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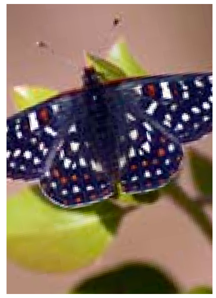

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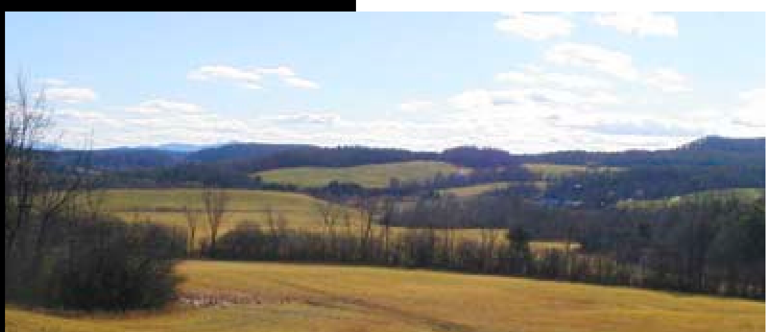
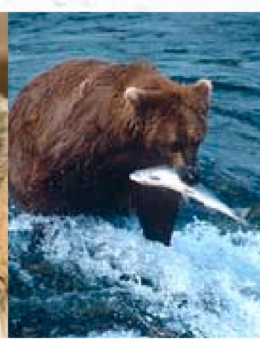
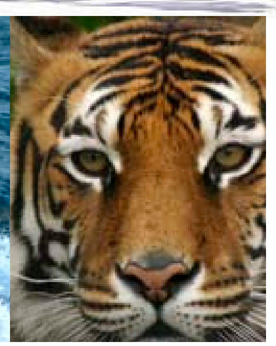
MAKING PROTECTED AREAS RELEVANT:



A guide to integrating protected areas into wider landscapes, seascapes and sectoral plans and strategies

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Making Protected Areas Relevant:

A guide to integrating protected areas into wider landscapes, seascapes and sectoral plans and strategies

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FOREWORD

Protected areas are the cornerstone of any strategy for conserving biodiversity. To date, 12.2% of land, and 5.9% of territorial marine areas are under some form of legal protection. Protected areas are remarkably efficient tools for the achievement of the aims of the Convention on Biological Diversity — to conserve biodiversity and ensure its sustainable use, while also equitably sharing its benefits. Protected areas contribute to the survival of genetic resources and species and the health of ecosystems around the globe. At the same time, protected areas provide livelihoods for nearly 1.1 billion people, are the primary source of drinking water for over a third of the world's largest cities, are a major factor in ensuring global food security through the protection of fisheries, wild crop relatives and ecosystem services, and provide a critical safety net for the one billion people living on less than a dollar a day.

Governments are facing national and global economic crises, increased poverty, increased fragmentation and habitat loss across landscapes, and increasing impacts from climate change. These pressures conspire to create unprecedented challenges in establishing, managing and maintaining comprehensive protected area networks. Yet never has this work been more important than today.

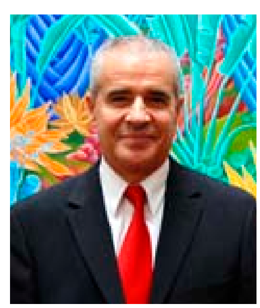
Protected areas established in isolation may not fully yield the expected benefits in the long term. Isolation in this sense is geographical as well as sectoral. If protected areas are solely the concern of the environment sector, then their benefits are not as great as when other sectors such as mining, tourism and energy participate in protected area planning and management within a balance that benefits all.

By integrating protected areas into the wider landscape and seascape, and by incorporating protected areas into sectoral plans and strategies, governments can be certain that their investments in protected areas will pay biodiversity and social dividends well into the future. A recent report that summarized over 1,000 studies worldwide, for example, estimated that investments in creating and managing protected area networks would yield a return on societal benefits on the order of between 25:1 and 100:1.

Perhaps one of the most important benefits of integrating protected areas is the side benefit of integrating and mainstreaming protected areas into climate change adaptation and mitigation strategies. A comprehensive, well-managed and well-connected network of protected areas, whose services, benefits and values are fully incorporated into national economies and economic sectors, will be one of the most important strategies for buffering communities against the impacts of climate change.

As the world begins to grapple with these new global challenges, this guide is particularly timely. It clearly lays out steps for integrating protected areas into the wider landscape, seascape and sectoral plans and strategies, with numerous examples from around the world. I extend my appreciation to the authors and contributors, and I thank the Government of The Netherlands for making available the necessary financial resources to develop and publish the document.

Dr. Ahmed Djoghlaf
Executive Secretary
Convention on Biological Diversity



CONTENTS

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INTRODUCTION

Life on Earth is disappearing fast and will continue to do so unless urgent action is taken. Well designed and effectively managed systems of protected areas are a vital tool for reducing biodiversity loss while delivering environmental goods and services that underpin sustainable development. There are currently over 130,000 protected areas worldwide, covering around 13.9 % of the Earth's land surface and 5.9 % of the territorial marine surface. These areas represent a tremendous resource for conserving biodiversity and for protecting vital ecosystem services. The world's protected areas exist in a rapidly changing world. There are many issues facing protected areas, including climate change, invasive species, fragmentation of natural ecosystems, increasing urbanisation and growing demands upon natural resources. Consideration of protected areas must be framed within this context of global change.

The most significant global development related to protected areas in the last decade has been the adoption of a comprehensive Programme of Work on Protected Areas by the Convention on Biological Diversity (CBD) in 2004. This innovative Programme is focussed and target-driven, and commits 195 countries to take action to effectively establish and manage protected areas.

There has been much progress on the CBD Programme of Work on Protected Areas since it was first developed in 2004. Many governments have completed assessments of protected area ecological gaps, management effectiveness and sustainable finance, and have begun taking many of the steps needed to secure a representative, effectively managed and sustainably funded protected area system. However, much still remains to be done. In particular, progress on integrating protected areas into the broader landscape, seascape and sectoral plans and strategies has lagged far behind1. Such integration is essential if protected areas are to become relevant and seen as essential elements of each country's effort to achieve sustainable development.

Protected area integration entails a two-fold process. The first involves linking protected areas within a broader network of protected and managed lands and waters in order to maintain ecological processes, functions and services. The second involves incorporating protected area design and management into a broader framework of national and regional land-use plans and natural resource laws and policies in order to maximize benefits from, and mitigate threats to, biodiversity. This document describes a set of practical steps needed for conservation professionals and policy makers to integrate protected areas into the surrounding landscapes, seascapes, and to integrate protected areas into sectoral plans and strategies.

Successfully integrating protected areas can enable protected area practitioners and policy makers to:

- Aid species conservation through improved connectivity and reduced fragmentation;
- Better adapt policies and programs to respond to the impacts of climate change;
- Achieve additional conservation benefits outside of protected areas;
- Manage ecological processes that occur over large spatial scales, such as hydrological processes, pollination, larval dispersal in marine systems;
- Enhance the provision of ecosystem services;
- Increase resilience to climate change;
- Tackle drivers of change that occur at large scales, such as economic, demographic and political factors;

- Strengthen relationships between conservation practitioners and other stakeholders, in particular with local communities and indigenous peoples, as well as other government agencies responsible for the management of land and marine resources across the broader landscape;
- Build wider support for protected areas within communities living in and adjacent to protected areas;
- Develop a robust, broadly-based policy framework that combines the needs of multiple stakeholders and is therefore more likely to stand the test of time; and
- Ensure more effective and sustainable financing opportunities for protected areas and for broader conservation work across the landscape.

If protected area practitioners and policy makers do not integrate protected areas into the broader landscape, seascape and sectoral plans and strategies, they run several risks, including:

- Increasing likelihood and severity of a range of threats within and outside of protected areas;
- Increasingly incompatible land and water uses in areas adjacent to protected areas;
- Decreasing opportunities to link protected areas through biological corridors of sustainably managed and/or protected lands and water;
- Decreasing viability of biodiversity within an increasingly fragmented landscape and seascape;
- Lack of support for protected areas among key stakeholders, particularly local communities and indigenous peoples, and also key government decision makers;
- Increasing likelihood of incompatible policies, plans and strategies in natural resource sectors; and
- Increasing likelihood that society will not fully value the benefits and services provided by protected areas.

This guide provides conservation planners with a concrete set of steps they can take to improve protected area integration, including getting started, assessing the broader context, developing and implementing strategies and monitoring the results. This guide also aims to inform and support others involved in land use planning to help them better understand and integrate conservation principles into their work.

RELATIONSHIP OF THIS GUIDE TO THE CONVENTION ON BIOLOGICAL DIVERSITY

The objectives of the Convention on Biological Diversity are to achieve the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the utilization of biological diversity. Many decisions of the Conference of the Parties to the CBD[1] have a direct bearing on this guide, including decisions that help biodiversity adapt to climate change by encouraging parties to enhance ecological connectivity and resilience as part of their climate change adaptation and mitigation programs.

In addition, there is a specific CBD Programme of Work on Protected Areas (PoWPA), whose overall purpose is to support the establishment and maintenance of comprehensive, ecologically representative,

1 See CBD Decision VII/15 and VIII/30 at www.cbd.int. In addition, see Appendix 1 for a description of how this guide relates to the Ecosystem Approach.

effectively managed, and sustainably funded national and regional systems of protected areas[2] by 2010 (2012 for marine areas). This program is organized into four elements: 1) actions aimed at planning, selecting, establishing, strengthening and managing protected area systems and sites; 2) actions aimed at improving governance, participation, equity and benefit sharing; 3) actions aimed at improving the enabling environment for protected areas; and 4) actions aimed at developing standards for assessment and monitoring.[3]

Although this guide involves all four elements of the PoWPA, it is the first target, specifically Goal 1.2, that has the greatest relevance to this guide (see Box 1). The goal of Goal 1.2 is "To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function," with the aim being that by 2015, all protected areas and protected area systems are integrated into the wider landscape and seascape, and into relevant sectors[4].

BOX 1: Specific actions of Goal 1.2 of the PoWPA

- ✓ Evaluate by 2006 national and sub-national experiences and lessons learned on specific efforts to integrate protected areas into broader land- and seascapes and sectoral plans and strategies such as poverty reduction strategies.
- ✓ Identify and implement, by 2008, practical steps for improving the integration of protected areas into broader land- and seascapes, including policy, legal, planning and other measures.
- ✓ Integrate regional, national and sub-national systems of protected areas into broader land- and seascape, *inter alia* by establishing and managing ecological networks, ecological corridors and/or buffer zones, where appropriate, to maintain ecological processes and also taking into account the needs of migratory species.
- ✓ Develop tools of ecological connectivity, such as ecological corridors, linking together protected areas where necessary or beneficial as determined by national priorities for the conservation of biodiversity.
- ✓ Rehabilitate and restore habitats and degraded ecosystems, as appropriate, as a contribution to building ecological networks, ecological corridors and/or buffer zones.

RATIONALE FOR INTEGRATING PROTECTED AREAS WITHIN WIDER LANDSCAPES, SEASCAPES AND SECTORAL PLANS AND STRATEGIES

There are many reasons for protected area and natural resource practitioners and policy makers to integrate protected areas into wider landscapes, seascapes and natural resource policies. Such integration helps to:

1. *Aid species conservation through improving connectivity and reducing fragmentation*

Chief among the causes of biodiversity decline are habitat loss and fragmentation, and disruptions in ecological processes[5] that result from this degradation.

Because fragmentation and habitat loss are the leading drivers for biodiversity decline, simply creating more protected areas may be insufficient for preventing further declines in biodiversity losses. In many countries, options for establishing new protected areas are also quite limited. A comprehensive strategy must include:

2 The CBD defines a protected area as a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives. The IUCN defines a protected area as: A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

3 CBD, 2004.

4 Ibid.

5 Bennett, 2003

- ✓ ***Improved linkages between protected areas:*** by creating biological corridors that allow species to move, and genes to flow, from one protected or conserved area to another;
- ✓ ***Improved protected area management:*** by better managing existing protected areas to ensuring species survival within these areas and other intact habitats and species persistence within intact habitats;
- ✓ ***Improved protected area design:*** by ensuring that the design, layout and configuration enhances species survival and enhances connectivity with the surrounding landscape;
- ✓ ***Improved management of the surrounding matrix:*** by encouraging natural resource sectors to adopt practices that either positively impact (or at least do not negatively impact) biodiversity conservation and connectivity; and
- ✓ ***Improved connectivity to allow species to migrate in the face of climate change:*** by ensuring species have a wider range of options for movement and adaptation in the face of climate change

BOX 2: Consequences of fragmentation

The consequences of habitat fragmentation include:

- ✓ reduces the overall quantity of habitat available;
- ✓ decreases the quality of habitat by increasing the exposure to invasive species, to fire and to other edge effects;
- ✓ concentrates species populations into smaller patches, thereby increasing competition for scarce resources;
- ✓ restricts species movement, thereby reducing genetic vigor and overall resilience; and
- ✓ disrupts key ecological and evolutionary processes upon which species depend (Anderson and Jenkins, 2006; Mackey et al., 2008)

2. Achieve additional conservation benefits outside of protected areas

A significant proportion of biodiversity is located outside of protected areas — working with other interest groups and other sectors across the wider land/seascape matrix can significantly improve biodiversity conservation, even without protected status being achieved. For example, ecologically friendly practices can be pursued in agriculture and extractive industries, while initiatives such as agro-forestry and sustainable tourism can adjust their practices so they are more compatible with biodiversity conservation. Regeneration and reforestation schemes can also help, potentially with funding from initiatives such as the Clean Development Mechanism of the Kyoto Protocol.

3. Manage ecological processes that occur over larger scales

Many natural processes occur at scales that span beyond protected areas, particularly those which are spatially and ecologically fragmented. Examples include freshwater connectivity and hydrological processes within broad river basins, and pollination and larval dispersal in complex marine systems. Protected area management that does not consider larger scales of ecological processes is unlikely to be truly effective at maintaining biodiversity in the long term.

4. *Enhance the provision of ecosystem services*

Integration initiatives are also imperative for maintaining and protecting ecosystem services that derive from these landscapes and networks. The continued fragmentation of habitats is likely to result in the loss of ecosystem services; the priceless benefits of clean drinking water, crop pollination, storm mitigation and carbon sequestration are all at risk from poor natural resource management across the landscape involving both protected areas and surrounding land uses [6].

BOX 3: Economic, social and ecological benefits of an integrated protected area network (from CBD, 2008a)

An integrated, functional network of protected areas, buffer zones and corridors, sustained by an enabling policy environment and long-term funding, will ensure many benefits to society, including:

- ✓ ***Livelihood security:*** By ensuring that communities have the natural resources they need to survive;
- ✓ ***Municipal water supplies:*** By ensuring that natural land cover is intact and provides the quantity and quality required by an ever increasing population;
- ✓ ***Agriculture:*** By ensuring the maintenance of ecosystem services required by agriculture, including water, soil stabilization, and pollination;
- ✓ ***Natural disaster mitigation:*** By providing natural buffers against the effects of severe flooding, storm surges, high winds, and the increasing impacts of climate change;
- ✓ ***Fisheries:*** By ensuring that areas of importance to fisheries stocks, such as migratory routes, nursery and incubation sites and spawning grounds are maintained; and
- ✓ ***Tourism:*** By providing the natural infrastructure required for a nature-based tourism industry.

5. *Increase resilience to climate change*

Integration can generate more spatial options for biodiversity and human adaptation to climate changes. For example, providing links between habitat patches across altitudinal gradients and the restoration of riparian zones can help to increase migration capacity by facilitating species range shifts from climate change or other disturbances. Particular emphasis may be warranted for the transition zones between biomes and also for species whose altitudinal and geographic ranges are limited.

6. *Tackle drivers of change that occur at large scales*

Drivers of change include economic drivers such as international and national trade, demographic drivers such as immigration, and political drivers. The effective management of protected areas cannot be undertaken in isolation and must consider these broader factors.

7. *Build strong relationships between conservation practitioners and other stakeholders*

Protected area integration fosters collaborative processes between protected area managers and other stakeholders and decision makers from broader natural resource sectors. This collaboration will enhance protected area management into the future. Agencies responsible for protected area management are often small and, increasingly, are managed under the umbrella of large natural resource management agencies. Thus effective relationships and partnerships must be forged with other key landowners and stakeholders.

6 Lindenmayer and Fischer, 2006; Birdlife International, 2007

8. Result in a robust, broadly-based policy framework that combines the needs of multiple stakeholders and is therefore more likely to stand the test of time

Fragmentation in biodiversity and protected area policies also results in challenges, constraints and barriers in the conservation of biodiversity. Perverse subsidies, inappropriate natural resource policies, unregulated land development, and inadequate land use planning all constrain the ability of conservation planners to design and implement effective and sustainable land/seascapes[7].

Protected areas are part of the solution to slowing trends in fragmentation and resulting biodiversity loss, but they are not enough. Any long-term solution must focus not only on the suite of protected areas and the lands and waters that connect them, but also on the broader matrix of laws, policies and practices within which this land/seascape exists[8]. It is this policy and sectoral matrix that will determine whether or not the land/seascape can achieve the ultimate objective of the Convention on Biological Diversity — to conserve biodiversity for current and future generations and ensure that any use of natural resources is ecologically sustainable.

9. Present sustainable financing opportunities for conservation work

Schemes for payments for ecosystem services require an explicit identification of the beneficiaries of ecosystem services, who are commonly located outside of protected areas. This guide encourages practitioners and policy makers to think about the broad integration of protected area benefits and services into local and national economies. Such approaches must also enhance and encourage more sustainable financing strategies for protected areas.

THE SCOPE OF THIS GUIDE

This guide aims to support the better integration of protected areas by providing a summary of the steps needed to achieve Goal 1.2, together with examples from different parts of the world.

Goal 1.2 includes two inter-related aspects of integration. The first is ensuring that protected areas are integrated into an inter-connected and functional land/seascape that allows for the long-term persistence of genes, species and ecosystems by maintaining ecological processes and functions across large spatial areas. The second is ensuring that protected areas are integrated into broader land and natural resource plans and strategies, and that conservation goals are considered in tandem with other stakeholders' goals for landscapes and seascapes, such as poverty alleviation and economic growth. While these two aspects of integration are closely related — initiatives must consider land and water management in areas beyond protected areas, which necessitates an understanding of different sectors — in practice, most efforts at protected area integration have focused on the scientific basis and mechanics of creating ecological networks, rather than on the policies and practices that affect the establishment and long-term maintenance of the network itself. This guide incorporates both aspects of protected area integration in a synergistic and complementary way, and addresses all five actions in Goal 1.2 of the Programme of Work on Protected Areas.

PURPOSE AND USE OF THIS GUIDE

The concept of integrated natural resources planning across broad spatial scales is not new — there is a wealth of literature on integrated resource planning, ecological network design, coastal zone man-

7 Petersen and Huntley, 2005
8 Machlis and Force, 1997

agement and natural resources sectoral analyses. The purpose of this guide is not to replicate existing literature, but rather to summarize key aspects, provide basic principles, tools and resources as they relate to an overall process of integrating protected areas within the landscape, and to provide a coherent and systematic process for conservation planners. Tools and resources for further reading are included at the end of each chapter. This guide is intended to provide an overall framework for integrating protected areas into the wider landscape, seascape and natural resource sectors. Although the chapters are organized sequentially with specific steps, this guide is not intended as a prescriptive recipe book, but rather as a menu of actions and steps from which the reader can choose, depending on the context of the country or the individual protected area. Nor is it intended as a comprehensive resource for all aspects of protected area integration, but rather as a summary of the main steps involved in the process with references for further detail.

Because this guide addresses multiple aspects of protected area integration, it can be used both in areas where there is an extensive protected area network in place, and in areas where there are very few protected areas. Planners can apply the principles and approaches included in this guide to individual protected areas, although a system-wide approach is more likely to be more strategic and effective for biodiversity conservation.

BOX 4: Key concepts

- ✓ ***Protected area integration:*** Includes 1) the process of ensuring that the design and management of protected areas, corridors and the surrounding matrix fosters a connected, functional ecological network; and 2) the process of ensuring that the policies and practices of natural resource sectors foster a connected, functional ecological network
- ✓ ***Wider landscape and seascape:*** Includes the array of land and water uses, management practices, policies and contexts that have an impact within and beyond protected areas, and that limit or enhance protected area connectivity and the maintenance of biodiversity
- ✓ ***Related sectoral strategies and plans:*** Includes any planning, strategy or related activities that contribute to the economy of a community or country, and that have an actual or potential bearing on the creation, integrity, and/or management of protected areas

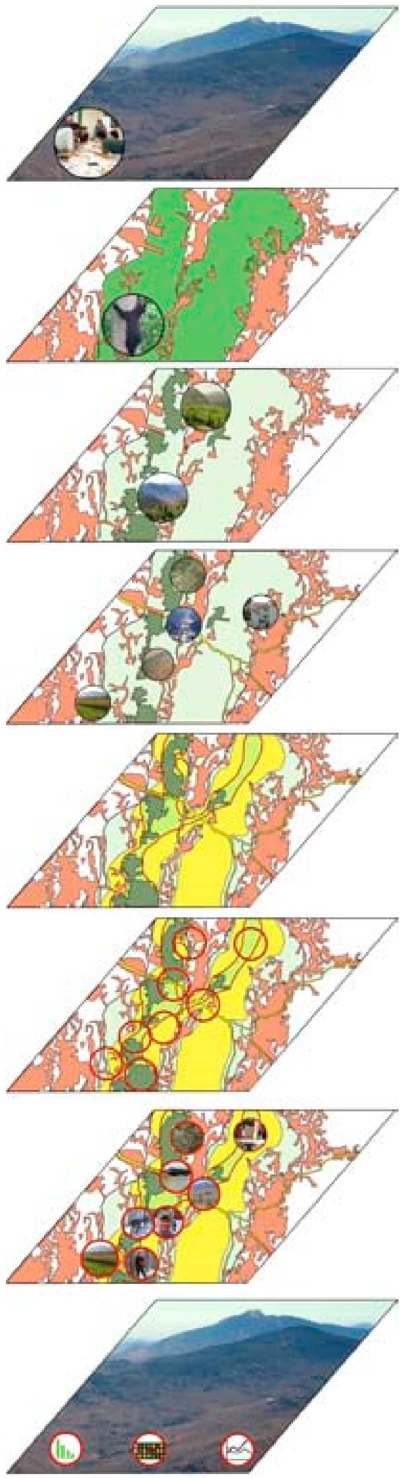
Intended audience

The primary audience of this guide includes practitioners and policy makers who are responsible for the planning, design, management and evaluation of protected area networks and related policies within their countries. While the primary audience of this guide is governmental staff, it may also be useful to non-governmental, private and community managers of protected areas, as well as to the many non-governmental initiatives seeking to integrate protected areas, such as large-scale connectivity conservation initiatives. This guide is also relevant to those involved in broader land use planning so that they can be made more aware of practical considerations relevant to integrating protected areas within their planning efforts.

Tools and references

Each chapter includes a set of tools and references for further guidance and information. The authors have strived to include those references that are available via the internet, and in many cases, the references included in this guide are available at www.cbd.int/protected.

