as a continuous activity;
- Encouraging game guards to play an active role in sensitization; i.e. some of their field visits should be mainly for sensitization of the communities especially on those aspects that have direct bearing on law enforcement.

Institutional Management

Park management policy was commonly based on assumptions and self-sustaining narratives. Often, changes were only implemented following a conflict. Management which relies overly on outside donors rather than national or local means is often unsustainable. For example decisions and policies concerning Korup Project were made at the donor level and therefore project staff identified themselves more with the different donors than with the Korup Project itself. The conservator of the national park should be the overall coordinator of all aspects of management in and around the park. This can be supported by a commitment to maintain the staff whose capacities were built by the project.

Lessons learned from Waza National Park

Co-management and Transparency

The management plan and other important documents concerning PA management should be openly discussed in meetings. This will allow the local population, including those who cannot read, to familiarize themselves with the process. The rules concerning the functions of the Park Committee

should be developed in consultation with local people to obtain their support to the committee's work, while providing access to relevant documentation (financial reports, reports of meetings etc.) and ensuring the transparency of the process and its credibility.

Other lessons learned that emerged from the Waza National Park include:

- The need to increase trust between stakeholders;
- The flexibility of stakeholders is necessary to ensure effective management negotiations;
- Effective support structures are indispensable for any co-management process put in place by a project as they allow for capacity building of new management structures;
- Existing co-management structures have to be taken into account in the process, rather than creating new structures that will disappear with the project;
- Make full and effective use of traditional mechanisms in guiding the functioning of management structures;
- Don't allow co-management facilitators to dominate the process at the expense of the diversity of actors involved;
- The establishment of solid and durable relations with appropriate donors from the start of the process guarantees a degree of success;
- The development of systems of auto-finance allows the management structures put in place to effectively execute their missions;
- The promotion of alternative solutions to the strategic interests of local populations reinforces confidence and contributes to successful co-management;
- The relentless push for a gender-balance and the inclusion of gender issues in the process is sometimes contradictory to local cultural realities and can provoke hesitation within local communities;
- The representation of stakeholders has to take into account different ethnic backgrounds;
- The failure to deliver on obligations and promises involving

the practical needs of local population's diminishes confidence;

- Be aware of potential conflicts of interest – e.g. eco-guards can become ineffective if their actions are driven more by their employer's interests as opposed to their community's interests; and
- It is impossible to execute co-management processes without accompanying measures, like the recruitment of sufficient game guards to protect the park.

Communicating lessons learned

In the case of Waza, there are many actors who do not speak French, and there are many illiterate community stakeholder groups living deep inside the forest where the education level is low. To effectively communicate the lessons learned to local communities it is advisable to employ representatives of isolated communities to transmit messages using media tailored to the communities (e.g. radio shows, and participatory workshops).

Lessons Learned in Dja

The key lessons to be learned from the Dja Reserve can be summarized as follows:

- Every organization actively using co-management created its own approaches and its own separate contact with local populations. This caused confusion and diminished the chance of more global advances;
- A focus on fighting poaching increased suspicion among the population. Innovative solutions to fight poaching should emerge from an understanding of the cultural and social basis of its practice;
- Too much sensitization and too little concrete development related activities contributed to community reluctance to get involved;
- There is a need for more collaboration and dialogue between the different organizations working in the Dja Reserve;
- Co-management approaches employed by the different

organizations should be harmonized to improve effectiveness;

- Traditional knowledge and know-how should be employed inside the co-management processes to improve people's comprehension and adherence.
- Traditional knowledge and modern scientific knowledge should be considered complementary not mutually exclusive;
- Technical aspects of the co-management approaches should be simplified to increase people's understanding;
- Attention should be directed into improving the livelihoods of local populations and addressing their priority needs;
- Local people should be engaged in the communication of co-management processes; and
- Alternative means for local livelihood development should be examined and capitalized on (ecotourism, handicrafts etc.), and mechanisms for auto-finance should be promoted.

Protected Areas, Costa Rica

In Costa Rica, the relationship between forests and people is a close one. Almost every Costa Rican urban citizen lives no more than 20 km from a PA and less than 1 km if you are a farmer. This proximity to PAs plays an important role in establishing a "green identity" for Costa Rica, which has embraced the idea that nature and PAs can, and should be, an integral part of the development futures. Like many other tropical countries, Costa Rica is home to a rich and diverse flora and fauna that contains a high proportion of the planet's biodiversity. In 2006, there were 160 PAs equivalent to 26 percent of the country's terrestrial surface, and 16 percent of its marine and coastal area.

The Costa Rica field learning site has built its capacity to manage complex socio-ecological systems through a system of PAs. The lessons are the result of a research process that comprised of three different types of activities. First a series of workshops were conducted with PA management professionals

from central agencies. Second, a series of interviews with key stakeholders was undertaken. These interviews aimed to tackle the views that key actors are seldom incorporated into policy documents or international projects conducted in the country. Third, a review of existing literature on Costa Rica and its conservation efforts was conducted.

The lessons learned target central agency professionals related to PA management, consultants, public managers, INGO's and research organizations. In the process of adapting the institutional structure of a PA system as a response to global changes in the economic and political scene, the main lessons have been summarized as follows:

The gap between knowledge production and practice continues to be wide. Managers and stakeholders often do not use new forms of knowledge for day to day decision-making. The conservation community has not given this fact enough



A flower in Tortuguero National Park, Costa Rica,
© Joëlle Dufour – IUCN

serious thought. There is an assumption that just producing knowledge is good enough. This extends to different forms of knowledge including scientific (knowledge produced by scientists through their formal research activities), practice-based (knowledge acquired after conducting the same action several times and reflecting on how things were done and how things could change), administrative (knowledge produced by the bureaucratic agencies through reports and monitoring efforts in the system), and finally traditional (knowledge held and produced by communities and transmitted through informal means from one generation to another).

Institutional reform can very easily become an objective rather than a means. The extended duration of any institutional reform can take over the attention and the energy of the management system and obscure the real objectives of conservation and equitable distribution of the PA's benefits. The conversion from means to objective is subtle and thus, any form of change activities should consider this from the beginning.

Being in a double-bind is the rule rather than the exception. Managing PAs is almost always situated in a double-bind between conservation and social interests. Interestingly enough, policy-makers, managers and even scientists continue to devise and proclaim absolute solutions and truths which undermine the path towards more dynamic understanding of nature and society. Conserving biodiversity and ecosystem functions is, in essence, a practice of compromise. What is necessary is to learn to what extent you can compromise objectives in respect of other social goals and which of the conservation priorities are non-negotiable. Establishing this hierarchy allows for a better mainstreaming of PAs through society in general.

Nature is not passive. It is crucial to focus on the resilience of ecosystems to provide key ecological services. This new dynamic and active understanding of nature will make it

possible for more assertive conservation decisions to take place. The first step in this direction in Costa Rica was the realization that PAs as biodiversity rich islands were doomed to failure. Thus, connectivity and the use of key ecological services criteria, particularly hydrological issues, can provide a much needed flexible understanding about the ecological systems which we are trying to protect. Luckily, when ecosystems are understood as complex adaptive systems we understand a lot about social systems as well. Embracing complexity, rather than excluding it, allows us to better understand how nature and society are part of the same assemblage.

The most important leadership is the one that ensures implementation after symbolic change. Good management tends to require a sustained effort of adaptation. Sustaining that effort until the new mode of thinking and acting becomes common practice is probably even more important than major short term changes. Leadership that is systematic and promotes organizational learning and knowledge management will always be more effective than leaders focused only on symbolic institutional transformations.

Managing PAs in their context is more of an art, than a technique. There is, and there will always be, a high level of uncertainty in the practice of conservation. This uncertainty proves fertile ground for experimentation. Uncertainty makes experimentation risky, but risk and surprise is the name of the game rather than a situation to be avoided. Shifting the mind frame of managers from a technocratic point of view, to a more "artistic" one will enable us to produce better science and more effective conservation. Good art, however, is not the product of chance. It requires systematic engagements and disciplined efforts.

Yasuni Biosphere Reserve, Ecuador

In Ecuador, the biodiversity conservation strategy has centred on the establishment of PAs categorized according

to the categories developed by IUCN¹⁴. Ever since their establishment, Ecuadorian PAs have faced severe problems deriving from multiple factors: social exclusion due to the adoption of strict preservationist models, scarce government investment in management, inclusion of industrial oil and mining activities, expanded human colonization and changes in land use, illegal forestry and illegal hunting, among others. There are 33 PAs in Ecuador: two in the insular region, Galapagos National Park and Galapagos Biological Marine Reserve; 12 in the coastal zone; 13 in the Andean mountain range, and nine in the Amazons. The Yasuni National Park (YNP) and Yasuni Biosphere Reserve (YBR) were created in 1979. Yasuni lies in the Amazonian territory and combines major oil reserves, as well as ancestral indigenous territories. The aim of this project was to create a field learning site to synthesize experiences and lessons from the YBR management processes carried out by local stakeholders, in the context of global change.

Lessons Learned

The lessons learned respecting global change in Yasuni are associated with the knowledge, practices and actions developed by different stakeholders present in YBR. It has to be mentioned that a clear concept of “global change” does not exist and that many problems of the PA are not even necessarily considered to relate to global conditions. However, there exists a general but variable idea about the linkage between the Yasuni’s environmental, social and institutional problems and regional Amazonian conditions.

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- I. Strict nature reserve/wilderness area: protected area managed mainly for science or wilderness protection
- II. National Park: protected area managed mainly for ecosystem protection and recreation
- III. Natural Monument: protected area managed mainly for conservation of specific natural features
- IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation.
- VI. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

The local Ecuadorian environmental authority (Ministry of Environment - Yasuni National Park office) acknowledges that insufficient financial resources are at its disposal for the implementation of adequate area administration. Control activities are carried out with limited financial resources many times only with the sponsorship of national and international NGOs such as the Wildlife Conservation Society (WCS). A strengthening of the national park’s local technical teams is necessary to establish control protocols and efficient monitoring of oil extraction and tourism activities that take place within the PAs boundaries. Illegal timber extraction has greatly affected YBR, due to its environmental effects and the harassment that isolated indigenous groups suffer from timber traders¹⁵.

Power sharing arrangements between the Ministry of Environment and YBR are a central issue. The Ministry of Environment identifies the importance of the YNP’s office promoting a greater protagonist role for the PA administration as a principal lesson learned. There is concern that power and decision making remains decentralized and is not centred remotely in Quito. The lack of adequate political and administrative powers combined with deficient communication between the different Ministry of Environment’s offices are considered as important lessons learned in the Yasuni region.

Another factor related to local power exertion is the unclear and inappropriate land tenure in areas around the YNP and inside the biosphere reserve. Settler’s and indigenous organizations identified the difficult access to title deeds as a problem that is hard to solve. Issues were seen as related to the bureaucracy of the National Agricultural Development Institute (INDA), which has limited authority and is dependent on the central offices in Quito.

15 In 2003 a Huaorani family was massacred inside the Yasuni NP; this event was related to acts of illegal timber extraction.

