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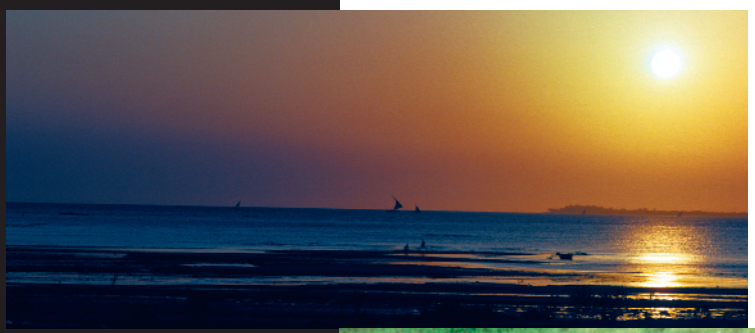
BIODIVERSITY ISSUES FOR CONSIDERATION IN THE PLANNING, ESTABLISHMENT AND MANAGEMENT OF PROTECTED AREA SITES AND NETWORKS



CDB UNEP WCMC IUCN WCPA SWEDISH SCIENTIFIC COUNCIL ON BIOLOGICAL DIVERSITY ICMM International Council on Mining & Metals

BIODIVERSITY ISSUES FOR CONSIDERATION IN THE PLANNING, ESTABLISHMENT AND MANAGEMENT OF PROTECTED AREA SITES AND NETWORKS

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FOREWORD

Establishment and management of protected areas together with conservation, sustainable use and restoration initiatives in the adjacent land and seascape are central to Article 8 on "*In-Situ* Conservation" of the Convention on Biological Diversity (CBD). Protected areas are known to provide a range of goods and ecological services while preserving natural and cultural heritage. They are thus essential components in national and global biodiversity conservation strategies.

There are now more than 100,000 protected area sites worldwide. However, according to the best available data, they do not adequately cover all ecosystems, habitats and species important for conservation. In particular, while 12% of the Earth's land surface is within protected areas, less than one per cent of the world's marine ecosystems are protected and other biomes, including major freshwater systems and grasslands, are poorly represented.

Last year, participants in the Vth World Parks Congress held in Durban, South Africa emphasized that, although the 1982 target of 10% protected area coverage of each biome by 2002 was met protected areas are currently not, always sufficiently well planned or appropriately managed to maximize their contribution to sustainable development including stemming global biodiversity loss. Therefore, there is an urgent need to take action to improve the coverage, representativeness and effectiveness of protected areas nationally, regionally and globally.

The 7th meeting of the Conference of the Parties to be held in February 2004 in Kuala Lumpur, Malaysia will consider protected areas as one of its main themes and will consider adopting a programme of work on protected areas with clearly identified targets. This event provides a unique opportunity to ensure that protected areas play an important role in achieving the globally agreed target of significantly reducing, by 2010, the rate of biodiversity loss and thus support the objectives of the Strategic Plan of the Convention, the Plan of Implementation of the World Summit on Sustainable Development and the Millennium Development Goals.

In order to provide an input to the seventh meeting of the Conference of Parties, the Secretariat requested members of the Ad Hoc Technical Expert Group on Protected Areas established by the Conference of the Parties at its sixth meeting and other experts, including in particular members of the IUCN World Commission on Protected Areas to gather practical information on key biodiversity issues relating to protected areas. A synthesis of these views was presented in a joint publication with UNEP-World Conservation Monitoring Centre, entitled "Protected Areas and Biodiversity – An Overview of Key Issues ".

The original contributions are considered so valuable in themselves that they deserve publication. They highlight critical issues relating to the selection, planning and effective management of protected areas for policy-makers, managers, and other actors in the protected area community. They benefited from the discussions and conclusions of the Vth World Parks Congress.

I thank all those who have contributed to this document. I express my deepest gratitude to the Swedish Scientific Council on Biological Diversity, Shell International Limited and the International Council on Mining and Metals for their financial support. I wish to acknowledge IUCN – The World Conservation Union, the World Commission on Protected Areas and the UNEP-World Conservation Monitoring Centre for joining efforts to gather the information published in this volume of the CBD Technical Series. I hope that this document will be of great help to various protected area stakeholders and will contribute to information exchange so important for the implementation of Article 8 of the Convention on Biological Diversity.

Hamdallah Zedan
Executive Secretary
Convention on Biological Diversity

LIST OF ACRONYMS AND ABBREVIATIONS

ABS	Access and Benefit Sharing
ADB	Asian Development Bank
AfDB	African Development Bank
AHTEG	Ad Hoc Technical Expert Group
AOS	Arabian Oryx Sanctuary
CAPE	Cape Action Plan for the Environment
CBD	Convention on Biological Diversity
CCAs	Community Conserved Areas
CITES	Convention on the International Trade of Endangered Species
CMPAs	Co-managed Protected Areas
CONABIO	Mexico's National Commission for Knowledge and Use of Biodiversity
COP	Conference of Parties
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ESHIA	Environmental social Health Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
GIS	Geographical Information System
IADB	Inter-American Development Bank
ICCN	''Institut Congolais pour la Conservation de la Nature''
ICMM	International Council on Mining and Metals
IFAD	International Fund for Agricultural Development
IMCAM	Integrated Marine and Coastal Area Management
INBio	National Institute of Biodiversity (Costa Rica)
IPIECA	International Petroleum Industry Environmental Conservation association
IUCN	The World Conservation Union
MCPA	Marine and Coastal Protected Areas
NBSAPs	National Biodiversity Strategies and Action Plans
NGOs	Non-Governmental Organizations
OGP	Oil and Gas Producers Forum
PAs	Protected Areas
R&D	Research and Development
Ramsar Convention	Convention on Wetlands of International Importance
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCBD	Secretariat of the Convention on Biological Diversity
TBPAs	Transboundary Protected areas
TEV	Total Economic Value
TILCEPA	Theme on Indigenous and Local Communities, Equity, and Protected Areas
UNDP	United Nations Development Programme
UNEP	United Nations Environment Program
UNF	United Nations Foundation
UNIDO	United Nations Industrial Development Organization
WB	The World Bank
WCMC	World Conservation Monitoring Centre
WCPA	World Commission on Protected Areas
WDPA	World Database on Protected Areas
WHC	World Heritage Convention
WMO	World Meteorological Organization
WPC	World Parks Congress
WSSD	World Summit on Sustainable Development
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

The Executive Summary provides short overviews of the 25 articles included in this volume. These overviews follow the sequence in which the articles appear in the document.

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1. Article 8 of **the Convention on Biological Diversity** (*In-situ* conservation) calls for the establishment of a system of protected areas or areas where special measures need to be taken to conserve biological diversity. It contains also many other provisions relevant to protected areas. The important role of protected areas in implementing the objectives of the Convention has been repeatedly emphasized in decisions of the Conference of the Parties (COP). Protected areas thus form a vital element of the various programmes of work agreed upon by Parties to guide the implementation of the provisions of the Convention. The 7th meeting of the COP, being held in February 2004 in Kuala Lumpur, Malaysia, will consider for the first time protected areas in a comprehensive manner and adopt a programme of work with clearly defined targets. Consideration of protected areas at the 7th meeting of the COP will benefit from a number of meetings that took place since its 6th meeting, including in particular the meeting of the Ad Hoc Technical Expert Group on protected areas, the IUCN 5th World Parks Congress, and the ninth meeting of the Convention's Subsidiary Body on Scientific, Technical and Technological Advice.

2. Protected areas carry out numerous functions that are beneficial to humans, and even essential to human welfare. Recently, a strong consensus has developed that protected areas need to make a solid **contribution to poverty alleviation and sustainable development**. The main challenge for using protected areas to alleviate poverty is how to find the right balance between the desire to live harmoniously with nature and the need to exploit resources to sustain life and develop economically. The problems facing protected areas are thus intimately related to socio-economic factors affecting communities in and around protected areas, including poverty, land tenure and equity. Chapter 2 suggests some ways for the various stakeholders to work together most effectively to achieve the conservation and development objectives of modern society.

3. The value of protected areas is poorly understood and greatly under-valued by markets, politicians and the general public. Traditionally, the only market economic values of protected areas that have been recognized are tourism revenues and income from extractive activities. The difficulty in quantifying many of the economic, social, environmental and cultural values of protected areas usually lead to their under-valuation when land and resource use decisions are made. The value of protected areas can in some ways be realized using the concept of total economic value. Quantification provides protected area advocates with a potent set of tools to make a better case for increasing support for protected areas as a concrete economic asset within local and national economies. Chapter 3 emphasize that protected areas have **significant values for humanity**, values that governments, citizens and non-governmental organizations (NGOs) should invest in.

4. There are **more than 100,000 protected area sites worldwide** covering almost 12 per cent of the Earth's land surface. However, they do not adequately cover all important ecosystems, habitats and species. Less than one per cent of the world's marine

ecosystems is protected and other biomes, including major freshwater systems and grasslands are poorly represented in the existing protected area systems. Protected areas are subjected to many threats and their effectiveness needs to be monitored. While there are many definitions of protected areas, the 1994 IUCN Protected Area Management Categories represent the international consensus about management types in protected areas.

5. Recent studies have shown that there are large gaps in the existing systems of protected areas in almost all regions. Selection of new sites should be made strategically taking into account ecological and human considerations. Chapter 5 briefly reviews the **criteria and methods for site selection** for the establishment of representative protected areas. They include ecological (e.g. species richness, vulnerability, level of threats endemism, irreplaceability and evolutionary processes) and socioeconomic factors. The "key biodiversity area" concept, an approach that combines various ecological considerations and uses globally applicable criteria applied to species, is described in some details.

6. The **global gap analysis** discussed in chapter 6 is considered to be an effective conservation planning tool that combines data on the global distribution of terrestrial vertebrates and protected areas to assess the effectiveness of the global protected area network in representing species, and to provide recommendations for the future expansion of this network. The results indicate that the global network is far from being complete, with more than 1,300 species of mammals, amphibians and threatened birds not represented in any part of their ranges. These results also demonstrate the inadequacy of percentage-based targets in global conservation planning.

7. Marine and coastal protected areas (MCPAs) provide an effective and flexible tool for implementing the three objectives of the Convention. However, the current degree of protection accorded to the marine environment is too low to be effective. Chapter 7 examines approaches for designing networks of MCPAs, based on the work undertaken by the Convention's Ad Hoc Technical Expert Group on MCPAs. Design principles for networks are discussed, as are practical steps to be considered in the design process. Adaptive management approaches are keys to the management of MCPAs and networks.

8. The diverse **inland water ecosystems** are probably the most threatened of all ecosystem types because of habitat degradation and unsustainable exploitation. They are characterised by a high proportion of migratory species, most of which must have connectivity between different habitats (usually through river corridors) maintained in order to complete their life-cycles. Inland waters and the biodiversity they support are very important for livelihoods and protected areas can be beneficial to local stakeholders. Although some relatively large areas are under protection, certain ecosystem categories are under-represented as are some regions. The major problem is that the effectiveness of inland water protected areas is almost always undermined through influences arising beyond their boundaries. The ecosystem approach to protected areas for inland waters is probably more critical to their effectiveness than for any other ecosystem.

9. Regarding forest biodiversity, although more than 10 % of the world's forests are included in protected areas, not all forest types are well represented. A more consistent forest classification and adequate gap analyses could help to improve the representativeness of protected areas. There is a need for developing practical methodologies to address the adequacy and efficiency of **protected forest areas**.

10. Dry and sub-humid land ecosystems are often believed to contain relatively low levels of biological diversity, particularly if

measured by species richness. However, it is especially in such ecosystems that people depend the most on biodiversity (including ecosystem functions and ecosystem services) for their livelihoods. A case is made that livelihood considerations must be included in the identification of priority areas for action such as biodiversity hotspots. Further it is argued that protected areas establishment and management have to take into consideration people concerns if they ought to be successful. Alternative protective measures, including community-based natural resources management, should supplement conventional protected areas approaches.