OVERVIEW OF THE PROCESS OF INTEGRATING PROTECTED AREAS INTO THE WIDER LANDSCAPE, SEASCAPE AND SECTORAL PLANS AND STRATEGIES



- ✓ ***Getting started:*** by creating a core group, setting goals, establishing parameters, and creating effective partnerships.

- ✓ ***Assessing the broader context***: Includes:
  - ✓ ***Assessing the ecological context***: by identifying key biodiversity, setting goals, and assessing connectivity gaps.
  - ✓ ***Assessing the protection context***: by assessing the type, distribution and effectiveness of protected areas and other conserved areas.
  - ✓ ***Assessing the socio-economic context***: by social, economic and cultural constraints and opportunities to integrate protected areas.
  - ✓ ***Assessing the policy and sectoral context***: by identifying policies and sectors, and their constraints and opportunities.
  - ✓ ***Putting it all together***: by aligning gaps and opportunities, and creating scenarios.

- ✓ ***Developing strategies and actions***: by identifying, screening and prioritizing actions, and identifying best practices for engaging stakeholders.

- ✓ ***Implementation***: by developing and mainstreaming an implementation plan for protected area integration strategies.

- ✓ ***Monitoring, evaluating and adapting***: by evaluating status and effectiveness and developing a monitoring plan.

RELATIONSHIP OF THE PROTECTED AREA INTEGRATION PROCESS WITH OTHER PLANNING APPROACHES

The steps in this guide are drawn from, and related to, the steps in many other conservation planning exercises. The intent of this guide is not to suggest an entirely new process of integrating protected areas, but rather to encourage planners to consider how they can include aspects of integration into ongoing conservation planning processes within their own countries. These may include:

Systematic conservation planning

Systematic conservation planning is a pragmatic approach that acknowledges limited funding and competing claims for land or sea use[9]. By translating these realities into well-defined constraints and opportunities, systematic conservation planning emphasizes the efficient achievement of conservation objectives — seeking the least area or financial outlay to realize the maximum biodiversity gain. The protected area integration process should be an integral part of systematic conservation planning. Specific steps in the systematic conservation planning process include:

- ✓ Identifying stakeholders
- ✓ Identifying and prioritizing key biodiversity elements
- ✓ Assessing existing conservation areas
- ✓ Identifying priority areas
- ✓ Selecting priority interventions
- ✓ Implementing conservation actions
- ✓ Monitoring impacts and evaluating changes

Ecological gap assessment process

A gap assessment compares a country's biodiversity with the scope and breadth of the protected area system to determine biases and gaps[10]. Many ecological gap assessments, however, do not include connectivity gaps. This guide promotes the inclusion of connectivity in the ecological gap assessment process. Specific steps of the ecological gap process include:

- ✓ Identifying key biodiversity elements
- ✓ Evaluating and mapping the occurrence and status of biodiversity
- ✓ Analysing and mapping the occurrence and status of protected areas
- ✓ Using the information to identify gaps
- ✓ Prioritising gaps to be filled
- ✓ Agreeing on a strategy and taking action

Protected area system master planning

Several recent guides[11] call for the development of a master plan for national protected area systems that links the various PoWPA elements and assessments together. This guide promotes the inclusion of

9 Margules and Pressey, 2000
10 Dudley and Parrish, 2006
11 Dudley et al., 2005; Ervin, 2007

protected area connectivity and integration in a protected area system master plan. Specific steps in the protected area system master planning process include:

- ✓ Setting a clear vision about the future of the protected area system
- ✓ Assessing the effectiveness and adequacy of existing laws and policies relating to protected areas
- ✓ Developing a plan to strengthen the design and representativeness of the protected area network
- ✓ Developing a plan to strengthen the management effectiveness of each protected area
- ✓ Developing a plan to strengthen the enabling environment surrounding protected areas
- ✓ Developing a plan to monitor the status and effectiveness of the protected area system

Planners should identify how they can incorporate issues related to connectivity and integration into these and other conservation planning processes.

CHAPTER 1: GETTING STARTED

Mechanisms to integrate protected areas will vary depending on the aims of the initiative, the political and cultural context and the range of parties interested in the initiative. Types of mechanisms include governmental task forces, regional advisory councils, *ad hoc* steering groups, international panels, community working groups and private sector collaborations. This guide is therefore generic, concentrating on the key steps required and providing suggestions, resources and examples to guide readers to make decisions based on their own situations.

The first step is to be clear about what the initiative is intended to achieve: Are there existing decision-making processes that the protected area integration process will feed into? What decisions will it try to influence? What authority will the initiatives' members have to make decisions regarding land uses and policies? What is the existing land-use planning framework? Does it have the capacity to take action on the ground? How inclusive can it aspire to be — for example, does the initiative represent conservation interests alone, or will it be able to include a constituency of stakeholders with wider interests, such as poverty alleviation and economic development?

BOX 5: Examples of core group members of a planning initiative

Costa Rica (Hidalgo, 2008):

- ✓ FONAFIFO: Fondo nacional de financiamiento forestal
- ✓ COBODES: Proyecto de Conservación del Bosque y Desarrollo Sostenible
- ✓ SINAC: Sistema Nacional de Áreas de Conservación
- ✓ INBio: Instituto Nacional de la Biodiversidad
- ✓ The Nature Conservancy (TNC)
- ✓ Conservation International
- ✓ CATIE: Central Agronómico Tropical de Investigación y Enseñanza
- ✓ SGP: Programa de Pequeñas Donaciones
- ✓ Minaet: Ministerio del Ambiente, Energía y Telecomunicaciones

Altai Sayan (Karryeva, 2008):

- ✓ Association for the Conservation of Biodiversity of Kazakhstan (ACBK)
- ✓ Committee of Forestry and Hunting of the Ministry of Agriculture RK
- ✓ Ministry for Environmental Protection
- ✓ Frankfurt Zoological Society (FZS)
- ✓ The Royal Society for the Protection of Birds (RSPB)
- ✓ The World Wide Fund for Nature (WWF)

Note that it is possible to begin the initiative before all of the relevant assessments are completed, and then revise and improve the objectives and actions once the assessments are completed. Therefore, this guide recommends beginning with the establishment of a core group first, and clarifying relative processes and objectives, rather than starting with the assessments as the starting point.

Creating a core group

Initiatives that attempt to integrate protected areas into the wider landscape are inherently complex; they inevitably require crossing organizational and political boundaries and involving multiple sectors

Wetland Park in Central China

and disciplines. Identifying a core group of diverse partners and stakeholders at the outset is a prerequisite to ensuring an inclusive and successful initiative. While the size and composition of this core group will vary from one initiative to another, members may include individuals from the public sector (e.g., protected area agency, natural resource departments, municipal and regional planning boards), the private sector (e.g., landowners, resource-based companies), the non-profit sector (e.g., community associations, environmental and social NGOs, universities) and representatives of indigenous peoples and local communities. It is important that the core group is of a manageable size for effective action, but has the potential to bring in additional expertise as required.

Regardless of which sector they come from, members of the core group should likely include individuals with the following skills:

- ✓ An understanding of land use trends, patterns, practices and policies
- ✓ A familiarity with natural resource issues, especially planning, policies and politics
- ✓ An understanding of a full suite of conservation and protection tools
- ✓ A familiarity with the trends, distribution patterns and biological requirements for key species within the region
- ✓ An ability to use GIS software and to manipulate a variety of data sets
- ✓ An understanding of the economic and business trends within the region
- ✓ An ability to develop, execute and evaluate strategic plans
- ✓ An understanding of current political issues and decision-making processes
- ✓ An ability to clearly articulate the goals of the initiative and to communicate well with a variety of stakeholders
- ✓ An understanding of financial management practices, including fund raising and basic accounting procedures
- ✓ An ability to work cooperatively, even when their goals do not align perfectly with other members' goals
- ✓ An ability to be viewed as neutral by interest groups whose interests may conflict

Setting a common vision and mission

To stay focused, integration initiatives require a clear vision and a mission statement. Both should be discussed and agreed upon by the core group. The vision will often involve a balance between different competing interests for the future of the land/seascape, such as seeking both conservation and development, and, where relevant, issues such as poverty reduction, equitable distribution of benefits, provision of water, infrastructure goals, resilience to climate change and other key interests. The process of preparing the vision statement is very important as a means of ensuring "buy in" to the process from different interest groups and also as a means of building a shared view of what the exercise is trying to achieve. The vision should be compatible with the overall political goals for the area, such as those outlined in national development and land use plans. In some cases, the vision statement could be related to the overall goal of Goal 1.2 of the Convention on Biological Diversity's Programme of Work on Protected Areas: "To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function." A higher-level vision statement relating to the overall goals of the Convention on Biological Diversity may also be useful.

The mission statement is typically a more focused statement that:

- ✓ s*ummarizes what the initiative is about* — the mission statement should clarify the goals and aims of the initiative;
- ✓ *describes the purpose of the initiative* — the statement should describe what the initiative is trying to achieve; and
- ✓ *defines the scope and scale of the initiative* — the statement should define the area or place, whether bounded by national boundaries or by broad geographical boundaries (e.g., Yellowstone to Yukon Conservation Initiative).

BOX 6: Two examples of a mission statement

"Our goal is to maintain and sustain this region in a way that allows wilderness, wildlife, native plants, and natural processes to function as an interconnected web of life. This is as much for the benefit of future generations as it is for the land, the wildlife, and the people currently living in the region." Yellowstone to Yukon Conservation Initiative, 2008.

The goal of the Argentine Andino Norpatagonic Biosphere Reserve is to maintain and sustain long-term environmental integrity and functionality, to consolidate an environmentally sustainable regional plan with respect to cultural diversity and social equity, to ensure active social participation and to strengthen management agencies.

Initiatives can occur at many different scales — one study of over 100 initiatives found cases ranging from 100 hectares to over 200 million hectares[12]. Each of these scales has its own inherent set of strengths and weaknesses. In general, the larger the scale, the more actors are likely to be involved, and the more politically complex the process is likely to be. At very large scales, the process will likely need to be broken up into smaller, more manageable sizes. The Yellowstone to Yukon Initiative, for example, has eight priority areas within the larger area. Each of these areas in turn has several smaller focal areas. Regardless of the scale, a clear mission statement will help provide focus and clarity to the initiative.

Setting parameters

Once there is a core group of planners and a clear vision and mission statement, the next step is to set some basic parameters for the integration initiative, including:

- ✓ *Identifying additional stakeholders* — The initial core group may on its own be insufficient to attain widespread public and private support of the initiative. The planning group will need to identify additional stakeholders, including the general public, and consider how and when to involve them[13].

12 Yaffee et al., 1996

13 See Appendix 2 for a framework for stakeholder analysis.

- ✓ *Establishing clear roles and responsibilities* — The group will need to have not only an effective leader, but also a team of individuals who are well coordinated, with clear roles and responsibilities. Specific tasks may include, for example, hiring staff, communicating with the public, gathering data, analyzing data and generating maps, developing a budget, raising funds, managing financial accounts, lobbying government agencies and managing the overall project.
- ✓ *Clarifying how decisions will be made* — There are several ways that a collaborative initiative can make decisions, including majority voting, consensus, and modified consensus. The decision-making procedures should be agreed upon by all members of the core group.
- ✓ *Agreeing on the scope of the process* — This guide outlines a series of steps involved in integrating protected areas into the wider landscape. However, planners will want to review the status of other conservation planning efforts, and determine whether all or only a portion of the steps are needed.
- ✓ *Setting a timeline* — Although it may be difficult to determine exactly how long each step may take, it will be helpful to set a goal for an end date of the process. This may include a series of short term deadlines (e.g., collect all data by a certain date), and it may include having a timeline for achieving overall goals. The government of Palau, for example, has set a timeline of 2020 to have a functional network of marine protected areas in place, covering 20 percent of the near-shore environment. Established and agreed-upon timelines, such as those agreed to by governments in relation to the CBD Programme of Work on Protected Areas, can help in reinforcing the relevance and legitimacy of the process.
- ✓ *Setting a budget* — The cost of planning processes can vary tremendously, depending on the scope of the project. Planners should use budgetary limits to help prioritize actions. Each major action should have a cost estimate and source of funds associated with it, and there should be an overall estimate of what the initiative will cost, including both planning and implementation costs. This estimate will be subject to change, depending upon the strategies that are developed. The funding should be identified at an early stage of the process.

BOX 7: Examples of protected area integration at a variety of scales

The scale of protected area integration can range from very small, local sites up to continental scales. The following examples illustrate these scales:"

- ✓ ***Chittenden County Upland Project*** (500 km2): A citizen-led partnership between local governments, communities and NGOs to promote connectivity in Vermont, USA
- ✓ ***Terai Arc Ecoregion Project*** (12,500 km2): A partnership between the governments of Nepal and India, and NGOs including the World Wildlife Fund, to create corridors, restore degraded areas and promote sustainable development across the Terai Arc.
- ✓ ***Valdivian Ecoregional Corridor*** (46,000 km2): A governmental initiative to ensure the protection and long-term functional sustainability of the Valdivian Ecoregion.
- ✓ ***Lithuanian Ecological Network*** (65,000 km2): A governmental initiative to create an ecological network across Lithuania.
- ✓ ***Mesoamerican Biological Corridor*** (208,000 km2): A partnership with governments and the Central American Commission for Environment and Development to link over 350 protected areas through corridors and sustainable use areas.
- ✓ ***Yellowstone to Yukon Initiative*** (1,200,000 km2): A coalition of many actors seeking to create a continental corridor along the Rocky Mountains from Yellowstone Park in Wyoming to the Yukon in Northern Canada.
- ✓ ***Coral Triangle Initiative*** (5,200,000 km2): An initiative of six neighboring Asia Pacific governments to address integrated ocean management challenges, including accelerating the establishment of marine protected areas and designation of seascapes.

Establishing and formalizing effective partnerships

Nearly all integration initiatives will benefit from clearly outlining the parameters of the partnership and the roles of the different partners. In most cases, a memorandum of understanding may be useful. Many successful integration initiatives share a set of common characteristics, including[14]:

- A charismatic, visionary leader who champions the initiative across many sectors
- One or more champions within the government who are well placed to effect change
- A clear vision and mission with a well-articulated purpose and objectives
- The support of local communities and community leaders
- Adequate funding to ensure the exercise can be undertaken at the appropriate and necessary level
- A shared agreement on the planning approach and process they will use
- An effective partnership structure
- A written memorandum of understanding between key partners
- Clear roles and responsibilities assigned to each member
- Engagement of multiple stakeholders from the beginning, including from public, private and non-profit sectors
- Clear understanding of the interests and needs of each stakeholder group
- A process that crosses multiple political boundaries
- Involvement of multiple economic and natural resource sectors
- A broad mandate, either by local communities or by the local or national government
- A variety of strategies, and a cohesive, integrated plan for implementing those strategies.

Challenges and enabling conditions

Some of the challenges inherent in integrating protected areas into the wider landscape, seascape and related sectors include:

- ✓ ***Creating innovative partnerships***: The protected area integration process will likely require new partnerships. In some cases there may be resistance to these new partnerships, particularly among groups that have traditionally had adversarial relationships on the past. This can be particularly challenging when there are disputes over land uses within the designated region. These disputes must be openly identified and addressed as part of the process.
- ✓ ***Deciding how to decide:*** The multi-stakeholder nature of a protected area integration initiative requires clear decision-making procedures, usually involving a degree of consensus. However, some actors may resist a consensus-based decision process. The relationship of decisions to established policy frameworks which decide upon the use of land and natural resources also needs to be clarified as part of the process.
- ✓ ***Balancing partnerships, roles and responsibilities***: It can be difficult to balance a range of stakeholders and interest groups, and to delineate clear roles and responsibilities for each participating group and individual. The formation of committees, each with a set of clear responsibilities and charter, will be helpful early in the process.

14 From Anderson and Jenkins, 2006; Soulé and Terborgh, 1999, Driver et al., 2003; Knight et al., 2006

Some of the enabling conditions that will help ensure the success of a protected area integration process include:

- ✓ ***A culture of civic participation***: A culture of open and robust civic participation will likely mean a greater degree of potential partners, and a greater willingness to seek consensus.
- ✓ ***A clear commitment***: A written government commitment to achieve the goals of protected area integration will inspire confidence in the process, as will demonstrated governmental commitment to follow through with the results. Linking with broader commitments, which governments have already subscribed too, may also be useful.
- ✓ ***Demonstrated agency leadership***: A willingness to set aside traditional agency agendas will help advance the process. This is particularly important where different agencies have had competing interests in land and water use and management. A strong protected area agency with clearly demonstrated leadership, can help the process run smoothly.

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A mosaic of public, private and community managed areas and sustainable agriculture in the Northeastern United States

CHAPTER 2: ASSESSING THE WIDER CONTEXT

ASSESSING THE ECOLOGICAL CONTEXT

Identifying what to connect

The first step in assessing the land/seascape is identifying the suite of key biodiversity features that should be integrated and connected within the ecological network[15]. A key biodiversity feature is a feature of biodiversity, such as a species, an ecological system, or an ecological process that planners can use to focus their planning efforts. In many large-scale conservation planning processes, the list of biodiversity features can be very long — some large-scale conservation plans, for example, may have hundreds of such features.[16] However, in the context of this guide, the suite of features is likely to be a much smaller list, as the emphasis is on selecting species and systems to enhance integration and connectivity, rather than on selecting features that fully represent a broad suite of biodiversity (which is the purview of an ecological gap assessment). Experience from several organizations suggests that a list of six to eight biodiversity features may be sufficient for connectivity planning[17].

There are many different approaches that can be used to identify these features (see Box 8). Regardless of the approach used, the resulting selection of features is likely to be comparable with other approaches — one study[18] that used five different approaches, for example, resulted in many of the same species being selected for connectivity planning. Similarities included species that required large areas of habitat, provided an 'umbrella' for many other diverse species, were vulnerable and/or irreplaceable, and contributed to the overall functioning of the ecosystem.

BOX 8: Three examples of approaches to selecting focal species for integration and connectivity

- ✓ ***Landscape species approach:*** The Wildlife Conservation Society for example, proposes the following selection criteria: 1) the area of the size of the species home range, and/or species dispersal distances; 2) the degree of habitat heterogeneity required by the species; 3) the vulnerability of the species to a variety of threats; 4) the effects of the species on ecological structures and functions within natural ecosystems; and 5) socio-economic significance. (WCS, 2002; Copollilo et al., 2004)
- ✓ ***Key biodiversity area approach:*** BirdLife International, Conservation International, IUCN, Plantlife International, and others focus on globally threatened species (based on the IUCN Red List), and then supports the identification of key biodiversity areas within a region — areas that are of global conservation significance because they regularly support populations of globally threatened species, restricted range species, biome-restricted species and/or species that congregate (Botrill et al., 2006; Langhammer et al. 2007)
- ✓ ***Vulnerable species approach:*** This approach focuses on species that are particularly sensitive, either to fragmentation — they may be rare, have specific habitat requirements but large home ranges, limited dispersal abilities, low reproductive potential and longevity, and/or low colonization ability; or to climate change — they exist at the margins of temperature and precipitation gradients, at the extremes of their range, at the limit of their altitudinal distribution, have a narrowly defined niche, and/or have a restricted range (Kettunen et al., 2007; Henle et al., 2004).

Setting goals for connectivity

Setting clear goals for conservation requires asking how much connectivity — and connectivity *of what to what* — is required to ensure that a species or ecological system persists over time. Setting connectivity goals not only helps planners understand the potential tradeoffs between protecting one corridor or

15 See for example Taylor et al., 2006; Crooks and Sanjayan, 2006; Bennet, 2003; Groves, 2003.
16 See for example Benitez et al., 2006.
17 For example, The Wildlife Conservation Society suggests three to six species per landscape (WCS, 2002), and The Nature Conservancy suggests eight focal targets for any specific area (TNC, 2006).
18 Botrill et al., 2006.

large patch versus another, but also helps planners assess the effectiveness of the network in achieving the overall goal of protecting biodiversity[19].

The following is a list of guidelines for setting goals in conservation planning[20], adapted to setting goals for integration and connectivity[21]:

- Identify the minimum size and connectivity of the habitat needed to sustain individuals within the population, as well as across a broader meta-population;
- Identify species and habitats of particular importance, such as IUCN Red Listed of Threatened Species, and habitats under immediate threat, such as through incompatible land uses;
- Identify ecologically functional populations — the number and distribution of a species needed to fulfill their ecological niche within a functioning ecosystem;
- Identify needs for daily, seasonal and lifecycle movement and dispersal;
- Ensure that species are distributed across the ecological regions to which they are native, to safeguard against natural disasters and environmental changes;
- Consider recommendations from national and international recovery plans when setting goals for species that are on endangered species lists, such as the IUCN species survival commission action plan;
- Incorporate the results of population viability analyses — the minimum number of individuals and sub-populations needed to sustain a broader population over time — into the goals for species for both populations and meta-populations;
- Incorporate the concept of minimum dynamic area — the minimum area of an ecological system needed to ensure survival or recolonisation;
- Use the results from species-area relationships (the relationship of a patch size to the density of individuals within that patch) to determine the minimum size of a habitat patch needed to sustain a focal species;
- Set higher connectivity goals for species with limited distribution and ranges;
- Consider historic natural ranges of variability as a guide post in setting connectivity goals;
- Allow for a range of goals to provide more flexibility, and to allow planners to make tradeoffs between one target and the next; and
- Observe the precautionary principle by including safety margins and redundancy in the goals for species and systems.

BOX 9: Example of a connectivity goal for elephants in West Africa:

Conserve a total population of 5000 elephants, at 1 elephant per 5 km^2 in their wet season habitats (savanna), and 1 elephant per 1 km2 in their dry season habitats (watering holes). To allow for movement among seasonal habitats, habitats should at minimum be connected by clear wooded corridors, at least 200 meters wide and with no gaps more than 200 meters wide, and should not be separated by more than 10km (maximum corridor length determined by annual movement abilities).

19 Groves et al, 2003

20 Drawn from Schaffer, 1981; Morris et al., 1999 ; Hilty et al., 2006 ; Groves et al., 2003; Anderson et al., 1999; Conner, 1998.

21 See also Appendix 4 for examples of connectivity targets and their goals.

Assessing the viability and connectivity of key biodiversity features

Assessing the viability[22] of key biodiversity features is a key step in nearly all conservation planning processes[23], including the integration and connectivity planning process. If there is an ongoing conservation planning process within a landscape or country, it is likely that the distribution, extent and viability of species and ecological systems have already been mapped. However, these analyses may not have included an assessment of the degree of connectivity for biodiversity features, a key component of viability. Appendix 5 summarizes approaches that planners can use to measure the connectivity for focal species and ecological systems.