For mestizos and other indigenous stakeholders, the main lesson concerning global change factors and their (indirect) management is local participation. Local participation is essential for any kind of conservation initiative in the Yasuni region. The participation should not only consist of creating spaces for dialogue and collective decision-making but also when generating productive opportunities for local rural areas.

Local governments consider local power exertion as a fundamental process. The different activities carried out by local governments for PA and environmental protection (formulating ordinances, creating environmental management departments, and establishing citizen committees) are considered valuable initiatives. Despite these advances, there exist many legal impediments to dealing with issues such as PA administration, oil extraction or forestry controls because these are non-decentralized activities of the State. In this context, tensions could emerge between the aspirations of YNP's and the Ministry of Environment's offices. While the former requests major power niches, the latter insists on continued exercise of the Ministry's current competencies. Although both parties agree on the necessity of strengthening political decision-making spaces, their opinion about which institutions should exert such powers differs.

From the local government's perspective adequate funding is needed for environmental management, creation of communication channels (for instance a regional data base), project implementation and efficiency in public administration. Financial resources that enable local responses are a fundamental requirement for the treatment of global change issues.

In indigenous organizations, it can be observed that the organizational and financial strengthening these organizations require must be combined with an evaluation of processes taking place in the reserve. It should not be forgotten that

in the Ecuadorian Amazon assistantship models for social organizations are operating, which make these organizations dependant on external support. Taking this into consideration, for indigenous organizations, activities are driven by the necessity of carrying out productive or tourism projects with technical and financial support to secure their sustainability over time.

Another important issue relating to indigenous organizations is their generally negative evaluation of external biodiversity conservation projects, due to the lack of integration of local knowledge. In this context, the lesson to be learned is the necessity for external support to broaden training and communication programmes for the indigenous communities.

Apo Island and Dauin Sancturries, Philippines

There are five field learning sites at the Apo Island and Dauin Sancturries referred to as the Apo-Dauin field learning sites. These are located in the Bohol (Mindanao) Sea, central Philippines. The Bohol Sea defines the northeast boundary of the 900,000 km² Sulu-Sulawesi Sea. This sea is known for its mega-biodiversity and important marine ecosystems including fringing coral reefs, mangroves and seagrass beds and the 33,000 ha Tubbataha Reefs Marine Park, a World Heritage Site, and a turtle conservation site. There is also the 90,000 ha Bunaken National Park off Manado, Indonesia, Sulawesi Sea, a renowned tourist destination.

The Department of Environment and Natural Resources, the local government units and the local communities have managed these sancturries since their establishment 25 years ago, under the initiative of the Silliman University Marine Laboratory. The PA system in the Philippines had been highly centralized until the 1998 Fishery Code which mandates the full participation of communities in fishery management and promotes the establishment of fish sancturries. Marine

reserves or sanctuaries appear to be the most viable fishery management tools for the Philippines because of their simplicity and the relative ease with which they can be established, as attested to by Apo Island Marine Sanctuary, the Masaplod Norte, the Dauin Poblacion sanctuaries and many other successful marine sanctuaries.

Lessons Learned

While external help is often necessary to initiate development projects, much depends on the initiatives of local communities and local government units to secure the human development objectives of food security and sustainable marine resources. Once the community understood the intrinsic link between food security and the development of a reserve, they were fully supportive of the project. Without community support and efforts to not only establish the site but to maintain it, the resources would not have been protected.

Interagency linkages and cooperation in the management of marine protected areas (MPAs) are essential. Despite these linkages being critical, the project had difficulty getting the necessary support from a number of government agencies. The Philippine coastguard was perceived as not being corporative when approached for assistance by the Dauin field learning site. It is possible that the agency had the will to assist in implementing the rules of PAs but lacked the resources to do so.

Management of MPAs should be science-based, drawing on information from all over the world, and especially from reserves in the country. The University partners in the area include scientists well aware of the advancements in marine biology and PA applications. Academia is a useful initiator of projects, but organized local communities and local government units should take on their roles as implementers. There was a perception that academics primary role was to conduct research and that other technical matters and implementation was not their responsibility.

A great deal of volunteerism is needed in successfully managing MPAs. Although this project demonstrated the critical role of volunteers, there were often difficulties in getting community members to contribute their time without compensation. Poverty is very rampant and people cannot afford to allocate time or labour unless compensated. The solution to this issue remains a challenge.

Monitoring and assessment of results using socioeconomic and biological indicators is needed. Monitoring is critical to show the benefits of establishing marine reserves as well as to track any necessary adaptations to management over time. This should be a combined effort of local governments, communities, and academia. Some members of the community have been trained in monitoring and scientific monitoring has been done since the 1980s using simple and standard methods. Assessments of the effects will use socioeconomic and biophysical indicators are being developed.

Use of technological interventions to address human population management is needed if sustainable development is to be addressed. In addition to preserving fisheries resources at the site, it is important to address social indicators that lead to the increase in resource exploitation. In this case, the project initiated education on family planning to help reduce or stabilize population growth. The success of this activity is still limited.

Establishing Conditions for Sustainability.

The community-based approach has some degree of sustainability because at any point in time there are several generations of people who are aware of activities required to sustain the effort. For example, on Apo Island small children have been known to tell visitors to follow the rules of the marine sanctuary. These children will grow up to teach their own children about the benefits of the marine sanctuary. Apo Island also has a scholarship program supporting selected Apo college students to enable them to finish their college

degrees. It then requires them to render community service on Apo. Members of the local community should be trained in monitoring the sanctuary using simple methods and providing feedback of the results to the community to keep them informed of what is going on in the sanctuary. Part of this activity should be the development of a database for purposes of continuing the information dissemination to the community.

Guidelines developed in response to the lessons learned

MPAs benefit biodiversity and people. The collected data shows an increase of fish biomass over time at Apo Island and the spillover of fish biomass to surrounding non-reserve areas, directly contributing to biodiversity.

Guideline: Whenever possible a reserve should be located in an area most likely to result in fish biomass spillover and enhanced biodiversity through production of marine propagula for the larger marine region. This directly relates to realizing the ultimate socioeconomic benefits of reserves. In developing countries with large populations, it may not be possible to create large marine reserve areas, but satisfying results can still be achieved by creating many small reserves. Since small reserves have localized effects, many reserves (large and small) should be established to form networks of marine reserves or sanctuaries in order to ensure large-scale positive impact on marine biodiversity and fisheries so conserving whole ecosystems, taking into consideration the oceanography of an area.

MPAs require decades before they can revert to previous pristine conditions, if at all. 20 years of data on fish recovery from Apo and Sumilon Islands indicate that this ecosystem recovery could take decades.

Guideline: Conduct baseline and ongoing monitoring of both marine reserve and fished area outside no-take zones

to show the long term benefit of increased fish stocks. Be prepared to invest significant time to support community organizations and education. In the case of Apo Island, two to three years was estimated for these activities.

Full community and local government involvement in the management of MPAs is necessary for the protection of the marine sanctuary, as demonstrated in the case of Apo Island.

Guideline: Partnership between local communities and facilitators must be balanced. Recognize that “ownership” of the project is important. Local government units must take responsibility for the legal issues and livelihoods. Facilitators (including scientists, community organizers and advocates) must be credible and have no perceived hidden agenda.

Flash floods reported by the sanctuary managers have eroded beaches and silted coral reefs in the field learning site areas.

Guideline: Continual protection and demonstration of the benefit of the marine reserve requires ongoing communication and adaptation to new and emerging issues. Management committees and boards must hold regular meetings and respond to feedback and concerns from the community, as well as to determine new ways of managing emerging threats to the reserve.

On the island of Mindanao a coral reef, bounded on one side by a tropical rain forest was invaded by a rebellious armed group that could not be controlled by local officials. This raised the possibility of the forest being logged with the result of causing sediment to pollute and kill the corals within a short time. In this case the local government and the community will follow a guideline of assessing the risk to the environment if a certain option is followed. This example illustrates the importance of social factors reinforced by global change

factors, as in this case large amounts of rainfall causing a large volume of sediment to be deposited on the reef. In deciding on a protection strategy, the probability of success should be part of the guideline in the absence of clear evidence for superiority of one strategy over the other.

The most effective means for communicating lessons to an international audience is websites, but locally the best way appears to be through visits to targeted areas, or through the radio. A study being conducted in the Dauin field learning site aims to determine the best ways of communicating with local stakeholders.

Socotra, Yemen

The Socotra Archipelago located some 400 km south of the Arabian Peninsula is part of the Republic of Yemen. The archipelago is a globally significant centre of biodiversity featuring 307 endemic plants, over 30 endemic vertebrates and more than 300 species of endemic invertebrates. WWF listed the island of Socotra as one of its Global 200 Ecoregions.

Socotra is much poorer and less developed than the mainland of Yemen. The main part of the Socotri population living in the rural areas consists of semi-nomadic pastoralists, living from goats, sheep, cattle breeding and date palm cultivation. On the coast, artisanal fishing is the main source of income.

Socotra's important but fragile biodiversity has long been considered under threat. Many recent conservation efforts have conflicted with development needs, such as infrastructure development (airport, paved roads) increasing access to formerly inaccessible areas, and thereby increasing pressure on the natural environment. Case study analysis of the challenges and opportunities facing conservation and development in Socotra have provided a range of lessons learned for PA planners and practitioners facing similar challenges and opportunities in the light of a mix of global change factors.

The constraints and challenges facing the conservation and development work on Socotra are vast. Tribal diversity ensures a great range of interests which are hard to bring to a consensus and land tenure issues often hindered Socotra Conservation and Development Project (SCDP) activities.

The main achievements of the SCDP have included:

- A comprehensive planning and research approach which resulted in the development of set of appropriate planning tools; i.e. the Conservation Zoning Plan (CZP) and Strategic Adaptive Management Plans (SAMP).
- Successful negotiation with local government authorities to prevent paved road construction in a unique nature sanctuary.
- Establishment of nurseries for both *ex-situ* and *in-situ* conservation of endangered plants.

Lessons Learned

The case studies analyses provide the following lessons learned and guidelines for PA planners and practitioners facing similar challenges and opportunities from global change:

- Newly founded PA systems are facing great implementation problems, even if they possess comprehensive planning tools. These implementation challenges can be met through good cooperation with all stakeholders which is led by a common vision and the participation of local people.
- Participatory management depends on PA manager's ability to encourage and engage local people in conservation and by giving advice. If the process of advising changes into a process of generating jobs or donations in exchange for conservation, local structures can become led by a demanding philosophy.
- Constructive cooperation to reach environmental goals is then hindered by financial conflicts that threaten the central point of cooperation. The chance for creating ownership concerning environmental protection is then missed.
- Local responsibility for conservation therefore gets easily lost and shifts to development demands if the

responsible agencies employ conservation workers without undergoing a sustainable capacity building process.