11. While planning, establishing and managing protected areas, there is a need to have in mind **corridors, connectivity and ecological networks**. Common elements of ecological network approaches include *inter alia* a focus on conserving biodiversity at the ecosystem, landscape or regional scale; and an emphasis on maintaining or strengthening ecological coherence, primarily through providing for ecological interconnectivity The principles of biodiversity conservation corridors – scale, connectivity and resilience - are the same wherever planning takes place, but the appropriate approach will depend on the local context. Successful establishment and management of corridors and networks require that land/resource-use decision-makers and stakeholders be brought into the process from an early stage and be provided opportunities for effective participation.

12. Trans-boundary protected areas are those, which straddle two or more countries. They present unique challenges for management, in particular, as a result of differences in legal systems, human, technical and financial resources, infrastructure and policies between relevant countries. They also offer many benefits including enabling larger areas to be protected and promoting the application of the ecosystem approach in particular through maintaining corridors for species migrations. A significant number of transboundary protected areas already exist although the level of co-operative management and status varies widely. Many more are required. A case study of international co-operation leading to the signing of the Carpathian Convention illustrates the importance of addressing trans-boundary needs within broader ecological networks.

13. Chapter 13 reviews the relationship between conservation, conflict, peace and cooperation including the transboundary protected areas, based on experience accumulated within the framework of the Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972). Three case studies are presented from Croatia, India and the Democratic Republic of Congo, where the World Heritage Convention promoted **on-site conservation amid conflict and war**. The critical need to better support the role of protected area personnel in biodiversity conservation is particularly emphasized.

14. The conventional model of protected areas needs a substantial paradigm shift towards more participatory forms of management, for effective and sustainable conservation, and social justice. There is a need to (i) increase the role of indigenous and local communities in the conceptualisation and management of government-notified protected areas, and (ii) recognize sites conserved by such communities (collectively called Community Conserved Areas). Tips for **successful participatory conservation** are described based on various cases studies around the world.

15. Management of protected areas has often been based on models that exclude the local resident populations and perceive their concerns as incompatible with conservation. The relatively new concept of "**governance" in the conservation field** can help design planning and management

systems compatible with resident or user communities, whose presence can be regarded as a conservation asset rather than a liability. Chapter 15 describes what is governance, its different types and qualities, and its relationship to the IUCN management categories. The four main identified protected area governance types include: government managed protected areas, co-managed protected areas, private managed protected areas, and community conserved areas. The importance of the concept of protected area "governance" has gained recognition for effective and efficient protected areas. Although it is not a panacea, protected areas governance can make the difference between social harmony and conflicts, and between decent livelihoods and destitution for the relevant communities.

16. Indigenous and local communities are owners and co-managers of considerable areas of land designated as protected areas. They often suffer direct economic losses when their access to biological resources is cut off by establishment of a protected area. For this reason, particular attention should be paid to the policies and process involved in the selection, designation and management of protected areas that involve **lands and waters traditionally occupied or used by indigenous and local communities**. The WWF/IUCN Principles and Guidelines on Indigenous and Traditional Peoples and Protected Areas should be considered for guidance. Chapter 16 emphasizes in particular that with reduced financial resources, protected area institutions are becoming weaker. It is this argued that a variety of actors, including traditional communities, should be considered assets for improving management effectiveness.

17. The **Global Environment Facility** (GEF) considers protected areas linked to their surroundings as the most important tool to achieve biodiversity conservation and ecological integrity. As such, they are an important target area for GEF support. The GEF protected area portfolio supports more than 1,000 protected area sites. Its main thrust is to develop ecological, institutional, social, political and financial sustainability. In its first decade of operation GEF provided approximately $1.1 billion for about 200 biodiversity projects involving protected areas. The third replenishment of GEF in 2002 received $3 billion commitments.

18. Important progress has been made in the last few decades in expanding and consolidating protected areas. However, much still needs to be done to ensure their effectiveness in the long-term. Chapter 18 reviews the main key activities that can contribute to **enabling the conservation effectiveness of protected areas**. These activities include: information for decision making, capacity building, conducive governance and policy framework, and financial support.

19. Many protected areas are being seriously degraded, and many are in danger of losing the very values for which they were originally established. **Assessment of management effectiveness** has so far been undertaken in only a small percentage of the world's protected areas. There is a growing awareness that evaluating management effectiveness and applying the results is at the core of good protected area management. The major challenges are to further enhance awareness of the benefits of evaluation, the willingness to use such systems and capacity building. A description of "management effectiveness evaluation" (what it is, and how it can be applied, in the light of recent experiences), and the framework for assessing the management effectiveness of protected areas developed by the World Commission on Protected Areas of IUCN are briefly presented in Chapter 18.

20. Bearing in mind the role that protected areas can play to meet the global biodiversity target of significantly reducing by 2010 the rate of biodiversity loss as a contribution to poverty alleviation and to the benefit of all life on earth, the **protected**

area coverage indicator is a possible means of assessing progress towards this target. Detailed and geo-referenced data exist on a large portion of the world's protected areas and efforts are underway to complete this picture. As decision makers and the general public can relate to the concept of protected area, the communication value of this indicator is high. However, efforts should be made to introduce a measure of the representativeness and the effectiveness of protected area sites and networks.

21. Mining and biodiversity conservation have traditionally been viewed as mutually exclusive activities. There is considerable scope for the industry to help alleviate pressure on protected areas due to poverty as well as to contribute directly to biodiversity conservation, while minimising environmental impacts. However, the challenges in realising this potential are formidable as a deep lack of trust characterises the relationship between the conservation community and the mining industry. Chapter 21 highlights key issues related to biodiversity conservation and mining interface and discusses recent initiatives including the IUCN - International Council on Mining and Metals (ICMM) Dialogue on Mining and Biodiversity and one of its outcomes, the ICMM landmark 'no-go' pledge. It is argued that advancing conservation and development objectives will require close cooperation between governments, multi-lateral organisations, industry, communities and NGOs. Partnership opportunities with companies offer environmental NGOs considerable potential to achieve on the ground conservation outcomes.

22. Chapter 22 describes **Shell's approach** to meeting the challenges between energy needs for socioeconomic development and maintaining the health and integrity of the world's ecosystems. The approach focuses on the three key areas that Shell has been working on: (i) playing a role in the public policy debate around protected areas, (ii) working to minimize its operational footprint, and (iii) making a positive contribution to biodiversity conservation.

23. Tourism has become a major economic activity. The apparent conflict between **tourism activities and biodiversity conservation** is often solved when a protected area is not considered only as a wilderness area set aside for conservation purposes, but as series of ecosystems composed of several interacting elements and actors which have to live in harmony. Unsustainable tourism activities will likely increase social degradation and may have a highly complex impact on cultural values. Sustainable tourism, in turn, can generate jobs and revenues, thus providing an incentive for preserving natural areas. Therefore the challenge for the development of sustainable tourism activities in protected areas is to correctly assess the trade-offs that occur between tourism development, the protection of resource values for which protected areas are established and the interest of local communities.

24. In chapter 24 the **perspectives of access to genetic resources and sharing of benefits** derived from the utilisation of these resources (referred to as "Access and Benefit Sharing" (ABS)) and opportunities that the genetic resources of protected areas promise are examined. A number of bioprospecting innovations have been derived from protected areas and they provide a background to the role of ABS in protected areas management, including the need for nationally adapted guidelines, policies and legislation. Concrete proposals as to what protected areas managers need to consider when addressing the issues in their country contexts are discussed.

25. The **role of youth** in the current and future planning and management of protected areas has been particularly emphasized in recent years. Efforts to involve younger generations in protected areas, and the challenges and barriers that hamper the opportunities for more effective engagement of younger generations in the

stewardship of protected areas are illustrated. Suggested recommendations include policy initiatives that facilitate working partnerships between protected areas and youth organisations; incentives to encourage younger generations into environmental careers; mechanisms for dialogue between private and public sector young professionals to encourage private sector engagement; policies to promote research and continuing support for environmental education and the use of protected areas as living class rooms.

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1 PROTECTED AREAS IN THE CONVENTION ON BIOLOGICAL DIVERSITY

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The Convention on Biological Diversity (CBD) with 188 Parties is the most important international legal instrument addressing protected areas, and supporting and fostering national and multilateral efforts in a comprehensive manner. The Convention defines protected area as "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives". Article 8 of the Convention calls for the establishment of a system of protected areas or areas where special measures need to be taken to conserve biological diversity. Accordingly, national protected area systems have been developed and maintained as key elements of national strategies to conserve biological diversity. Articles of the Convention concerning protected areas are reproduced in Box 1. The Convention recognises protected areas as a tool for *in situ* conservation that must be seen in conjunction with other relevant provisions of the Convention.

The Convention has developed guidance on various cross cutting issues relevant to the establishment and maintenance of protected areas. The important role of protected areas in implementing the objectives of the CBD has been repeatedly emphasized in decisions of the Conference of Parties (COP). Similarly protected areas form a vital element of the various thematic programmes of work viz., marine and coastal, inland water, dry and sub-humid lands, forest and mountain biological diversity. Various decisions of the Conference of Parties on protected areas from its first to the sixth meeting are depicted in Box 2.

Although at the global level the number and extent of protected areas have been increasing in the past decades, existing systems of protected areas are not representative of all categories of biodiversity important for its conservation and sustainable use as set in Annex 1 to the CBD. This is particularly true for marine areas, of which less than 1% are protected, and with regard to hotspots, in line with the Plan of Implementation of the World Summit on Sustainable Development.

To facilitate the implementation of article 8 and related provisions of the Convention, the fourth meeting of the COP decided to consider protected areas as one of the three main themes for its seventh meeting (decision IV/16). The preparatory process on protected areas leading up to the seventh meeting of the Conference of Parties is described in Box 3. In preparing for the theme on protected areas, the COP, in its decision VI/30 encouraged the active collaboration with the Vth World Parks Congress and established an Ad Hoc Technical Expert Group (AHTEG) on protected areas to review methods and approaches for the planning and management of protected areas including options for appropriate policies, strategies, and practices consistent with the objectives of the Convention.

The AHTEG which met from 10 to 14 June 2003 in Tjärno, Sweden, identified ecosystem and bioregional approaches to protected area management and sustainable use of biological diversity, and mechanisms to enhance stakeholder involvement. It identified options and priority actions required for effective establishment and management of protected areas as well as

Box 1: Articles of the Convention concerning protected areas

The term "protected area" is defined in Article 2 of the Convention as "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives". Paragraphs (a), (b), (c) and (e) of Article 8 contain specific references to protected areas and provide that Parties should:

(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

(b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;

(c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use; and

(e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.

In addition to the provisions on *in-situ* conservation, a number of additional articles are relevant to the establishment and management of protected areas. These include in particular:

- Provisions on sustainable use in Articles 6 and 10, given the fact that increasingly protected areas are places managed for multiple purposes;
- Provisions on *ex-situ* conservation (Article 9) and restoration / rehabilitation (Articles 8f and 14.2) to complement on site efforts to protect habitats and species;
- Provisions on tools important for protected area management and planning such as biodiversity monitoring (Article 7) and impact assessment (Article 14);
- Other provisions including 8(j) on traditional knowledge, Article 11 on incentive measures, Article 12 on research and training and article 13 on public education and awareness.

The text of the Convention can be accessed at http://www.biodiv.org/convention/articles.asp

options for management of transboundary protected areas. Based on the review of approaches, tools and gaps, the AHTEG elaborated elements for a programme of work on protected areas under the Convention which were further discussed at the Vth World Parks Congress

Following the review at the World Parks Congress, the elements for a programme of work on protected areas prepared by the Expert Group was considered by the ninth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) in November 2003, in Montreal, Canada. The Subsidiary Body provided its recommendation to the seventh meeting of the COP (9-20 February 2004, Kuala Lumpur, Malaysia) for consideration.

The overall purpose of the proposed programme of work is to significantly reduce the loss of biological diversity at the international, national and sub-national levels through the implementation of the three main objectives of the Convention, and to contribute to poverty alleviation and sustainable development, thereby supporting the objectives of the Strategic Plan of the Convention, the Plan of Implementation of the World Summit on Sustainable Development and the Millennium Development Goals. It is envisaged that the Convention's work on protected areas should be undertaken in the context of ecosystem approach. The ecosystem approach provides a framework within which the relationship of protected areas to the wider landscape and seascape can be understood, and goods and services delivered by protected areas can be valued.