Optimizing connectivity for multiple biodiversity features

Once planners have assessed the viability and connectivity for each key biodiversity feature, the challenge is to then combine these different data layers into a single scenario — one that optimizes connectivity for all focal species. This process will likely require trade-offs between one species and the next, and will likely benefit from the inclusion of multiple scenarios and options for planners to discuss. There are different approaches to developing these multiple connectivity scenarios, but planners are faced with two fundamental choices — to use sophisticated software based on GIS information, or to use expert opinion and best judgment. The former is generally faster (assuming all information is available and fully digitized), less prone to biases, more reliable, and easily generates multiple scenarios. It is also more expensive, and requires expertise in using it. Examples of software packages include:

BOX 10: Dedicated connectivity software and algorithms	Software that can incorporate connectivity
Habitat availability index (Saura and Pascual-Hortal, 2007)	RESNET (Fuller et al., 2006)
Spatial links tool (Drielsma et al., 2007)	C-PLAN (Linke et al., 2008)
LQGraph (Fuller and Sarkar, 2006)	MARXAN (Smith et al., 2008)
GIS-based multi-criteria approach (Phua and Minowa, 2005)	ZONATION (van Teeffelen and Cabeza, 2006)
Map-analysis tool (Hargrove et al., 2005)	
GIS site-selection process for habitat creation (Nikolakaki, 2004)	

Expert opinion, on the other hand, is readily available and inexpensive, fosters increased participation in and understanding of the process, and does not require digitized information — participants can use existing maps and overlays to make decisions. However, using solely expert opinion to optimize the connectivity of multiple species requires effective group decision making and leadership, a clear understanding of the needs of each species and the effects of different scenarios and tradeoffs, and is typically very time consuming. Perhaps the most robust and realistic way to optimize connectivity for multiple species is to generate a series of scenarios using software programs, and then use expert opinion to identify which of these is most practical to implement. It is important to present these scenarios in a clear and easily understood way to key decision makers, preferably using maps and visual images.

22 See Appendix 5 for further information on assessing the viability of key biodiversity features

23 See for example Groves, 2003; Margules and Pressey, 2000

Measuring connectivity and identifying gaps

There are numerous approaches to measuring connectivity[24]; most of them rely on a combination of species and habitat data, combined with computer modeling. Some of these methods include:

- ✓ *Nearest neighbor approach*: Based on standard survey data
- ✓ *Spatial pattern indices*: Based on remotely sensed data
- ✓ *Scale-area data*: Based on point or grid-based data of species occurrence
- ✓ *Graph theory approaches*: Based on habitat data and species dispersal data
- ✓ *Buffer radius and incidence function models*: Based on a radius around a core area
- ✓ *Actual species movement*: Based on an estimate of actual connectivity patterns

Regardless of the approach used to measure and optimize connectivity for a suite of different focal species, the end goal is to be able to identify and map constraints and gaps in connectivity across the physical landscape. In very few situations will there be a scenario that fully connects all focal species. There are almost always gaps and constraints, including the following:

- ✓ *Core areas that are too small for some species*: the minimum habitat size will vary from one species to the next, and either because of limitations in the physical landscape, or because of tradeoffs between different species, some core areas may be too small to sustain focal species;
- ✓ *Physical barriers to the movement of some species:* some physical barriers, such as roads and developed areas, may be more difficult to some species to overcome than others;
- ✓ *Corridors that are too long for some species*: The maximum distance that a species can travel between core patches will vary from species to species. In cases where the distance is too long, planners may consider creating nodes or small patches within the corridor;
- ✓ *Corridors that are too narrow for some species*: Some species are more sensitive to the effects of edges than others, and may need wider corridors;
- ✓ *Stepping stones that are too far apart for some species*: Some species can move more easily than others across inhospitable areas to stepping stones — small, isolated patches between larger patches; and
- ✓ *The likelihood of future threats*: Areas that are intact now may be likely to be threatened in the future from changes in land use, invasive species, climate change and a range of other threats.

Assessing connectivity for climate change resilience and adaptation

The need to integrate protected areas into the wider landscape has never been more urgent, and will only become more so each year, because of the synergies and negative feedback loops between fragmentation and climate change[25]. Fragmentation impairs the ability of a species to adapt to the rapidly shifting habitat patterns and ecological processes that result from climate change, further weakening their resilience, and increasing the likelihood of local and widespread extinctions[26]. Because the severity and distribution of impacts from climate change are so uncertain, the maintenance of landscape connectivity across biophysical gradients is essential to safeguarding biodiversity. Furthermore, climate

24 See Appendix 6 for a more complete description of these approaches.
25 Thomas et al 2004; De Dios et al., 2007
26 Opdam and Wascher, 2004

change will continue to have widespread impacts on natural resource sectors, which will in turn alter the constraints and opportunities for conservation.

It is particularly urgent, therefore, that conservation planners create integrated national and regional networks that not only provide for the persistence of species today, but that also anticipate and provide for the persistence of species under different climate change scenarios in the future. Different scenarios for climate change and associated impacts on biodiversity should also be identified. This will require a much higher level of integration between protected areas and the surrounding environment than is currently the case in the vast majority of countries.

Furthermore, planners need to think ahead to the likely responses of human communities to climate change — both to plan for the revised needs of these communities, and to predict the likely impacts on biodiversity. For example, will different crops or agricultural techniques be preferred? Will fisheries target different fish species? Will communities move, or different areas be used for human uses than is currently the case? Conservation planners should consider these and other questions related to climate change and the protected area integration process.

BOX 11: Role of a functional ecological network in climate change adaptation:

- ✓ Intact areas provide habitats with increased resilience to the stresses of climate change
- ✓ Adjacent matrix and buffer areas can strengthen the resilience of core areas
- ✓ Core areas provide relatively intact ecological processes and services that can serve as sources for colonization and repopulation
- ✓ Core and buffer areas and corridors provide suitable habitat for species to relocate as a result of climate change
- ✓ Core and buffer areas provide continued habitat for species where climate change is not enough to trigger migration
- ✓ Intact core areas along elevation and soil moisture gradients enable species to shift their ranges further up slopes
- ✓ Core areas provide refugia for species at the limit of their ranges, or for species that are particularly vulnerable to the effects of climate change
- ✓ Core and buffer areas and corridors provide habitat for keystone species, enabling the persistence of key ecological processes
- ✓ Core and buffer areas provide protection of the enduring features, such as slope, aspect, soil type and elevation, which in turn will enable the persistence of diversity even under a range of climate scenarios
- ✓ Large unbroken tracts of habitat ensure that large-scale natural disturbances, including those influenced by climate change, can occur
- ✓ Corridors along a north-south gradient ensure that species can shift their ranges latitudinally
- ✓ Certain intact core areas, such as mangroves and near-shore forests, can buffer the impacts of extreme weather events (e.g., flooding, hurricanes) caused by climate change (Mohr, 2007)

ASSESSING THE PROTECTION AND CONSERVATION CONTEXT

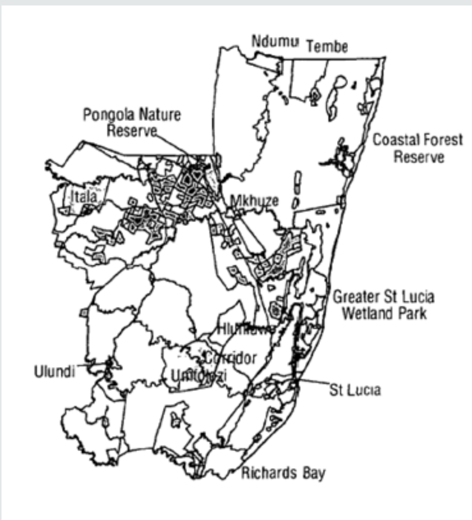
Assessing the protected area network

Assessing the protected area network includes assessing the type, distribution and management effectiveness of the full range of protected areas across the planning landscape. Protected areas can range in size from tiny sites of no more than a few hectares, to giant swaths of land or water hundreds of square kilometers in size. They can have a range of objectives, from strict wildlife protection to a range of social

BOX 12: Assessing connectivity and management effectiveness in KwaZulu Natal, South Africa

A 2003 study (Goodman, 2003) of the management effectiveness of 110 protected areas across KwaZulu Natal, South Africa found that protected area isolation was one of the largest threats to biodiversity within protected areas. The majority of parks are surrounded by high-voltage electric fencing, and park staff must translocate large mammals in order to avoid in-breeding.

Simultaneously, a study found that private protected areas and game reserves between national parks constituted one of the region's greatest opportunities for promoting connectivity (Goodman et al., 2002). By developing shared management plans and crafting agreements that spanned multiple ownerships and jurisdictions, park officials were able to dismantle many of the electric fences, and restore connectivity across a much greater area. The map below shows the distribution of private game reserves.



and economic uses[27]. And they can be owned and managed by public, private, non-profit, community and corporate entities[28].

Assessing the IUCN categories and governance types can be a useful step when mapping and assessing protection status by helping planners identify the degree of protection within each protected area, and the configuration of that area relative to the ecological landscape. Planners can use this information to identify under-protected areas that are important for connectivity.

Similarly, data on protected area management effectiveness can be useful when planning for integration and connectivity. The issue of protected area management effectiveness has gained considerable attention over the past decade, and there are numerous methodologies, guides, case studies and summary analyses that are widely available[29]. Nearly 100 countries have completed an assessment of management effectiveness on at least a portion of their protected areas[30]. Nearly all assessments of protected area management effectiveness contain a common set of core elements[31]. This set of elements allows planners to pinpoint the strengths, weaknesses and threats within protected areas, which can then be used to identify threatened and poorly managed protected areas that are important for connectivity, and thus to help planners prioritize actions and strategies.

Assessing other conserved areas and sustainable use areas

Protected areas are a critical component of an effective land/seascape, as they often form the large core areas that species and ecosystems need to persist over time. Many planning processes focus exclusively on legally designated protected areas, without considering the range of other conservation areas[32]. However, lands and waters that are not part of a legally-designated protected area network may also provide significant ecological benefits. These areas are sometimes called "other conserved areas" or "sustain-

27 A common system for categorizing the wide range of protected area objectives is the system of categories advocated by IUCN (2008); see Appendix 8 for a summary of these.

28 The most common system for categorizing governance types is the system proposed by Borrini-Feyerabend in Lockwood et al., 2006. See Appendix 8 for a summary of governance types.

29 See Hockings et al., 2007 for a comprehensive summary.

30 See www.unep-wcmc.org/wdpa/me for a summary of many of these assessments

31 See Appendix 7 for a list of common elements of protected area management effectiveness.

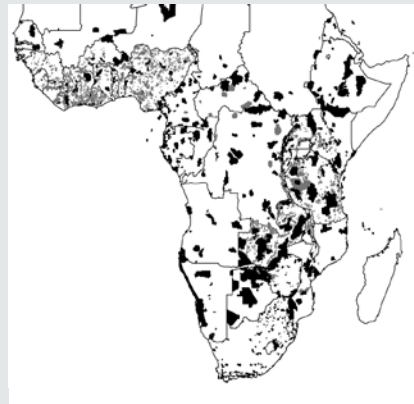
32 See for example Ashley and Jenkins, 2006

able use areas," and may have incentives and other mechanisms in place to ensure that they provide at least some assurance of long-term biodiversity protection, and, in many cases, they can maintain connectivity at a landscape scale.

Unlike legally designated protected areas, which generally fall into the well-established IUCN categories, there is no commonly agreed upon classification system of other conserved areas. However, the following parameters could be used when measuring the conservation value of other conserved areas[33], as part of a protected area integration process:

- ✓ *Biodiversity value*: the overall benefit to biodiversity within and beyond the sustainable use area, particularly for maintaining connectivity;
- ✓ *Conservation intent*: the extent to which biodiversity conservation is a conscious strategy of the management system;
- ✓ *Amount of modification*: the extent to which the area maintains ecological systems in a relatively intact condition; and
- ✓ *Permanence*: the length of time the area is likely to be conserved, ranging from short term to long term or even permanent.

BOX 13: Protected areas and forest reserves in Africa



The World Database on Protected Areas includes details of many countries' forest reserves. Throughout Africa there are more than 4,300 forest reserves that comprise approximately 616,700 km^2. Not only are the majority of the Red Listed plants in the forested habitats of the eastern African coastal forests and the Eastern Arc Mountains of Tanzania and Kenya found in these forest reserves, but they also play a vital role in contributing to overall connectivity across large regions (Stolton and Dudley, 2006).

ASSESSING THE ECONOMIC, SOCIO-DEMOGRAPHIC AND CULTURAL CONTEXT

The protected area integration process requires an assessment of the economic, socio-demographic and cultural context of an area. This will usually start with a desk-based assessment based on published information and statistics, plus conversations and interviews with stakeholders in the region. It should build upon the stakeholder assessment as described in Chapter 1.

Economic

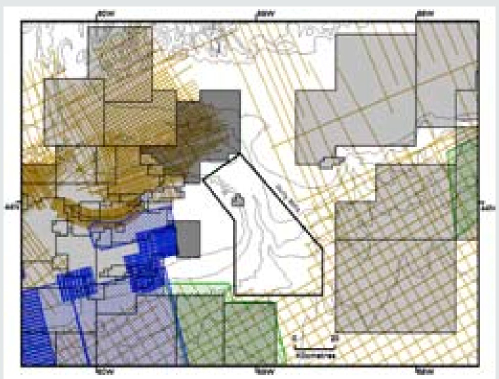
The first step is to gain a clear understanding of the economic sectors that operate within or affect the land/seascape. Several authors[34] have advocated that an analysis of sectors must be an integral component of any process that seeks to design an ecological network or an integrated land/seascape. Assessing the sectoral landscape is among the most difficult in the protected area integration process, described by one author[35] as "a complex, messy zone of competing and cooperating social and political actors making demands on the available natural resources."

A related sector is any activity that contributes to the economy of a community or country and that has an actual or potential bearing on the creation, integrity or management of the land/seascape. Examples

33 From Stolton and Dudley, 2006. See also Appendix 9 for examples of other conserved areas.
34 Anderson and Jenkins, 2006; Kettunen et al., 2007; Angelstam et al., 2003
35 Cline-Cole, 2000

BOX 14: Sectoral and policy analysis in Canada

The map below shows hydrocarbon licences and seismic acquisition lines adjacent to the Gully Marine Protected Area in Nova Scotia, Canada. Several sectors have begun to integrate with this protected area. In the energy sector, for example, oil and gas exploration is prohibited in the protected area, the environmental assessment has been expanded, there is a voluntary code of conduct for transit in the area, and there are collaborative research and monitoring efforts. In the transportation sector, the park boundaries have been added to all transportation charts, and there are clear transportation guidelines, such as avoiding sites of high conservation value, and for discharging ballast water (M. Patry, pers. comm.).



of related sectors include forestry, energy, transportation and tourism[36].

A spatial assessment of these sectors can help provide a clearer understanding of the contributions each makes towards social and economic objectives, the threats they pose to the sustainability of the land/seascape, and the opportunities to improve sustainability and biodiversity conservation through improved working practices and better spatial planning. Some questions to ask include:

- ✓ What contribution does each sector make towards economic growth? This can be measured through Gross Domestic Product (GDP) or Gross Value Added (GVA) statistics, which are commonly available from government statistics offices.
- ✓ Who are the main players in each industry? Are there industry representative groups? Do any individual corporations dominate the land/seascape?
- ✓ What are the future plans for resource use within the designated corridor initiative area? Are they compatible with biodiversity conservation objectives?
- ✓ How will land prices and the value of production activities (such as mining, forestry, fisheries, agriculture, energy etc.) affect the integration initiative? Are there some areas where competing land uses make them simply too economically valuable to protect or conserve (i.e., the 'opportunity cost' of conservation is too high)?
- ✓ What are the main land tenure systems? How do these affect the ability of communities and other stakeholders to manage the landscape?
- ✓ Which areas provide ecosystem services to communities, with benefits such as clean drinking water, reduced erosion and flood control? How can the protected area integration process capitalize on these benefits and promote increased protection and connectivity?

Socio-demographic

- ✓ How large is the human population within the land/seascape? How is this distributed?
- ✓ What are the trends over time? Are some areas experiencing high population growth? Have municipal and regional planning boards designated growth centers? What threats, constraints and opportunities do these pose?
- ✓ What is the relative wealth of different areas? What are the levels of poverty (measured through the UN's Human Development Index) or levels of malnutrition and infant mortality?
- ✓ What are the main sources of livelihood for local people? Would these be strengthened or threatened by the proposed connectivity corridor or by other integration strategies?

36 See Appendix 10 for a checklist of related sectors and policies to include in the policy assessment

Cultural

- ✓ What are communities' views and attitudes towards conservation? How supportive would communities be of possible protected area integration strategies, such as adding new corridors, expanding existing protected areas, and changing land-use policies? What constraints and opportunities do these attitudes present?
- ✓ Are there marginalized groups in the area? Indigenous groups? Are there issues of gender equality?
- ✓ What areas are important for social, cultural and/or economic reasons? For example, are there areas that have high recreational, spiritual or aesthetic importance? Are there areas that are especially important for economic reasons, such as important fisheries? How can the initiative capitalize on these opportunities?

ASSESSING THE POLICY AND REGULATORY CONTEXT

Identifying relevant policies

In addition to the sectoral analysis described above, the team should also assess the relevant policies in place or planned in the land/seascape, as well as the policy environment — the procedures, norms and belief systems that provide the context to natural resource policies. Examples of related policies and the broader policy environment include land use planning laws; development plans; regulation of forestry, fisheries, mining, infrastructure and energy; national and local political environment; and law enforcement practices. Although 'sectors' and 'policies' are conceptually distinct, in practice they are integrally related, as each sector has its own laws, policies and policy environment.

The next step will be to identify the impacts of these policies on the objectives of the land/seascape, including both positive and negative impacts on — and incentives relating to — the conservation objectives, such as subsidies to productive sectors, land tenure systems, legislation on designating different types of protected and mixed use areas. This can lead to the identification of potential policy changes that would assist the initiative and realistic road maps towards influencing these policies, including whom to target, and what role the members of this initiative will be able to play.

Identifying constraints and opportunities to achieving the area's conservation objectives

Once the conservation planning team identifies the relevant sectors and policies, the next step is to identify which of these are constraints and which are opportunities in creating a functional land/seascape. The matrix below is one tool that can be used to systematically identify these constraints and opportunities. Planners first identify the suite of relevant sectors and policies that are likely to have a bearing on protected area integration. They then identify the specific constraints to creating and securing new areas, maintaining the ecological integrity of existing areas, or managing existing areas more effectively. These areas may include protected areas, other conserved areas, buffer zone areas (including the surrounding matrix), and corridors between areas.

For example, two opportunities, highlighted in the two cells below, could include the interest of mining companies to use biodiversity offsets to establish new conserved areas to compensate for their mining activities, and the interest of tourism groups to establish a corridor for recreation purposes. Two constraints, highlighted in the two lighter cells below, could include the practice of stocking rivers in or near protected areas with invasive alien fish species for sport fishing, and the waste disposal policies of hotels that have an impact on water quality in the buffer zone and broader matrix.

BOX 15: Examples of constraints and opportunities to achieving conservation objectives	**Actions**							
	Creating and securing new areas and corridors				**Effectively managing, maintaining and restoring the ecological integrity of areas and corridors**			
Natural resource sectors and policy environment elements	Protected areas	Other conserved areas	Buffer zones and broader matrix	Connectivity corridors	Protected areas	Other conserved areas	Buffer zones and broader matrix	Connectivity corridors
Urbanization								
Transportation								
Energy		Opportunity						
Tourism				Opportunity				
Wildlife management								
Agriculture & grazing								
Forestry								
Fisheries					Constraint			
Freshwater resources								
Waste management							Constraint	
Invasive species								
Climate change								
Legal environment								
Sectoral coordination								

Identifying impacts on related objectives of the land/seascape

In many cases, the objectives of protected area integration are not restricted to the conservation of biodiversity, but also relate to social and economic objectives. The assessment therefore should also consider the impacts of activities within the land/seascape on these related objectives. For example, the assessment could consider the impact of establishing conservation corridors on goals of poverty alleviation and human wellbeing.

PUTTING IT ALL TOGETHER

Aligning protection and connectivity gaps with opportunities

This step entails two parts. The first is to identify where gaps in protection and connectivity align with protection opportunities and constraints. Unprotected areas that are intact, and have high importance for the functioning and/or connectivity of key biodiversity targets, could be candidates for improved protection, provided that the costs, land tenure status and other factors allow. Similarly, such areas may be screened as not being feasible because of societal and economic constraints. For example, a large intact area in the middle of a potential corridor, which is owned by a single landowner, could likely be a feasible candidate for a conservation easement, whereas a large area divided into many smaller parcels owned by many landowners may be more difficult.

The second part of this step is to identify where gaps in protected areas and connectivity align with sectoral constraints and opportunities. Areas that are significant for the ecological network, but are either negatively impacted or are likely to be negatively impacted by the surrounding landscape could be the focus for improving sectoral practices and policies. For example, planners might address waste management policies for coastal resorts and hotels that are having an impact on nearby marine protected areas. The idea is to identify places where protection gaps align with protection and policy opportunities.

BOX 16: Examples of opportunities and constraints from Egypt. (K.A. Harshash, personal communications)

CONSTRAINTS			
	Strategy 1: Changing the physical environment	**Strategy 2: Changing sectoral practices**	**Strategy 3:Changing market incentives, distortions and externalities**
Sector 1 **Energy**	The Ministries of Energy and Petroleum are much stronger than the Ministry of Environment	Inflexible laws and policies do not allow for positive incentives. Mining is the top priority of the government.	There are perverse governmental energy subsidies
Sector 2 **Tourism**	Loss of habitats with no biodiversity offsets	Huge unplanned infrastructures are being developed	Absence of policies for sustainable tourism
Sector 3 **Laws and legal framework**	Lack of policies on offsets and protection of key habitats	Lack of enforcement of environmental laws.	Biodiversity services are not fully valued in market terms.
OPPORTUNITIES			
	Strategy 1: Changing the physical environment	**Strategy 2: Changing sectoral practices**	**Strategy 3: Changing market incentives, distortions and externalities**
Energy	The Ministries of Energy and Petroleum should compensate for biodiversity loss through biodiversity offsets.	Develop fees and taxes to enable the energy sector to subsidize biodiversity protection	Develop fees and taxes to enable the energy sector to subsidize biodiversity protection
Tourism	Promotion of ecotourism	Applying environmental impact restrictions to the tourism sector	Global growing demands for ecotourism
Laws and legal framework	Create policies that enable the development of biodiversity offsets	Strengthen capacity for law enforcement and properly implement existing land-use regulations.	Develop methods for valuation of biodiversity and ecosystem services

Creating options for a connected, integrated land/seascape

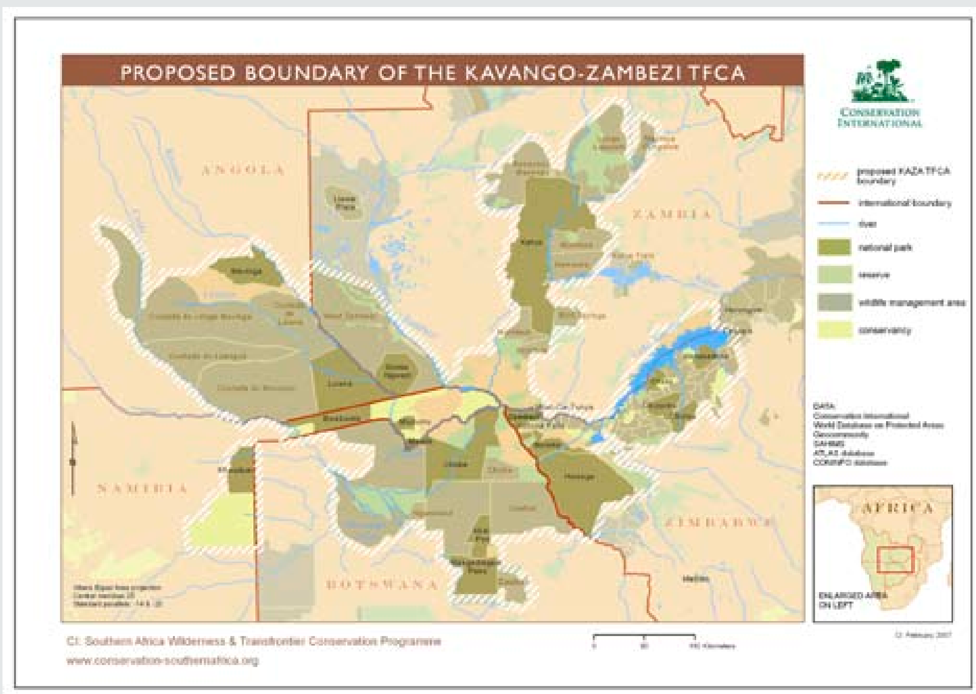
This step entails the creation of one or more scenarios for an optimal, connected network. This process requires several steps:

- ✓ Identify areas where there are opportunities and priorities for protection and/or policy interventions to fill key gaps

- ✓ Identify areas where there are limiting constraints for protection and/or policy interventions
- ✓ Combine the multiple data layers into a single layer
- ✓ Identify a range of multiple scenarios for a connected protected area network based on opportunities and constraints
- ✓ Identify a smaller subset of scenarios that are feasible and realistic to implement
- ✓ Consider options for presenting information to key decision makers
- ✓ Continually revise the scenarios and adapt strategies based on progress and new information as it becomes available. This links to the concept of adaptive management, as outlined in Chapter 5

BOX 17: Aligning connectivity gaps with opportunities in the Kavango-Zambezi Transfrontier Conservation Area (Cumming, Braack and Lawrence, 2008)

The map below shows clusters of core conservation areas in the Kavango-Zambezi Transfrontier Conservation Area. These areas, which include game reserves, conservancy lands, forest reserves, national parks and wildlife management areas, have been selected as the most feasible scenario for spatially integrating protected areas.