- Planning tools involving regional analysis in conjunction with science-based zoning for conservation, and public participation, provide a good guideline base for PA management. These should be followed until they are seen to no longer effectively deal with new problems. New problems should then result in an early adjustment of the planning tools and guidelines, with consideration of management constraints and potentials. Such a dynamic process contributes to adaptive management and is crucial for PAs in times of global change.
- Furthermore, the local people have to be made aware of the new adjustments, results and approaches. The participatory process has therefore to be seen as a regular process and must not stop at one stage. Local opinions and ideas must be taken into account in any consultative, planning and implementation process, as participatory results might shift during the implementation as conditions change.
- Alternative income generating mechanisms, as well as alternative methodologies are only successful if they are adapted to local potentials and needs and are followed up and accompanied with regular training or supervision. They also need time to be accepted through the diffusion of good experiences.
- Well managed plant nurseries can become a useful tool for training, awareness and research, and can contribute to both *ex-situ* and *in-situ* plant conservation.
- Training and capacity development processes need to be followed up by practical on-the job exercises, otherwise skills will not be retained. Global pressure is complex and comprehensive and specific skills are needed to overcome this threat. Therefore capacity development should be goal-directed and appropriate for the purpose of the expected tasks. The effectiveness of capacity building exercises in the way of their application and

effect on job performance needs to be monitored and evaluated. A target orientated approach is essential for effective capacity development.

- Government power is needed to regulate global pressure. Presidential decrees are essential legislative tools to counterbalance external pressure. They become useless if government authorities do not follow them strictly or implement them effectively. Good governance is therefore critical for both legislative development and environmental project implementation.
- SAMP and CZP and other tools are effective conservation and development mechanisms which can lead to decreased external pressure if all the stakeholders are aware of and agree on them. If there is a lack of political awareness or support, PA managers have to keep up with capacity development and awareness building efforts at the governmental level.
- The institutional partners of any project need to be sure about the common goals before the implementation process starts. Otherwise local communities and target groups become confused and even disillusioned. Such conditions do not serve the stakeholders and may even lead to conflicts or unjustifiable demands as competing or contradictory goals between the partners become apparent.
- Lack of income from tourist activities reduces the potential that tourism may have in the support of self-help development strategies. At the initial phase, most financial benefit stayed with the tour operators and responsible NGOs which had to care for their own financial independence before sharing benefits. The little profit made should be shared appropriately and focused on fixing problems. The assumption that the economic benefit of ecotourism activities leads to an improved conservation effort by the local people is false. Pure financial or infrastructure support from international donors will not lead to a sustainable solution. A strategic approach backed by professional

management capabilities, and adhering to conservation and sustainable development objectives, is needed to realize sustainable benefits from tourism.

- Cooperation with global tour operators can be successful and support local goals if local tourism infrastructures and services are up to speed and fed effectively by local knowledge and skills. Promotion of tourism is important but has to be built upon independent resources and require good financial consolidation.
- Land tenure problems have to be resolved prior to advising or trying to implement local PA management. The solution has to be found with the help of the responsible government institutions.
- Capacities for comprehensive project implementation are often limited by a lack of resources to support long-term expertise. Activities therefore should address the most important challenge and opportunities and not disintegrate into micro project approaches. An overall vision is therefore an indispensable condition.
- Well consolidated cooperative societies which are dependent on the sustainable use of resources, especially when they are realized through self-help initiatives, have the strength to set up their own rules and demands, and fight against outside pressure without requiring external help.

Kruger National Park, South Africa

The Kruger National Park (KNP) in South Africa has developed and adopted a fundamentally new orientation to management that embraces 'learning-by-doing' through strategic adaptive management (SAM). The approach holds, at its core, the themes of heterogeneity and variability which characterize savanna systems in southern Africa, but which have been ignored in favour of management approaches based on averages. This innovative approach was developed through concerns for the rapid deterioration of rivers flowing through the national park, however, is now being used to address many other management issues.

Objectives of the study

- To document and analyse the experiences and use of adaptive management approaches first, as a means to manage river systems associated with PAs and, second as a basis for engaging various stakeholders in collaborative management for action;
- To provide the KNP project team with the opportunity to reflect on their own practice;
- To share findings of the process with KNP managers and rangers through dialogue, workshops and documentation; and
- To contribute lessons learned and guidelines for PA managers regarding adaptive management of riverine systems, through the EPP project.

Achievements

The main achievement for the KNP has been the development of a new system of stewardship that is based on a clear mission informed by stakeholder involvement and on strategic adaptive management that has a strong learning feedback loop. This has allowed a much closer partnership to develop between researchers and managers with a strong sense of buy-in and co-learning.

In the case of river management, an additional challenge has been to broaden horizons and deal with the realities of conflicting drivers and objectives. This has necessitated an



A desert warthog in Kruger National Park, South Africa
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approach that has attempted to reach a common understanding between different stakeholders with very different interests and hence demands on the water resources. Fortunately for KNP, the new legislative environment has provided strong support for the concept of sustainability through the Reserve.

Lessons learned

- Management should be directed towards achieving a desired state. This has fundamentally re-orientated the management of Kruger, and staff and resource allocations.
- An important adjunct to the first principle is that in semi-arid savannas this desired state is not a stable state but is one based on a fundamental recognition of variability as an overarching characteristic which confers resilience. Thus judicious management is predicated on understanding the underlying ecosystem drivers and characteristics of the system in question. Since river systems are dynamic and in a continual state of flux it is necessary to monitor conditions and to revisit management objectives. System dynamics need to be understood in the broader context of what is occurring both inside and outside of the PAs.
- River systems are common-property resources. In South Africa, there is no private ownership of water and flow through a portion of land does not confer inalienable rights on that landowner. Moreover, rivers in South Africa and indeed in many other countries are now managed on a catchments basis where demand is viewed from a catchments-scale perspective of the total water resources. This means that there will be tradeoffs and compromises to ensure equity and sustainability. These two factors necessitate that relevant stakeholders participate in water resources management. Relevant PA staff need to be assigned this duty and supported to participate in multiple stakeholder platforms when decisions are taken.
- The collaborative role in developing thresholds of potential concern (TPCs) and the joint role of research and management in ensuring they are set and met have been cited as a powerful motivation for monitoring staff, such as rangers and wardens who then become a key link in the iterative SAM cycle. The role of involving field staff in setting management objectives cannot be underestimated in terms of developing commitment and buy-in.
- The initial setting of TPC levels can be a difficult process but it is essential to initiate the SAM cycle and, bearing in mind that these are hypotheses, they also highlight important research gaps. A sequenced approach that takes the first attempts as 'first generation' TPCs is useful where uncertainty and gaps prevail. TPCs that have been developed must be carefully audited and controlled. The desired system, and the TPCs, must be continuously refined in a reflexive manner.
- The question of "how many TPCs?" is an important one given the nature of constraints that might be experienced at the implementation level. Authors report that Kruger was over ambitious in its first attempt at a SAM. The result was that a number of themes and TPCs have yet to be implemented. However it is possible that all 'first generation' SAMs are likely to be built upon a broad base of trial TPCs that will be scaled-down with time and according to experience, constraints and effectiveness.
- The risk of a 'false alarm' is an important consideration in that a response may be launched 'too early' under the SAM model. The challenge is to develop an early warning system to identify when trajectories are heading in the wrong direction. At the same time one wants as few as possible false alarms. The authors recommend that field staff should err on the side of caution and by tabling a TPC sooner than later.
- The SAM system with its defined desired 'envelope' within which management endeavours to stay is seen as divergent from traditional target setting associated with management planning by conservation agencies.

However, KNP scientists point out that the dichotomy of targets and envelopes might reflect the level of compliance to the desired set of ecosystem conditions. It has been noted that agencies regulating areas that are mostly outside the desired envelope may find target setting to be a more practical formulation in the initial stages of management planning. Kruger is perceived to be mainly within the envelope making the TPC formulation appropriate for its management practices.

- Knowledge management is a challenge that needs to be addressed. After a TPC is tabled there is a tendency for several unpredictable threads of information to emerge as implementation proceeds. These threads may or may not be documented with the appropriate qualitative level (i.e. everything is taken to be equally relevant). The authors recommend that there is a continual 'roping together' of the information so that the organization benefits as a whole and a disparate and isolated approach is avoided.
- KNP has been described as supporting one of the most sophisticated long term ecological research programmes, yet the extensive records are not easily accessed. The SAM approach is likely to generate a wealth of field data that needs to be recorded, captured and made accessible. Today the park is developing a knowledge environment based on GIS as well as non-spatial databases. The park is aiming to capture all new monitoring and research results and transfer these to indexed electronic files. The intention is draw science and management together by putting data to productive use rather than archiving for historical purposes only.
- Once the challenging aspects of knowledge management have been negotiated they lead to the need for shared learning. KNP has experimented with the formation of communities of practice from, initially, a core of enthusiasts whose task it is to continually rework and improve the SAM system and make it more accessible for use by others.

- Experience shows that there is a need for the integration of programs run by the KNP. By using information from the past, new techniques and by drawing on a wider variety of specialists and practitioner experiences it is thought that more realistic TPCs can be set in the future. This project has provided and tested a model that might be applicable to other research and management areas both locally and more widely a field. Lessons for integrating new concepts such as ecosystem services and social ecology with more traditional approaches have yet to be learned.

Cape Floristic Region, South Africa

The Cape Floristic Region (CFR) in South Africa is home to a rich flora where some 1,400 plant species are threatened. The region currently has 259 PAs of which eight are on the UNESCO World Heritage List as part of a serial site. The predominant ecosystem type in the CFR is fynbos¹⁶, which is threatened by a growing water crisis in the region, invasive alien species (IAS), property development, and other development pressures.

Just as natural systems consistently face threats, the impacts of which are mediated by their resilience and the adaptive responses they adopt, so too social systems in PAs face a similar array of threats and possible impacts necessitating the need to respond. Climate change is one such threat, intimately connected to other, often better recognized threats and pressures which challenge natural and social systems to produce unequivocal, if multi-faceted, responses. Some of the factors that shape vulnerability of social systems to impacts in the CFR are uniquely South African in nature while other factors are more universal. This begs questions about what people managing and working in PAs need in order to strengthen their responses to climate change.

¹⁶ Fynbos means "fine bush" in Afrikaans and is the natural shrubland or heathland vegetation occurring in a small 100-200km wide coastal belt stretching from Clanwilliam on the West coast to Port Elizabeth on the Southeast coast.



Protea Flowers in Kirstenbosch National Botanical Garden, South Africa © Alicia Held – IUCN

A series of adaptation lessons were generated during the course of the study and recommendations to strengthen resilience of the social systems responsible for *protecting* fynbos vegetation, or (as it is increasingly acknowledged) responsible for *facilitating* its adaptive behaviour to change. Recommendations below aim to strengthen climate change resilience of indigenous fynbos vegetation in the region.

Lessons Learned

The literature identifies three types of learning in social-ecological systems: incremental learning, lurching or episodic learning, and transformational learning. Incremental learning happens when models used to inform policy-making are updated on the basis of new data. Episodic learning tends to take place in the aftermath of environmental crises which demonstrate the inadequacy of current policies and the models which inform them. Transformational learning exposes underlying assumptions when existing frameworks of ideas fail, allowing profound changes in ideas.