Box 2: Decisions of the Conference of the Parties on protected areas from its first to the sixth meeting

- The Conference of the Parties specifically considered Article 8 at its second and third meetings, where it emphasized the importance of regional and international cooperation, stressed the importance of disseminating relevant experience and requested the Executive Secretary to provide suggestions on how the collection and sharing of relevant information and experience might be enhanced (decisions II/7 and III/9). The Conference of the Parties also instructed the financial mechanism to support Parties' efforts to implement Article 8 as a matter of urgency and priority (decisions I/4 and II/6).
- Protected areas form a central element of the various thematic programmes work adopted at the fourth and subsequent meetings of the Conference of the Parties:
- Programme element 3 of the programme of work on marine and coastal biological diversity is dedicated to marine and coastal protected areas. The two aims of this programme element are to facilitate research and monitoring activities related to the value and the effects of marine and coastal protected areas or similarly restricted management areas on sustainable use of marine and coastal living resources; and to develop criteria for the establishment of, and for management aspects of, marine and coastal protected areas (IV/5, annex).
- The programme of work on the biological diversity of inland water ecosystems recommends the sharing of information and experience relevant to conservation and sustainable use of such ecosystems, specifically referring to use of protected areas and their management strategies for conservation and sustainable use of inland water ecosystems. The Conference of the Parties also specifically encouraged the implementation of the joint work plan with the Convention on Wetlands (IV/4, annex 1).
- The use and establishment of additional protected areas is identified as one of the necessary target actions for the implementation of the work programme on dry and sub-humid lands (V/23, annex1, part B, activity 7(a)).
- The programme of work on Article 8(j) on traditional knowledge includes a component on protected areas.
- The expanded programme of work on forest biodiversity, which was adopted in decision VI/22, contains a number of activities related to protected areas. The programme of work also calls for work on the role and effectiveness of protected areas.
- The value of taxonomic data in assisting protected areas site selection is recognized in the programme of work for the Global Taxonomic Initiative contained in decision VI/8. Protected areas are also mentioned in connection with identification, monitoring, indicators and assessments (decision VI/7) and the Addis Ababa principles and guidelines for sustainable use of biodiversity.
- In the Global Strategy for Plant Conservation (annex to decision VI/9), the Conference of the Parties adopted targets 4 and 5, which specify respectively that by 2010 (i) at least 10 per cent of each of the world's ecological regions should be effectively conserved, implying increasing the representation of different ecological regions in protected areas, and increasing the effectiveness of protected areas; and (ii) protection of 50 per cent of the most important areas for plant diversity should be assured through effective conservation measures, including protected areas.

All the decisions referred to in this box can be accessed at http://www.biodiv.org/decisions/default.aspx

The proposed programme of work on protected areas is cross cutting in nature and is developed bearing in mind the need to avoid unnecessary duplication with the existing thematic programmes of work and other ongoing and new (such as work on mountain biodiversity and the development of guidelines for sustainable use and application of ecosystem approach) initiatives of the Convention, and to promote synergy and coordination with relevant

programmes of various international organizations.

The seventh meeting of the Conference of the Parties provides the first opportunity since the Convention came into force to directly address the Convention's provisions on protected areas in a comprehensive manner. Building on the recent developments, CBD enables Parties, other Governments, and relevant organizations to effectively implement provisions on *in-situ* conservation by canalising efforts and resources in support of an effective global protected area network. The ultimate result of the implementation of the programme of work is the establishment and maintenance of an effectively managed, ecologically representative global system of protected area networks, where human activities are managed to maintain the structure and functioning of the full range of ecosystems, in order to provide benefits to both present and future generations and achieve a significant reduction in the rate of biological diversity loss.

Box 3: Preparatory process on protected areas leading up to the seventh meeting of the Conference of the Parties

"Protected areas" is one of the priority themes of the seventh meeting of the Conference of the Parties. The preparation process leading up to the seventh meeting of the Conference of the Parties consisted of a number of steps with the meetings of the ad hoc technical expert groups on marine and coastal protected areas and on protected areas, and the Fifth IUCN World Parks Congress being the major sources of input. Specifically, the following are the main steps in the preparatory process leading up to the seventh meeting of the Conference of the Parties:

- The Ad Hoc Technical Expert Group on Marine and Coastal Protected Areas mandated by decision IV/5 concluded its work in 2002. The results of this work were considered at the eighth meeting of SBSTTA in March 2003 and served as the basis for recommendation VIII/3 B on marine and coastal protected areas. These results provided an interesting and illustrative indication of what is feasible in the wider context of protected areas in general.
- The World Summit on Sustainable Development (September 2002) called, in paragraph 44 (g) of the Plan of Implementation, for supporting initiatives for hotspot areas and other areas essential for biodiversity and promoting the development of national and regional ecological networks and corridors.
- The Open-ended Inter-Sessional Meeting on the Multi-Year Programme of Work of the Conference of the Parties up to 2010, held from 17 to 20 March 2003 in Montreal requested that the Ad Hoc Technical Expert Group (AHTEG) on Protected Areas, the Subsidiary Body on Scientific, Technical and Technological Advice at its ninth meeting and the Conference of the Parties at its seventh meeting consider the outcome of the World Summit on Sustainable Development relating to hotspots, ecological networks and corridors and other areas essential for biodiversity in the context of the work on protected areas, taking into account other relevant thematic programmes and cross-cutting issues, in the context of national strategies and action plans, and focusing on biodiversity loss.
- In pursuance of paragraph 4 of decision VI/25, Governments submitted thematic reports on protected areas in May 2003. These thematic reports provide information about national-level protected areas in the context of the implementation of the Convention;
- A strategic roundtable on protected areas, ecological networks and corridors held in June 2003 in Hague, provided input to the AHTEG, and to the ninth meeting of SBSTTA on the topic of ecological networks and corridors;
- The Ad Hoc Technical Expert Group on Protected Areas met from 10 to 14 June 2003 in Tjärno, Sweden. The objectives of the meeting included review methods and approaches for planning and management of protected areas; identification of ecosystem and bioregional approaches; identification of mechanisms for stakeholder involvement and options for management of transboundary protected

areas. The Group reviewed a number of issues relating, *inter alia*, to the planning, establishment, and management of protected areas; status and trends of, and threats to, protected areas; stakeholders involvement; and ecological networks. The Group also identified elements of a programme of work on protected areas for the Convention on Biological Diversity.

- The IUCN Fifth World Parks Congress (WPC) was held in Durban, South Africa, from 8 to 17 September 2003. The main outputs of the Congress are the Durban Accord, Durban Action Plan, the message to the Convention on Biological Diversity and a set of 32 recommendations approved by different workshops organized during the Congress. The Durban Accord calls for a fresh and innovative approach to protected areas and their role in broader conservation and development agenda, and for specific action *inter alia* on: expansion and strengthening of worldwide systems of protected areas; mainstreaming protected areas within overall development and poverty-alleviation agenda; interests and aspiration of all stakeholders. The Durban Action Plan provides a framework of the detailed actions needed to achieve the commitments called for in the Durban Accord. The message to the Convention on Biological Diversity calls on the Conference of the Parties to adopt a rigorous programme of work on protected areas including specific targets and time tables, and establish effective means to monitoring and assessing the implementation of the programme of work.
- The Executive Secretary convened a liaison group meeting on the World Parks Congress on 18 September 2003 in Durban, South Africa, to analyse the outcomes of the Congress with a view to identifying elements from the Congress that are not fully reflected in the outputs of the Ad Hoc Technical Expert Group on Protected Areas, and which should be drawn to the attention of SBSTTA for possible integration in its advice to the Conference of the Parties at its seventh meeting.
- In response to paragraph 19(d) of decision VI/22, the Executive Secretary convened in Montreal from 6 to 8 November 2003, just prior to the ninth meeting of SBSTTA, an international workshop on protected areas as a measure to conserve and sustainably use forest biological diversity. The workshop enabled participants to exchange current knowledge and experience on opportunities and challenges to establishing and ensuring long-term sustainability of protected forest areas. The workshop recommendations were submitted to SBSTTA for consideration.
- The ninth meeting of SBSTTA held from 10 to 14 November 2003 considered protected areas as one of the themes for in-depth consideration and adopted recommendation IX/4. A revised proposed programme of work on protected areas is annexed to that recommendation for consideration by the Conference of the Parties at its seventh meeting.

2 PROTECTED AREAS, POVERTY, AND SUSTAINABLE DEVELOPMENT

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1. Introduction

Many areas of great natural wealth that are protected as national parks, game reserves, strict nature reserves, or other types of protected areas, are found in the most remote parts of a country, farthest removed from the mainstream developments that may be bringing prosperity to other parts of the country. Not surprisingly, these remote, but nature-rich, areas also support some of the least economically-prosperous segments of the country's human population, making the linkage between nature conservation and poverty alleviation especially challenging. The challenge has gone unaddressed for far too long, and indeed, the rural populations have sometimes been encouraged, or even forced, to abandon the areas designated to achieve conservation objectives.

More recently, a very strong consensus has developed that protected areas need to make a solid contribution to poverty alleviation, going far beyond simply doing no harm. This paper will highlight some of the most relevant issues, pointing out that many approaches to developing protected areas can also provide important economic benefits to rural populations. It is also important to recognize that poverty is not simply a lack of money, that human well-being (sometimes called "sustainable livelihoods") also involves living in a healthy relationship with the environment, and that areas important for their natural values can also lead to significant benefits for local people, in terms of watershed protection, non-timber forest products, and other such values. Many of the rural poor well recognize the value of conserving certain features or landscapes, and have established their own protected areas (sometimes called "sacred sites") through their own cultural mechanisms. Thus the relationship among protected areas, poverty alleviation, and sustainable development has many complexities, which this paper will begin to identify.

The CBD defines "protected area" as "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives" (Article 2). The 5th World Parks Congress, meeting in Durban, South Africa, in September 2003, recognised that protecting such areas is no longer seen as a process of eliminating people from the land, but rather of integrating conservation objectives and human activities in an appropriate manner that assures the future of both. The modern approach to protected areas makes them essential parts of sustainable development (McNeely, 1999).

The CBD has marked a significant shift in the perception of protected areas by governments. It has linked protected areas to larger issues of public concern, such as sustainable development, poverty alleviation, traditional knowledge, access to genetic resources, national sovereignty, equitable sharing of benefits and intellectual property rights. Protected area managers are now sharing a larger and more important political stage with development agencies, agricultural scientists, NGOs, anthropologists, ethnobiologists, lawyers, economists, pharmaceutical firms, farmers, foresters, tourism agencies, the oil industry, indigenous peoples, and many others. These competing groups claim resources, powers, and privileges through a political decision-making process in which biologists, local

communities, the private sector, and conservationists have become inextricably embroiled (McNeely and Guruswamy, 1998). The challenge is to find ways for the various stakeholders to work together most effectively to achieve the conservation and development objectives of modern society. This paper will suggest means for doing so, with a special emphasis on the rural poor.

2. Contributions of protected areas to sustainable development

Protected areas carry out numerous functions that are beneficial to humans, and even essential to human welfare. Ten important ones are listed below:

- *Biodiversity*. Conserve genetic resources and biological diversity more generally, enabling evolution to continue and providing raw materials for biotechnology.
- *Watershed protection.* Protect watersheds for downstream hydroelectric, irrigation, and water supply installations.
- *Storm protection.* Protect coastlines against damage from storms (especially coral reefs and mangroves), and absorb heavy rainfall (especially wetlands and forests).
- *Tourism*. Provide destinations for nature-based tourism and recreation.
- *Local amenity*. Ameliorate local climate conditions and provide amenity values to nearby communities
- *Forest products.* Provide a wide range of non-timber forest products, and limited amounts of timber.
- *Soil.* Build soils, control soil erosion, and recycle nutrients.
- *Carbon.* Sequester carbon, thereby contributing to global efforts to address anthropogenic climate change.
- *Research*. Provide sites for scientific research on a wide range of ecological, social, and economic topics.
- *Cultural values.* Conserve culturally important sites and resources, and demonstrate the nation's interest in its natural heritage.