CHALLENGES AND ENABLING CONDITIONS

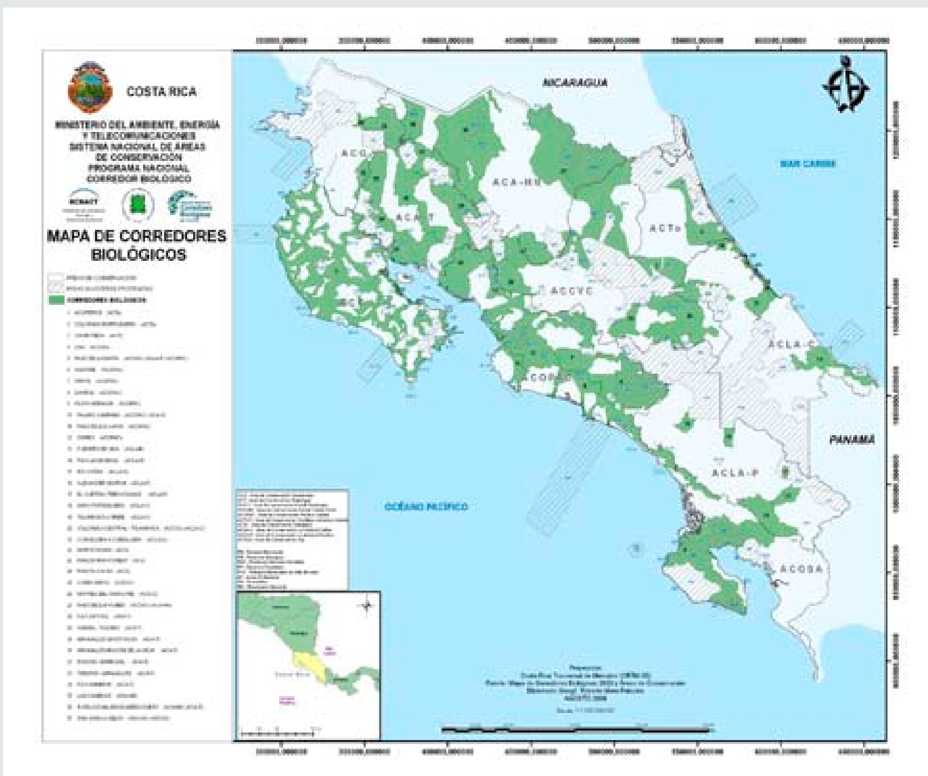
Some of the challenges inherent in integrating protected areas into the wider landscape, seascape and related sectors include:

- ✓ ***Securing sufficient data:*** Assessing the wider landscape typically requires many data layers and a wealth of information, and in some countries, these data sets are either unavailable or too expensive to obtain.

- ✓ ***Limiting the number of biodiversity features***: Selecting a relatively small number of key biodiversity features can be a difficult challenge, especially in countries with high levels of biodiversity.
- ✓ ***Setting goals and assessing viability of key biodiversity features***: The science of setting goals and assessing viability of biodiversity features is still evolving, and this, combined with a lack of data, may mean that planners must rely on general rules of thumb when setting goals.
- ✓ ***Inability or unwillingness to agree upon scenarios***: Identifying a suite of scenarios enables stakeholders to choose among different and often competing options. However, agreeing upon a single scenario can often be one of the most difficult processes involved in protected area integration[37]

BOX 18: An example of an integrated, connected protected area network in Costa Rica

This map shows the suite of protected areas and biological corridors that together would comprise a comprehensive, functional protected area network. This network was developed based on the ecological gap assessment that identified explicit conservation goals for representation and connectivity.



Some of the enabling conditions that will help ensure the success of a protected area integration process include:

- ✓ ***Solid GIS capacity:*** GIS capacity, while not a prerequisite for integration planning, can be an invaluable tool for overlaying multiple data sets.

37 See, for example, Sayer et al., 2007 and Sandker et al., 2007, for guidelines on how to quantify trade-offs between scenarios.

- ✓ ***Expertise in optimization software:*** Planners will find that having optimization software will help them generate multiple options and scenarios, and discuss potential tradeoffs between these scenarios.
- ✓ ***Diversity of participants:*** Having a diverse set of stakeholders in the assessment process will be invaluable for understanding actual conditions, constraints and opportunities.

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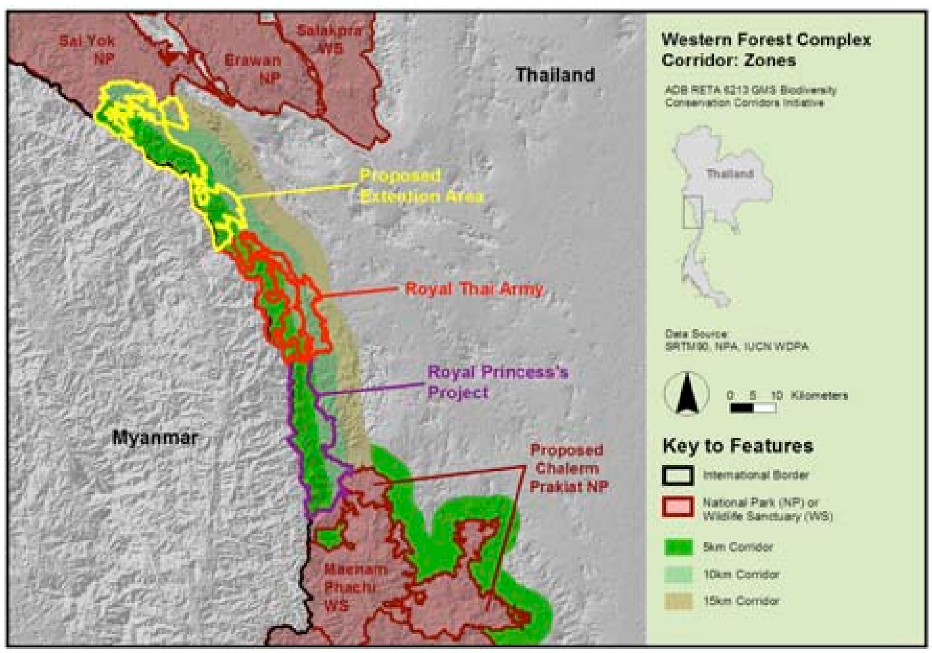
CHAPTER 3: DEVELOPING STRATEGIES AND ACTIONS

Identifying strategies and actions

By assessing the wider landscape and identifying optimal scenarios, planners will generate a set of priority areas for improving integration and connectivity of the protected area network, and these areas should be the starting point for developing specific strategies and actions. Below are examples of the types of strategies and actions planners might identify and employ..

BOX 19: Developing strategies to join Sai Yok National Park with Maenam Pachi Wildlife Sanctuary in Thailand (A. Nateewathana, 2008, pers comm.).

Strategies include extending existing protected areas, creating a new protected area, working with the Royal Thai Army to modify management practices to enable species movement, and creating buffer zones.



- ✓ ***Changing protection levels:*** Strategies to change protection levels may mean creating new protected areas, fostering the creation of other conserved areas, and/or creating new corridors and buffer zones. Some of the core areas may be strict wilderness areas; while others are likely to span the full gamut of IUCN categories and governance types, including community conserved areas, indigenous reserves and protected landscapes. Strategies in this category therefore include expanding existing protected areas and other conserved areas, reconfiguring them to better protect key habitats and linkages, and changing the designation to a stricter form of protection.

- ✓ ***Changing management practices:*** Strategies to change management practices include managing species within protected areas to improve connectivity, improving habitat, and/or improving ecological functions and processes. Examples of strategies that use management

Nairobi National Park, Kenya

practices to improve connectivity include improving forest management (through voluntary best practices, certification, logger education) to allow for longer rotations and avoiding areas of critical importance for species connectivity; improving river functioning through improved flow management; and improving grassland health through prescribed burning techniques and improved grazing practices.

- ✓ ***Change laws and policies:*** Strategies to change laws and policies include, for example, changes to policies relating to any of the natural resource sectors (e.g., land use planning, invasive species), as well as specific protected area laws and policies. This set of strategies may also entail the creation of new laws and policies (e.g., a new land tenure law), and the elimination of inappropriate laws and policies, such as perverse incentives and conflicting land tenure laws. This strategy also includes the creation of voluntary best practices, such as riparian zone management practices in agriculture and forestry.

- ✓ ***Change market incentives, distortions and externalities:*** Strategies to change market incentives include the creation of market-based incentives to improve management, such as promoting green taxes and subsidies (and removing subsidies on fishing and agriculture that promote environmentally destructive practices); internalizing externalities; payments for ecosystem services schemes whereby ecosystem managers are rewarded for sustainable management; carbon trading and REDD; transferable quota schemes such as those used in some fisheries; conservation agreements; certification of forests (e.g., Forest Stewardship Council); fisheries (e.g., Marine Stewardship Council,) and agriculture (e.g., IFOAM-accredited certification); and voluntary incentives such as the creation of biodiversity offsets.

- ✓ ***Changing sectoral practices:*** Strategies to change sectoral practices are as varied as the relevant sectors themselves. These may include, for example, strategies to foster appropriate site and configuration of infrastructure (e.g., mining operations, roads, intensive forest plantations), as well as strategies to discourage negative policies and practices within natural resource sectors (e.g., discourage heavy pesticide use near key freshwater areas).

- ✓ ***Changing the enabling environment:*** Strategies to change the enabling environment include improving national leadership, improving coordination and communication among sectors, improving the legal and judiciary environment, especially enforcement, and promoting public awareness. Specific actions could include public campaigns, lobbying, advocacy and capacity building.

- ✓ ***Changing the physical environment:*** Strategies to change the physical environment primarily include strategies to restore species and habitats within new or existing protected areas, corridors of buffer zones. Specific actions could include river restoration through stream bed modification, forest restoration through reforestation efforts, artificial habitat creation such as coral reef beds, and removal of invasive species.

BOX 20: Example of the range of strategies used in the Vilcabamba Amboro Conservation Corridor of Peru and Bolivia:

- ✓ ***Municipal Land Use Planning:*** Develop a land use plan for the Municipality of Apolo in order to harmonize conservation with the needs and objectives of local communities and increase understanding of conservation issues
- ✓ ***Community based ecotourism:*** Incorporate an approach that supports local livelihoods, with an emphasis on training local staff and forging alliances with the private sector and government
- ✓ ***Management plan:*** Develop a management plan for Reserva de la Biosfera indigenous territory that includes a strategy to foster local livelihoods, incorporates participatory mapping, and improves management for connectivity of key species
- ✓ ***Media:*** Develop brochures and a film "Treasures without Borders" & "The Green Tent" that communicate the values of the protected area
- ✓ ***Transboundary coordination:*** Form a bi-national technical committee in order to understand the dynamics of international relations and political realities of transboundary conservation, and exchange experiences in protected area integration. (Surkin and Lawrence, 2008)

Screening and prioritizing strategies

Once planners identify the full suite of potential strategies needed to implement the integrated landscape design, they must then screen and prioritize these strategies. Planners may consider the following criteria in their screening and prioritization process:

- ✓ ***Effectiveness***: Is the strategy effective in achieving the goals of protected area integration? Will it result in long-term changes that improve connectivity?
- ✓ ***Efficiency***: Is the strategy efficient in achieving protected area integration relative to other potential strategies? What is the potential return on investment?
- ✓ ***Feasibility***: Is the strategy feasible to implement? How politically palatable is it among key decision makers? How practical are the steps needed to implement the strategy? Is funding available or likely to become available?
- ✓ ***Affordability***: What is the overall cost of implementing the strategy? Is the strategy easy to implement given existing resources?
- ✓ ***Momentum***: Is the strategy an 'easy win' that will help to gain momentum and build support for additional actions in the future?
- ✓ ***Innovation***: Does the strategy provide a new model for protected area integration? What is the likely adoption of this new innovation across the country?

- ✓ ***Social and economic impact***: How will the strategy affect local communities? Will the strategy improve social benefits and human well-being? What are potential negative social and economic impacts?
- ✓ ***Replicability***: How easy will it be to replicate this strategy in similar areas? What can planners learn from this strategy that can be applied more broadly?
- ✓ ***Importance***: Is the strategy critical for success in a high-priority area? How does it rank against other strategies?
- ✓ ***Public support***: How much public support or opposition is there likely to be?
- ✓ ***Success***: How likely is the strategy to succeed in achieving the intended goals? If it is a success, will it be viewed as such by key decision makers?
- ✓ ***Risk***: Are there other inherent risks that might be involved in implementation?

Based on the answers to the questions above, planners will want to narrow the list of potential strategies down to a select few that will achieve the largest gains in protected area integration in the most efficient and timely manner with the least risk.

Challenges and enabling conditions

BOX 21: Developing strategies for protected area integration in the Terai Arc of Nepal (S. Bhatta, personal communications)

The Terai Arc of Nepal, considered the "rice bowl" of the country, has more than half of its population living in poverty, two-thirds dependent upon a hectare or less for their livelihoods, and over 80 percent dependent on natural forests for fodder, fuel, food and medicine. Much of the land between protected areas has been degraded or converted, and poaching has drastically reduced tiger and leopard populations over the past two decades.

With this socio-economic and ecological context as a backdrop, the government of Nepal, with the World Wildlife Fund and other partners, identified four major strategies: 1) restoring degraded corridors and bottlenecks with native vegetation; 2) conducting a major anti-poaching campaign; 3) developing alternative sources of energy and fuel to reduce dependence on fuelwood from local forests; and 4) introducing the cultivation and marketing of high-value agricultural and agri-forestry products, such as menthe, mamelo juice and cane furniture.

Some of the challenges inherent in developing strategies for integrating protected areas into the wider landscape, seascape and related sectors include:

- ✓ ***Evaluating costs and benefits:*** It can be difficult to put an economic value on the costs, benefits and economic tradeoffs resulting from any particular strategy;
- ✓ ***Accepting a realistic timeframe:*** Many strategies, particularly those involving policy changes, may require longer time frames than planners typically use (e.g., ten years or more);
- ✓ ***Balancing different screening criteria:*** Planners are likely to find that no suite of strategies fully meets all of the screening criteria. Unlike ecological planning, there is no software support for balancing the multiple factors in strategic planning.

Some of the enabling conditions that will help ensure the development of effective strategies include:

- ✓ ***Diversity of practical experience:*** Including diverse participants with a broad range of experience across the diversity of different strategies will ensure that the discussions are grounded in the practical realities of implementation;

- ✓ ***Nuanced understanding***: Having an in-depth understanding of critical issues, such as the likely public support for a specific strategy and its potential social and economic impacts, will be critical in the screening and prioritization process;
- ✓ ***Flexible approach***: Considering a wide range of potential strategies, and creating multiple scenarios and options will enable planners to have wider flexibility. In addition, planners may need to tailor strategies that work in other countries to suit their own conditions and circumstances.

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CHAPTER 4: IMPLEMENTING STRATEGIES AND ACTIONS

Developing an implementation plan

Once strategies and actions have been identified, screened and prioritized, the next step is to develop a more detailed plan for implementation. Below are the steps involved in developing an effective implementation plan for protected area integration:

- ✓ ***Develop more specific strategies —*** This step entails clarifying and articulating the strategies needed to achieve the goals of the protected area integration initiative.
- ✓ ***Identify specific actions and objectives for each strategy:*** This step requires a more detailed description of the specific actions and their associated objectives.
- ✓ ***Identify main actors responsible for each objective*** — This step includes identifying not only those individuals and agencies that are responsible for undertaking the actions involved in the strategy, but also those who may have in influence on the overall success of these actions.
- ✓ ***Set timelines for each objective*** — This step includes setting a clear timeline for each step, based on the overall timeline of the strategy.
- ✓ ***Identify costs and resources associated with each objective*** — This step requires an identification of the likely costs and resources involved for each step, including, for example, costs such as land acquisition, data, software, staff time, transportation, and communication.
- ✓ ***Identify indicators of success*** — This step involves identifying milestones and indicators of success that will allow the program manager to be sure that the initiative is on track.

BOX 22: Example of elements of implementation plan for one strategy – improving management to enhance connectivity – of a protected area integration initiative:

- ✓ ***Strategy:*** Improve the management of protected areas to enhance connectivity of key species
- ✓ ***Specific action:*** Revise the management plans for those protected areas that play a key role in maintaining connectivity for key species.
- ✓ ***Main actors:*** Protected area staff and managers, consultants, communities adjacent to the protected areas; national protected area agency, GIS specialist and related government agencies.
- ✓ ***Timeline:*** Complete habitat and species data analysis by Dec 2010 within 12 protected areas. Hold public meetings for each management plan by June 2011. Complete first draft of 12 management plans for review by December 2011. Complete 12 revised management plans by June, 2012.
- ✓ ***Costs and resources:*** Approximately 4 full-time equivalent staff positions; 12 public meetings requiring transportation, facilitation site, communication costs.
- ✓ ***Indicators of success:*** The GIS data and analysis for key species is completed; first draft of management plans are completed; public meetings are held; final management plans are completed; the project succeeds in achieving main objectives.

Mainstreaming strategies

Mainstreaming is the internalization of biodiversity conservation goals into economic and development sectors, policies and programs, such that they become an integral part of their functioning of these sectors[38]. Many countries have attempted such efforts (e.g., through National Biodiversity Strategies and

38 Petersen and Huntley, 2005; Sandwith, 2002

Actions Plans) and it is important to link corridor initiatives within and under the general umbrella of these efforts wherever possible.

BOX 23: Examples of mainstreaming biodiversity into sectors

Agricultural Sector *(*McNeely, 2005*)*

- Maintain natural habitats within productive landscapes
- Use economic incentives to encourage farmers to conserve wild biodiversity
- Compensate farmers for economic damage from wild species
- Recognize property rights of farmers and indigenous communities
- Use market instruments to promote sustainable agriculture
- Educate landowners about sustainable practices

Wildlife Sector (Goodman et al., 2002)

- Develop game ranchers association to represent interests
- Create a legal framework that supports ownership of private land and of wildlife
- Provide technical support to ranchers
- Provide financial incentives for creating private game ranches
- Use sales from game reserves to fund protected area management
- Encourage ecotourism within private game reserves
- Remove physical barriers (i.e., fences) between game reserves and protected areas

Energy Sector (Kapila, 2005; EBI, 2002; Kiesecker et al., 2009)

- Share information on the location of sites with high biodiversity value
- Encourage energy companies to develop a voluntary biodiversity offset program
- Incorporate connectivity and biodiversity conservation issues into the strategic environmental assessment and environmental impact assessment
- Form partnerships with conservation scientists to measure and mitigate impacts

Mainstreaming approaches are characterized by:

- The infusion of biodiversity and conservation values into broad economic sectors, such as forestry, mining, tourism, energy, infrastructure development, transportation;
- The infusion of biodiversity and conservation values into the broader enabling policy environment, including policies and legislation, land-use planning, financial incentives, education and research;
- The inclusion of a wide variety of tools, strategies and approaches to achieve mutually-beneficial goals; and
- The incorporation of a broad array of actors, with a wide range of partnership mechanisms and agreements.[39]

While there is no prescribed set of steps to biodiversity mainstreaming, the following steps may be useful to consider when integrating protected areas:

- Form partnerships between stakeholders interested in biodiversity conservation issues and those interested in development issues
- Explicitly identify key stakeholders' interests

39 Petersen and Huntley, 2005; Sandwith, 2002, Ranganathan et al., 2008

- Identify mutually beneficial outcomes
- Identify conflicts and trade-offs, and work towards mutually acceptable solutions
- Identify subsidiary strategies that serve mutually beneficial interests and achieve mutually beneficial outcomes
- Embed and institutionalize these strategies in the institutions, policies, agreements, programs and mechanisms of each sector.

Best practices in engaging stakeholders

The following are some best practices for engaging stakeholders as part of the protected area integration process[40]:

- ✓ ***Build trust***: By sharing information, by engaging repeatedly with stakeholders, and in some cases by working through trusted intermediaries
- ✓ ***Be inclusive****:* By including many diverse sets of stakeholders, especially including those most affected by the outcomes of the integration process. This means involving stakeholders in all aspects of decision making.
- ✓ ***Clarify responsibilities****:* By clarifying roles and responsibilities for data collection, participation, decision making, planning and other actions needed to advance the initiative
- ✓ ***Be transparent***: By sharing how information will be used, who will use it, and how participants can access the final results
- ✓ ***Be clear on decision-making processes***: By explaining how decisions will be made, who will make then, when they will be made, and what will be done with the results
- ✓ ***Empower the vulnerable****:* By identifying and including those groups who do not normally have access to participation mechanisms
- ✓ ***Clarify norms of engagement****:* By clarifying the timeline, scope of participation, and other norms of engagement
- ✓ ***Create a learning environment****:* By finding creative and non-traditional ways of interacting and seeking stakeholder input

Challenges and enabling conditions

Some of the challenges inherent in integrating protected areas into the wider landscape, seascape and related sectors include:

- ✓ ***Ensuring adequate representation:*** It can be difficult to ensure that the stakeholders represent the interests needed for the integration initiative to succeed.
- ✓ ***Creating trust:*** In some environments, particularly where there has been a history of conflict over natural resources, it may be difficult to create an atmosphere of trust such that stakeholders fully participate in the process.
- ✓ ***Managing the implementation process:*** Because the protected area integration process will involve many different actors, there are inherent difficulties in keeping all of the partners on track.