Resilience is located in lessons that have already been consciously learned and structured into the spectrum of responses available to people working with biodiversity in PAs – such as the ‘success’ of corridors, the idea of co-operating all the way along a riverine corridor (upstream impacts), the value of networking, combining indigenous knowledge with outside support, adopting a “we are all learning” orientation

and treating different knowledge equally. Underlying all the strategies that humans can adopt in the interests of resilience to climate change is the principle of integration with other risk management strategies.

Our approach is that no-one knows everything, we are all learning and there’s no such thing as a stupid question. We also acknowledge traditional knowledge, without putting it on a pedestal and making it something immutable. We’ve said - let’s use whatever is available to us to develop more knowledge.

Key lessons generated during the dialogue session of the feedback seminar included:

- Adaptation to climate change means preparing for future change, even where some uncertainty exists. Good preparation means putting shock absorbers and insurance policies in place, to increase resilience in the face of risk.
- Resilience is both pragmatic and attitudinal; resilience can be woven into organizational culture but it can also be implemented by ensuring a core of consistent staff who sustains the institutional memory, and a core budget. Resilience means creating structures that are better able to cope with the unexpected.
- Decisive action is possible, even while some knowledge gaps remain open. The active engagement of decision-makers is vital. It is possible for the scientists to paint scenarios in enough detail to give decision-makers clear choices, based on a range of likelihoods.
- Attitudes are changing. People are more interested in climate change now than they were a few years ago and therefore more receptive to useful information.
- People respond to information that is relevant to them. Information about climate change that answer the question, “What will this mean for me?” is more likely to galvanize action, in policy-makers, conservationists and members of communities. Making the economic linkages can be very powerful. Drawing connections between

climate change and related issues that have immediate urgency and relevance (such as water shortages) can attract attention.

- Communicators are challenged to keep climate changes message clear and not create the kind of alarm that freezes people into inaction.
- Action includes two main threads: treading more lightly on resource use (which means some re-prioritizing and changing of consumption patterns in our private and professional lives) and finding more effective ways to protect and preserve (naturally adapting) biodiversity. This second activity will be informed by monitoring species assumed to be climate change 'winners' and 'losers' - if scientists can identify what is most worth saving, this will facilitate major investment in protection strategies. Ecosystem functions and services that benefit human well-being should stay at the forefront of this work.
- There isn't one climate change adaptation goal. Instead, there are tiers of goals. It is valuable to have achievable goals that offer rewards as well as longer-term more complex goals. Working towards a shared set of goals, and ensuring that there are incentives along the way requires co-ordination.
- Policy-makers have a range of options available to them, from rewarding behaviour change to regulating it.
- Different organizations in the biodiversity sector offer different kinds of resilience. Some are more able to take risks. Others have established strong relationships with vulnerable communities. Still others successfully connect local biodiversity initiatives with international expertise. There is no one-size-fits all. If organizations are able to recognize what makes them resilient and contribute these strengths to the overall resilience of the sector, the bigger picture starts to emerge. This needs both co-ordination and leadership at a macro level.
- The term "adaptation strategy" can mislead people into thinking that it is highly sophisticated and technical.

Projects may not recognize or report their adaptation actions because they fail to recognize them as such.

- Climate change needs leaders who can manage the complexity of inter-connected threats and pressures, and who can articulate the ways in which climate change links to existing challenges but also creates new opportunities. Leaders who understand that the best learning happens through making mistakes and reflecting on what 'went wrong', and who can create the space for this kind of learning. Good leaders can reach people across the diversity of the CFR.

Terai Arc Landscape, Nepal

The Terai Arc Landscape Field Learning Site (TAL-FLS) is spread over 23,199 km² and includes four PAs, three Ramsar Sites and two World Heritage Sites. The TAL-FLS is home to 6.7 million people, the majority of whom live in poverty (< USD 1 a day), own less than 1 ha of land, and have few alternatives to agriculture. Forest resources play a vital role in their livelihoods, especially those of the poorest people. In TAL-FLS land is a principal source of income and employment for the majority of households. The poor rely on very few and declining assets and a high proportion of households do not own enough land to support them.

Habitat fragmentation due to a variety of land use pressures was identified as the key change factor to articulate lessons learned from the responses implemented in the TAL-FLS to address the issue. The visible expressions of habitat fragmentation in the TAL-FLS PAs include vast settlements, agricultural expansions, infrastructure and urbanization. The edge effect of fragmented landscapes, is leading to magnified impacts such as increased occurrences of IAS like *Eupatorium odoratum*, *Mikania micarantha*, *Eichhornea crassipis*, and *Lantana camara*. Some of the socio economic changes driving habitat or forest fragmentation in TAL-FLS have been attributed to forest conversion including conversion of forestland into agriculture land on the pretext of authorized resettlement

schemes as well as by illegal encroachment. Encroachment into forest land is also driven by poor agriculture practices. Population growth compounded by a failing land tenure system is another crosscutting factor affecting habitat fragmentation. Forests are used for fuel, animal fodder, food, building materials, medicine, and income generation and 61 percent of rural households still rely on fuel wood for cooking. Forests are also heavily used for animal fodder, either through direct grazing, or collection for stall feeding. These resources are becoming scarcer, due to the massive decline in forest area since the 1950s. Only 12,100 km² of forest remain in the TAL.

Lessons Learned

Conservation Approach

The key lesson learned in the TAL-FLS has been a shift in the approach to PA management. Traditionally the five PAs which cover the Terai region of Nepal were managed as isolated and exclusive areas that needed strict protection. There is however, growing concern that the PAs in the Terai, are surrounded by incompatible land use due to the surging human population and infrastructure. As a result, the conservation interests of the national park authorities and the livelihood interest of the local inhabitants are often at loggerheads. The delineation of PAs is seen as a threat to accessing the basic needs of the local inhabitants and often results in growing antagonism and conflict. Therefore in its approach to managing PAs Nepal has moved from a species-based approach, to a community-based approach, and increasingly to a landscape level approach.

Conservation and Livelihood Linkages

As landscape pressure increases the extent to which conservation (management of PAs) and the livelihoods of local communities are inextricably linked becomes more and more evident. Livelihood issues have to be addressed in order to make conservation and management of natural resources effective.

Partnership and Coordination

TAL is a vast landscape with complex environmental and development issues and includes numerous stakeholders, organizations, government sectors and donors. With a landscape approach the vision is more holistic and inclusive and involves all key stakeholders at the local, district and national level. The ten year TAL strategic plan is an example of close coordination with government, NGOs, donors and community based organizations both at the national and local levels.

Policy

The landscape level approach has also been instrumental in opening up new challenges and opportunities for legal and policy reform whereas the traditional approach to PA management was limited. Some examples of policy contradictions are:

- The Private Forests Nationalization Act of 1957 which brought all forests under government jurisdiction. Despite some democratization of forest use since then (such as in 1978, & through the Forest Act of 1993) which has allowed fuller engagement with community management there remain significant restrictions on most forests users.
- Retaining intact forests under government jurisdiction instead of making them available for community management leaves the government with a management role that it does not have the capacity to fulfill. The lack of government capacity to adequately manage and protect national forest areas allows for uncontrolled use by local stakeholders who lack an incentive to play a stewardship role since they have no official responsibility for the forest and no guarantee of future access.
- Inequitable sharing of benefits within community forest user groups (CFUGs) drives people to continue exploiting national forests. Lack of formal support for CFUGs and inadequate operational plans leads to

poor forest management and ineffective use of national forests resources. Many CFUGs are unable to market timber outside the community due to legal restrictions. A refusal by some district forest officers (DFOs) to provide access to valuable forests for community foresters and a frequent refusal to approve community forestry operational plans that include timber marketing may encourage communities with a right to national forest access to engage in illegal logging within the national forests.

- Confusion and contradiction among different legal acts relating to rights of different institutions regarding use of forest resources is also an ongoing issue. Forestry legislation still prevails over local government legislation. Similarly, there is discretionary power given to DFOs. The International Centre for Integrated Mountain Development (ICIMOD)¹⁷ recommends, among others, the need for attaining consistency among forest acts, rules, and related laws.

Site level lessons

The project documented lessons and success stories related to prevailing management practices which have led to improved conservation of flagship species. With respect to species conservation, the increase in the populations of rhinoceros and tiger since the establishment of the PAs are fine examples. Similarly, captive breeding and reintroduction of gharials, translocation of rhinoceros and camera trapping of tigers are internationally recognized conservation success stories. In terms of habitat management, there are some exemplary works that emerged from the trial and error approach. For example, controlled burning and grass cutting are considered to be beneficial for the overall management of grasslands. There are also some areas where challenges and problems were considered as lessons for sharing, such as pollution of wetlands and the invasion of alien plant species. Similarly, many lessons have been learned in relation to

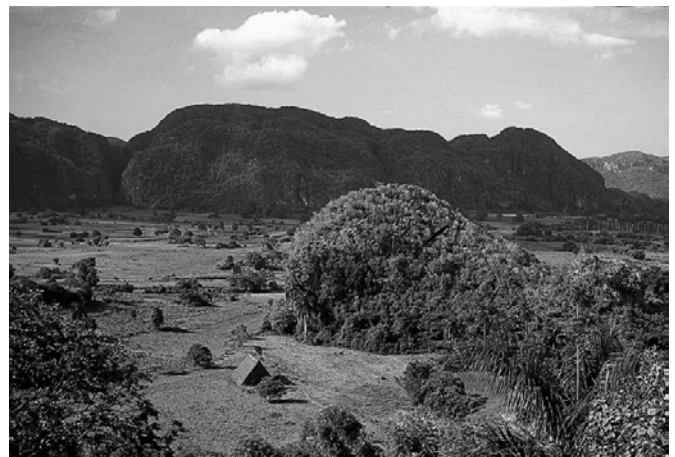
habitat fragmentation resulting from the development of infrastructure associated with growing human population.

Zapata Swamp, Cuba

The Zapata Swamp is a well protected wetland of 7,634 km² located in the insular Caribbean Western region of Cuba. This territory was declared a Biosphere Reserve in the year 2000 and became a Ramsar site in 2001. At national level the Zapata Swamp is considered a well managed resource PA. The main economic activities carried out in the territory are tourism, fishing, apicultural and agricultural activities with a substantial specialization in forestry.

A range of both biophysical and socioeconomic global change factors are affecting the site, however, climate change impact including sea level rise and the prevalence of hurricanes in this region was the main change factor considered in the field learning site. The field learning site examined the causes, mechanisms and interrelationships between these factors as they affect the site coming up with a range of lessons learned and recommendations to respond through an adaptation strategy linked to local financing opportunities.

The project considered several climate change scenarios linked to sea level rise predictions to consider potential impacts in the PA. Based on these impacts an action plan



Cuba's Viñales Valley is an outstanding karst landscape
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outlined a series of management interventions designed to buffer against adverse impact. For example sea level rise impact on sectors such as water resources, terrestrial and marine biodiversity, fisheries, tourism, human settlements and insurance considerations were assessed. Action plans have been developed to consider issues such as monitoring and management of potential invasive species; restoration of mangrove forest buffers to storm damage; and water drainage management. Environmental awareness and education programmes have been designed to heighten the understanding of potential climate change impacts.