Some of these functions can also be provided by unprotected nature, agricultural lands, or even degraded wastelands; but properly selected and managed protected areas typically will deliver more of these functions per unit area at lower cost than will most other kinds of land use in the biologically important areas that require protective management (e.g., Tilman *et al*., 1997; Hooper and Vitousek, 1997). The way these functions are transformed into benefits for people, including the rural poor living around protected areas, will depend on the management objectives of the protected area and how effectively these objectives are converted into action.

2.1 Material benefits from protected areas

The people living in rural areas have long depended on the natural resources that are available there. Experience and logic indicate that local communities are likely to support protected areas to the extent that such areas continue to provide benefits to them, especially in the form of continued availability of resources. Commodities such as animal skins, bamboo, beeswax, construction materials, dyes, fibres, firewood, fish, fodder, fruits, game meat, honey, medicinal plants, mushrooms, ornamentals, resins, and timber have been harvested more or less sustainably for thousands of years. The local people have often developed mechanisms for managing these resources sustainably and allocating the benefits among the community (as recognized in Article 8(j) of the CBD).

Properly managed tourism in protected areas can also bring considerable income, without threatening the natural resource base. In Kenya, tourism is one of the largest export industries, earning over US$300 million per year; thousands of jobs exist because of visitors to Kenya's magnificent coast and wildlife parks. Divers spend about $30 million per year at the Bonaire Marine Park in the Netherlands Antilles, $14 million in protected areas in the British Virgin Islands, over $53 million per year in marine protected areas in the Cayman Islands, and $23 million

in Virgin Islands National Park in St. John's (OAS/NPS, 1988).

Governments throughout the world have been able to capture considerable economic benefits from tourism, through visa fees, airport taxes, entrance fees for protected areas, bed taxes payable by tourist resorts, taxes on tour operators, and so forth. Tourists and tour operators can contribute at least part of the costs of the provision of large-scale tourism infrastructure and the costs of maintaining protected areas. Some countries are quite successful in generating such revenues; the South Africa Parks Board, for example, is able to earn about 80% of its running costs through various kinds of revenue-generating activities, as is the protected area system of Ontario, Canada (Moos, 2002).

2.2 Ecosystem services from protected areas

Far more important than income from tourism or harvesting of renewable resources are the ecological services protected areas can provide to local communities, the nation, and the international community. Particularly important services at the community level include soil regeneration, nutrient cycling, pollination, recreation, provision of pure water, and maintenance of the functioning ecosystem which yields harvestable resources. Such benefits are often difficult to quantify, and even local people may take them for granted. Ecological services do not normally appear in corporate or national accounting systems, but they far outweigh direct values when they are computed; one recent review estimated that coastal ecosystems provide services worth over US$4,000 per ha per year, while tropical forests are valued at US$3,000, wetlands at nearly US$15,000, and lakes and rivers at US$8,500 (Costanza *et al*., 1997).

One of the most important ecosystem services, especially in view of the major investments in water resource management being made in much of the world, is the stabilizing of hydrological functions. Experiences from various parts of the world demonstrate that protected areas are a cost-effective management option for maintaining healthy watersheds that produce a steady and reliable source of water. For example, 7600 ha of cloud forest in the La Tigra National Park in Honduras provide the capital city of Tegucigalpa with 40% of its drinking water at a cost of about 5% of its second largest source; Guatopo National Park in Venezuela provides 20,000 litres per second of high-quality water to Caracas, justifying an expenditure of over US$15 million to buy out timber and farming interests in the area; and the value of the hydroelectricity produced by Venezuela's Canaima National Park (3 million ha) is equivalent to 144 million barrels of oil per year, about US$2.5 billion at the current price (Garcia, 1984).

2.3 A word of caution

Economic assessment of the full range of goods and services provided by protected areas is part of the global move toward a market economy. This economic valuation is broadly endorsed by governments, but it can have negative impacts on the way that resources are managed. By transforming non-monetary values into monetary ones, land, labour, and nature become commodities rather than part of the cultural heritage that binds the members of the community to one another (Alcorn, 1997).

Further, assigning values to biological resources and ecosystem services inevitably makes value judgements about distributional and irreversible effects. While a complete discussion of the value of biodiversity should extend well beyond utilitarian values and market prices, even partial assessments of value can help to clarify the importance of biological resources to national development objectives and suggest ways of applying economic incentives and disincentives to ensure that the benefits of protected areas are delivered to the community, and that the community in turn is enabled to protect the resources upon which its continued prosperity depends.

3. Management approaches to deliver greater benefits from protected areas to sustainable development

Wild resources have been harvested sustainably by rural people for thousands of years, often as an important part of the culture (such as the *Hema* grazing management systems in many part of the Middle East). But the increasing population, more sophisticated technology, and changing social, economic and political structures of today have removed most traditional controls on how resources are managed. If sustainable benefits are to be provided to local communities (a primary objective of development), more effective controls may be required to ensure that populations of plants and animals are maintained at productive levels. The means of doing this will vary from place to place, but management of protected areas for sustainable development should be based on four main principles:

Principle 1: The major functions of protected areas deliver different benefits at different scales.

Protected areas are important at many levels, including local, national, and global. Drawing on the list of the functions of protected areas presented in section 2, Box 1 presents a model of the various scales at which benefits are delivered by these functions, ranging from local to global. The range of possible benefits at each scale indicates the importance of defining objectives for individual protected areas; different management approaches will provide different mixes of benefits at different levels.

Box 1: The scale at which benefits are delivered by protected area functions

Protected areas provide benefits to people at all levels. Using the ten key functions listed above, this Box provides a model of the scale of which benefits can be derived, from 0 (=no benefit) to 4 (=maximum benefit). More precise determinations can be made for individual protected areas, based on management objectives.

Key Functions	**Scale at which benefits are delivered**		
	Local	National	Global
1. Biodiversity	0-4	2-4	4
2. Watershed protection	4	2-4	1-3
3. Storm protection	4	2-4	1-3
4. Tourism	0-4	4	2
5. Local amenity	2-4	1-2	0-1
6. Forest products	0-4	1-2	1-2
7. Soil	0-4	1-2	1-2
8. Carbon	0-1	1-2	2-3
9. Research	0-3	2-4	2-3
10. Cultural values	0-4	2-4	1-2

The first step in protected area management is to determine objectives at both the system and site levels; these objectives determine who gets what benefits, and pays what costs at what scale. This is a political process that should involve dialogue with the key stakeholders, including landowners, scientists, local communities, NGOs, and the private sector. Because different objectives involve trade-offs in terms of the distribution of costs and benefits, they need to be made explicit in management terms. Further, many of the public goods benefits of protected areas provide significant advantages for the global community, including conservation of

biodiversity, sequestration of carbon, and the results of ecosystem research. Capturing appropriate rents at the national or local level from these global benefits remains a challenge that is only partially being met by intergovernmental processes such as the CBD, Ramsar, and World Heritage. NGOs that capture willingness to pay among consumers in wealthy countries or sectors of society and deliver the results to protected arrears in need can play an important role in this regard.

Principle 2: Many stakeholders have interests in protected areas and important roles to play in their management.

Local communities, the private commercial sector, non-governmental organizations, and research institutions, contain considerable variability as well as important potential to contribute to various aspects of protected area management. However, these different categories of stakeholder tend to have very different major motivations, leading to different major roles that they can play in protected area management (Box 2). The way that the resources of a protected area are used in any particular place and time is the result of accommodation among conflicting interests between stakeholders having different objectives. Seldom does any single group dominate absolutely, and resources can be used in many different ways at the same place and time. Thus protected area management is part of an on-going process in which an appropriate balance is sought among the different interests of the various stakeholders. A national protected area system plan can provide the basis for this process, but the Durban Congress highlighted the need to provide significantly greater attention to the rural poor living in and around protected areas.

Box 2: Major motivations and roles of key stakeholders

This chart presents a model of the motivations and roles of four major categories of stakeholders in protected areas in addition to government resource management agencies. These will vary considerably from place to place, but government resource management agencies should recognize the main motivations, harness the strengths of each stakeholder, and be aware of the limitations of each.

Stakeholder	Major motivation	Major roles
Local communities	Sustainable livelihoods	Resource management; buffer-zone management
Private commercial sector	Economic profit	Managing profitable operations; providing sponsorship
Non-governmental organizations	Conserving public goods	Public information; technical advice; linkages among stakeholders; funding from public
Research institutions	Scientific curiosity	Research and monitoring; technical advice

Principle 3: The major problems facing protected areas need to be addressed by institutions at the appropriate scale, with appropriate roles.

Just as different benefits of protected areas are delivered differently at different scales, so too must the different problems faced by protected areas be addressed by the right institutions operating at the appropriate scale. The first step in determining appropriate management responses is to clearly identify the problem being addressed. In general, local people possessing secure tenure can deal with most day-to-day threats better than governments can, while governments can resist major abuses better than local people can (providing they have the technical and institutional resources and political will to do so). When the main threat to a protected area arises from cumulative overuse by too many people making too many demands on ecosystems to meet their day-to-day subsistence needs, local regulation and social control may be required, along with investments in improved agricultural practices or alternative livelihoods (Caldecott, 1997). When poaching of endangered species is a major problem, law enforcement will be a critical element. However, many of the factors leading to the loss of biodiversity and degradation of protected areas originate in national government policies far from protected area boundaries, such as national development priorities that may subsidize industrial agriculture in buffer zones, promote resettlement in remote areas, build roads or dams in protected areas, and issue timber concessions in protected areas or buffer zones. These require broader approaches such as improved national policies on development, trade, land tenure, and land-use planning.

A protected area system needs diversity in institutional approaches. Government conservation institutions in many countries claim an exclusive mandate to manage conservation areas and activities but lack the necessary human, financial, and technical resource capacities to carry out that mandate effectively. But protected areas support biological processes that often operate at small scales that vary dramatically in climate, elevation, structure, and importance from one site to the next. An over-emphasis on centralized protected area agencies can undermine institutional mechanisms at smaller scales, such as traditional approaches to conservation based on local knowledge about specific complex interactions and concerns about natural capital that can be applied in daily life. This clearly is not an either-or situation, but instead calls for creating new systems of governance for protected areas, with different institutions having different responsibilities at different scales. Simply stated, large-scale, centralized governance units do not, and cannot, have the variety of response capabilities -- and the incentives to use them -- that large numbers of local institutions can have (Ostrom, 1998).

Involving multiple stakeholders in protected area management has many advantages. The key challenge is to specify appropriate functional roles, as suggested in Box 3. How these roles are distributed will depend on the management objectives of each individual protected area and how these are implemented, but the Durban Congress underlined the importance of directing a greater share of the benefits to the rural poor.

Principle 4: Protected areas are best conceived as parts of a national system of land use.

As called for under the Convention on Biological Diversity, each country needs to treat its protected areas as a system, with different parts of the system designed to provide different kinds of benefits to different groups of stakeholders, though of course with considerable redundancy built into the system to ensure sustainability. Box 1 implied that protected areas need to be conceived as a national system, with some sites designed to provide primarily national benefits, others designed primarily to meet needs of local people for watershed protection, other sites to ensure sustainable use of non-timber forest products, and others designed primarily to conserve biological diversity.

A national protected area systems plan will ensure that all major ecosystems are well protected, the different components of the

system are managed to the appropriate objectives, connections between protected areas are promoted where possible, developments in adjacent lands (buffer zones) are supportive of the protected area system, roles for different stakeholders are identified, and priorities for investment are specified.

Box 3: Functional roles in the management of protected areas

While each protected area has different challenges, the general distribution of responsibility among government, the private sector, NGOs, research institutions, and local communities can be assessed for each of the functional roles for protected areas. The table below assesses the importance of the role for each of the five groups, scoring from 0 (no role) to 4 (lead role). These scores are indicative only, and will vary with the site and its objectives.