40 World Bank, 1996

Some of the enabling conditions that will help ensure the success of a protected area integration process include:

- ✓ ***An effective implementation plan:*** Success of the protected area integration initiative will depend upon having an effective implementation plan that is comprehensive, has clear actions, timelines, indicators, and responsibilities.
- ✓ ***Broad support for, and agreement on, the implementation plan:*** An implementation plan is only as good as the support of the partners involved. All partners and stakeholders must support at least the actions that they are responsible for implementing, and there must be at least a modicum of support from civic society.
- ✓ ***Clear leadership and commitment:*** Even with an effective plan, sufficient funding and broad public support, a protected area integration process must have strong programmatic and political leadership and a demonstrated commitment to follow through with the implementation plan.

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A protected area that encompasses both terrestrial and marine areas

CHAPTER 5: MONITORING, EVALUATING AND ADAPTING

Issues in monitoring and evaluating protected area integration initiatives

Planners face an array of problems and issues when developing a monitoring program for large-scale conservation initiatives; many monitoring programs are not founded in ecological theory, lack clear logic in selecting indicators, do not have triggers for management interventions and policy responses, do not connect monitoring results with decision making, lack sufficient funding and are inadequately implemented[41]. Even if planners avoid these problems, they still face a range of challenges.

Challenges to scientists and practitioners include an inadequate understanding of historical reference conditions, temporal lag times between action and outcomes, unpredictable and non-linear thresholds, cascading effects, short-term data errors and incomplete and biased data sets[42]. Challenges to decision makers include difficulties working at large spatial scales and crossing administrative boundaries, in developing and maintaining data systems, in integrating data from multiple sources with different protocols, and in choosing from a myriad of potential indicators[43]. Even simple monitoring programs with a small set of indicators that provide direct and timely information to decision makers are rare. Because of these challenges, many projects and programs have neglected to develop or implement monitoring plans[44]. Yet monitoring is a critical component of any conservation initiative, including large-scale connectivity and integration processes. It increases accountability, credibility and transparency, and promotes learning and adaptive management. Equally important for large-scale conservation initiatives, monitoring can provide planners with an early warning for when interventions may be needed to prevent irreversible biodiversity losses.

BOX 24: Monitoring status vs. monitoring strategy effectiveness

Conservation planners can use two types of monitoring: status and strategy effectiveness.

Status monitoring:

Status monitoring asks the question "What is the status and trend of biodiversity independent of our actions". Status monitoring includes three aspects: 1) monitoring status — the value of an indicator at a single point in time; 2) monitoring baseline conditions — the value of an indicator at a point in time other than the present to set a reference or benchmark condition; and 3) monitoring trends — the change of the value of an indicator over time (Busch and Trexler, 2003).

Strategy effectiveness monitoring:

Strategy effectiveness monitoring asks the question "Are our conservation actions achieving the desired results". This type of monitoring generally relies upon a clear model that includes a specific strategy, an expected outcome from that strategy, and a desired impact from one or more outcomes (FOS, 2007). These three components link to form a 'results chain,' or a conceptual scheme of cause and effect between strategy, outcome and impact. Such a model provides a transparent and explicit model for developing specific monitoring indicators.

41 Noon, 2003

42 Trexler and Busch, 2003

43 Noon, 2003; Bauscher and Trexler, 2003.

44 For example, a survey of more than 37,000 river restoration projects, costing over $14 billion dollars, found that less than ten percent had any monitoring or evaluation plans at all (Bernhardt et al., 2005).

Protected wetlands, uplands and mountains in the Western United States

Developing a monitoring plan

The following are steps to developing an effective monitoring program for connectivity initiatives[45]:

- ✓ ***Clarify objectives*** — In the absence of clear objectives, there is little basis upon which to design a monitoring program (Legg and Nagy, 2006). A clear objective clearly specifies the desired condition or outcome. This may be based on historical reference conditions, on benchmarks set in a pristine habitat, on inherent thresholds of the species or ecosystem, such as acceptable degree of variation, or simply on expert opinion about what is sufficient.
- ✓ ***Select indicators*** — An indicator is a measurable attribute that characterizes the status of some component of biodiversity and/or environmental quality. Good indicators are accurate and reliable, easily measurable, and cost-effective.
- ✓ ***Select methods*** — For each indicator there will need to be a method for collecting information. The method will depend on the indicator, and available resources.
- ✓ ***Develop an implementation work plan*** — A work plan should identify what will be monitored and why, which indicators are highest priority, who will conduct the monitoring, when it will take place, how it will be implemented, how much it will cost, who will use the information and how they will use it.
- ✓ ***Gather data*** — This step may include gathering data on status and trends, as well as on the effectiveness of strategies. It also includes the development of a robust system for capturing data and tracking it over time.
- ✓ ***Develop thresholds for intervention*** — The primary purpose of monitoring is to be able to adaptively manage. To be effective in achieving this goal, a monitoring plan should include thresholds (e.g., degree of fragmentation, loss of habitat) that would trigger management and policy intervention.
- ✓ ***Develop clear links to decision making*** — The monitoring plan should clearly identify linkages between the monitoring data and decision makers.
- ✓ ***Communicate results*** — There are many potential stakeholders who will be interested in the results of monitoring, and therefore any monitoring program should have a clear communications plan.

45 From Noon, 2003; DeAngelis, et al.,2003; FOS, 2007

Sample indicators for monitoring connectivity initiatives and measuring progress on Goal 1.2

Below are some sample indicators that planners could use to monitor the status and/or the effectiveness of connectivity initiatives[46]. Some of these indicators can be used at national and even global levels, others are more appropriate for use at more local levels.

Viability of species and habitats:

- ✓ Population trends for key species
- ✓ Species movement across new connectivity features

Threats:

- ✓ Fragmentation indices for natural land cover (e.g., forest cover)
- ✓ River fragmentation (i.e., dams)

Protection and conservation:

- ✓ Amount and category of protected areas within the country
- ✓ Amount and category of protected area within key connectivity gaps
- ✓ Protected area management effectiveness (overall effectiveness and effectiveness for connectivity) across the PA system

Connectivity Policies:

- ✓ Number of policies that are developed to enable improved land and water connectivity and integration
- ✓ Development of a national plan to integrate protected areas into the wider landscape, seascape and broader sectors

Overall status of effective conservation:

- ✓ Amount of land and water that has low threat, is under some kind of protection or conservation status, and has some connectivity
- ✓ Amount (number and distribution) of species and ecosystems that are adequately protected or conserved, have low levels of threat, and have sufficient viability and connectivity to ensure long-term persistence.

BOX 25: Characteristics of effective monitoring indicators

- ✓ ***Relevant:*** effective indicators are directly related to the objectives and goals.
- ✓ ***Easily understandable:*** effective indicators should be easy to understand by a wide range of stakeholders, including the general public.
- ✓ ***Easily communicated:*** effective indicators are easy to communicate, including both the raw data and the resulting information
- ✓ ***Easily measurable:*** effective indicators must allow for a rapid and relatively inexpensive snapshot of the current status.
- ✓ ***Reliable:*** effective indicators provide information that is consistently accurate and trustworthy
- ✓ ***Widely applicable:*** effective indicators are able to be applied in a variety of situations to allow for changing circumstances

46 See also Appendix 12 for a summary of indicators used in the 2010 Biodiversity Indicators Partnership

Using monitoring results to learn and adapt

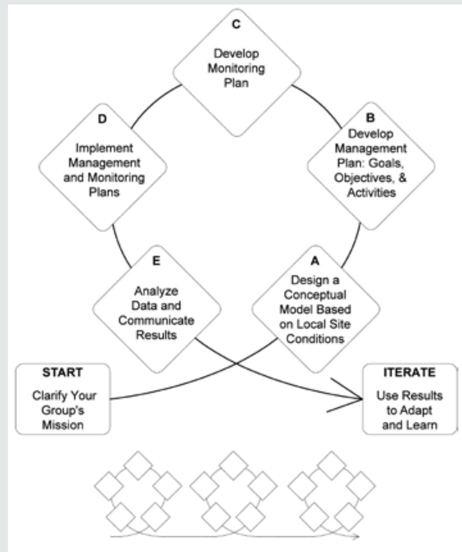
It is possible to start the protected area integration process before all assessments are completed, and then revise and improve — amending the objectives and actions — as time goes on and more assessments are completed (see, for example, the VACC case study).

Adaptive management involves three aspects: 1) a process of developing and testing assumptions about which actions are likely to be effective in achieving the desired outcomes; 2) a process of reviewing, analyzing and adapting based on the results of monitoring; and 3) a process of documenting and sharing the resulting lessons learned. Specific steps include[47]:

- ✓ Establish clear objectives;
- ✓ Design an explicit conceptual model to test assumptions;
- ✓ Develop implentation plan;
- ✓ Develop monitoring plan that will prove or disprove the assumptions in the conceptual model;
- ✓ Implement strategies in the plan;
- ✓ Analyze the data;
- ✓ Document and communicate the results; and
- ✓ Use the results to adapt and learn.

BOX 26: The adaptive management cycle

Adaptive management is an integral part of an iterative process of any project management. Simply put, it is a process that "integrates the design, management and monitoring of a project to systematically test assumptions in order to adapt and learn." (Margoluis and Salafsky, 2005). This diagram illustrates the adaptive management process.



This process requires a very careful selection of monitoring indicators to maximize learning and adaptation.

Challenges and enabling conditions

Some of the challenges inherent in integrating protected areas into the wider landscape, seascape and related sectors include:

- ✓ ***Lack of data:*** Some species and ecosystems are difficult to monitor, particularly in the marine realm.
- ✓ ***Lack of scientific consensus on monitoring indicators:*** There are few areas where scientists and planners can agree on simple, effective indicators for monitoring the status of biodiversity and the effectiveness of actions
- ✓ ***Lack of interest in monitoring:*** Some agencies may have little interest in monitoring, preferring instead to focus on taking actions and implementing strategies

47 Margoluis and Salafsky, 2005

Some of the enabling conditions that will help ensure the success of a protected area integration process include:

- ✓ ***A commitment to using the results of monitoring to adapt and learn:*** It is critical that the planning group maintain a commitment to adapt and learn, based on the successes and lessons learned in implementing the integration initiative.
- ✓ ***Strong partnerships***: Integration initiatives will benefit from strong partnerships with universities and other groups that collect and maintain key data sets
- ✓ ***Effective mechanisms for adapting to thresholds***: One of the most important aspects of monitoring is the development of thresholds that will trigger actions. A clear mechanism that enables these triggers is essential.

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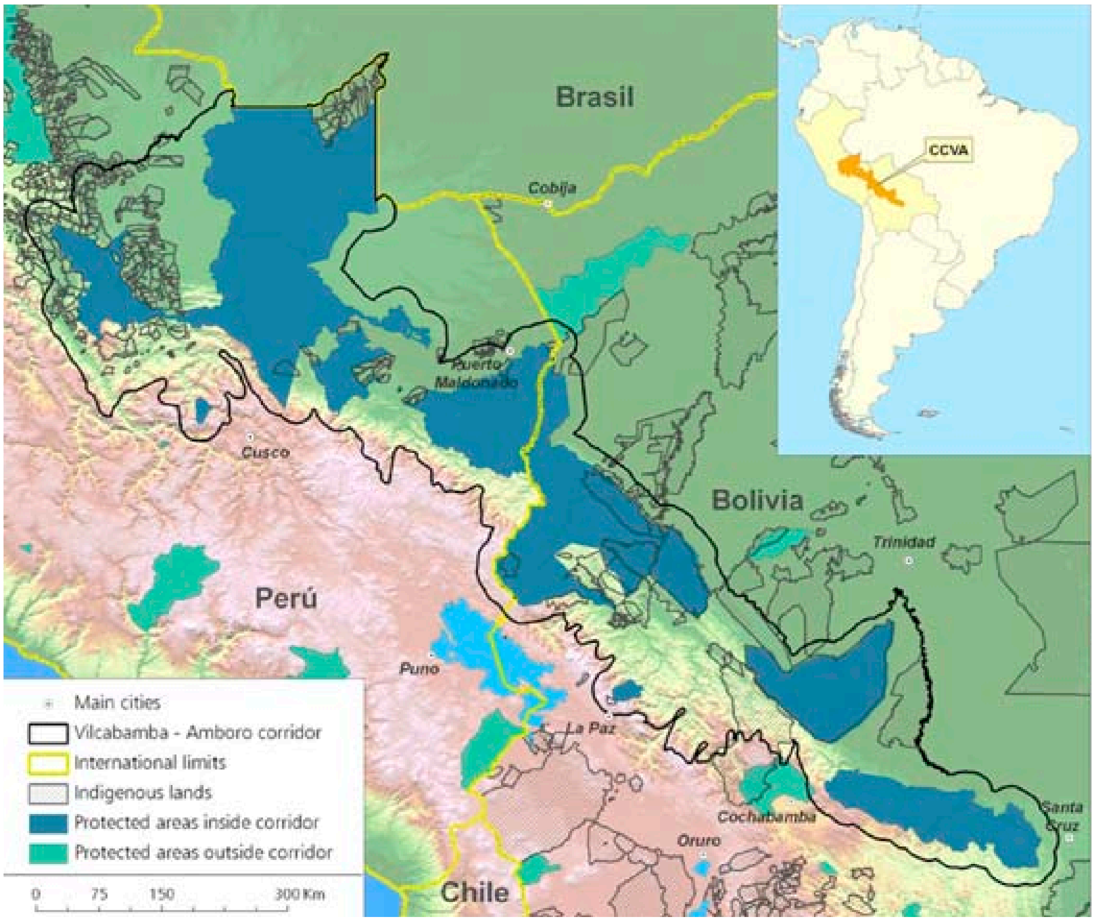
CASE STUDY 1: VILCABAMBA AMBORÓ CONSERVATION CORRIDOR

—Jordi Surkin, Eduardo Forno and Kellie Pettyjohn



map Carlos Ledezma

BACKGROUND

The Vilcabamba Amboró Conservation Corridor (VACC) is a trans-boundary conservation corridor that includes portions of the center south Andes Amazon regions of Bolivia and Peru. It was formed in December 2000, after years of groundwork by stakeholders in both countries, and is considered a pioneering approach in landscape-scale conservation in South America. The development and expansion of the corridor has been an ongoing process in which the Bolivian and Peruvian national governments, Conservation International (CI), other NGOs and local communities have been heavily involved.

The VACC is a conservation strategy that seeks to articulate multiple categories of protected areas into schemes that integrate management and sustainable land use. The protected areas in the VACC provide critical environmental services to local communities, and are integrated into the local, regional and national economies. The conservation corridor thus proposed a concept that goes beyond the biological connectivity of the protected areas by proposing a land use system that organizes use and management systems that reconcile protection with economic development.

The corridor covers more than 30 million hectares, stretching from Vilcabamba Cordillera in central Peru to Amboró National Park in south-eastern Bolivia (CEPF, 2001; Chavez Salas et al, 2006). Nineteen formal protected areas, covering 13 million hectares, are nested within the corridor as a core area, the first of which, Tambopata National Park, was created in 1990. Beyond these formal protected areas there are many other conserved areas that were created which allow for sustainable use, including: indigenous reserves, conservation concessions, ecotourism concessions, and production concessions, among others.

The corridor has an altitudinal range of 200 meters to more than 6,000 meters, providing an array of corresponding ecosystems. It plays an essential role in the regulation of ecosystem functions and hydrological processes at a regional level (CEPF, 2001), as well as provides habitat for 145 globally threatened species and an estimated 6,000 plant species. The area includes the wetlands and grasslands of Beni and Heath, the tropical moist forest of the Amazon Southwest, Puna highlands, dry forests in the Cacho, and the Yungas. The corridor is also home to over one million people, both indigenous[48] and non-indigenous, many of whom rely on ecosystem services from the protected areas.

GETTING STARTED

Engaging the Peruvian and Bolivian national governments and other key stakeholders in the region early in the corridor development process was crucial to the success of the corridor. In the early 1990s, the Peruvian National Institute of Natural Resources (INRENA) and the Bolivian National Service of Protected Areas (SERNAP) worked together with local authorities and the Ministries of Foreign Affairs to set up the Tambopata-Madidi trans-border conservation complex, a key area of the VACC. CI worked closely with INRENA and SERNAP, as well as with local government officials, protected area administrators, other NGOs and local communities, creating a core group of dedicated stakeholders. Through of series of workshops, the group developed a shared vision and strategy for the corridor which targeted both conservation and human well-being objectives. The likely impacts of climate change were also considered while developing the VACC's vision.

When the corridor was created, the vision was that in 15 years, protected areas and natural habitats would be functionally associated within the land use management systems. There will be a stronger environmental conscience and social and cultural cohesion between the different local groups, and their socio-economic and environmental conditions will improve through the sustainable use of natural resources and biodiversity and the provision of environmental services.

The specific objectives of setting up the VACC were defined as:

- To identify the conservation needs in the corridor based on a comprehensive analysis of the biological and ecological priorities;
- To determine the conservation potential from the human perspective, acknowledging the current state of conservation and future scenarios for biodiversity; and
- To define the long term technical guidelines for conservation management in the corridor.

The process of creating the corridor led to defining five key objectives for the implementation of the vision for the corridor, including:

48 Indigenous groups include among others Cavineños, Cayubaba, Chama, Ese Eja, Chiman, Lecos, Mosetén, Movida, Reyesano, Tacana y Yuracaré in Bolivia and Arahuaca, Amarakaeri, Ashaninka, Cashinahua, Culina, EseEja, Mashco Piro, Matsiguenka, Nahua, Piro, Sharanahua y Yaminahua en Perú. Cubriendo las Regiones de Cusco, Madre de Dios, Puno, Junin, Ucayali y Ayacucho in Perú

- o consolidate the bi-national nature of the corridor;
- o secure the protection of biodiversity in the corridor;
- o promote sustainable use of natural resources and biodiversity;
- o strengthen local capacity; and
- o build the social sustainability of the corridor.

The corridor was initially designed by drawing a rough 20 kilometer buffer around the existing protected area network; allowing the process to get off to a rapid start. However, the design of the corridor was an iterative process; as new information was discovered, the corridor was refined accordingly. For example, a study in 2005 identified priority conservation gaps in the corridor as well as the feasibility of protecting these areas. This information fed into the strategic plan of the corridor (Surkin, 2006).

ASSESSING THE BROADER CONTEXT

Ongoing research is being conducted on the extent of habitat degradation, current land cover types, species richness, levels of endemism and numbers of threatened species in the corridor. Conservation priorities have been based on the IUCN list of globally threatened species, however the socio-economic impacts on local communities from protecting these areas have also been given due consideration.

The VACC is distinct from many other conservation corridors in that it has large tracts of wilderness, both within and outside of its protected areas. This requires a different approach to corridor management to that used when the focus is on linking highly fragmented protected areas with a landscape mosaic.

ASSESSING THE PROTECTED AREA NETWORK

The corridor contains a diverse assembly of protected areas and other conserved areas designated for conservation and/or sustainable management, including national parks, communal reserves, integrated management reserves and indigenous territories. The IUCN has defined six levels of protected areas based on their management style, with Category I being strict nature preserves and Category VI including managed resource protected areas. The protected areass in the VACC are representative of IUCN Categories II, IV, V, and VI.

The funding sources for the protected areas vary; many are underfunded and understaffed, making it difficult to adequately secure the areas from poachers, squatters and illegal logging. The lack of adequate infrastructure in many of the protected areas also hampers effective management. In addition, within and surrounding the areas are a large number of indigenous and non-indigenous territories that rely on the protected areas to varying extents.

ASSESSING POLICY

The development of a policy framework for the corridor has been an iterative process, as lessons have been learned on how to successfully integrate conservation priorities with the development needs of the local and national populations in the region. Planning for the corridor has slowly begun to be integrated into broader policy and planning processes in both Bolivia and Peru. The main issue to date has been the overlapping of rights to land and resource access and land tenure for multiple parties. Addressing this issue directly has helped to create an enabling environment for both conservation and sustainable development at a variety of scales.

ASSESSING CLIMATE CHANGE RESILIENCE

In addition, given the altitudinal range within the corridor, there is great opportunity to use the corridor as a climate change adaptation strategy for both biodiversity and human populations. CI is currently conducting research with a local NGO in a portion of the corridor to assess human vulnerability to climate change and the role of the surrounding landscape in mitigating the effects of climate change.

DEVELOPING STRATEGIES AND ACTIONS

Developing a successful strategy that accounts for the complexity and diversity of land use and land cover for the entire corridor is inherently difficult. An array of biological, social and political factors must be considered as well as the competing interests of politicians, landowners, activists and farmers. The strategy for the Vilcabamba Amboró conservation corridor has attempted to account for these multiple factors by engaging stakeholders in the planning process and outlining clear conservation priorities. A variety of strategies and actions have been developed:

- ***Promoting trans-boundary coordination***: Coordination is critical given that the corridor encompasses major population centers in Bolivia and Peru. In 2003, a Binational Technical Committee was formed, composing of the directors of protected areas of the Tambopata National Park, representatives of SERNAP (previously INRENA) en Peru (recien creada en el Ministerio del Medio Ambiente), the representatives of Madid National Park in Bolivia, and CI. The committee coordinated actions within the VACC, exchanged information and developed policy related to conservation and development processes in the corridor. Coordination strategies have also focused on providing learning exchanges between different communities who live in the corridor. Workshops and trainings have been held for community members, focusing on sustainable systems of agricultural and animal husbandry, agricultural extension and monitoring of hunting and fauna (Salinas, 2006). However it has proved challenging to develop these efforts into a consolidated trans-boundary process;
- ***Identifying and mitigating threats***: Threats to key biodiversity features include unsustainable agriculture and natural resource use, weak policy frameworks, high population pressure, mining and hydrocarbon development and expansion of the road infrastructure (Fleck et al, 2006). The ongoing construction of the Interoceanica Sur that connects Brazil to the Pacific through the VACC, will affect numerous protected areas, in particular Tambopata, Bahuaja Zonene and the Conservation Concession that CI manages "Rodal Semillero de Caoba Tahuamanu" and will intersect sensitive ecosystems in the corridor. (Dourojeanni, 2006; Surkin, 2006). Mitigation actions have included efforts to mandate best practices by the construction companies;
- ***Developing robust land use management plans for municipalities***: The CI office in Bolivia for instance, was instrumental in creating the municipal land use plan for Apolo, which helped to integrate protected areas into the local socio-political context and generate a more sustainable land use matrix. Similar work is about to be completed in other municipalities. The innovative aspect of this approach is the insertion of conservation concerns into the land-use planning methodology;
- ***Strengthening planning and management capacities***: SERNAP and the Wildlife Conservation Society developed the management and livelihood plan developed for the for the Reserva de la Biosfera-Tierra Comunitaria de Origen Pilon Lajas, an indigenous territory in Bolivia. The plan focused on developing livelihood strategies for local community members while maintaining connectivity between key natural areas. Similar efforts have been carried out in other areas of Bolivia;

- **o** ***Developing land uses that are compatible with biodiversity***: CI and other conservation groups have worked with local communities to enhance the cultivation of organic coffee, improve production and management of Brazil nut forests, support the harvest of natural medicine, and increase local knowledge of conservation. Some of these actions in the corridor inspired UNDP in the development of a conceptual framework on alternative development proposed for Bolivia in their thematic Human Development Report "The Other Frontier: Alternative Uses of Natural Resources in Bolivia (UNDP, 2008);
- **o** ***Community-based ecotourism***: To support the developing industry of ecotourism, emphasis has been placed on incorporating a value chain approach and adequate training for management personnel. Past experiences, for example the Chalalan indigenous community based ecotourism enterprise in Bolivia, have highlighted the importance of creating strong alliances with the private sector and local government. Based on the lessons from Chalalan, CI has been able to promote and consolidate other initiatives such as San Miguel del Bala.
- **o** ***Promoting payment for ecosystem services***: Reducing emissions from deforestation and forest degradation in developing countries (REDD) has become very important tool that can contribute to the conservation of forests and protected areas in the VACC by providing funding for the ecosystem service of climate control. CEPF and local organizations have supported proposals for the payment of ecosystem services, with the endorsement of the Regional Government of Madre de Dios and the national government, through the newly created Ministry of the Environment in Peru

IMPLEMENTING STRATEGIES AND ACTIONS

All of the above actions are either completed or ongoing. Implementing a corridor strategy for the VACC has required a switch from large-scale planning to local-scale execution. A crucial lesson learned has been the importance of engaging not only national stakeholders, but also local stakeholders in every aspect of the planning and implementation process. In Bolivia in particular, involving local communities has provided community members a sense of responsibility for the conservation of their protected areas. Having support from the local communities also helps when attempting to mitigate some of the threats to the region, namely the conversion of forest to agricultural land, mining, and oil and gas extraction. The growth of ecotourism in parts of the corridor highlights a successful alternative livelihood strategy that is based on close community involvement in corridor planning.