Lessons Learned

The project translated its site based findings into generic lesson learned. These include:

- Trying to integrate climate change considerations across all aspects of management of the PA noting that the change requires going beyond short term technical solutions.
- There is an immediate need for rapid adaptation to mitigate against climate change impact and to design and implement monitoring and evaluation programmes in PAs. The administrators of the PA need to pay special attention to global change factor impacts and incorporate these aspects into management effectiveness tools.
- It is necessary to identify adaptation priorities through detailed plans against disasters that can decrease the vulnerability of society to extreme events. These lessons can be disseminated through the implementation of mechanisms such as environmental education, publications, radio programmes, visual media and websites.

Specific priority lessons for PA stakeholders in Cuba

- Encourage projects which can mitigate effects of change both inside and outside of the PA;
- Prepare a strategy and policy for the mitigation and adaptation of the national system of PAs to address climate change;

- Identify climate change indicator species at the national level for the national system of PAs; and
- Incorporate a communications strategy that allows the exchange of lessons learned on global change issues in PAs.

For PA Planners

- Take into consideration global change issues when developing management plans and incorporate adaptation and mitigation measures;
- Identify vulnerable areas adjacent to the PA for potential expansion and investigate options for biological corridors;
- Elaborate protection plans against natural disasters to decrease vulnerability;
- Include ecological and climate monitoring activities within management programmes;
- Include climate change in environmental education activities; and
- Implement zoning approaches that address the impact of the climate change by key sectors.

For PA Managers

- Elaborate collaboration agreements with different stakeholders to mitigate the negative consequences of change such as increased forest fires, management of scarce fishing resources and extreme meteorological events such as hurricanes;
- Implement monitoring programmes for early warning systems; and
- Implement programmes that allow integration and flexibility.

Next steps to face the challenge of global change in the Zapata Swamp PA are to:

- Identify those impacts to which the PA is most vulnerable;

- Identify a vulnerability model for the PA for each one of the global change factors;
- Design adaptation measures for each one of the impacts;
- Outline strategies with a middle and long term goal to mitigate impacts; and
- Establish an ongoing monitoring programme for PA management effectiveness.

Case Studies

Cooperation Between the Private Sector and Conservation: The Nogal Nature and Community Project, Costa Rica

Nogal is located in one of the poorest districts of Costa Rica. The area is also home to two communities: Nogal and Guayacan, each hosting 60 families. Chiquita's Nogal and Guayacan farms are the single major employers to the majority of the local communities' members. Two main factors in addition to predominant poverty and social instabilities represented a threat to biodiversity in this area: habitat fragmentation due to land conversion (mostly for monoculture) and unsustainable use of natural resources (forest exploitation) by the local communities. In particular, between 1991, when Chiquita acquired the Nogal property and 2003, when the forest started to be actively managed, there were incidences of illegal hunting and logging.

On a different scale, two multinational food companies, Migros, one of the biggest food retailers in Switzerland, and

Chiquita, one of the largest banana producers in the world with 15,000 ha of banana-farmed land in Costa Rica alone, were experiencing different, but complementary challenges, in implementing their commitment to introduce environmental principles in their business operations.

It is within this framework that Chiquita initiated discussion with Migros about a conservation project, which then developed into the Nogal Nature and Community Project. The project effectively represents an incremental step in Chiquita's commitment to implement best environmental and social practice for sustainable banana farming. Rainforest Alliance field experiences combined with the political weight of The German Federal Ministry for Economic Cooperation and Development (GTZ) have been instrumental in demonstrating a pro public-private partnership model to effectively achieve conservation objectives.

Lessons Learned

The Nogal project has so far clearly demonstrated that working in partnership can bring beneficial results, and that linking conservation to education and community development activities can create the appropriate conditions for long term conservation in challenging situations, in this case where habitat fragmentation is predominant.

Key lessons that can be drawn from this experience replicable in similar ecological and socio-economic situations include:

The support and participation of local communities is key in a project focused on conservation. Community respect for the conservation of the area and its ecological diversity, the prevention of interference and abuse of the area and its facilities, and the will to support and participate in the effort, are vital for the creation of a PA adjacent to a community. Beyond protection, the community can play a vital role in welcoming visitors, generating an income to sustain the activities, observing and recording fauna and flora, monitoring

Lessons learned from a project manager's perspective

When asked about views on the most important lesson learned from the Nogal Nature and Community Project, the project manager since the inception of the project, Jenni Dinsmore, replied: "I believe it's about working with people! Unfortunately, it is generally assumed that people would not want to participate in this type of project. I have found that reality is quite different. Our community committee group, which meets quarterly, has provided the farmers, who are typically left aside, with a place where they feel part of something. This learning can be adapted easily to other situations, as it is most important to work with everyone and ensure their participation."

change and staffing the project or reserve management team. Furthermore, the management response needs to build on existing ownership structures and land uses, as well as to link biodiversity conservation to economic development by creating economic incentives for the conservation of natural resources.

Make a realistic assessment of the time needed to involve people. The resources and time needed to involve people in a project (from training to educational programmes) are in general underestimated. In the Nogal case the planned amount of training for small businesses had to be almost doubled during the course of the project.

Involve the private sector in conservation efforts. Many of the big non governmental organizations working on conservation strategies at local and regional levels do not involve the private sector enough. Not engaging the private sector, given their significant role as either land owners or in other influential positions, misses a good opportunity to build synergies with key economic and social actors.

Formalize achievements. Achieving wildlife refuge status for Nogal played an important role in strengthening the relationship with the community. It has generated a great sense of pride in the community, and also given Chiquita a formal recognition of their role as partners in conservation.

Build on the educational and communication opportunities offered by conservation. Conservation in the field can be very successful in raising awareness and in education. Local conservation successes offer powerful global communication potential, and projects can generate extremely interesting stories of great educational value both locally but equally to distant audiences. This potential should be built into a project from the outset in terms of the communication products that can be generated as well as recognizing the international benefits.



Trees in Costa Rica, © Joëlle Dufour – IUCN

Support and complement traditional biodiversity conservation strategies with environmental education programmes and the creation of alternative livelihoods.

In areas where communities are stable, independent and economically self-sufficient, unsustainable use of natural resources is minimized. Furthermore, pride and a sense of ownership also play a decisive role in preventing communities from unsustainable exploitation of natural resources.

Conclusions

Combating habitat fragmentation in regions where land ownership is shared between large and small owners is a complex challenge. Poverty and social instability also greatly exacerbate matters by triggering unsustainable use of the resources. The experience in Nogal demonstrates that conservation strategies in areas characterized by intensive use, multiple ownership and unstructured communities have to build

on the full participation of all local stakeholders from the start. The project has also demonstrated that biodiversity is a global issue. The success achieved by the communication strategies launched by Migros and Chiquita demonstrate that local conservation efforts can support a wider and long term reflection on the value of biodiversity and generate sustainable benefits by increasing awareness about the value of biodiversity in our everyday lives, at a local as well as a global level.

The main conclusion that can be drawn from this experience is that conservation is clearly the responsibility of all segments of society. Possibly, no organization (governmental or non governmental) or company (despite its size) would be strong enough to succeed in effectively implementing a biodiversity conservation strategy in isolation. The so-called “Public – Private Partnership” model can provide a successful framework to overcome the weaknesses of unilateral initiatives. In Nogal, the conservation field experience of Rainforest Alliance has been effectively complemented by the business acumen and understanding of Chiquita and Migros, the political weight of GTZ, as well as bringing leverage power to other (smaller) businesses.

Development of Transfrontier Conservation Areas, Southern Africa

These initiatives constitute some of the most exciting and ambitious conservation projects in the world today. The transfrontier conservation areas (TFCAs) projects aim to establish large conservation and wildlife areas not only through the integration of vast landscapes and re-connecting ecological systems, but also through development of cross-border tourism linkages, ensuring sustainable benefits to local communities through socioeconomic uplift, and the promotion of peace and stability in the region. The development of TFCAs is also an exemplary process of partnerships between governments and the private sector. While the main players are the relevant governments and implementing agencies,

donors and NGOs have also greatly contributed towards the creation of transfrontier parks and transfrontier conservation areas.

Southern Africa’s first TFCA was opened in 2000 by the Presidents of Botswana and South Africa. In the same year Mozambique, South Africa and Swaziland established another TFCA. These TFCAs were followed by the Kingdom of Lesotho and South Africa who established the Maloti-Drakensberg Transfrontier Conservation and Development. In 2002, the Great Limpopo Transfrontier Park was proclaimed with the signing of the International Treaty at Xai-Xai, Mozambique by Mozambique, South Africa and Zimbabwe. The International Treaty for the establishment of the IAI-Ais/Richtersveld Transfrontier Park was signed in 2003 by Namibia and South Africa. Finally, the Limpopo / Shashe TFCA project gained momentum with the signing of the MoU by Botswana, South Africa and Zimbabwe in 2006.

It is evident that the development of transboundary conservation areas in the region can potentially play a significant role from both a conservation and socioeconomic development perspective by contributing to regional economic development and integration, sustainable livelihoods, peace and security and increased capacity for biodiversity conservation.

The key objectives of the study include the following:

- To evaluate lessons learned in the development of TFCAs in South Africa as part of IUCN’s EPP Project;
- To provide background information on the development of Transfrontier Parks / Transfrontier Conservation Areas in South Africa; and
- To provide PA managers and decision makers with innovative, practical ideas and approaches that better equip them to manage large scale landscape level conservation initiatives.

Lessons learned

Based on experience to date, the following key issues are critical to defining the success of the planning and development process for the establishment of TFCAs:

- High-level political buy-in often results in high level of exposure and funding. Conversely lack of political will and understanding will impede the process. This includes a lack of understanding and/or commitment from other relevant government agencies and key role players in the TFCA development process;
- Effective collaboration and co-operation between countries often results in peace and stability in the region;
- A key strength of transboundary conservation projects is the ability to create opportunities for collaboration and partnership building on various levels and scales i.e. international, national, regional, and local levels;
- Unequal management capacity, including the lack of human and financial resources in the relevant institutions, will also impede the process. Rate of planning, development and implementation process may not be suitable to all the parties involved, especially when there are disparities relating to institutional capacity, financial resources, and level of community / stakeholder participation;
- Capacity to lobby for and secure funds for TFCA related activities could potentially slow down the rate of implementation of the project;
- Disparity in policies and legislation may require harmonization processes to facilitate effective implementation of TFCAs;
- Effective local community and key stakeholder participation in the planning, development, and implementation process is critical to the long term success of the project;
- Potential conflicts could arise resulting from countries having different resource management strategies (e.g. sustainable consumptive use versus non-consumptive use);
- Potential incompatibility of goals when countries

are in different stages of development, or when the components of the TFCA differ in the level of tourism infrastructure investment, could hinder progress; and

- Language barriers may have to be overcome to ensure effective communication.