Functional role	Govern-ment	Private Sector	NGOs	Research institutes	Local commun-ities
Site planning	4	1	2	2	3
Establishing norms	4	1	1	1	2
Maintenance of roads	4	1	0	0	1
Maintenance of trails	4	1-2	2	1	2
Running of hotels, lodges	0-4	0-4	0-2	0	0-4
Running of campsites	0-4	0-4	0-2	0	0-4
Habitat management	4	1-2	1-2	1-2	1-4
Wildlife management	2-4	1	1-2	1-2	1-4
Public information	2-4	1	1-4	1-2	1
Public relations	2-4	2	1-4	0-2	0
Extension	1-4	1	1-4	2-3	1
Research	0-4	1	1-4	2-4	1
Education	2-4	1	1-4	2-4	1
Monitoring	0-4	1	1-4	2-4	1-2
Bio-prospecting	0-1	4	1	2-4	2
Issuing permits	4	0	0	0	2
Funding	2-4	1-3	1-3	1	1

4. Conclusions: providing benefits to rural communities

Far more needs to be done to build support from local communities for protected areas. This will require a challenging combination of incentives and disincentives, economic benefits and law enforcement, education and awareness, employment in the protected area and employment opportunities outside, enhanced land tenure and control of new immigration (especially where the buffer zones around protected areas are targeted for special development assistance). The key is to find the balance among the competing demands, and this will usually require a site-specific solution.

A key factor is the stability of rural communities, implying that governments need to be particularly cautious when contemplating major efforts at relocating people from one part of the countryside to another. Those people who have developed long-term relationships with particular settings, and have developed knowledge on how to manage the resources contained within those ecosystems, are likely to have very different relationships with the land and its resources than are new immigrants who have no particular linkage to local resources and often receive considerable subsidies from outside; the new arrivals frequently are responsible for more destructive land-use practices than are the long-term residents, but of course new technologies and new markets can be expected to change behaviour of local villagers irrespective of their traditional conservation practices.

At a minimum, local communities should be consulted on any decisions that affect them. In many cases, giving the local people preferential treatment in terms of employment within the protected area (including seasonal or project-based employment), providing economic incentives to establish tourism or other income-generating activities in the buffer zone, and ensuring an appropriate flow of benefits from the protected areas to the surrounding lands can help to build a positive relationship between protected areas and local communities.

It is possible that some local communities have a limit on their perceived needs, and once their basic needs are met, then they will reduce their impact on protected area resources. But this rosy assumption is far from a generality and most communities contain at least some individuals who happily will try to exploit more from a system than can be supported in a sustainable way, even if the social costs far outweigh the private benefits. This means that protected area management needs to be based on a clear understanding of rules and regulations, and effective means of enforcing them through various kinds of incentives (such as employment, clean water, various kinds of linked development, and so forth), and disincentives (such as public ostracism, fines, and jail terms).

Protected areas are created by people, so they are expressions of culture and serve as models of the relationship between people and the rest of nature. Thus the culture of each country is reflected in its system of protected areas, so each will tend to have different characteristics.

The single over-riding issue for those interested in using protected areas to alleviate poverty is how to find the right balance between the generalized desire to live harmoniously with nature and the need to exploit resources to sustain life and develop economically. The problems facing protected areas are thus intimately related to socio-economic factors affecting communities in and around protected areas, including poverty, land tenure, and equity; they also involve national level concerns, such as land use, tourism, development, balance of payments, energy, and resource management; and global concerns such as biodiversity, climate change, and generation of new knowledge about life.

The sustainable development programme for national protected area systems advocated here needs to include both firm governmental action and alliances with the other stakeholders at all levels. National governments cannot delegate their role as guarantors of the conservation of a country's cultural and natural heritage, so the appropriate authorities need to build the capacity to fulfil their regulatory and management duties and responsibilities. But civil society can share certain rights and responsibilities regarding the management of protected areas after careful preparations and an adequate definition of roles and responsibilities. Given the interests of NGOs, businesses, scientists, indigenous peoples, and local communities who live within or close to protected areas, alliances can be created among stakeholders to enable each to play an appropriate role according to clear government policies and laws. Social and economic incentives can be used to reward land-holders that contribute effectively to protected area management.

If governments and the general public recognize the many economic, social, cultural, ecological, developmental, and political values of protected areas; if appropriate institutions are established to manage protected areas in close collaboration with other stakeholders; if sustainable economic benefits are enabled to flow to protected areas and their surrounding communities; and if information from both traditional knowledge and modern science can be mobilized to enable protected areas to adapt to changing conditions, then protected areas can be the engines for new forms of sustainable rural development that ensure a better life for all.

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3 CAN WE QUANTIFY THE VALUE OF PROTECTED AREAS? FROM TANGIBLES TO INTANGIBLES

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1. Introduction

Protected areas cover some 11.5 percent of the earth's land surface and have been established in almost every nation on earth. According to the Convention on Biological Diversity, in Article 8(a), Parties should "establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity." Clearly, protected areas have significant values for humanity, values that governments, citizens and non-governmental organizations (NGOs) are willing to invest in. Nevertheless, protected areas in almost every nation are under increasing pressure from competing land and resource uses and priorities.

The value of Earth's "natural capital" is poorly understood and greatly under-valued by markets, politicians and the general public. Short-term political horizons encourage the exploitation of biological resources to meet short term economic goals. However, liquidation of these natural assets often goes unaccounted in national and company balance sheets, thus artificially reducing costs and inflating profits. The considerable economic value of ecosystem services do not register in conventional markets (value does not become price), and are therefore not considered to be "real" economic assets by policymakers. This systemic under-valuation of biodiversity results in a common view that establishment of protected areas incurs huge opportunity costs, particularly for developing countries. "This has meant that protected areas have been undervalued when land and resource decisions are made. When a protected area generates no obvious commercial returns, conventional economic analysis suggests it also has no value."[1]

2. Why quantify the values of protected areas?

To increase political, financial and community support for protected areas, it is often asserted that conservation proponents need to better quantify the values that protected areas provide to humanity in tangible economic terms. Quantifying the values of protected areas can:

- Demonstrate that protected areas are productive assets in the economy;
- Build support for existing protected areas from policymakers and the public;
- Provide a stronger rationale for expanding protected areas systems;
- Integrate protected areas in national economic planning and help coordinate their management with sectoral plans and development agencies;
- Support requests for funding from traditional sources such as governments, donor agencies and NGOs;
- Help identify innovative sources of finance such as charges for water supply maintenance, carbon sequestration and other ecological services; and
- Inform management practices and ensure that they serve the full range of values provided by protected areas.

3. The difficulties of quantifying all values of protected areas

[1] Protected Area Development in the Lower Mekong Region (undated). *Economic valuation: Its use in protected area management.* Accessible at www.mekong-protected-areas.org/mekong/lessons.htm.

Not all protected area values, however, can be quantified. Protected areas provide humanity with many non-material, spiritual values that are very difficult to translate into market terms. The value of solitude and communion with nature that many people visit protected areas for can, to some extent, be quantified in terms of "willingness to pay" – the amount, for example, that people pay to travel to and utilize protected areas and their facilities. But it is very difficult to assign a "market value" to, for example, an indigenous sacred site, and even the attempt to do so strikes many people as inappropriate.

One could easily quantify the market economic value, for example, of Notre Dame Cathedral in Paris, in terms of the building, its furnishings, the land that it stands on, and the economic activity it generates as a religious facility and tourist attraction. One could then make a judgment that its economic value is less than an alternative use of that site, such as a high-rise office tower or amusement park, but such a proposal would strike most people as absurd and even offensive. Replacing a forest held sacred by an indigenous community with a pulpwood plantation or logging concession is equally offensive in the eyes of that indigenous community (and many other people), of course. But it happens all the time nonetheless. The difference lies not in the market economic values of Notre Dame and the sacred grove versus alternative uses, but rather in the imbalances of power in the "political marketplace." The "value" of indigenous sacred groves will increase, and be better defended, when indigenous communities and their supporters gain sufficient political leverage to put a stop to their conversion, and arguments about the "economic value" of the grove will not be much help in that struggle.

In short, quantifying the values of protected areas is an important and useful strategy for building support and obtaining financing, but it must be carried out in a manner that recognizes the many values that are not easily or appropriately quantified. And, importantly, economic quantification of protected area values should not be allowed to be used, by itself, to determine whether a particular area should remain protected or should be granted new protection.

Even in the many cases where the market economic values of protected areas can be credibly quantified, it is important to place such market values in their particular local context. Differences in available wealth to particular communities, and differences in overall wealth between countries, mean that the use of simple "dollar values" can be extremely misleading. Protected areas may be the only source of employment in an area, or may provide a critical source of timber, or of animal protein in local diets. Converted to dollar values on open markets such measurements may appear trivial in economic terms, but their loss could be devastating to large numbers of people in a particular place.

Finally, aggregate economic values, by themselves, can disguise serious inequities in the current or proposed future distribution of protected area costs and benefits. It is therefore always important to assess costs and benefits for whom?

4. The values of protected areas

Traditionally, the only formal (i.e. market) economic values of protected areas that have been recognized have been tourism revenues (where tourism exists) and income from extractive activities in those protected areas where such extraction is permitted. . Since many economic, social and environmental values or benefits of protected areas have no formal market, price, or expressed cash value, they are omitted from conventional concepts of economic value (IUCN 1998).

Protected areas provide a wide range of values and benefits to humanity. Broadly, these can be divided into *direct* use values and benefits; *indirect* use values and benefits; *option* values; and *non-material* values and benefits. Taken together, these constitute a protected area's *total economic*

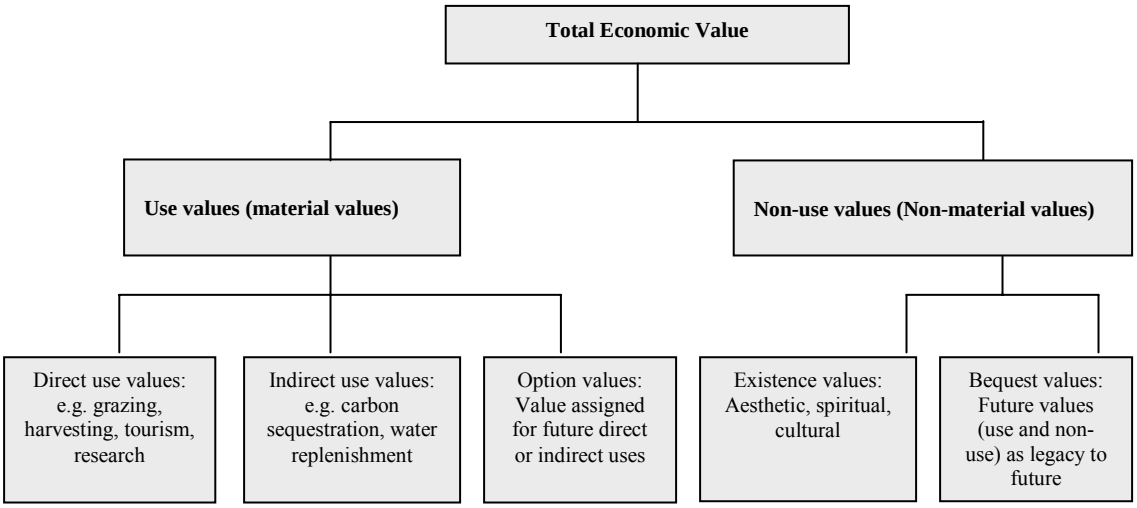
value. The challenge is to develop politically credible, relatively simple to understand ways in which to express the many components of total economic value in formal market price terms.

4.1 Total economic value

The concept of Total Economic Value (TEV) has been widely used to attempt to convert all values and benefits of natural ecosystems into simple economic terms. Instead of focusing only on direct commercial values, TEV encompasses non-market values, ecological functions and non-use benefits (see Figure 1). Figure 1 shows the main categories of values and benefits which contribute to TEV.