MONITORING, EVALUATING AND ADOPTING

CI has an outcome monitoring process that focuses on the following indicators: species; fragmentation and deforestation indices both outside and inside protected areas; governance; and policy changes. However it has proven difficult to establish the marginal impact of the VACC initiative as there was no baseline available to calculate impacts against. This baseline now exists. There is now a need to incorporate more socioeconomic indicators and to implement a more systematic landscape-scale monitoring and evaluation plan.

KEY OUTCOMES

The ongoing process of developing and managing the VACC initiative has provided lessons learned, both for policy creation and implementation of a large scale protected area integration process. One of the biggest challenges has been the integration of corridor planning into policies and planning instruments for local and regional government and local partners. Another key lesson learned has been the importance of integrating stakeholders into every level of corridor planning and ensuring that there is inter- and intra- regional coordination. Similarly, the importance of exchanging ideas and sharing knowledge throughout the corridor has been a recurring theme.

To fully understand the strengths, weaknesses and potential of the corridor and its management regime, a landscape-scale monitoring and evaluation plan is required. Proper evaluation of the corridor will provide the necessary feedback on how to enhance the corridor's ability to address conservation and human well-being issues. The development of the corridor has been a learning process, and as more knowledge is produced on the region, the corridor strategy will be revised accordingly.

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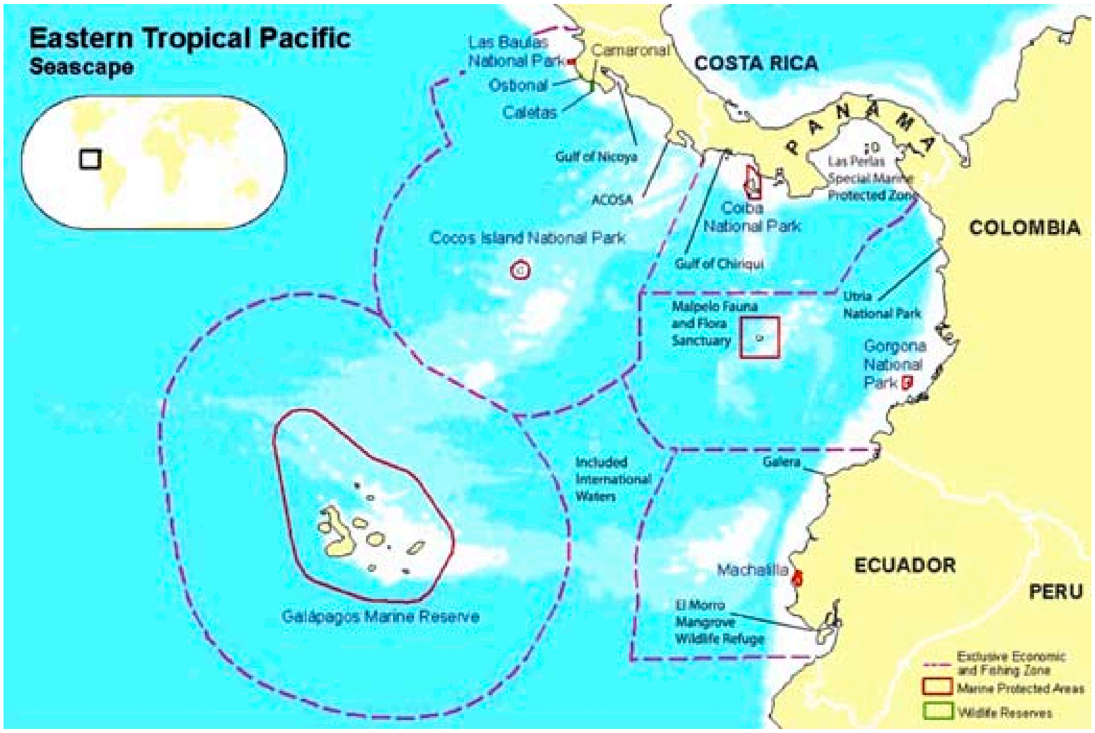
CASE STUDY 2: THE EASTERN TROPICAL PACIFIC SEASCAPE

—Scott Henderson



The Eastern Tropical Pacific Seascape (ETPS) is a 2,000,000 km^2 marine region with abundant marine life spanning the national waters of Costa Rica, Panama, Colombia and Ecuador. Its complex biogeography, including isolated islands, the convergence of numerous currents, and productive upwelling, give rise to valuable fisheries, high species diversity and endemism, and concentrations of charismatic species that have become rare elsewhere. Important coastal habitats include some of the most extensive coral reefs in the Eastern Pacific, large mangrove forests, estuaries, rocky coastal cliffs, and sandy beaches. The area is a crossroads for migrations of whales, sea turtles, tuna, sea birds, and sharks, which move across the seascape in response to seasonal supplies of food. The ETP Seascape includes an impressive cluster of four marine UNESCO World Heritage Sites (Costa Rica's Cocos Island National Park, Panama's Coiba National Park, Colombia's Malpelo Fauna and Flora Sanctuary and Ecuador's Galápagos Marine Reserve) as well as a growing number of important marine protected areas.

In 2004, the governments of the four countries signed a voluntary cooperation agreement, the San Jose Declaration, which created the Eastern Tropical Pacific Marine Conservation Corridor (CMAR). This initiative promotes transboundary cooperation on conservation and sustainable development within the member countries' marine environments. The initiative has a secretariat that coordinates discussions between the four member countries, a technical committee that provides guidance and feedback regarding the initiative's progress, and a ministerial forum that enables strategic decisions to be made by each country's highest environmental authority.

The ETPS is a transboundary initiative coordinated by Conservation International (CI) that supports implementation of the CMAR, as well as other actions. The ETPS provides technical and financial support to a broad partnership that includes governments, research organizations, non-governmental organizations, and the private sector to undertake hundreds of marine conservation and management projects. Together this partnership aims to conserve the marine environment's intrinsic and utilitarian values on which the survival of species, the integrity of habitats, and the well-being of millions of people depend. Decisions regarding strategic priorities and specific activities in the ETPS are made based on consultative processes conducted by CI with the representation of organizations and public institutions that implement, are involved in, or affected by, specific projects.

GETTING STARTED

Discussions regarding the idea of a transboundary marine management effort began in earnest at the Johannesburg World Sustainable Development Summit in 2002. At this meeting a core political group comprised of the presidents of Ecuador and Costa Rica, the vice president of Panama and the vice minister of environment of Colombia announced their intention to establish a large scale "marine corridor". This corridor was initially envisioned to provide special management attention to the areas between Cocos Island National Park and the Galápagos Marine Reserve. These governments considered the following factors as the basis for the initiative:

1. Ecological connectivity evident in the regional bathymetry and oceanography and documented migration patterns of species of conservation and economic importance;
2. Shared uses by these nations' fishing, maritime transport and ecotourism sectors, and;
3. The considerable vulnerability of the region's marine ecosystem, in particular to severe El Niño and La Niña events, that require coordinated monitoring and ecosystem-based management.

With high-level political support and sound scientific and strategic justification, the initiative was off to a promising start. As a result, CI, the International Union for the Conservation of Nature (IUCN), the United Nation's Environment Program (UNEP) and later UNESCO's World Heritage Center (WHC) committed support, thereby adding valuable technical expertise and funding mechanisms to the core political group. This new partnership also provided significant on-the-ground experience to help establish concrete strategies to reach agreed-upon objectives.

By early 2004, CI and UNESCO WHC had secured a sizeable grant from the Global Conservation Fund and the United Nations Foundation to initiate detailed assessments and address priority challenges identified by experts, in particular MPA managers and closely cooperating NGOs and research organizations. In April of that year the government of Costa Rica, UNESCO WHC and CI hosted a joint planning meeting to establish a work plan for this first project in which the term 'seascape' was first introduced. In a parallel meeting at the same event, the four governments drafted the San Jose Declaration, established a governance structure for the initiative, and wrote an intergovernmental technical document outlining the broad vision for what became known as the CMAR.

The San Jose Declaration identified the following objectives for the CMAR Corridor:

1. Promote the management and conservation of the CMAR's shared marine resources;
2. Improve management of the CMAR's MPAs;
3. Establish a regional marine management framework
4. Promote cooperation between governments and with NGOs, multilateral agencies and others;
5. Secure an adequate funding base for regional cooperation and MPA management;
6. Guide national and international technical and financial support for the CMAR;

7. Promote tourism in the CMAR, especially that which contributes to sustainable development for local communities;
8. Promote information sharing relating to the objectives and achievements of the CMAR, and;
9. Promote the participation of all sectors necessary for the CMAR's integrated management.

Despite these very promising beginnings, there were significant omissions at the beginning. Importantly, although the initiative proposed to coordinate actions covering a wide range of marine management issues, environmental groups and environmental authorities dominated the San Jose planning meeting. Notably absent were authorities from the fisheries, defense and tourism sectors. Similarly, other important regional coordination groups were not involved, including the Permanent Southern Pacific Commission (CPPS), which includes Ecuador, Colombia and Panama and the Interamerican Tropical Tuna Commission (IATTC), which includes all four CMAR countries and is charged with establishing regional tuna fishing resolutions. Thus, the partnership that launched the initiative was not inclusive enough and the failure to secure participation of these groups at this critical planning meeting impeded progress, a valuable lesson learned for areas considering similar initiatives. Although the industrial fishing sector did not object to any specific agreement, neither was their support forthcoming, since they had not participated in the process from the beginning.

ASSESSING THE WIDER CONTEXT

An important feature that differentiates seascapes from other large areas for marine management such as ecoregions, as used by WWF and TNC, is that the definition of seascape relies as much on strategic criteria as it does on biogeographic and ecological criteria (Bensted-Smith and Kirkman 2009). The inclusion of strategic considerations accounted to a large degree for the ETPS' geographic scope and initial investments to improve management. Although the ETPS is underpinned by clear ecological and social connectivity, the geographical focus was perhaps to an even greater degree motivated by the existence of political will shown by member countries to get down to work and improve management in specific thematic (e.g. sea turtle conservation) and geographic (e.g. a core set of predetermined MPAs) areas. These choices were made more on the basis of expert opinion, existing commitments under conventions and MPA manager and supporting NGO priorities revealed by an informal consultative process than by any initial global strategic priority setting process based on targeted research.

THE ECOLOGICAL CONTEXT

Given the considerable institutional capacity in the ETPS, substantial information regarding the ecological context existed at the beginning of the initiative. However, information tended to be found in reports of limited distribution, was more abundant for some sites or species than for others and was rarely shared between institutions and countries. To address these limitations, an ambitious region-wide program was established with experienced marine research institutions active at main sites. The program included a core set of ecological parameters monitored using comparable methods to improve baseline ecological knowledge, track major ecological trends at the site, national and regional scales and to orient adaptive management.

Similarly, the ETPS program established a network comprised of both sea turtle and shark experts. These groups held regional meetings to assess the current status of ecological knowledge, identify gaps, establish priorities, agree on methods and write yearly action plans, resulting in specific actions by each participating group. For example, as a result of these discussions, Migramar, the ETPS expert shark working group (www.migramar.org), initiated a comprehensive tagging program to determine shark distributions and migration patterns across the seascape.

THE PROTECTION AND CONSERVATION CONTEXT

Phase 1 implementation of the ETPS also included a thorough assessment of the region's MPAs and MPA network to identify major gaps and to orient efforts to establish new MPAs. The focus was to meet the Convention on Biological Diversity's 2012 goals of protecting at least 10% of national waters. The Nature Conservancy and CI teamed up to produce an ecoregional analysis first in Ecuador, then covering all Pacific coastal areas of Costa Rica, Panama and Colombia. This assessment played a valuable role in generating the scientific and political interest in a number of sites. Governments have since designated many of these as new MPAs. In terms of climate change, a theme that has grown in importance since the ETPS was launched, an inter-institutional partnership in Galápagos undertook a comprehensive vulnerability assessment to identify both ecological and socio-economic impacts and to produce a prioritized set of management recommendations to mitigate these impacts. This pilot effort resulted in a methodology now being applied in other sites. Finally, the group undertook formal threat assessments using IUCN Red List criteria to identify which microalgae, corals and fish were in greatest need of targeted protection.

THE SOCIO-ECONOMIC AND POLICY CONTEXT

A full policy assessment was crucial in identifying main policy needs. Of particular importance was the need in most countries to work towards unifying multiple, often inconsistent, marine policies championed by the environmental, fisheries, defense and economic development branches of government. This assessment also identified the urgent need for formal processes by which to designate MPAs in a wider range of management categories, from fully non-extractive to multiple-use, and with a wider range of governance mechanisms that included the possibility of stakeholder participation and co-management, in addition to traditional top-down management. Likewise, highly participatory socio-economic assessments at the site scale contributed to both the designation of new community-supported MPAs, and the development of management plans that were more compatible with local community expectations and cultural and economic realities. As such, an improved policy framework now provides an overarching umbrella for the ETPS program of work and socio-economic assessments have greatly reduced management costs by creating programs that enjoy greater community support and less reliance on expensive command and control management.

DEVELOPING STRATEGIES AND ACTIONS

The experience gained from addressing urgent priorities, as well as the results of the assessments noted above, contributed not only to improved field effectiveness, but perhaps more importantly to refining the seascape concept. As a result of the first five years of work, the following essential elements have been identified as the hallmark features of a consolidated seascape, which includes not only the ETPS, but other seascape initiatives that CI is currently supporting.

The essential outcomes of a seascape initiative are to:

1. Restore or maintain critical habitats so that ecological processes and ecosystem services are sustained, and;
2. Mitigate threats to reverse declining population trends for all threatened marine species, including those of utilitarian value, but also those without direct human uses.
3. Improve economic, spiritual and cultural wellbeing of human communities that are dependent on marine and coastal resources and ecosystems, in a manner consistent with the Millennium Development Goals.

The essential enabling conditions for a seascape initiative to achieve these outcomes include:

1. A legal and policy framework that facilitates marine conservation, including marine managed area establishment, appropriate governance structures for managing marine ecosystems, and economic development plans that are consistent with sustainable resource use;
2. An adequate institutional framework and capacity, including personnel, infrastructure, and equipment, to implement policies and make governance structures effective;
3. Ecosystem-based management using multidisciplinary natural and social science information to effectively plan, implement, monitor, and evaluate management of marine ecosystems;
4. Private-sector engagement that links business benefits to environmental performance, and engagement with local communities to support resource access and governance systems that reward responsible resource stewards with environmental goods and services central to human well-being;
5. Supportive stakeholders who understand marine conservation issues and who support and participate in management;
6. A reliable flow of stable and diverse resources to finance conservation activities.

MONITORING, EVALUATING AND ADAPTING

The ETPS monitoring program involves four inter-related monitoring efforts:

1. Partner organizations that receive sub-grants establish specific results and indicators for the projects they undertake as part of the overall ETPS strategy implementation;
2. CI, the donor, and in many cases the partners that eventually receive sub-grants agree on a set of deliverables and objectively verifiable indicators for each activity in the program's three-year work plans.
3. CI has a set of biome-neutral strategic outcomes and standard outputs towards which all its programs should contribute;
4. The Walton Family Foundation, a major donor, has an outcomes monitoring framework towards which all its investments in particular geographies should contribute.

The data required for tracking progress against the various levels of program indicators is extensive and is collected in a number of different ways. In some cases monitoring indicators are quite quantitative, as in the case of the ecological conditions at core MPAs where specific in-the-water targets have been specified and research institutes receive grants for monitoring, and in other cases information is more qualitative, especially where the collection of quantitative data would be prohibitively expensive or time-consuming. Progress reports are prepared on a semestral basis and project adaptations based on monitoring results are made during yearly planning meetings at which main partners and program donors participate.

CONCLUSION AND LESSONS LEARNED

The ETPS program has produced an impressive record of accomplishments. It has also continually refined basic concepts and strategies in an ongoing adaptive process as experience is gained and lessons are learned. Some of the most important lessons regarding the implementation of this large, region-scale marine conservation initiative, which places equal emphasis on protected areas and areas outside MPAs, include:

1. High level declarations regarding the establishment of a regional scale program can generate unnecessary and difficult-to-overcome resistance if the full range of sectors that will be affected by management are not involved from the beginning, and if concepts and objectives are not communicated clearly, in particular those that could be perceived as posing a risk to any particular sector or interest group;
2. Getting the balance right between investments at the early stage in research to more completely understand the context vs. simply tackling obvious challenges is important. Too much emphasis on research can lead to few tangible results and loss of momentum. Tackling poorly assessed challenges too quickly can lead to early failures, poor prioritization, use of inappropriate methods and cost overruns.
3. The huge range of management challenges that must be met to generate sustainable, integrated solutions requires a broad partnership with complementary skill sets and contact networks.
4. Scaling up from the site to regional scales requires identifying unifying themes that are priorities to multiple constituencies.
5. Although non-governmental organizations may play an important technical assistance role, successful integration of efforts between protected areas and the broader seascape requires clear government leadership and will.
6. Efforts are far more likely to succeed when they respond to established governmental priorities, rather than trying to get them on the agenda.
7. The communication of successes in terms of clear stakeholder benefits and sharing the credit for successes is critical to sustaining momentum.
8. Building flexibility into a program's framework is crucial to taking advantage of emerging opportunities and responding to challenges.

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CASE STUDY 3: INTEGRATING PROTECTED AREAS INTO LANDSCAPES IN CAMBODIA

The Northern Plains Landscape, which stretches across the borders of five northern provinces in Cambodia, is one of the largest blocks of remaining deciduous dipterocarp forests in Southeast Asia. The landscape encompasses an area of 18,000 km2, and includes 30 species on the IUCN Red List, including a number of globally threatened species. The landscape includes a mosaic of different land uses, including protected areas, wildlife sanctuaries, logging concessions and unprotected areas.

GETTING STARTED

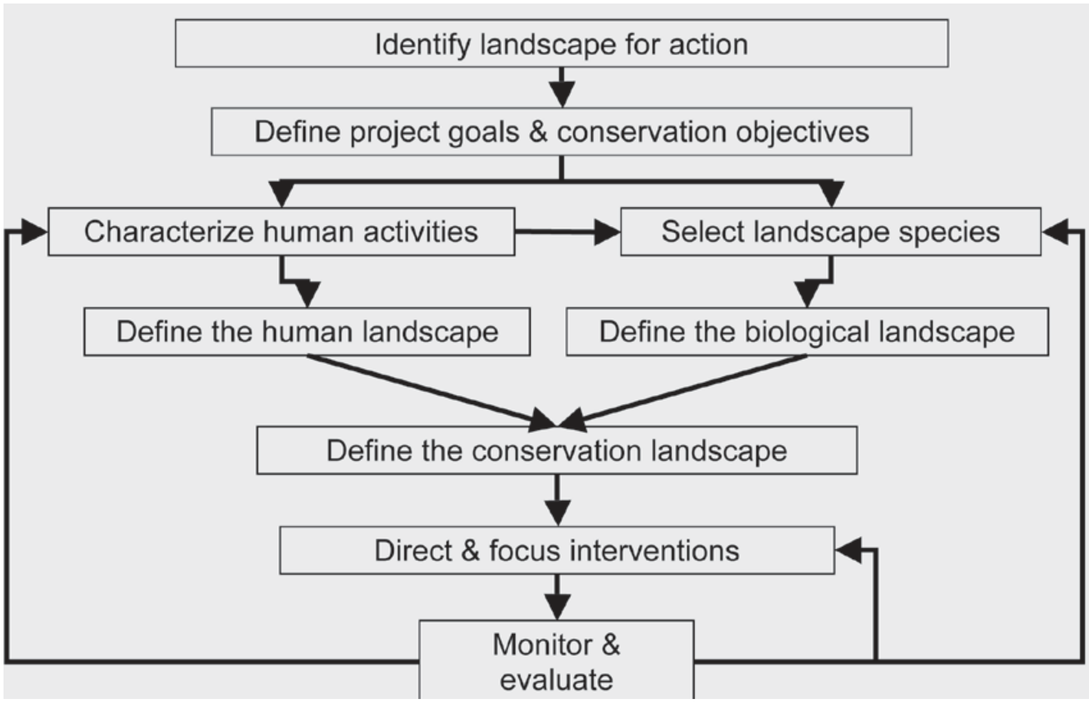
The landscape integration project, called "CALM" — Establishing Conservation Areas through Landscape Management in the Northern Plains of Cambodia — is a collaborative effort that involves an array of partners. These include the Cambodian Forestry Administration (FA) in the Ministry of Agriculture, Fisheries and Forestry (MAFF), the General Department Administration of Nature Conservation and Protection (GDANCP) in the Ministry of Environment (MoE), the Ministry of Land Management, Urban Planning and Construction, PSDD (a multi-donor initiative based in the Council of Ministers), the Royal Cambodian Armed Forces, Police and Military Police and the Wildlife Conservation Society. Additionally, the project works with other agencies within MAFF and MoE. Although they are not physically present in the landscape, additional partners include: the UNDP/GEF Integrated Resource Management and Development in the Tonle Sap Region, the World Bank/GEF Biodiversity and Protected Areas Management Project, Technical Working Group for Forestry and Environment, the Multi-Donor Livelihood Facility (a consortium of government and donor partners engaged in livelihoods development), the UNDP/GEF Mekong River Basin Wetlands Biodiversity Conservation and Sustainable Use Programme, the World Bank Land Management and Administration Project, the Cambodia Vulture Conservation Project, which is a joint project of WCS, Birdlife International in Indochina, WWF and the Angkor Centre for Conservation and Biodiversity, and the University of Sydney's Greater Angkor Project, which has provided assistance in locating and mapping features in the landscape.