The following issues relate specifically to lessons learned in biodiversity conservation:

- The importance of developing a Joint Management Plan to provide policies and guidelines on the management of joint issues. This plan should also address issues relating to management zoning, and ensuring that the zoning of each area is compatible with the neighbouring area;
- If desirable, change the designation of the PA to give it higher importance / status in each country, and make it compatible with the PA classification of the TFCA component in the neighbouring country;
- Adopt an approach which embraces sustainable multiple land use in achieving trans-border ecosystems management and conservation of shared biodiversity;
- Harmonise approaches to natural resource management, which include community based natural resource management; and
- Develop a common vision to disease control, which is based on the sharing of information, and develop contingency plans for when the levels of wildlife diseases get above acceptable levels.

The following issues relate specifically to lessons learned in stakeholder participation and socioeconomic development:

- Consult and involve all stakeholders in the TFCA planning and decision-making process, and the implementation of the project;
- Involve local communities and other key stakeholders in the monitoring and evaluation process of the TFCA goals and objectives;
- Develop an integrated tourism strategy and infrastructure

development plan, which addresses issues such as linkages, tourism development zones, branding, product development, etc.;

- Create partnerships between the stakeholders involved in the process, and develop mechanisms to ensure that benefits accruing from the project are distributed in an equitable way between all parties involved; and
- Projects need to demonstrate and deliver tangible socioeconomic and community benefits in order to be sustainable and effective in the medium to long-term.

The following issues relate specifically to lessons learned in institutional development and change:

- Unequal management capacities, including the lack of human and financial resources in the relevant institutions, will also slow or impede the process;
- The planning and development of TFCAs, which include communal and private land, and the formation of appropriate institutions to manage these presents a bigger challenge than with only state owned land;
- In order to have effective management of TFCAs, the relevant institution should also ensure effective participation of and communication to the various key stakeholders involved in the process. These stakeholders will often include local communities and the private sector;
- Develop appropriate institutions for the management of the area. This should include creating opportunities for closer collaboration, building the capacity of the institutions of the weaker parties involved, and ensuring that there are opportunities for the transfer of skills in the development process;
- Harmonize approaches and procedures for private sector involvement in the project, and encourage local investors to actively participate in the project. This would include the reviewing and harmonization of tenure policies to provide security for potential investors and protecting the rights of local communities; and

- Develop mechanisms to resolve conflicts between partners in the planning and management of the TFCAs.

Impacts of Climate Change and Pollution in Barsakelmes Nature Reserve, Kazakhstan

The Barsakelmes Strict Nature Reserve was established in 1939 and is located in the Aral Sea area of Central Asia. Within the Aral Sea Basin there are 20 state reserves with a total area of 600,000 ha situated in the Central Asian states of Uzbekistan, Turkmenistan, Tajikistan, and Afghanistan. This is a region which has been subject to catastrophic environmental change during the last 40 years, changes which have dramatically altered the hydrological regime and micro climate. A combination of increasing aridity, desertification, chemical pollution and a huge drop in water levels has resulted in profound ecological impact on nature and local people living in the north and east parts of the Aral Sea area. The environment in this region has radically changed from a well watered inland maritime environment to cold waterless desert. Compounding the environmental problems in this area is a complex mix on interrelated factors: socioeconomic changes to settlement patterns and livelihoods; altered hydrology due to human demands on water for irrigation and development; natural and altered evaporation cycles; and a legacy of heavy metal and pesticide contamination in water, sediment and the biota.

Of all the PAs in the region Barsakelmes Nature Reserve has been subjected to greatest change. During the last ten years decreasing water levels have reunited what was originally an island reserve with the east coast of the Aral Sea. As such significant change has occurred in many of the reserve's parameters including the movement of wildlife from the PA to the coast. Global climate change is likely contributing to these changes.

Despite these impacts the Nature Reserve has survived as a PA for the conservation of local biodiversity. In recent years the Kazakhstan government, through its special agency on PAs (Committee of Forestry and Hunting of Ministry of Agriculture of Kazakhstan), has increased the size of the reserve and established a good management and protection system. The State expanded the reserve in 2006 by almost 10 times including the addition of the dry seabed. Now conservationists propose the creation of a Man and Biosphere Reserve to improve protection of the broader values of the area with the Barsakelmes Nature Reserve at its core.

This case study examines the unique interplay of circumstances within the Barsakelmes Nature Reserve which serves as a model landscape and a rare example of natural biological successions with very limited human impact. It is situated in the middle of the Aral ecological dynamic and is therefore a unique natural laboratory for studying climate aridization; desertification of landscapes; changes of structure and composition of ecosystems; and evolution and adaptation of biota to global environmental change.

Lessons Learned

It is important that PAs in this region aim to conserve genetic diversity and species reproductive viability balancing ecosystem health with the ability to sustain human well-being. The most effective form of conservation for this area is a through the creation of strict nature reserves. Expansion of the Barsakelmes Strict Nature Reserve is recommended to include three cluster areas within the reserve: 1) former island Barsakelmes with surrounding dry seafloor; 2) the two former islands Kaskakulan and Uzunkair with surrounding dry seafloor which are main habitats of onager (kulan) and Persian gazelle (jairan); and 3) wetlands in the Syrdarya river mouth.

New deltas formed through proposed dam construction (North Aral Sea - 42 m in height) can provide for new natural

systems (hygro-mesophytic meadow-tugay vegetation with associated wildlife, water and riparian forest). Deltaic lakes and shallow water can also provide spawning habitat for fish thereby supporting economical activity. Regulations to protect the area and its resources are the only guarantee for the conservation, of commercially valuable species.

It is recommended that a Man and Biosphere reserve be established in the near future as the most flexible way to integrate and coordinate measures for conservation and sustainable development in the region. This new form of PA will be an important link in the process of strengthening the PA regime, interacting with local people for sustainable development and for investment in the area. The World Bank supported North Aral Sea project will support the initial stages of a process to find better balanced conservation and development outcomes for the region.

The case study also identifies the need to stabilize and restore degraded ecosystems which have been badly impacted by the combination of change factors at work.

Several specific ecosystem priorities have been identified as important for conservation in this region:

Vegetation

The need for effective conservation of several natural communities and ecosystems including 'Saxaul' woodlands in their natural condition; typical 'Turan' desert plant communities; primary dry seabed vegetation including rare and endemic species; and floodplain meadows and shrublands. It will also be important to guarantee on-going island ecosystem natural successions on Barsakelmes without human impact, noting the value of this PA as a laboratory for the study of vegetation dynamics and primary successions important for understanding processes of evolution.

Wildlife

Consideration of adequate habitat conditions such as drinking water will be important to the management of wildlife populations. For example lack of drinking water forced the migration of kulans to irrigation canals in summer, returning to the peninsula in winter. The possible reintroduction of Persian gazelle should be considered. The viability and management of wetlands is also of great significance in supporting populations of migratory waterfowl.

Landscape diversity

The landscape's diversity and interrelationships with global change factors offer great potential for global study. For example understanding the natural and human induced landscape dynamics which drive desertification processes; the development of new ecosystems and biota in continental conditions; and the development of aeolic processes and salinization – desalinization processes.

Effect of Grazing on an Invasive Species, Koshi Tappu Wildlife Reserve, Nepal

Koshi Tappu Wildlife Reserve (KTWR) is located on the floodplains of the Sapta Koshi River in Saptari and Sunsari districts of eastern Nepal. The biological richness of Koshi Tappu is outstanding, and includes the country's only wild buffalo (*Bubalus bubalis*) population. With over 400 endemic and migratory bird species, the reserve supports about 50,000 waterfowl and is an important staging and nesting site for a large number of bird species. Recognizing its resources as being of global significance, KTWR was included on the Ramsar List in 1987, the first Ramsar site in Nepal. Since the declaration of Koshi Tappu as a Wildlife Reserve in 1976, while many conflicts regarding the resource utilization exist between local people and Reserve authorities, livestock grazing has always remained a debatable issue. The area has been continuously used for livestock grazing by local people for decades. The number of livestock, mostly cattle and buffalo, could easily reach 20,000 to 25,000. This level of grazing was being practiced despite the



Rhododendrons on Mount Makalu, Nepal
© Jeffrey McNeely, 1973 – IUCN

legal ban on any sort of resource use being in place, probably due to lack of enforcement of park regulation until 2002.

Mikania micrantha, commonly known as mile-a-minute, is a smothering vine of varied habitat, but grows well under humid, sunny or shaded habitats. High levels of invasive alien species (IAS) in the KTWR is potentially posing a great threat to the ecosystem including *Begonia tribenensis*, a rare species and the only endemic species occurring in the PA. In recent years *M. micrantha* has gravely invaded the forest communities of the eastern bank of Koshi River.

The objectives of the case study research were to: (a) assess the present status of *M. micrantha*, and associated flora in KTWR; (b) assess the impact of total control of grazing on the spread of IAS, (c) understand the responses of plant and animal species (birds particularly) to IAS, and (d) assess peoples' perception towards current status of IAS and its impact on their socioeconomic conditions. Of particular interest was the relationship between grazing and control of *M. micrantha* and what grazing regime in the PA was the most effective in controlling these aggressive IAS.

Factors related to spread of *M. micrantha* in KTWR

Grazing: The spread of *M. micrantha* has not only changed the species composition, but also affected the grassland's structural integrity which is important for supporting sizeable populations

of different bird species; in particular Olive-backed Pipit (*Anthus hodgsoni*) which are facing problems finding suitable places inside the reserve because of high infestation of *M. micrantha*.

Soil characteristics: Soil characters seem to be an important factor for the establishment and dispersal of *M. micrantha* in KTWR. It was observed that *M. micrantha* grows well and vigorously covers the forest trees, regenerating tree saplings, bushes and grasses where fertility, organic matter, and soil moisture are all high.

Road corridor: The KTWR is linked with easily accessible roads which seem to act as a functional corridor for quick dispersal of *M. micrantha*. Seed dispersal by wind and on the hairs of animals in the past might also have enhanced the dispersal of *M. micrantha*.

Lessons Learned

M. micrantha as a resource for local people

Comparatively the hill communities collect more *M. micrantha* as fodder for stall-feeding than the Terai community. Particularly during the rainy season when fodder is scarce, the hill communities feed *M. micrantha* to goats, buffaloes and cows as raw or cooked (kundo) with grain powder and rice husk. The hill communities believe that *M. micrantha* is low quality fodder and that among other things, it reduces milk production. Grazing seems to have played an important role in keeping the population of *M. micrantha* low along the western boundary of the reserve. However, an optimum level of cattle population needs to be identified for sustainable management of the ecosystem in KTWR.

Moderate grazing as a tool for habitat management

The study found that an intermediate level of disturbance in many systems generates the highest level of species richness and diversity and higher primary production, thus moderate level of grazing could be a tool to manage the ecosystems in KTWR. This counter intuitive notion that grazing in a PA which is often

strictly prohibited, might be ecologically beneficial in the control of IAS in PAs provides an interesting IAS control tool for PA managers.