TEV analysis of benefits needs to be complemented with evaluation of total economic costs as well, to derive net economic value. Significant advances have been made in understanding the total economic costs of protected areas, which are now understood to encompass more than just direct management expenditures. Other costs that need to be considered include: costs to other activities; human disease and injury; livestock and crop losses; alternative land and resources uses foregone; losses of profits from alternative investments, etc. (Hitchcock, 2000).

Figure 1: The constituent elements of total economic value (TEV)



Source: Adapted from IUCN (1998)

4.2 Direct use values and benefits

Protected areas provide a range of direct use values and benefits, and these are the easiest to quantify:

Recreation and tourism: Many protected areas have considerable direct economic value that arises from their use by tourists such as hikers, campers and scuba divers. While park entry fees are one obvious indicator of this value, it is also important to consider the total economic input of tourists into regional and local economies, including travel and accommodation costs, and employment generated in local communities. Protected areas are also of value to visitors themselves, and their "willingness to pay" for the experience is a partial measure of the value that they receive. This can also be viewed in terms of employment of local

populations. Such economic values are a critical element, but the attractions of protected areas for many visitors are often, in fact, their non-material values (Eagles *et al.*, 2002).

Sustainable use of renewable resources: Some categories of protected areas permit the sustainable harvesting of certain renewable natural resources. Such activities may include: grazing of livestock; fishing; hunting; the collection of non-timber forest products; agriculture; water extraction and the collection of genetic resources for both scientific and commercial purposes. Many of these values are of particular importance for local and indigenous communities living within or adjacent to protected areas, especially in developing countries.

Extraction of non-renewable resources: Certain extractive activities are non-sustainable, notably the extraction of petroleum products and minerals. In general this would appear to be contrary to the concept of "protection and maintenance" associated with the definition of protected areas. There may be cases, however, where the extraction process has limited impacts and the material being extracted may be non-essential to the objectives and functioning of the protected area. In such situations some argue that economic benefits (direct payments) for the extraction process may justify this activity.

Education and research: Protected areas offer some of the best opportunities to understand and explain natural ecosystem processes. They also offer a natural baseline against which to measure environmental change. Scientific and academic institutions are therefore often willing to pay for the opportunity to conduct research within protected areas. Such activities not only produce tangible financial returns but can also greatly improve the knowledge base for effectively managing a protected area.

4.3 Indirect use values and benefits

Protected areas also provide many indirect values and benefits, largely in the form of "ecosystem services". One 1997 study estimated the annual value of ecosystem services from the entire biosphere at $33 trillion, noting that most of this value is outside the market (Costanza *et al*. 1997). Some key ecological services that protected areas provide include the following:

Climate influences: Protected areas play a critical role in mitigating the impacts of climate change, acting as carbon reservoirs or sinks. Many protected areas play a critical role in maintaining micro-climatic or climatic stability, including rainfall patterns.

Water services: In addition to climatic influences, protected areas are widely used as a form of watershed protection, guaranteeing the supply of water to adjacent populations. Many wetland areas and other natural ecosystems have been observed to play a role in water purification. The presence of natural vegetation, notably forests and wetlands also reduces extremes of water flow and hence plays a role in flood control.

Physical processes: Certain habitats such as salt marshes, mangroves and coral reefs are widely cited for their role in coastal protection. In terrestrial areas the presence of protected areas, even relatively small areas along waterways or in strips along hillsides, has an important role in reducing soil erosion.

Wider ecological influences: Spill-over of animals from protected areas into adjoining land and water can support adjacent extractive uses. This is particularly the case in marine environments, where even relatively small marine protected areas have been shown to increase the abundance of fish and other marine life in adjacent fishing grounds. Some protected areas also help sustain high levels of natural pollination, avoiding the costs associated with commercially provided pollination (SCBD, 2003).

4.4 Option values

Future direct and indirect uses, including all of those listed above, are considered "option values". By maintaining protected areas and their ecological functions, we preserve the option of enjoying the benefits that they produce into the future.

Genetic resources: One of the most widely cited option values is the role of protected areas as in situ reservoirs of genetic material in the form of wild crop progenitors, raw material for development of new medicines, and the like. Although impossible to calculate, it is likely that such a role, when the global system protected areas is considered as a whole, could be critically important for the maintenance of future food resources or the development of future treatments for illness (ten Kate and Laird, 1999).

Refugia and adaptation: With growing concerns about climate change – as well as the more immediate impacts of pollution spills and other environmental disasters – the potential importance of protected areas as refugia for future restoration and recovery of adjacent areas is being increasingly realized (Bennett, 1999 and IPCC, 2002). In addition, well designed protected area systems (especially those that cover altitudinal and other ecological gradients) may allow certain species to persist by migrating to new areas as climate change occurs and they are forced to adapt.

4.5 Non-material values and benefits of protected areas

Many of the benefits and values of protected areas cannot easily be expressed in economic terms. While, in some cases, economic figures have been derived for values such as beauty, cultural importance, or even spiritual roles, such values are generally fairly coarse proxy measurements that rely on what are, in the end, subjective assumptions. And as noted above, some would argue that that placing monetary value on some non-material values is inappropriate. Principal non-material values include:

Aesthetic: For many people, the values of natural beauty and wilderness – and the inspiration, excitement and adventure they provide – are among the most important reasons for the existence and maintenance of protected areas.

Spiritual: Perhaps the oldest protected areas of all are holy sites such as the sacred forests of India. In many indigenous cultures as well as in the holy scriptures of all the major world religions respect for nature is implicit or explicit and, as natural areas are diminished and species are driven towards extinction there is an increasing call from religious groups to protect nature because of its spiritual dimension.

Cultural heritage: Certain elements of the natural or semi-natural landscape are of considerable cultural value for historic or more recent reasons. Many indigenous peoples place special cultural significance on particular sites and species (Posey *et al.*, 1999).

Intrinsic: It is argued by some that values exist independent of human perceptions and unrelated to the human view. Elephants, for example, certainly value the existence of sufficient habitat to provide adequate conditions for their livelihoods. Such values are, but their nature however, un-measurable.

Intergenerational: We cannot know for certain what value future generations of humans will put on the existence of protected areas and the benefits they provide. If one starts from the principle that the needs and preferences of future generations are likely to be similar to our own – and deserve equal respect and concern – then it follows the value of protected areas to future generations is a real value that protected areas provide, independent of any current benefits that they confer.

5. Quantifying the Values of Protected Areas

Numerous methods have been employed for quantifying the benefits of protected areas. As a general matter, those that are most easy to apply tend to focus on marketable benefits and require the least amount of data collection, but are prone to undervaluation. More complex methods that include valuation of non-marketable values tend to require greater investment in data collection, usually involve use of a number of assumptions that may be more or less valid,

and may fall prey to the objections to economic valuation of non-material benefits discussed above.

The method most appropriate for a particular protected area or protected area system will in depend on the audience for the valuation exercise, the scope of values one wishes to quantify, availability of data, and the level of technical capacity and financial resources to carry out the evaluation. Some common methods for valuing the economic value of ecosystem goods and services are reviewed below.

5.1 Market prices

The market price method estimates the economic value of ecosystem products or services that are bought and sold in commercial markets. The market price method can be used to value changes in either the quantity or quality of a good or service. It uses standard economic techniques for measuring the economic benefits from marketed goods, based on the quantity people purchase at different prices, and the quantity supplied at different prices.

This method is effective because it uses standard, accepted economic techniques to determine individuals' actual willingness to pay for costs and benefits of goods that are bought and sold in markets, such as fish, timber, or fuel wood. Also, price, quantity and cost data are relatively easy to obtain for established markets.

It is, however, an incomplete method since market data is only be available for a limited number of goods and services provided by a protected area, and may not reflect the value of all productive uses of the protected area's resources. Hence, exclusive reliance on the market price method tends toward undervaluation.

5.2 Effects on production (productivity)

The productivity method estimates the economic value of ecosystem products or services that contribute to the production of commercially marketed goods. . If a natural resource is a factor of production, then changes in the quantity or quality of the resource will result in changes in production costs, and/or productivity of other inputs. This in turn may affect the price and/or quantity supplied of the final good. It may also affect the economic returns to other inputs. For example, water quality affects the productivity of irrigated agricultural crops, or the costs of purifying municipal drinking water. Thus, the economic benefits of improved water quality can be measured by the increased revenues from greater agricultural productivity, or the decreased costs of providing clean drinking water.

This is a relatively simple methodology, its data requirements are limited, and relevant data is likely to be readily available. On the other hand, the method is limited to valuing those resources that can be used as inputs in production of marketed goods, and if changes in the natural resource affect the market price of the final good, the method becomes more complicated to apply. The method is also prone to undervaluation, since not all services will be related to the production of marketed goods.

5.3 Replacement costs, damage costs avoided, and mitigation costs equivalents

Even where protected area goods and services have no market, alternatives or substitutes may be traded on markets, and these "replacement costs" can serve as proxies for protected area values. A protected area may, for example, provide the flow of water for hydroelectric power generation. Erosion protection, storm protection, and provision of fish-breeding habitat are other examples where this method can be used. The value of that ecological service can be inferred, using this method, from what it would cost to replace the power thus generated with oil-based electricity generation. A similar approach can be used to estimate "damage costs avoided" by the maintenance of a protected area's ecological goods and services, and/or the costs for mitigating the negative impacts of losing those services.

These methods can provide a rough indicator of economic use value for services which are difficult to value by other means. And where causality is relatively clear

("deforestation in the protected area caused a flood that killed 200 people"), the values at stake are clear to policymakers and the public – sometimes painfully so. Such methods assume, however, that environmental actions are taken on a cost-benefit basis, which is not always the case. The methods also do not consider social preferences for protected area goods and services, or individuals' behaviour in their absence.

5.4 Travel costs

Many protected areas are valued as recreational destinations, and people spend significant amounts of time and money to visit them. This spending – for transport, food, equipment, entrance fees, accommodation and the like – can be measured, providing a proxy for the value that people place on the recreational aspects of protected areas. This is a "revealed preference" method, since it uses actual behaviour and choices to infer values.

The travel cost method's advantages include its similarity to conventional empirical economic techniques, its reliance on actual behaviour, low cost, and opportunities for large sample sizes. Also, the results are relatively easy to explain, and can be related to concrete economic inputs into local economies arising from a protected area. It assumes, however, that people travel for only a single purpose (or site), and involves conceptual difficulties in valuing the opportunity costs of the time people invest in travelling to a protected area. In addition, those who place a very high value on a particular site may choose to live nearby, meaning a travel cost analysis will greatly underestimate the value they ascribe to the protected area.

5.5 Contingent valuation

Even where protected area goods and services have no market price and no close substitutes, they nevertheless often are of high value to people. Contingent valuation techniques infer this value by asking them their willingness to pay for protected area goods and services (or willingness to accept compensation for their loss) under various hypothetical scenarios. A study in Kenya, for example, asked visitors questions such as "Would you be wiling to pay $100 (or more, or less) to contribute towards elephant conservation" and "How much would the cost of your safari have to be reduced by if elephant populations decreased by half?" Contingent valuation techniques are one of the only methods that can be used to assess option and existence values of protected areas. It is, however, by its nature, very hypothetical.

6. Conclusions

None of these methods, by themselves, can fully and credibly quantify the values of protected areas in tangible ways that will sway funding agencies and government policymakers. Taken together, however, they provide protected areas advocates with a potent set of tools to make a better case for increasing support for protected areas as a concrete economic asset within local and national economies. Most importantly, they enable the protected areas community to speak the language of economics – the language that largely dominates the political and economic decisions that so often determines the fate of protected areas.