The overall goal of the project is to address the escalating biodiversity loss across the region and improve landscape connectivity for key species. Specific objectives include: 1) the introduction of biodiversity considerations into provincial-level land use planning; 2) the incorporation of specific biodiversity mainstreaming interventions into livelihoods and stakeholder management at three key sites; and 3) the demonstration of improved management of biodiversity by the government at three key sites. The first phase, from 2002 to 2004, focused on conducting widespread consultations and surveys in order to select the key sites. The second phase, from 2006 to 2012, is focusing on taking action within these sites, which included protected areas and forests, logging concessions and community lands.

ASSESSING THE BROADER CONTEXT

The project used the landscape species approach. This process includes: a) identifying the specific landscape for taking action, b) defining project goals and conservation objectives, c) characterizing human activities in order to define the 'human landscape'; d) selecting the landscape species in order to define the 'biological landscape'; e) defining the combined 'conservation landscape'; f) directing and focusing interventions; and g) monitoring and evaluating results (see figure below).

Threats and pressures to biodiversity included uncontrolled logging, destructive fishing practices, land clearing and wildlife trade. Based on these threats and the results of the landscape species analysis, the project identified a suite of ten landscape species that had specific habitat requirements and that were threatened by human actions. The project also selected three key sites: Kulen Promtep Wildlife Sanctuary (KPWS), Preah Vihear Protected Forest (PVPF), and the Cherndar Plywood logging concession, an area that is contiguous with both PVPF and KPWS and has the potential to act as a corridor between these two sites.



The vast majority of families in the region rely on subsistence rain-fed paddy rice cultivation, the collection of forest products, and seasonal fishing. Many families practice shifting cultivation for vegetables, and wildlife is a principal source of protein. Poor, rural communities are the most vulnerable; many lack land title or tenure over traditional resources, they live in remote areas with poor access to transportation and communication, many lack food security, and they have little voice in governmental decision-making processes. Therefore, the project needed to simultaneously address political, socio-economic and ecological issues.

DEVELOPING STRATEGIES

Based on the aims of the project, the threats and opportunities within the landscape and the overall ecological, conservation, socio-economic and political context, the CALM Project selected several strategies, described below.

- The project focused on developing landscape planning processes that: a) recognized globally important conservation areas; b) identified sites for economic development; c) improved livelihood options for local communities; d) integrated tourism by linking cultural and natural tourism sites; and e) improved governance and co-ordination of the planning process.
- The project focused on improving community-based conservation efforts. Protected areas and forests in Cambodia contain many human populations, and the majority lack core protection zones. Therefore, a key strategy was to develop integrated land use planning that established rights and responsibilities for local communities. Specifically, this strategy aimed at: a) strengthening village capacity; b) empowering a local committee; c) mapping zones and setting rules and regulations; d) protecting village resources; e) ensuring governmental sup-

port; f) creating a basis for future management of the area; g) demarcating the boundary of protected areas and the permanent forest estate; and h) monitoring land use by communities to ensure that conservation agreements are effective. Already more than 400 families have experienced sustained improvements in cash income as a direct result of the project, four community development plans have incorporated conservation activities and a further eight villages are developing community plans, four villages have received community tenure and/or title over agricultural and residential land, and an incentive scheme has benefited over 100 families.

- The project has been successful in improving community livelihoods which are directly linked to conservation management. We have integrated tourism into conservation efforts and three communities across the landscape have elected nine-member committees to develop nature-based tourism. Villagers agreed to stop hunting threatened wildlife, and to protect ponds and other key habitats. As a result, income from tourism has increased from 2005 to 2008 by more than 400 percent and through capacity development within communities, a greater proportion of tourism income is now being retained by the villages. The tourism funds were used for local community development projects through a village development fund, and the spot was promoted internationally by tourism agencies. The CALM project is working with local partners on Ibis Rice, a project which aims to establish a system which links preferential prices for rice produced by community members who adhere to conservation agreements. This has involved establishing village cooperatives to buy produce from farmers, giving priority to the poorest in the village; to reduce human impact on protected areas by offering these farmers preferential prices for their products contingent on adherence to conservation agreements; and to develop a sustainable product marketing system for this high quality wildlife-friendly™ rice..
- The project focused on improving the monitoring and protection of key species. In the region, globally important bird species are severely threatened by the collection of eggs and chicks. Through the CALM Project, local community members are provided a small amount of money for reporting nests and are employed as nest protectors, resulting in more than 400 nests of globally threatened species directly protected every year within the landscape. Already this strategy has resulted in increased populations – the Sarus Crane has increased from 10 breeding pairs in 2003 to 50 in 2009, the Giant Ibis from 10 to 40 breeding pairs, and the Lesser Adjutant from 100 to 250 breeding pairs. Additionally, numbers of vultures observed at monitoring sites has increased and increasing numbers of vulture nests are found each year. Monitoring of large mammals takes place in PVPF and Cherndar and this has demonstrated that conservation management is effective: some species such as deer and wild pigs are increasing and we now have a baseline of population density for many species. A baseline for the wild Asian Elephant population is being developed based on DNA sampled from dung in the landscape.
- The project is focusing on improving protected area and forest management by supporting government enforcement teams that enforce forestry and protected areas laws; stop border wildlife markets and controlled wildlife trade; and control habitat destruction within key sites. The implementation of Management Information SysTem (MIST) monitoring enables the project to monitor illegal activity and law enforcement activities in conjunction with community-based land use monitoring is providing support to law enforcement efforts. Satellite imagery has been used for long-term monitoring of forest cover across the landscape and this monitoring system informs strategic planning of the landscape.

IMPLEMENTING STRATEGIES

The CALM Project is focusing on mainstreaming biodiversity into production landscapes and sectors by introducing biodiversity values into landscape-level land-use planning processes. Therefore, the project works directly with forestry, tourism and agriculture sectors. Particular emphasis is placed on building the capacity of provincial departments and authorities, and on integrating the specific goals into established provincial planning processes. This includes, for example, raising awareness about forestry and protected area laws to aid their implementation and developing management plans for natural resource areas that include conservation of key components of biodiversity. Major achievements include changing proposed road routes to reduce their impact on biodiversity and management.

The CALM Project also focused on building national, provincial and local ownership of the project activities and outputs. At the national level, the National Biodiversity Steering Committee provided guidance on how the project should contribute to the achievement of the national conservation agenda as set out in the National Biodiversity Strategy and Action Plan. In addition, The National Committee on Discussion, Recommendation and Conflict Resolution of Protected Areas, which was established in 2000, was used to resolve institutional conflicts regarding the management objectives of Kulen Promtep Wildlife Sanctuary in particular, and regarding the management of the productive landscape in general. At the provincial level, the project operated through the Provincial Support Program, and was consistent with the provincial annual planning framework. The Provincial Rural Development Committee was used to provide leadership forums to discuss and coordinate integrated landscape conservation and development into the Provincial Support Program. At the local level, communities and local committees were included in participatory land use planning exercises, and were instrumental in project design and implementation.

MONITORING, EVALUATING AND ADAPTING

The CALM project focused on four main areas for monitoring: a) monitoring of law enforcement efforts and results; b) monitoring of threats and illegal activities; c) monitoring of deforestation rates through remote-sensing; d) biological monitoring for landscape species, including mammals (elephants, Eld's Deer, and wild cattle through annual line transects, distance sampling and dung counts) and birds (ibises, vultures and adjutants through annual census of nesting birds).

SUSTAINABLE FINANCING

Long-term financing for conservation management is essential for ensuring that the gains in the conservation status of forests and wildlife in the CALM landscape are not lost. At local levels, the development of community-managed nature tourism can provide sufficient support to motivate communities to support conservation objectives. Likewise, Ibis Rice can motivate communities to also support these objectives in further villages across the landscape. However, effective monitoring and management feedback by the government and its partners is essential to ensure that quality of conservation management is maintained. The CALM project is working with various partners to obtain financing for this and one option could be development of a Reduced Emissions from Deforestation and Degradation (REDD) project.

APPENDIX 1: RELATION OF THIS GUIDE TO THE ECOSYSTEM APPROACH

Both the introduction to the PoWPA and Goal 1.2 specifically mention the use of the ecosystem approach when integrating protected areas into the wider landscape, seascape and relevant sectors. The CBD calls this approach:

> "…the primary framework for action under the Convention of Biological Diversity. The ecosystem approach provides a framework within which the relationship of protected areas to the wider landscape and seascape can be understood, and the goods and services flowing from protected areas can be valued." (CBD, 2004)

The ecosystem approach[49] has 12 principles:

1. The objectives of management of land, water and living resources are a matter of societal choice.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4. Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management program should:
   (i) reduce those market distortions that adversely affect biological diversity;
   (ii) align incentives to promote biodiversity conservation and sustainable use; and
   (iii) internalize costs and benefits in the given ecosystem to the extent feasible.
5. Conservation of ecosystem structure and functioning, to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognize that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

49 See also UNESCO-MAB. (2000). Solving the Puzzle: The Ecosystem Approach and Biosphere Reserves. UNESCO, Paris.

APPENDIX 2: FRAMEWORK FOR CONDUCTING STAKEHOLDER ANALYSIS

Stakeholder group (examples)	Interests	Likely outlook	Whom to involve	How to involve	When to involve
PUBLIC SECTOR					
Protected area agency officials					
Protected area managers					
Forestry agency staff					
Zoning administrators					
Municipal, state, province and national planning agencies					
Transportation agency					
Wildlife agency staff					
PRIVATE SECTOR					
Landowners					
Community leaders					
Tourist associations					
Agricultural companies					
Forestry companies					
Mining companies					
NON-PROFIT SECTOR					
Universities and scientists					
Community and economic development staff					
NGOs					
Community associations					

This matrix includes a range of stakeholder groups, including the public, private and non-profit sectors on the vertical axis, and the questions for analysis, including the interests and outlook, and, how and when to involve specific stakeholders.

For example, planners may decide that landowners are an important stakeholder group, but limit their focus to those landowners who would be directly affected by the integration initiative, such as those landowners who would be affected by the designation of a connectivity corridor. Planners could assess the potential attitudes that these landowners have, and based on that insight, identify specific strategies for engaging with that group, such as engaging landowner cooperatives, or identifying a landowner who is likely to be influential among other landowners.

APPENDIX 3: BASIC CONCEPTS AND TERMS

There are many relevant concepts that are applicable to creating ecologically functional landscapes; the following are four that are particularly relevant for this guide: landscape ecology, landscape connectivity, ecological network and species population dynamics[50]. The first general concept is that of a landscape and its structural elements, derived from the field of landscape ecology. In the context of landscape ecology, *landscapes* are generally defined as "heterogeneous areas of land or water that include clusters of interacting and repeating ecosystems"[51]. In a broader sense, 'landscape' is also used in this guide to mean "an area of land or sea as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."[52] Components of a landscape include *patches* (relatively homogenous, non-linear areas that differ from their surroundings), the *matrix* (the most extensive and connected landscape that surrounds patches), and *corridors* (strips of land or water that are similar to patches and differ from the matrix and that link patches) A *landscape mosaic* is the spatial configuration of habitats, patches, corridors and the matrix within a landscape. Note that the term 'landscape' in this guide is used to mean both landscape and seascape.

The second general concept is that of landscape connectivity. *Landscape connectivity* encompasses two related aspects. The first is *structural connectivity*, which is defined as the degree to which patches are connected through corridors[53]. Structural connectivity can be measured through metrics that are independent of any particular species, and landscapes are defined in terms of their 'porosity' and 'permeability'. The second aspect is *functional connectivity*, which is defined as the degree to which the landscape configuration of the matrix, patches, and corridors enables the movement of species and the functioning of ecological processes[54]. Structural connectivity is generally easier to measure and design than functional connectivity, and the preponderance of connectivity practice and research has focused on the former[55]. Focusing on structural connectivity may be appropriate at regional and continental scales, but for national-scale and landscape-scale initiatives, a focus on functional connectivity is more appropriate and likely to result in better conservation planning. Since the aim of this document is to provide guidance on protecting biodiversity, and the primary audience is national governments, this guide focuses mostly on functional connectivity — that is, it focuses on a specific set of focal species and ecological systems, and describes methods for assessing the extent to which the connectivity of an ecological network is adequate for sustaining those biodiversity features.

The third general concept is that of *ecological network*. The term "ecological network" generally refers to a network of *core areas* (e.g., areas that have high viability and integrity), which are surrounded by *buffer zones* (areas of compatible land uses that serve as transitional zones) and *sustainable use areas* (areas of land and water that are managed for the sustainable use of natural resources and ecosystem services). These core areas and buffer zones are connected by a series of *corridors* (mechanisms by which species can disperse and ecological processes can occur) and/or *stepping stones* (small patches that are close enough to core areas to allow for species dispersal) across a landscape[56].

50 Anderson and Jenkins, 2007; Bennett, 2006
51 Forman and Godron, 1986
52 European Landscape Convention, 20.x, 2009.
53 Taylor et al., 2006
54 Tischendorf and Fahrig, 2000; Taylor et al.1993
55 Taylor et al., 2006
56 Bennett 2003, Bennett and Mulongoy, 2006

The fourth general concept is that of *species population dynamics*. This concept focuses on the maintenance of species *metapopulations* (a set of localized populations within a larger area that periodically interbreed with populations from another area), by: 1) maintaining *minimum viable population sizes* (the smallest population size that can ensure the long-term persistence of a species); 2) ensuring the protection of *source habitats* (areas that have higher average birth rates than death rates for a key species); 3) minimizing the influence of *sink populations* (areas that have higher average death rates than birth rates for a key species); and 4) buffering vulnerable species against the impacts of environmental change[57].

57 Anderson and Jenkins, 2006

APPENDIX 4: EXAMPLES OF CONNECTIVITY TARGETS, THEIR GOALS AND RATIONALE FOR SELECTION

Site	Connectivity target	Rationale	Connectivity goal
Madison Valley (Brock et al., 2006)	Boreal toad (*Bufo boreas boreas)*	Highest Ranked Landscape Species (of 63), according to criteria outlined in Coppolillo et al. 2004, including areas requirement, heterogeneous use of habitats, ecological functionality, vulnerability, and socio-economic significance.	To maintain a viable meta-population (breeding activity and recruitment in at least 4 out of 10 years), where a population equals one or more breeding localities located with a 2nd or 3rd order drainage separated by no more than 5 miles).
Madison Valley (Brock et al., 2006)	Grizzly bear (*Ursos arctos)*	Sixteenth ranked Landscape Species (of 63). Highly threatened, representing numerous unique threats and habitats.	To maintain connectivity that allows expansion of Grizzly bears from source population in the Madison Range and Yellowstone National Park to the Centennial and Gravelly's Ranges.
Madison Valley (Brock et al., 2006)	Wolverine (*Gulo gulo*)	Fifth ranked Landscape Species (of 63), and complementary to higher ranked species	To maintain a viable population that includes the Madison Valley and is connected to adjacent habitats.
Somerset landscape (Dudley and Rao, 2008)	Flooding processes, shoreline habitat	Flooding maintained a suite of processes and species, and had been severely curtailed	To restore flooding processes in order to restore viability of key species
Yukon to Yellowstone Initiative (Y2Y, 2008)	Grizzly bear (*Ursos arctos*)	A wide ranging species facing an array of threats and increasing habitat fragmentation and key choke points	To maintain connectivity between populations along corridors from Yukon to Yellowstone
Chittenden County Upland Project (Ervin, 2003a)	Bobcat	A wide-ranging carnivore with specialized habitat requirements in an increasingly fragmented habitat	To maintain connectivity between populations in the Southern and Northern Green Mountains

In developing connectivity goals for a focal species, a more specific goal is generally better for developing conservation plans and monitoring effectiveness. Ideally a goal for connectivity should have a statement about:

- ✓ The total number of occurrences across the region of interest
- ✓ The number of individual groups or units
- ✓ The quality of each individual group or unit (e.g., size, density).
- ✓ How individual groups or units should be distributed in space
- ✓ How individual groups or units should be connected (e.g., width, maximum length of corridor, and description of the structure of corridor)

APPENDIX 5: ASSESSING THE VIABILITY OF KEY BIODIVERSITY FEATURES

Assessing the viability of key biodiversity features is a key step in nearly all conservation planning processes[58]. This holds true for the process of integrating protected areas into the broader landscape, as the extent and distribution of viable populations of focal species and intact ecosystems form the cornerstone of a functioning ecological network. Species viability is defined as the extent to which a population can maintain its vigor, and maintain its ability to adapt and evolve over time[59]. Ecosystem integrity, a related concept, is the degree to which an ecosystem has the full range of elements, such as species, communities, structures, and the full range of naturally occurring processes, such as biotic interactions, disturbance regimes and nutrient and energy flows[60].

Overall Viability Summary					
East Molokai - Hawaii					
Conservation Targets		Landscape Context	Condition	Size	Viability Rank
1	North Shore Forests & Cliffs	Fair	Good	Fair	**Fair**
2	Montane Wet Forest	Fair	Very Good	Fair	**Good**
3	South Slope Mesic Forest & Shrubland	Poor	Good	Poor	**Fair**
Overall Biodiversity Health Rank					**Fair**

In many conservation planning processes, species viability assessments focus primarily on three indicators: *size* (e.g., the population size, or size of the ecosystem patch); *condition* (e.g., the quality of the species habitat); and immediate *landscape context* (e.g., the condition of land and water surrounding the habitat patch)[61]. They are less likely to focus on connectivity aspects in their viability analyses.

One of the challenges to conservation planners is the difficulty in combining rankings of size, condition and landscape context to arrive at an overall ranking for viability. The matrix above shows one method of integrating these three factors[62]:

58 Groves, 2003; Margules and Pressey, 2000
59 Soulé, 1987; Groves, 2003
60 Karr and Chu, 1999; Groves, 2003
61 Groves, 2003; TNC, 2006
62 TNC, 2006

APPENDIX 6: APPROACHES TO MEASURING CONNECTIVITY FOR KEY BIODIVERSITY ELEMENTS AND FOCAL SPECIES

The following is a summary of approaches that planners can use to measure connectivity for focal species[63]:

Approaches to measuring connectivity for key biodiversity features and focal species

- ✓ ***Nearest neighbor approach:*** This approach is based on standard field survey data and/or modeled data on whether or not a habitat patch is likely to be occupied by a key species, and then measures how isolated this patch is from its nearest neighbor. This approach is considered the least reliable method, but also requires the least data.
- ✓ ***Spatial pattern indices:*** This approach uses remotely sensed data, and uses metrics such as number, size, extent, shape and spatial arrangement to provide an estimate of structural connectivity. The advantage of this approach is that it can be used across very large spatial scales to quickly characterize the structural connectivity, but it does not provide much information on functional connectivity.
- ✓ ***Scale-area data:*** This approach uses point or grid-based data of species occurrence at one point in time, such as historical records. Based on this information, planners can then determine what percentage of a region is occupied by a particular species. The disadvantage of this approach is that historical records are typically out of date, or have inherent biases.
- ✓ ***Graph theory approaches:*** This approach uses spatially explicit habitat data, combined with data on species dispersal, to identify the likely ability of a species to move through a landscape. Also known as graph theory, this approach represents a landscape as a mathematical graph, and can be used to simulate multiple scenarios by simulating the destruction of various habitat patches and measuring the potential effects on the overall model. This approach has the advantage of easily scaling up to national and regional levels.
- ✓ ***Buffer radius and incidence function models:*** This approach calculates a buffer with a radius around a core area based on species dispersal information, and then measures how many occupied patches lie within that radius. Also known as an 'incidence function model, this approach provides a very detailed level description of patch-level connectivity, but is difficult to scale up beyond a landscape scale.
- ✓ ***Actual species movement:*** This approach provides the most direct estimate of actual connectivity because it tracks patterns of actual species movement through radio tracking, camera traps and mark-release methods. However, this is the most time-consuming and data-intensive approach.

These categories are arranged in ascending order of both information and data requirements, and of degree of detail and reliability of the resulting analyses. As Fagan and Calabrese note, there is a clear tradeoff between choosing an approach that requires less data but provides less useful information (e.g., nearest neighbor approach), and a data-intensive approach that is more robust (e.g., actual species movement data).

63 From Fagan and Calabrese, 2006.

APPENDIX 7: ELEMENTS OF PROTECTED AREA MANAGEMENT EFFECTIVENESS

The table below is a collection of management effectiveness indicators that has been endorsed by numerous organizations, including the World Commission for Protected Areas, World Conservation Monitoring Centre, The Nature Conservancy, the Global Environment Facility, and the World Wide Fund for Nature, among many others.