Lessons for PA Managers

Rapid migration or spread of IAS such as *M. micrantha* disturbs original habitats of animals such as rhinos and deer. In the case of Terai, rhinos were found to leave the core area of the park in search for natural food in nearby forests frequently visited by poachers. The key lessons learned in this case study is that there is a positive correlation between the number of rhino kills and the spread of this notorious weed.

Management of M. micrantha

The KTWR is an environmentally sensitive area. All IAS should be considered as potential threats, and should therefore be carefully managed, and monitored for conservation purposes. Some suggestions recommended for management include:

- Enforcement of legal instruments;
- Public awareness and education; and
- Identify future steps in the areas of research, prevention, containment and eradication, and control.

M. micrantha has spread in many parts of the reserve therefore, research activities dealing with control technologies need to be increased and intensified. Some possible ways are: (a) Physical control, (b) Chemical control, and (c) Biological control; only after a careful field trial and monitoring.

The issue of IAS needs to be put on the national agenda in Nepal and an action plan developed on *M. micrantha* without further delay. The status of *M. micrantha* and its impact on natural systems in different parts of the country must be assessed. The research should be initiated by implementing a long-term pilot study in the KTWR to assess the impact of grazing, and other physical and biological factors. Adequate quarantine regulations should be promulgated to control the introduction of IAS. Management of IAS will require an integrated approach with

coordination among different ministries and agencies, relevant departments, academic institutions, NGOs, communities, and most important among the PA managers. In this context, Nepal needs to extend national, regional and international cooperation in developing, sharing, linking and integrating IAS database and information systems, and research support for effective prevention and management of *M. micrantha*. These undertakings will improve the public awareness of the impact of IAS to national stakeholders, and strengthen participatory management practice.

Urbanisation and Protected Areas: Challenges and Opportunities, Global

Urbanization has long been one of the major forces shaping the world, and most PAs will be affected by it in one way or another. Urban centres both help and hurt PAs. On one hand they relieve pressure on rural land and natural areas by concentrating human populations achieving economies of scale. On the other hand they can cause harm to surrounding environments through pollution and depletion of natural resources. The lessons learned from the case studies draws examples from tropical savannahs, grasslands, and deserts, and looks at how urbanization is affecting PAs globally. More specifically, it examines situations in parts of Kenya, Mexico, South Africa, and the USA (with notes on other countries). Based on these case studies and the scientific literature, challenges and opportunities have been identified, and lessons learned are presented.

Lessons learned

- *Realize that the answers are more political than technical.* Such tools as ecosystem management, buffer zones, and regulation of privately owned land are certainly useful, but those responsible for PA rarely have authority to implement them alone. In any case, such methods usually don't work well in places under pressure from urbanization unless they are accompanied by political action. Since PA managers are usually restrained from intervening in politics, they need to make alliances with those who can.

- *Forge alliances.* Useful for many reasons, alliances range from temporary coalitions to formal partnerships, to umbrella organizations that deal with a broad range of issues. Some potential allies are obvious (other conservation agencies and conservation NGOs), others less so. Talks aimed at forming alliances should begin as early as possible. Multipurpose projects are a good way of building long-term partnerships.
- *Encourage social entrepreneurs.* People with entrepreneurial skills are essential to making partnerships work and carrying out creative ideas. Such people need to be identified, encouraged, and supported. These agents of change are not always vocal "leaders"; they often like to keep low profiles.
- *Help and engage your neighbours.* Urban neighbours are much more likely to help PAs if PAs help their urban neighbours. Urban neighbours should be regarded as partners, and encouraged to act that way.
- *Engage political and community leaders.* Such leaders include not only officials of all levels of government, but also heads of businesses, universities, and civic associations, as well as opinion leaders, especially members of the press. Organized visits are effective ways of showing leaders the resources, opportunities offered, and problems faced by PAs in urban and urbanizing settings. In working with decision-makers, benefits should be quantified as much as possible, and words should be chosen carefully, e.g., "ecological services" may have more appeal than "biodiversity."
- *Educate and engage the public.* Over the long term, the most important things that can be done to cope with urbanization are educating the public at large about the impacts of urbanization on PAs, and engaging them in finding and carrying out solutions.
- *Educate conservation colleagues.* The doctrines and priorities of PA agencies typically relate to the hinter lands. Leaders of conservation agencies and NGOs need to be educated about the special problems faced by PA in

urban and urbanizing situations, as well as the special opportunities offered by urban PAs. Not least among these opportunities is strengthening support among urban voters for large-scale conservation.

- *Give special attention to immigrants.* Many of the world's cities have become magnets for immigrants from other countries. Newcomers are often unfamiliar with the natural environments of their new homes, environments that can differ radically from their places of origin.
- *Demonstrate good environmental behaviour.* Promote by example such sustainable practices as recycling, green building, and solar energy.
- *Bypass the local establishment if you must.* Local officials are often unwilling or unable to stand up to urban sprawl. Action by higher levels of government may be necessary.
- *Take advantage of international organizations and processes.* International organizations, both governmental and non-governmental, can provide expert advice, funding, and opportunities to exchange experience. Formal processes under intergovernmental agreements can sometimes provide remedies, e.g., concerning migratory or threatened animal species, or transboundary pollution.
- *Use advanced policy, management, and technical tools.* Examples of such tools are satellite imagery and methods of collaboration and evaluation.
- *Use policy and social science research.* Although PA managers are accustomed to working with natural scientists, they can also benefit from experts in such fields as economics, public policy, management, sociology, and health. Especially useful are ongoing relationships with universities in these fields.
- *Help organize and participate in training and exchanges.* Formal training and more international exchanges of professionals are needed.
- *Draw on creative people and their ideas.* Writers and artists who give voice to a strong regional identity are key ingredients in standing up to urban sprawl, as are ideas

and concrete examples about what is possible in specific situations.

- *Adapt buffer zone and wildlife corridor concepts to local circumstances.* Those who succeed in creating such zones and corridors in urbanizing areas are politically skilled, adept at seizing opportunities, and know how to raise money from public and/or private sources. Although national and state or provincial governments can provide a framework, land-use decisions are essentially local and require negotiation parcel-by-parcel. Wildlife corridors have special requirements: They must be defined based on specific scientific knowledge of wildlife migration patterns.
- *Promote alternatives to urban sprawl.* Those responsible for PAs can work with others to create regions that are mosaics of urban, working landscape, and wild.
- *Take aggressive action to control invasive species.* Along with urbanization often come invasive plant and animal species that can cause enormous damage to biodiversity in PA within a short time. Quick and aggressive responses are required.
- *Host "conservation nerve centers" in urban PAs.* Such centers promote cooperation and synergy among agencies and NGOs by housing their offices and providing meeting space.
- *Work for transparency.* Almost everywhere, political influence undermines efforts to control unwise development around PAs. Often, this influence is bought with election campaign contributions or favour-trading, if not outright bribes. In many countries, this is a very sensitive, even a dangerous issue. However, opportunities may arise to report bribery or make alliances with those who can do so. There is a growing international anti-corruption movement.
- *Accept that it's probably not "already being done."* An all-too-typical response to hearing about innovative programmes is "it's already being done." Chances are that much more could be done than is being done.

Bio-Income and Plant Invasion: Chitwan National Park, Nepal

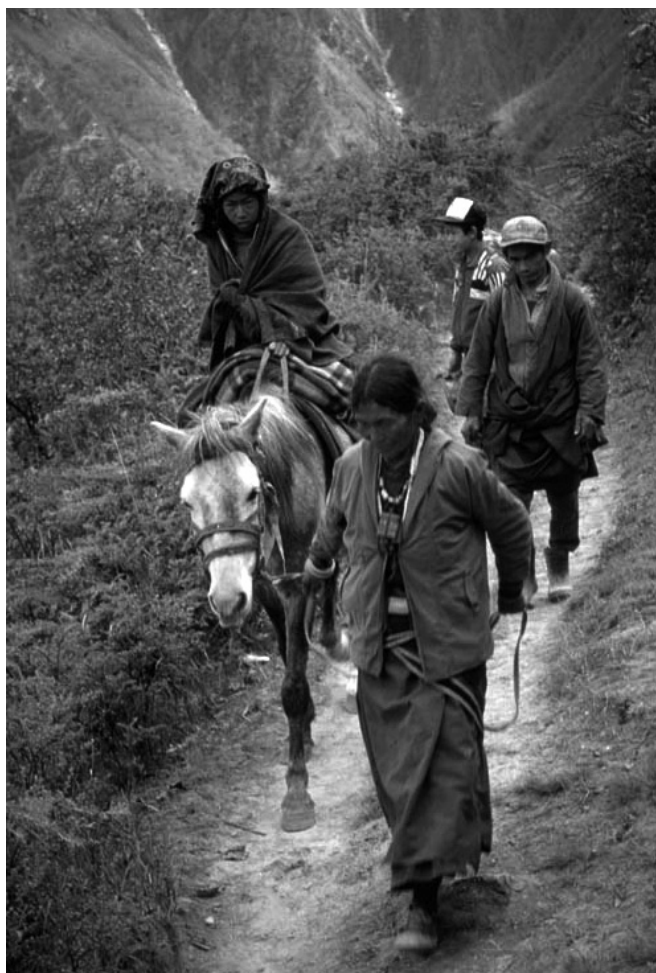
The Terai Arc Landscape, a composite form of different habitats, ecosystems and land use types in the shadow of the Himalaya links the PAs through maintaining the connectivity of remaining forests. Stretching over an area of 49,500 km² from Nepal's Bagmati River and east of India's Yamuna River in the west, this landscape maintains a link between 11 PAs in India and Nepal.

Pressure on the forest resulting from over harvest of fuel wood is one of the major causes of degradation of forests in the Terai Arc Landscape. 61 percent of the total households in the Terai Arc Landscape depend on fuel wood as a primary source of energy. Average fuel wood consumption per household per day is 6.8 kg. Therefore, promotion of alternative and energy efficient technologies such as biogas plants is the major strategy to counteract the threat of forest degradation from over reliance of the local communities on fuel wood. Biogas promotion is one of the major activities of integrated and multi-pronged interventions to restore and conserve wildlife corridors and forest connectivity in the Terai Arc Landscape.

Lessons Learned

The lessons learned from management interventions such as habitat extension, and cash crop cultivation can be viewed from two perspectives, namely habitat extension and bio-income generation.

Promotion of biogas plants as an alternative energy technology took momentum with the implementation of the Biogas Support Programme of the Dutch Development Organization (SNV Nepal) in 1972 and the establishment of an Alternative Energy Promotion Centre (AEPC) by the Government of Nepal in 1996. Previously, biogas was thought to be meant for well off farmers only because of its high cost despite the government's subsidy. Thus, the poor farmers could not afford installation of biogas plants. In this regard, WWF¹⁸ Nepal took an initiative to



Men and women in the Shey-Phoksundo National Park, Nepal
© Jim Thorsell, 2000

promote biogas plants through micro-finance schemes with the aim of reaching the poor farmers as well. Revolving funds are established at the local cooperatives to operate micro-credit schemes. The cooperatives provide collateral free soft loans to the farmers for installing biogas plants. The cooperatives charge only eight percent interest towards the loan taken for biogas installation. Likewise, the farmers have an opportunity to pay back the loan through several instalments. Due to the micro-credit schemes even poor farmers have been able to install biogas plants.