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4 STATUS AND TRENDS OF, AND THREATS TO, PROTECTED AREAS

(See SCBD, 2003 for a full paper on the topic and Mulongoy and Chape, 2004 for additional data)

1. Introduction

The concept of "protected areas" has been in existence since historical times. The more recent concept, with the formal establishment of protected areas by Governments, began to emerge in the nineteenth century. Originally, these were largely "wilderness areas" where there was no significant human impact, and where the place of humans was restricted to visitors. A 1959 United Nations Economic and Social Council resolution gave global recognition to protected-area systems including the first attempts to register their number, extent and location, through a request to compile the *World List of National Parks and Equivalent Reserves*. This was endorsed in a 1962 United Nations General Assembly resolution that initiated the periodic "United Nations List". The World Database on Protected Areas, managed by the UNEP World Conservation Monitoring Centre, is the most comprehensive dataset on protected areas world-wide underpinning the production of the United Nations List of Protected Areas. The 2003 United Nations List of Protected Areas was released at the Fifth World Parks Congress in September 2003. The IUCN Protected Area Management Categories (see Box 1) provide a common language and enable the comparison and summary of management objectives for the world's protected areas and the basis for inclusion in the list, although classification systems have some shortcomings.

2. Coverage of protected areas

The number of global protected areas has been rising for the past few decades and is now in excess of 100,000 sites. The total area has also increased continuously from less than 3 million km² in 1970 to more than 12 million km² by the late 1990s. However, ecoregional and habitat representation remains uneven.

Protected areas cover about 12 per cent of the Earth's land surface. In terms of extent, using the IUCN management categories, national parks, 'managed resource areas' for biodiversity conservation and sustainable use, and habitat/species management areas and protected landscapes and seascapes are the most preferred means for conserving biodiversity. The expansion of urbanization and other development pressures have made it increasingly difficult to declare larger wilderness areas or to properly protect existing ones, – although some countries such as Brazil and Madagascar announced the establishment of major reserves at the 5th World Parks Congress. Many reserve systems are often biased towards the economically less valuable and often species-poorer habitats, while leaving others inadequately protected. Although the economic benefits of natural protected areas remain unclear, a growing knowledge base supports the conclusion that they greatly exceed those of conversion.

Data for marine protected areas are limited but suggest that, while the oceans comprise 70 per cent of the Earth's surface, less than 1 per cent of the marine environment is adequately conserved. The high seas, outside national jurisdiction, which comprise an estimated 64 per cent of the world's ocean, are an area of obvious neglect. A relatively larger proportion of inland aquatic habitats are within protected areas.

Box 1: IUCN Protected Area Management Categories (1994)

Category Ia – Strict Nature Reserve: Protected area managed mainly for science.

Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

Category Ib – Wilderness Area: Protected area managed mainly for wilderness protection.

Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Category II – National Park: Protected area managed mainly for ecosystem protection and recreation.

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

Category III – Natural Monument: Protected area managed mainly for conservation of specific natural features.

Area containing one or more specific natural or natural/cultural features which are of outstanding or unique value because of their inherent rarity, representative or aesthetic qualities or cultural significance.

Category IV – Habitat/Species Management Area: Protected area managed mainly for conservation through management intervention.

Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category V – Protected Landscape/Seascape: Protected area managed mainly for landscape/seascape conservation and recreation.

Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

Category VI – Managed Resource Protected Area: Protected area managed mainly for the sustainable use of natural ecosystems.

Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Source: IUCN, 1994.

However, it is difficult to estimate the percentage of inland waters that is effectively protected, in particular as they are vulnerable to impacts from outside those areas (e.g., within-catchment influences).

Similar concerns exist for the long-term future for marine protected areas. The major

lake systems of the world and temperate grasslands remain under-represented in the global protected areas system. Mountain areas were among the first to be accorded protected-area status and represent a relatively high proportion of sites. Many mountains cut across national boundaries and provide opportunities for international cooperation in protected-area management. The scientific focus of conservation has moved towards landscape-scale and ecosystem approaches and interest in transboundary protected areas has consequently increased.

At the global level about 12.4 per cent of the world's forest is in protected areas as classified by IUCN categories. There are, however, considerable differences between the regions, ranging from 5in Europe to 20.2 per cent in North and Central America.

In the framework of the Convention on Biological Diversity, national biodiversity strategies and action plans, national reports and thematic reports on protected areas provide information on the status of, and threats to, the biodiversity within them, the legal and policy framework for action and the institutions responsible for it. They indicate that protected-area systems are well advanced in most countries and Article 8 of the Convention is identified as a high priority by most Parties. Human, institutional and financial resources limitations are the major constraints to the full implementation of the protected-area networks as well as the management of individual protected sites.

3. Effectiveness of protected areas

The majority of protected areas appear to be effective in conserving species, habitats and landscapes of value. However, a large number of protected areas are inadequately supported or fail for a variety of reasons. Direct and indirect threats to protected areas are well described but only a small fraction of protected areas have been subject to some kind of analysis of threat. A compilation of national thematic reports submitted in May 2003 indicates that less than 25 per cent of forest protected areas are considered to be well managed with a good infrastructure, and a large proportion of forest protected areas in responding countries had no management at all. Only 1 per cent of forest protected areas are regarded as secure in the long term. Even less is known about the threats to marine protected areas but a recent survey concluded that only 14 per cent were effectively managed. Lack of integrated marine and coastal area management was also a problem in most countries and for most marine and coastal protected areas.

International recognition of protected areas, including, *inter alia*, areas designated through the World Heritage Convention, the Ramsar Convention on Wetlands and the Man and Biosphere Programme, carries a significant element of prestige which assists both with the designation of sites and subsequent support for their management. All the programmes of work of the Convention directly or indirectly involve protected areas.

4. IUCN Management Categories

The overview of global statistics indicates that 67% of the world's protected areas have been assigned an IUCN management category, covering 81% of the total area protected. Among the categorised sites, the largest numbers lie within Category IV (Habitat/Species Management Area) and Category III (Natural Monument). Together they comprise almost 47% of all protected areas. In terms of total area, Category II and Category VI comprise 47% of all protected areas. This is not surprising, since national parks have traditionally been established to protect larger areas at the ecosystem and landscape level, and the 2003 figures reflect the trend in previous *United Nations List*s, although in relative terms the extent of Category II is marginally less than it was in 1997. However, the considerable extent of Category VI is a relatively recent phenomenon. It was the most significant

Table 1: The number and size of protected areas on the basis of IUCN management categories as well as those sites without categories (*Source: 2003 United Nations List of Protected Areas)*

IUCN Category	Number of sites	Percentage of total number of protected areas (%)	Area covered (km²)	Percentage of total area protected (%)
Ia	4,731	4.6	1,033,888	5.5
Ib	1,302	1.3	1,015,512	5.4
II	3,881	3.8	4,413,142	23.6
III	19,833	19.4	275,432	1.5
IV	27,641	27.1	3,022,515	16.1
V	6,555	6.4	1,056,008	5.6
VI	4,123	4.0	4,377,091	23.3
No category	34,036	33.4	3,569,820	19.0
Total	**102,102**	**100**	**18,763,407**	**100**

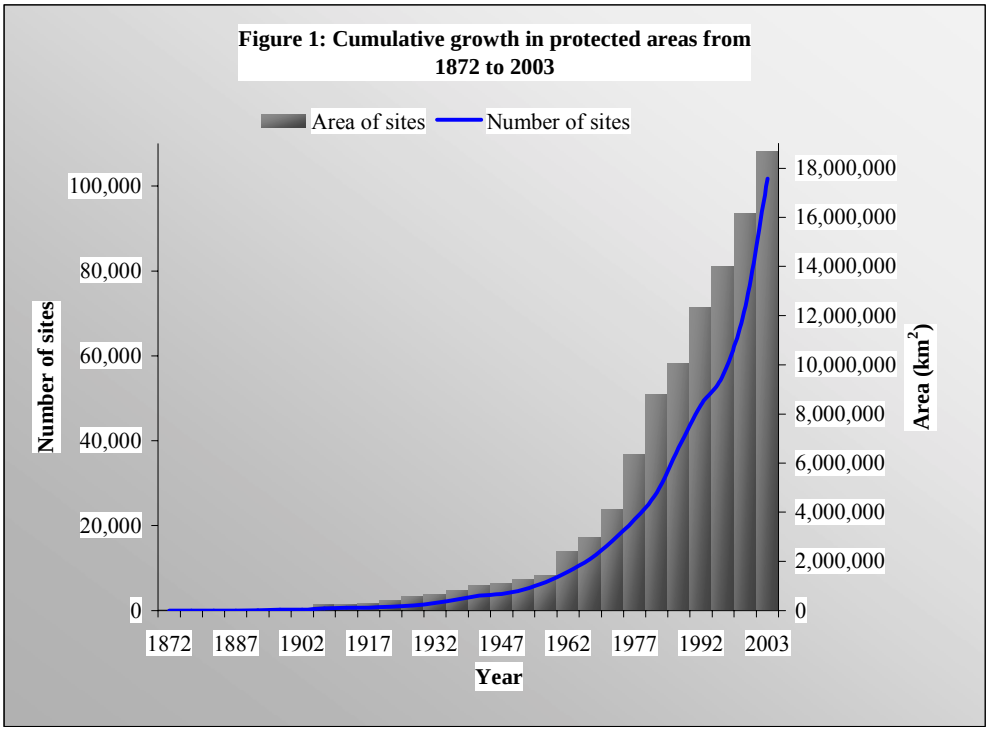

Figure 1: Growth of the global number and total area of protected areas from 1872 to 2003. *Source: 2003 United Nations List of Protected Areas*.

innovation in the last revision of IUCN's management category system, and recognised the important role protected areas play in the sustainable livelihoods of local people.

5. Threats to protected areas

Direct threats to protected areas can be classified into five main categories:

(i). Individual elements removed from the protected area without alteration to the overall structure (e.g. plant, animal or marine species);

(ii). Overall impoverishment of the ecology of the protected area (e.g. through encroachment, grazing, air pollution damage, persistent poaching and illegal logging);

(iii). Major conversion and degradation (e.g. through removal of vegetative cover, construction of roads and settlements, or mining); and

(iv). Isolation (e.g. through major conversion of adjacent lands)

(v). Invasive species.

Indirect threats to protected areas vary from place to place, but often include:

- Inappropriate land allocation and land use decisions;
- Unclear legal status of lands and waters and resulting conflicts;
- Weak and inconsistent enforcement of laws and regulations;
- Policies that capacity for natural resource-based industries in excess of sustainable supplies of raw material (such as timber);
- Rural poverty and landlessness; and
- Revenue needs of central or local governments.

The underlying causes of the threats to protected areas are difficult to separate from the underlying causes of biodiversity loss generally. These were defined by the 1992 Global Biodiversity Strategy as:

- The unsustainably high rate of human population growth and natural resource consumption;
- The steadily narrowing spectrum of traded products from agriculture, forestry and fisheries;
- Economic systems and policies that fail to value the environment and its resources;
- Inequity in the ownership, management and flow of benefits from both the use and conservation of biological resources;
- Deficiencies in knowledge and its application; and
- Legal and institutional systems that promote unsustainable exploitation

Other underlying causes of threats to protected areas include climate change and loss of cultural connections between people and the land. Beyond these external threats to biodiversity generally, protected areas are also specifically threatened by the lack of resources and capacity in the agencies responsible for their management. "Lack of capacity" encompasses a variety of problems, including:

- Lack of financial resources;
- Lack of staff and staff training;
- Inadequate institutional capacity and infrastructure;
- Lack of information about the biology of the area;
- Lack of political/legislative support and/or unclear or contradictory legislation;
- Lack of local community involvement and participation;
- Lack of coordination among management agencies;
- A poor legal framework and lack of adequate enforcement tools;
- Absence of comprehensive land-use plans or management plans;
- Poor definition of protected areas boundaries;

- Lack of agreements about resource use adjacent to or within protected areas; and
- Rapid turnover of protected area staff

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5 PROTECTED AREAS DESIGN AND SYSTEMS PLANNING: KEY REQUIREMENTS FOR SUCCESSFUL PLANNING, SITE SELECTION AND ESTABLISHMENT OF PROTECTED AREAS

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1. Introduction

Current extinction rates are at least a thousand times higher than typical in Earth's history (Pimm *et al.,* 1995) and *in situ* conservation is considered one of the most effective and cost-efficient means to halt this rapid species decline (Balmford *et al.,* 1996). As well as providing direct protection to species, site conservation can also reduce the loss of natural habitats, the main cause of extinctions (IUCN, 2003). Moreover, site based conservation allows direct participation of local communities in on-the-ground actions and, very importantly, maintains and supports many economic and ecosystem services (Daily, 1997; Bennun, 2002; Balmford *et al*., 2002; De Groot *et al*., 2002).