WCPA Framework Element	WDPA ME indicator	Common reporting format 'headline indicators'
1. Context	1. Value and significance	Five important values
		Level of significance
	2. Threats and constraints	Five important threats
		Level of extent and severity of threats
		Trend of threats
		Constraint or support by external political and civil environment
		Main constraining factors of external political and civil environment
2. Planning	3. Site design and establishment	Park gazettal and tenure security
		Adequacy of legislation
		Marking and security/ fencing of park boundaries
		Appropriateness of design
	4. Management Planning	Management plan
3. Input	5. Management resources	Adequacy of staff numbers
		Adequacy of current funding
		Security/ reliability of funding
		Adequacy of infrastructure, equipment and facilities
	6. Information base	Adequacy of relevant and available information for management

WCPA Framework Element	WDPA ME indicator	Common reporting format 'headline indicators'
4. Process	7. Internal management systems and processes	Effectiveness of administration including financial management
		Effectiveness of governance and leadership
		Management effectiveness evaluation undertaken
		Model of governance
		Adequacy of building and maintenance systems
		Adequacy of hr policies and procedures
		Adequacy of staff training
		Staff morale
		Staff/ other management partners skill level
	8. Law enforcement	Adequacy of law enforcement capacity
		List (up to) five main issues for law enforcement
	9. Stakeholder relations	Appropriate program of community benefit/ assistance
		Communication program
		Involvement of communities and stakeholders
		List community benefit/ assistance program
	10. Visitor management	Character of visitor facilities and services
		Level of visitor use
		Visitors catered for and impacts managed appropriately
	11. Natural and cultural resource management systems	Natural resource and cultural protection activities undertaken
		Sustainable resource use — management and audit
		Research and monitoring of natural/ cultural management
		Threat monitoring
5. Outputs	12. Achievement of work program	Achievement of set work program
		Activities/ services and outputs have been produced
6. Outcomes	13. Conservation outcomes	Proportion of stated objectives achieved
		Conservation of nominated values — trend
		Conservation of nominated values -condition
	14. Community outcomes	Effect of park management on local community

APPENDIX 8: EXAMPLES OF TYPES OF OTHER CONSERVED AREAS

Below are examples of various types of other conserved areas[64]:

TYPE	SUSTAINABLE USE STRATEGY (SELECTION)
1. MANAGEMENT TYPE: Agriculture	
✓ Legally-established system	Agrochemical control
✓ Third party certification	Organic certification
✓ Second party certification	Self assessment schemes
✓ Voluntary agreements	Agreements
2. MANAGEMENT TYPE: Forest management	
✓ Legally-established system	Forest reserves
✓ Third party certification	Forest Stewardship Council
✓ Second party certification	ISO-14000 forest standards
✓ Voluntary agreements	Codes of practice
3. MANAGEMENT TYPE: Marine fishing	
✓ Legally-established system	Government no-take zones
✓ Third party certification	Marine Stewardship Council
✓ Second party certification	ISO certification for fisheries
✓ Voluntary agreements	Community no-take, codes
4. MANAGEMENT TYPE: Freshwater fishing	
✓ Legally-established system	Fish management areas
✓ Third party certification	Organic aquaculture certification
✓ Second party certification	ISO certification for fisheries
✓ Voluntary agreements	Voluntary landowner agreement
5. MANAGEMENT TYPE: Ecosystem services	
✓ Legally-established system	Avalanche control

64 Dudley and Parrish, 2006, Stolton and Dudley, 2006

TYPE	SUSTAINABLE USE STRATEGY (SELECTION)
✓ Third party certification	Forest managed for water quality
✓ Second party certification	ISO 1400 certification
✓ Voluntary agreements	Retention of mangroves for fish
6. MANAGEMENT TYPE: Hunting	
✓ Legally-established system	Hunting reserves
✓ Second party certification	Bushmeat controls
✓ Voluntary agreements	For-profit hunting reserves
7. MANAGEMENT TYPE: Wildlife protection outside protected areas	
✓ Legally-established system	Protection of endangered species
✓ Voluntary agreements	Private protected areas
8. MANAGEMENT TYPE: Cultural protection	
✓ Legally-established system	Cultural site with biodiversity
✓ Voluntary agreements	Sacred sites
9. MANAGEMENT TYPE: Recreation / tourism	
✓ Legally-established system	Recreational park with wildlife
✓ Third party certification	Certification of eco-lodges
✓ Second party certification	ISO certificates for eco-lodges
✓ Voluntary agreements	Protection of breeding sites

APPENDIX 9: GOVERNANCE TYPES AND IUCN CATEGORIES

The table below shows a range of governance types and IUCN Categories. Protected areas can be classified according to this scheme (Borrini-Feyerabend et al., 2006).

Governance type	**Governance by national and local government**			**Shared governance**			**Private governance**			**Governance by indigenous peoples and local communities**	
IUCN Category	**Federal or national agency, ministry or body**	**Sub-national ministry, agency or body**	**Government-delegated management (e.g., to an NGO)**	**Trans-boundary management (across one or more governments)**	**Collaborative management and co-management**	**Joint management (pluralist management board)**	**Owned by individual land owners**	**Owned by non-profit organizations (e.g. NGOs)**	**Owned by for-profit organizations (e.g., corporations)**	**Indigenous peoples' territories and protected areas**	**Community conserved areas**
Ia. Strict Nature Reserve											
Ib. Wilderness Area											
II. National Park											
III. Natural Monument											
IV. Habitat/species management											
V. Protected Landscape/Seascape											
VI. Protected area with sustainable use of natural resources											

APPENDIX 10: CHECKLIST OF RELATED SECTORS AND POLICIES

This list is drawn from a group of commonly recognized threats to biodiversity[65], and from a list of policy issues that are considered relevant to protected areas[66].

Urbanization and development: This sector includes residential development (including cities, towns, settlements) and/or commercial development (stores, factories, warehouses, commercial centers). Possible indicators include:

- There are appropriate land use policies in place.
- Buffer zones are designated and effectively enforced.

Transportation: This sector includes long and generally narrow corridors and the vehicles that use them, including roads and railroads, utility and service lines, shipping lanes and flight paths. Possible indicators include:

- Transportation agencies include considerations of connectivity when assessing options for building new roads.
- There are measures in place (e.g., wildlife overpasses and underpasses) to mitigate critical wildlife crossing areas.

Energy: This sector includes the exploration and production including related infrastructure) of energy resources, including oil and gas drilling, mining and quarrying of minerals, coal and other materials, and the utilization of hydro-electricity, wind power, tidal power, and solar power, among others. Possible indicators include:

- There are clear policies regarding the exploration and mining of oil, gas and minerals within protected areas.
- There are measures to mitigate the impact of energy exploration and utilization across the landscape, such as biodiversity offsets.

Tourism: This sector includes policies, practices and related infrastructure (such as huts, lodges, hotels, trails) associated with recreation and tourism, including golf, skiing, hiking, camping, snorkeling, and boating among many other forms of recreation. Possible indicators include:

- The siting of tourism infrastructure (e.g., trails, ski areas, lodges) does not conflict with areas of key importance for connectivity.
- Members of the eco-tourism industry (e.g., hotel managers, guides) understand issues related to connectivity.

Wildlife: This sector includes consumptive uses of wild plants and animals, including animal hunting and trapping and plant collection. This includes policies, as well as both legal and illegal practices. Possible indicators include:

- Wildlife management agencies incorporate focal species in their management policies, particularly issues related to connectivity.

65 CMP, 2006

66 Petersen and Huntley, 2005; Ervin, 2003b and 2007

Agriculture and grazing: This sector includes activities related to the cultivation of annual and perennial crops, and livestock grazing. Possible indicators include:

- Farms and ranches include areas of natural vegetation as corridors when and where appropriate.
- Efforts are made to contain the spread of disease from livestock through wildlife corridors and to protected areas.

Forestry and agro-forestry: This sector includes the management of forested lands for timber and non-timber forest products, the establishment and management of plantations and lands managed for agro-forestry. This sector also includes illegal logging, as well as fire management practices and policies within forests. Possible indicators include:

- Fire management policies and practices are compatible with connectivity goals and protected area management objectives.
- Forest harvesting policies and practices are compatible with connectivity goals and protected area management objectives.
- Enforcement of illegal logging is especially strong in areas of high conservation value, and in areas critical for connectivity.

Fisheries and aquaculture: This sector includes activities related to deep sea, near-shore and in-land fishing, and the cultivation of fish and other aquatic species through aquaculture. Possible indicators include:

- Aquacultural practices, including the location and management of facilities, do not negatively impact key species within protected areas or corridors.
- Fishing policies are compatible with protected area objectives and the goals of connectivity.

Freshwater resources management: This sector includes the suite of laws, policies and actions associated with rivers, streams, lakes, ponds and other freshwater bodies. Included in this sector is dam construction, water flow management, and allocation of water resources. Possible indicators include:

- Rivers, streams and other freshwater bodies are managed to maintain connectivity for key freshwater species (e.g., fish ladders) and related processes (e.g., flooding processes)
- The damming, diversion and allocation of water resources ensures connectivity for focal aquatic species and habitats

Waste management: This sector includes the laws, policies and practices related to waste generation and disposal from other sectors, including solid waste from municipalities, industrial waste from industrial centers, and other forms of waste and pollution. Possible indicators include:

- The siting and configuration of waste management areas (e.g., sewage treatments, landfills) does not conflict with key connectivity areas.
- Illegal dumping is controlled in sites of high conservation value.

Invasive species management: This aspect of policy environment relates to policies and practices related to the management of invasive plants and animals across many sectors (e.g., forestry, agriculture, tourism). Possible indicators include:

- National policies for invasive species explicitly recognize the inherent vulnerability of protected areas to invasive species, and the potential risks of corridors as a pathway for invasive species.
- Efforts to eradicate and control invasive species focus on areas of high risk and vulnerability that could affect the ecological network.

Climate change: This aspect of policy environment relates to the national policies and practices that relate to climate change adaptation and mitigation planning. Possible indicators include:

- National climate change adaptation plans and policies include measures to ensure connectivity for focal species across north-south gradients and altitudinal gradients
- Protected areas and corridors incorporate shifts in species ranges based on reasonable climate change predictions

Legal and judiciary environment: This aspect of policy environment includes not only local and national-level law enforcement, but also the court systems through which laws are upheld, from prosecution through to sentencing. Possible indicators include:

- Law enforcement policies and practices are sufficient for the establishment, management and long-term security of protected areas and corridors
- The judiciary system is sufficient for deterring and adequately addressing illegal activities that adversely affect the protected area system and corridors.

Inter-sectoral communication, commitment and coordination*:* This aspect of policy environment relates to the degree to which agencies and sectors communicate and develop coordinated natural resource plans, including those related to the formation of an integrated land/seascape. Possible indicators include:

- The level of communication and coordination between key agencies and natural resource sectors is sufficient to allow for the full range of activities needed to integrate protected areas into the wider landscape, seascape and related sectors.
- The level of governmental commitment is sufficient to ensure long-term success of protected area integration efforts.

APPENDIX 11: EXAMPLE OF LANDSCAPE MONITORING INDICATORS FOR THE SAN GUILLERMO BIOSPHERE RESERVE

Main monitoring subjects	Key Attribute	Indicators	Units	Main Factors
Land use changes	Road density	A. Meters of opened and no-restored roads in the year previous to the analysis B. Meters of opened and non-restored roads in the year of the analysis C. Meters of restored roads in the year of analysis D. Total meters of opened and no-restored roads inside each unit of a 10x10 km grid in the year previous to the analysis	mts/km²	Miner activity Illegal hunting Tourist activity
	Prospecting Areas in Concession	Total area affected inside each unit of a 10x10 km grid	has/km²	Mining Activity
	Total area of mining prospecting camps	A. Total affected and non-restored area in the year previous to the analysis B. Total affected and no-restored area during the year of the analysis C. Restored area in the year of the analysis D. Total affected and no-restored area inside each unit of a 10x10 km grid	has/km²	
	Exploitation Areas in Concession	Total area affected inside each unit of a 10x10 km grid	has/km²	
	Total and build area of mining exploitation camps	A. Total affected and non-restored area in the year previous to the analysis B. Total affected and no-restored area during the year of the analysis C. Restored area in the year of the analysis D. Total affected and no-restored area inside each unit of a 10x10 km grid	has/km²	
	Area affected by "rajos".	A. Total affected and no-restored area in the year previous to the analysis B. Total affected and no-restored area during the year of the analysis C. Restored area in the year of the analysis D. Total affected and no-restored area inside each unit of a 10x10 km grid	has/km²	
	Area affected by dump	A. Total affected and non-restored area in the year previous to the analysis B. Total affected and no-restored area during the year of the analysis C. Restored area in the year of the analysis D. Total affected and no-restored area inside each unit of a 10x10 km grid	has/km²	
	Area affected by processing camps	A. Total affected and no-restored area in the year previous to the analysis B. Total affected and no-restored area during the year of the analysis C. Restored area in the year of the analysis D. Total affected and no-restored area inside each unit of a 10x10 km grid	has/km²	

Main monitoring subjects	Key Attribute	Indicators	Units	Main Factors
Surficial and deep water resources	Surficial and deep water quality	Temperature	° C	Mining Activity Climate change
		PH	PH units	
		Dissolved oxygen	Mg/l	
		Conductivity	uS/cm	
		Turbidity	FTU	
		Sulphates	Mg/l	
		Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Ni, Pb, Se, Zn Concentration	Mg/l	
		Free Cyanide (CN_F)	Mg/l	
		Weak Acid Dissociable Cyanide (CN_{WAD})	Mg/l	
		Total Cyanide (CN_T)	Mg/l	
		Maximum flow	M^3/seg	
Deep water resources	Dynamic	Depth	meters	Mining Activity Climate change
Glaciers	Extension	Area	hectare	Climate change Mining Activity
Snow	Coverage	Pixels covered by snow	Snow index	Climate change
Vegetation units	Spatial distribution of vegetation communities classified in 2 types	Area covered with humid prairies with coverage over 50% Area covered with humid prairies or herbaceous units with coverage between 10 and 50%	hectare	Climate change Mining Activity Exotic species introduction Cattle Grazing Activity
	Coverage of vegetation communities classified in 6 different units	Proportion of bare soils; shrubs; perennial, annual and biannual herbaceous cover or vegetation of humid upland prairies inside each unit	percentage	
	Photosynthetic activity of vegetation communities classified in 2 types	Photosynthetic activity of areas covered with humid prairies with coverage over 50% Photosynthetic activity of areas covered with humid prairies or herbaceous units with coverage between 10 and 50%	Average NDVI	
	Richness, diversity, exotic species presence in vegetation communities classified in 6 different units	Amount of species inside each map unit Species diversity inside each map unit Native species/exotics species ratio inside each map unit	N° species Shannon Index N° native species/ °N exotics species	

APPENDIX 12: INTEGRATING PROTECTED AREAS INTO CLIMATE CHANGE ADAPTATION AND MITIGATION PLANS, POLICIES AND STRATEGIES

One of the most important issues facing protected areas is climate change. Indeed, climate change has emerged as one of the key threats to biodiversity within and across protected areas. Terrestrial impacts include shifting ranges for species and habitats, altered migration patterns and timing, increased habitat fragmentation, and increased frequency and intensity of storms, fires and flooding. Marine impacts include rising sea levels and changing coastal patterns, increasing sea temperatures, coral bleaching, increasing acidification, decreasing salinity and altered habitats and migration patterns, to name a few.

At the same time, climate change represents an unprecedented opportunity for protected areas, as nations increasingly recognize the importance of intact ecosystems in both mitigating climate change impacts, and enabling human and natural communities to adapt to these impacts .[67] The process of integrating protected areas into climate change mitigation and adaptation is likely to be very similar to, if not the same as, the process of integrating protected areas into wider landscapes, seascapes and sectoral plans and strategies. Therefore, this Appendix describes how each of the various steps included in this guide can be adapted specifically for the purpose of integrating protected areas into climate change adaptation and mitigation plans, policies and strategies.

GETTING STARTED:

The first step of the protected area integration process is to create a core group. In order to include climate change mitigation and adaptation issues, this step will likely include actors and interests not typically involved in natural resources planning. For example, this may include involving a) insurance companies that may have already analyzed areas that are vulnerable to increased floods and fires, b) major municipalities that have a vested interest in securing drinking water for their populations, and c) private investors who are investing in protected areas as part of a carbon offset program.

The task of establishing a common vision and mission is likely to be more complex than simply planning for connectivity and biodiversity conservation – there are likely to be conflicting goals and potential tradeoffs between interests. A vision statement that aims to include elements of biodiversity conservation, human wellbeing and climate resilience might read, for example: "The goal of this initiative is to ensure intact ecosystems in an integrated and connected network of protected areas, corridors, buffers and other conserved areas across the region, in order to maintain biodiversity, sustain ecosystem services, mitigate the impacts of climate change and enable climate-resilient adaptation of human and natural communities.

In setting parameters for an integrated protected area and climate change initiative, not only will the stakeholder group need to be more varied, but the timeframe will likely be longer, since the effects of climate change will continue well into the coming century. Planners may want to establish time horizons that include immediate (1 to 5 years), short term (5 to 10 years), medium term (10 to 25 years) and long term (25 to 50 years).

67 N. Dudley et al., 2010.

ASSESSING THE ECOLOGICAL CONTEXT:

The first step in assessing ecological context is identifying what to connect. In order to include climate change adaptation and mitigation issues when identifying key biodiversity elements, planners should include in their integration and assessment processes those species that are vulnerable to the impacts of climate change (e.g., species whose ranges and/or migratory patterns are likely to shift dramatically), and those species that could represent broad shifts in migration patterns for many other species. Planners should also identify ecosystems that are likely to be important under climate change scenarios, such as those that a) will likely continue to provide key services, such as drinking water and storm surge protection; b) are likely to be resilient to climate-related pressures such coral bleaching; and c) will provide carbon sequestration value, such as large blocks of intact forests, peatlands, grasslands and seagrass beds.

One approach to assessing the ecological context under future climate change scenarios is to identify the underlying suite of geophysical factors that determine the composition of ecosystems, including geographical features such as bedrock and soil types, and topographic features, such as elevation, aspect and slope. Planners can, for example, incorporate into their selection criteria areas with a) high topographic complexity; b) a multitude of elevational ranges, c) high local connectivity, and d) bottlenecks in regional connectivity[68]. In this way, planners can anticipate changes not only to the 'actors' of biodiversity, but also the underlying 'stage,' or geophysical drivers, that will remain constant even under various climate scenarios.

ASSESSING THE PROTECTION AND CONSERVATION CONTEXT:

The first step of assessing the protection and conservation context is identifying the lands and waters that have some form of protection and/or conservation status. As areas designated as carbon offsets become more common in the future, they should be included in an analysis of the protection and conservation context.

Another important aspect is evaluating the effectiveness of management of protected and conserved areas. Planners can integrate this step with climate change mitigation and adaptation by assessing how well the areas are managed for various elements of climate change. For example, under certain management regimes, peatlands are maintained as carbon sinks. However, if they are allowed to dry out, they can become carbon sources[69]. Similarly, fires are likely to become more frequent and intense in some ecosystems under climate change scenarios, and managers will want to assess how effective their management practices are in promoting resilience to such fires. Planners should also more thoroughly assess the existing and likely impacts of climate change on biodiversity within their protected areas, and establish baselines for monitoring change in the future.

ASSESSING THE ECONOMIC, SOCIO-DEMOGRAPHIC AND CULTURAL CONTEXT:

Climate change may represent a huge funding opportunity for protected areas. Funds from REDD (reducing emissions from deforestation and degradation) and "REDD Plus" are examples of how protected areas might benefit financially from intergovernmental agreements and instruments. For example, the Tanzanian government has been able to raise carbon-related funds for protected areas in the Eastern Arc Mountains by making a case that the forests within protected areas were showing far lower defores-

68 M. Anderson, 2009.
69 N. Dudley et al., 2010.

tation and degradation than surrounding forests outside of protected areas[70]. Similarly, the government of Madagascar has used both REDD funds and other carbon funding (World Bank BioCarbon Fund) to fund the establishment of the Ankeniheny-Zahamena Corridor, and to establish five new protected areas[71]. Additional sources could include funds from voluntary and market carbon offsets — the total global carbon market in 2008 was $117.5 billion[72]. These sources are likely to grow with the creation of the Copenhagen Green Climate Fund to finance climate-related mitigation and adaptation activities.

Protected areas provide an ideal recipient for carbon-related funds for a variety of reasons, including: there are already comprehensive laws and frameworks in place for protected areas; carbon sequestration is likely to be higher in intact protected areas; and protected areas have management agreements, staffing and infrastructure in place to ensure that that management practices maintain carbon sequestration values[73]. Therefore, planners seeking to integrate climate change and protected area financing may find a variety of new options to explore.

As part of integrating protected areas into national economies, planners may find that a full assessment of the economic and social contributions of protected areas will help make the case to governments that protected areas are an important benefit. When integrating climate change interests into this process, planners should consider how the value of protected areas is likely to increase under climate change scenarios. For example, Mexico's protected areas provide over $3.3 billion of benefits and services annually through carbon sequestration, water provisioning and tourism. The first of these two values are likely to continue to increase over time as the value of forests that sequester carbon and provide water, and the value and benefit of Mexico's protected area system continue to increase under climate change scenarios.

ASSESSING THE POLICY AND REGULATORY CONTEXT:

Protected area integration efforts may already consider relevant sectors, such as transportation and forestry. However, seeking to integrate climate mitigation and adaptation, planners should carefully consider how to incorporate those sectors that will be increasingly important under climate change scenarios. For example, climate change is expected to have large impacts on food security. Therefore, the agriculture and fisheries sectors may be particularly important to involve in protected area and climate change integration efforts. Similarly, water, health, insurance, and disaster planning are all expected to be affected by climate change, and each of these sectors will be important to involve in the planning process.

PUTTING IT ALL TOGETHER:

In combining the results of the various assessments, planners will typically arrive at a series of scenarios that aligns protection and connectivity gaps with existing opportunities from other sectors. When incorporating climate change interests, planners may want to explicitly focus on the alignment of opportunities for protected area connectivity, sectoral integration and climate change mitigation and adaptation. For example, planners may want to identify scenarios that identify areas that are important both to overall connectivity and to climate adaptation, for example. They may want to also identify large blocks of intact habitat that can provide substantial benefits to biodiversity and to carbon sequestration.

One way of combining these interests is by including areas important to climate change as a distinct layer within software optimization tools (e.g., SPOT, MARXAN). By conducting multiple runs, the soft-

70 WWF, 2009; N. Dudley et al., 2010.
71 B. Ferfuson, 2009.
72 K. Hamilton et al., 2009.
73 WWF, 2009.

ware will eventually hone in on those areas that provide multiple values, including areas important for biodiversity, climate change adaptation and mitigation, and ecosystem services, for example.

DEVELOPING STRATEGIES AND ACTIONS:

This guide identifies a basic list of potential strategies that could be employed when integrating protected areas. This list can easily be adopted to help identify strategies that integrate protected areas and climate change adaptation and mitigation. For example, in developing strategies related to changing management practices, planners could consider strategies that create new protected areas that provide both biodiversity benefits (by improving the representativeness of the protected area network) and carbon benefits (by providing a high level of carbon sequestration). Strategies that focus on improving management could focus on practices that improve both species connectivity and climate change adaptation. Strategies related to laws, policies and finance might include legal and financial mechanisms to allow for carbon funds to support protected areas. Strategies related to restoration could focus on both the connectivity value and the climate mitigation value. By identifying strategies that provide biodiversity, societal and carbon benefits, planners will improve the likelihood of the long-term success of these strategies.

IMPLEMENTING STRATEGIES AND ACTIONS:

One of the most important aspects of protected area integration is mainstreaming strategies into other sectors. One of the most practical ways to do this with climate change is to mainstream protected areas into national climate change adaptation plans. These include both NAPAs (National Adaptation Programmes of Action — national plans that identify priority activities to respond to climate change adaptation) and NAMAs (Nationally Appropriate Mitigation Actions – voluntary actions by developing countries to reduce emissions and mitigate the impacts of climate change). The processes of developing these plans include many opportunities to integrate protected areas. For example, the recommended process for developing a NAPA includes: a) synthesizing available information on climate change adaptation; b) conducting participatory assessments of vulnerability to current climate variability and extreme events and of areas where risks would increase due to climate change; c) identifying key adaptation measures as well as criteria for prioritizing activities; and d) selecting a prioritized short list of activities. Each of these steps could and should include protected areas as a key aspect. However, only a handful of NAPAs to date have integrated protected areas into their plans[74].

MONITORING, EVALUATING AND ADAPTING:

The final step in this guide is monitoring, evaluating and adapting. Planners interested in integrating protected areas and climate change could consider identifying indicators that provide information on the role of protected areas in adapting to, and mitigating the effects of, climate change. Examples include indicators that estimate the amount of carbon stored within protected areas, the extent and scope of ecosystems services provided by protected areas, the degree of connectivity for climate adaptation, and the extent of fragmentation (and therefore increased vulnerability to climate change). The emphasis on “measurable, reportable and verifiable” indicators within the United Nations Framework Convention on Climate Change means that these indicators are likely to be widely supported and used beyond the protected area community.

74 See for example http://unfccc.int/cooperation_support/least_developed_countries_portal/

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