There is evidently a future for biogas in the Terai Arc, but this technology is still out of reach for the majority of people who cannot afford it without micro-finance schemes.

Residents of Khata village are like many villages in Terai dependent on the forest products which exert massive pressure

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on the forest that maintains the link between Bardia National Park in Nepal and Katarnia Wildlife Sanctuary in India. Biogas promotion is one of the important activities to stop unsustainable extraction of fuel wood from corridor forests in Khata village.

200 farmers in Khata village have installed biogas plants under the micro-credit scheme established by WWF Nepal which saves 900 metric tons of fuel wood annually. As a result a significant growing stock of trees has been saved from clear felling for fuel wood.

“The advantages of biogas plants are numerous,” says Bhadai Tharu, a villager. “The village’s reliance on forest fuel wood has decreased dramatically, and health and sanitation conditions have improved.”

The use of biogas has brought noticeable improvement in health and sanitation conditions. Cooking with firewood causes chronic respiratory related infections, especially as there are no chimneys in traditional rural houses in Nepal. Installing biogas plants in houses especially improves the health of women and children, who spend a lot of time in the kitchen.

Seeing the multi-fold benefits of biogas, villagers of Khata are now committed to install more biogas plants in their communities in the days to come. The case study demonstrates the importance of addressing underlying causes of environmental degradation and impact on PAs, in this case through a focus on supporting the use of alternative energy technologies to change people’s lives and so reduce the demand for fuel wood.

Community-Based Conservation and Decentralization, India

Decentralization of political and administrative power is a global phenomenon, with various countries at various stages of devolving decision-making functions to local governments. This appears to have varying impacts on the conservation and management of natural resources, but the relationship is not

well-studied. This study attempted to look at these links in the context of community-based and participatory conservation in three States of India; Nagaland, Orissa, and Maharashtra.

Two kinds of decentralization are relevant:

1. Informal, people-initiated moves to gain control over decision-making and implementation. This is often achieved through site specific institutions and systems.
2. Formal legal or policy measures by governments, to devolve powers.

The two above may overlap, but very often they run in parallel. The case study focused on how these two modes of decentralization relate to each other, to centralized forms of decision-making, and to biodiversity conservation initiatives. Specifically, this report asked the following questions:

1. Does decentralization in general, or one or both of these modes of decentralization, enhance or hinder conservation?
2. How do these two forms of decentralization relate to conservation and to each other?
3. How do these two forms of decentralization relate to PAs (here including community conserved areas (CCAs))?
4. What are the lessons that can be learned from diverse conservation initiatives using decentralized models of decision-making?
5. Are changes needed in the way in which both informal and formal decentralization is taking place, to enhance conservation effectiveness and sustainability?

Lessons Learned

As noted above, the study investigated questions on formal and informal decentralization in the context of case studies from three states of India: Maharashtra, Orissa, and Nagaland. Culturally, these are very diverse states. Many of the case studies are based in areas with significant or predominantly tribal populations.

Lessons learned and conclusions include:

- It is important to look at three different kinds of decentralization (political, administrative, legal), both in their formal and informal modes.
- In general, it appears that decentralization creates the conditions for more robust conservation and sustainable management of natural resources. However, this is not always necessarily the case; it also depends on a number of other factors.
- Decentralized management at all the sites studied seems to have improved the status of natural ecosystems and wildlife (based on visual information and local testimonies), but barring one site, there are no systematic studies to scientifically establish this. Such studies are urgently needed.
- In turn, the community based conservation initiatives seem to have promoted stronger decentralization, by further empowering local institutions and people. In some cases, local mobilization in other (e.g. development, empowerment) arenas has helped in conservation; in others, local mobilization in conservation has helped in decentralized efforts at livelihood improvement and more sustainable developmental inputs. Provision of information has been a critical source of greater local empowerment. Strength has also been obtained in some cases due to conserving communities getting together on a common front.
- In some cases previously underprivileged groups such as women and 'lower' castes, have gained greater equity through the conservation initiative. But this is not the case across the board, and equity issues remain a critical gap in many instances.
- There is a clear link at all the sites, between conservation and livelihoods. The conservation initiative, where decentralized or sensitive to local concerns, has usually led to improvement or strengthening of natural resource based livelihoods of local people. This may not, however, be equally spread across the relevant communities.
- Security of tenure of land/resources being conserved, or the confidence that the community could continue with its initiative irrespective of the legal ownership of the land, is key to a successful decentralized initiative. Where ownership or control was clearly established, conservation seemed more secure. In turn, community mobilization to conserve resources had at times increased the tenurial security over the land/resources being conserved. In cases of continued tenurial insecurity, conservation was on a more tenuous footing.
- At all the sites, it was clear that an individual or a group of individuals from within the community played an extremely important role in motivating the community, carrying out important tasks and guiding the entire initiative. Such leaders often pay a substantial personal price for their role. Passing on of leadership could be a crucial issue for the sustainability of these initiatives.
- In this regard, the role of a well-established local institution was found to be crucial. Where the initiative was dependent on an individual, continuity problems could be felt sooner or later. Where there was an institution, set up by or with the consent and central involvement of the local community, continuity was more assured. Institutions were also crucial as the interface between the community and outside agencies.
- The role of outside agencies or persons appeared to be crucial in all cases, including those where the effort was completely self-initiated. This role could be viewed as a catalyst, facilitating links with the outside world, intervening in conflict situations, or for providing crucial policy/technical/information inputs.
- The national and state policy environment within which these initiatives are located have a great influence on their success or failure. In most cases, such an environment was inadequate, and could in fact be a hurdle to long-term security of the conservation effort. There is a great and urgent need for changes in state and national policies and laws, to further facilitate community-based and participatory conservation.

Lessons Learned Matrix

Global Change Factor	Field Learning Sites									Case Studies						
	Congo Basin, Cameroon	Protected Areas, Costa Rica	Yasuni Biosphere Reserve, Ecuador	Apo Island and Dauin Sanctuaries, Philippines	Socotra, Yemen	Kruger National Park, South Africa	Cape Floristic Region, South Africa	Terai Arc Landscape, Nepal	Zapata Swamp, Cuba	Nogal Nature and Community, Costa Rica	Transfrontier Conservation Areas, Southern Africa	Barsakelmes Natural Reserve, Kazakhstan	Koshi Tappu Wildlife Reserve, Nepal	Urbanization and Protected Areas, Global	Chitwan National Park, Nepal	Nagaland, Maharashtra, and Orissa, India
Socioeconomic																
Urbanization															✓	✓
Consumption and production patterns	✓	✓	✓	✓	✓			✓	✓	✓		✓		✓	✓	
Population and GDP growth		✓	✓	✓	✓			✓				✓		✓	✓	
Biophysical factors																
Climate change	✓						✓		✓		✓	✓				
Habitat conversion and fragmentation	✓	✓	✓		✓		✓	✓		✓	✓		✓		✓	
Alteration of hydrological cycles						✓	✓					✓				
Invasive alien species							✓	✓	✓				✓			
Biodiversity loss	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Institutional change																
Governance	✓	✓		✓						✓	✓					✓
Changing global norms (human rights and equality, democracy, accountability and global cooperation)	✓			✓		✓		✓		✓	✓				✓	✓
Access to information*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ease of communication*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* Implicit by definition of the EPP Project and through the creation of PALNet as a knowledge management tool.

Conclusions

All the “factors of global change” mentioned above result in increasing uncertainty for the future of global biodiversity and the goods and services provided by ecosystems. However, they also open new windows of opportunity to make PAs more sustainable and effective in social, economic, and ecological terms. The challenge lay in managing these areas adaptively in order to address new challenges while capturing new opportunities.

Whilst the lessons learned and findings of the EPP Project field learning sites and case studies represent a very varied spectrum of experiences in diverse circumstances there are some common threads which emerge:

- Change can be gradual and almost imperceptible or it can be sudden and dramatic as is the case in the far reaching ecological impacts seen in the Kazakhstan case study.
- Global change is not always negative, in fact how we view change and respond can be the difference between a negative impact and a positive benefit. The case study on urbanization demonstrates that being in touch with changing demographics can allow managers to better anticipate and take advantage of shifts in visitor attitudes and awareness and perhaps consequent political support.
- Innovation may come at any level – at the site, national, regional or international level but is generally most effective when it delivers practical results in the field.
- Adaptive management allows PA decision makers to be more responsive in coping with change. The process of accepting the inevitability of change and forecasting impacts and trends is a healthy one leading to a constant cycle of improvement. A good example comes from the Strategic Adaptive Management tool developed in the Kruger National Park which is challenging our understanding of the desired state of management.
- The choices open to PA managers to address change can sometimes appear counter-intuitive; a perceived threat may mean a solution to another threat within the same PA. This is demonstrated in the case of the Terai Arc Landscape study showing how the controlled use of grazing can help control alien invasive plants.
- PA planners and managers need to adopt a holistic approach, one which tries to understand and address the root causes of impact and the overall system dynamics when considering innovative approaches to biodiversity conservation. For example understanding and acting on alternative energy technologies such as the use of biogas in lieu of fuel wood can have a profound positive impact on resource degradation.
- Partnerships are crucial to successful PA management in a changing world. New actors are forging new, stronger alliances and governance models to address change. The successes of public-private partnerships in Costa Rica and multi-sectoral, approaches in Cuba testify to this.
- A common factor for success lay in investing in local community participation. Long-term commitment, patience and genuine respect for local views are universal lessons learned from our experience in managing PAs.
- PA benefits must be real and tangible if we are to capture the value of these areas in dealing with global change. The learning from the Congo Basin Co-Management Network in Cameroon reinforces this point.
- Many people are experimenting with creative approaches for dealing with threats and opportunities. Unfortunately, many of these innovators are working in isolation from other managers and do not recognize the innovative nature of their approaches. As noted in the case studies on urbanization this can lead to the false assumption, that “it’s already being done”.

The work presented in this synthesis is but a fraction of the creative approaches being used around the world. There are many gaps in the global change factors addressed through the EPP Project. A common change factor, however, relates to the increasing ease of access to information. Interestingly this project's emphasis on exchanging innovation especially through the creation of the PALNet interactive website is an example of an innovative response to this for PA practitioners. Demand for access to new ideas is increasing and it is hoped that PALNet will play an on-going and expanding role as a tool to share knowledge and lessons learned within the PA community.

More Information

As previously mentioned, the field learning sites and case studies presented are part of a larger global initiative, the EPP project and PALNet.

For further information on the field learning sites and case studies, the reader is directed to the interactive PALNet website (www.parksnet.org) where full reports, contact persons and other supporting documents are available. To find out more about IUCN's PAs Programme and the WCPA please contact:

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IUCN - The World Conservation Union

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