We therefore need to develop a system of conservation sites based on key areas which provide the minimum foundation for the long-term persistence of biodiversity (Rodrigues and Gaston, 2001). These sites must be managed to conserve the important biodiversity that they shelter, and demonstrate the continuing provision of biodiversity goods and services to people (Bennun and Eken, 2003). While most priority conservation sites will need to meet the strict definitions of protected areas set by IUCN (IUCN, 1994), some areas may not require such strict protection — they might, for example, be sustainably used and managed by local communities. Besides, site conservation should form part of a wider, integrated conservation approach and selected areas should be connected with each other within managed landscapes or other corridors (See Chapter 11 on Protected Landscapes, Corridors, Connectivity and Ecological Networks)

Unfortunately, for a variety of reasons, existing systems of protected areas were rarely designed to conserve biodiversity systematically and cover all species for which site conservation is needed. Recent studies have shown that there are large gaps in the existing network of protected areas in almost all regions, particularly in the tropics (Rodrigues *et al.,* 2003 and see also Chapter 6 on Global Gap Analysis). Various methods have been developed and are being used to select new sites for conservation and strategically expand the site system. Two main groups of considerations are taken into account to select sites: ecological and human considerations (Balmford, 2002). The first group (ecological considerations) is widely used to design a conceptual system of protected areas, whereas the latter group (human considerations including threats, human resources, conservation costs and benefits etc.) is usually incorporated into the identification of immediate priorities for on-the-ground action.

2. Where to conserve? – An overview of site selection criteria and methods

Various methods have been developed to locate key areas for conservation based on ecological considerations. For instance, a total of 16 criteria are being used under 13 prioritisation schemes for freshwater sites. Species endemism (restricted-range species), species richness and threatened species are the most frequently used criteria – see Table

1 (Darwall and Vié, 2003). Most methodologies embrace combinations of such criteria and their scientific rationale and/or tools may vary according to desired conservation outcomes. This section gives an overview of the most frequently used methodologies.

Table 1: Site selection criteria and frequency of use in 13 freshwater site prioritisation schemes (Darwall and Vié, 2003).

Selection criterion	Number of schemes
Species endemism	11
Species richness	9
Species threatened status	9
Rare, outstanding, representative habitat types	7
Rare species	5
Threatened habitats	4
Species biodisparity	3
Biome restricted species assemblages	3
Habitats important as refugia / migration routes / food sources	3
Species aggregations, particularly during migrations	2
Significant population numbers (often as breeding pairs)	2
Taxonomic distinctiveness	2
Beta diversity (species turnover along spatial gradients)	2
Keystone species	1
Representative species assemblages	1
Genetic value	1

Biologically rich areas

Biodiversity is distributed heterogeneously across the earth. Some areas teem with biological variation, others are extremely poor and most fall somewhere in between (Gaston, 2000). Conserving areas with high biodiversity can, therefore, be considered as an efficient and simple way for allocating resources. However, biodiversity comprises a variety of different quantifiable aspects, such as number of species, species evenness or phenotypic diversity, and cannot be expressed by measuring only a single aspect. It is therefore not always easy to measure biodiversity in ways that are useful for site conservation (Purvis and Hector, 2000). Furthermore, the species richness approach alone might exclude poorer areas that play a vital role for a limited number of threatened, restricted-range, biome-restricted or congregatory species.

This approach may also be misleading and tend to over-emphasise areas that include ecotones and widely dispersed and vagrant species. To overcome this weakness, the criterion may be applied to protect

'contextual' species richness; that is, species richness within a biogeographically restricted community and not simply total number of all species occurring in an area (Bennun and Eken, 2003). Using the species richness approach in combination with other criteria can help to design more complete sets of priority areas (Balmford, 2002).

Areas of narrow endemism

Some areas contain many species found nowhere else. Conservation of such irreplaceable areas is evidently essential if global extinctions are to be avoided (Balmford, 2002; Rodrigues *et al*., 2003). Regions rich in narrow endemism tend to have a strong correlation with biogeographically isolated landscapes (for example, greater rates of endemism are observed in closed basin lakes, high mountains or remote islands). ICBP (1992) and Stattersfield *et al.* (1998) defined narrowly distributed (restricted-range) bird species as those with an historical breeding range of 50,000 km^2 or less. Although this threshold was selected arbitrarily, it is now widely applied and has proven its conservation effectiveness for birds. BirdLife International's Endemic Bird Areas programme is a key global-scale application of the narrow endemism concept which highlights regions where distributions of at least two restricted-range bird species overlap (ICBP, 1992; Stattersfield *et al.*, 1998). Studies on global distribution patterns of restricted-range amphibians, reptiles and mammals are currently being carried out, while similar analyses have been undertaken in Europe for plants and a number of groups of vertebrates (Williams *et al.*, 2000).

Occurrence of threatened species

Occurrence of threatened species is widely used to identify priority sites as pursued by the CBD and other legal international instruments. An identification process entirely based on the presence/absence of threatened species might lead to large gaps in overall representation (Balmford, 2002). However, when integrated with other criteria, threatened species can be extremely useful in selecting conservation-efficient systems of sites.

A new global site selection programme using the threatened species criterion is the Alliance for Zero Extinction. This programme, led by a group of biodiversity conservation organisations, aims to identify and protect the world's most endangered species with globally irreplaceable populations: species that qualify as Critically Endangered or Endangered under the IUCN criteria and occur at a single site globally. These areas meet the two fundamental criteria of site selection: vulnerability and irreplaceability (Margules and Pressey, 2000). They comprise the most vulnerable and highly irreplaceable areas on earth. By starting with the species that are most endangered, the Alliance aims to create a frontline of defence against extinction that will hold until broader scale conservation efforts can restore sufficient habitat to enable populations to rebound (www.zeroextinction.org).

High priority natural communities

The conservation of many species, both rare and common, depends on the survival of natural communities. Thus, conservation of natural communities is viewed as a coarse filter for the conservation of all species, particularly for those taxa that are poorly known (Grossman *et al*., 1998). This approach primarily requires the identification and mapping of natural communities. Each community should then be represented by best available examples of natural habitats weighted primarily by their intactness but also applying secondary criteria such as diversity, endemism or threatened species (Olson and Dinerstein, 1998). Occurrence of threatened habitats is also recognised as a criterion for selecting sites of conservation concern (Anderson, 2002).

Several methods have been proposed to classify the world's ecological communities and habitats and map their boundaries.

These include phytosociological methods (Braun Blanquet, 1928), physical classification methods (Walter, 1954), life zones classification methods (Holdridge, 1978), the ecoregion approach (Dinerstein *et al*., 1995) and a number of physiognomy-based classification methods (Mueller Dombois and Ellenberg, 1974; Gregorio and Jansen, 2000). This wide range of habitat classification methods, however, highlights a major drawback with their use in identifying site scale conservation targets. The reason why so many methods exist is that the surface of the earth comprises a continuous environmental space, not a set of discrete habitats. As a result, it is hardly possible to derive a science-based, data-driven method for identifying ecological community or habitat conservation targets at the site scale within any given bioregion.

Ecological and evolutionary processes

Site systems can be designed not only to represent species and habitats, but also to maintain key ecological and evolutionary processes (Balmford, 2002). Balmford (2002) lists several processes that should in principle be addressed in systematic priority setting but concludes that we are a long way from being able to incorporate the vast majority of these process-linked concerns into site prioritisation, due to lack of sufficient understanding of their functions. Nevertheless, some process-linked concerns involving species, such as migration bottleneck-sites, corridors for dispersal and key areas for congregatory species, have already been widely adopted as important indicators for identification of priority sites (Fishpool and Evans, 2000; Bennun and Eken, 2003; Darwall and Vié, 2003). Other concerns, such as ecotones, areas supporting high population densities or enclave populations, also have potential to be integrated into criteria for site identification.

Complementarity

Complementarity-driven algorithms are based on the principle of representing as much biodiversity as possible as efficiently as possible (for example, within a limited area) (Williams, 2001). This methodology may incorporate one or more of the ecological criteria listed above as well as other criteria based on human considerations. For example, complementarity may be applied to ensure a desired level of representativeness by first selecting irreplaceable areas with unique species records, and then selecting others that complement the species composition of the irreplaceable areas until the total set of areas represent all targeted species or until the targeted area is reached (Williams *et al.,* 2000; Williams, 2001). A complementary richness analysis for Europe has been carried out based on distributions of plant and vertebrate species. The analysis showed that 94% of the targeted 3,143 plants and vertebrate species could be represented within 5% of the entire study area (Williams *et al.,* 2000). PC software is available to run similar analyses. One weakness of the complementarity approach is that it often selects areas that are widely scattered and each patch of habitat chosen may be too small to retain viable populations. Furthermore, complementarity requires equal sampling effort for all candidate areas and this often has high financial demands and may be time-consuming (Balmford, 2002). However, complementarity methods can be particularly useful when prioritising conservation action among key areas.

3. Key biodiversity areas: Using globally applicable criteria to identify sites for conservation

The "key biodiversity area" concept is an approach that combines various criteria mentioned above. Key biodiversity areas are places of international importance for the conservation of biodiversity at the global, regional or sub-regional level. This approach aims to identify, document and protect systems of such areas. Sites are selected by setting objective and globally applicable criteria and applying them to those species for which site-based conservation is

appropriate (Bennun and Eken, 2003). Key biodiversity areas are identified using four selection categories: (1) Threatened species; (2) Restricted-range species, with small global distributions; (3) Biome-restricted assemblages (sets of species confined to a particular broad habitat type, or biome); and (4) Congregations of species that gather in large numbers at particular sites during some stage in their life cycle.

These non-exclusive categories correspond to the two main considerations used when planning systems of sites - vulnerability and irreplaceability (Margules and Pressey, 2000). The first category – threatened species – addresses vulnerability, while the others cover different facets of irreplaceability. Key biodiversity areas, as a set, form a systematic network of sites throughout each target species' biogeographical range. Ideally, each site should be big enough to support self-sustaining populations of as many as possible of the species for which it was identified or, in the case of migrants, provide their requirements for the duration of their presence (Bennun and Njoroge, 1999).

Species richness *per se* is not a criterion for identifying key biodiversity areas. Rather, contextual species richness is used – prioritising areas within a particular biome or area of endemism which are particularly rich in biome-restricted or range-restricted species. Given the problems associated with setting targets for the extent and location of site scale conservation within bioregions, habitat classifications in themselves are not used. Key biodiversity areas are also not identified by formal complementarity analysis. They seek to identify the entire set of significant sites, and therefore do not have any explicit aim of area-efficiency. Nevertheless, complementarity methods could usefully be applied to prioritisation of conservation action among key biodiversity areas (Brooks *et al*., 2002).

Criteria for identifying sites based on these categories are already in place for birds and used to identify the Important Bird Areas (IBAs) worldwide (Fishpool and Evans, 2001; Heath and Evans, 2000). Where data are available, the IBA criteria and systems can readily be extended to cover other taxa. Criteria for identifying key biodiversity areas are set internationally. To ensure consistency, their application also needs international review. However, the process itself must be led at a local or national level to ensure use of the best available data and ownership of the resulting priorities.

4. Where to invest first? – Priority setting in site conservation

All key biodiversity areas are important and need to be conserved and managed so that the biodiversity they shelter is not lost. However, human and financial resources for conservation are extremely scarce, so it is essential to identify those key biodiversity areas where we need to invest in conservation first. Although all key biodiversity areas are chosen according to their vulnerability and/or irreplaceability, some sites may be highly irreplaceable as well as vulnerable and therefore play a critical role in preventing species extinctions. If the main conservation goal is to avoid extinctions, the AZE (Alliance for Zero Extinction) approach enables the identification of immediate global priorities. The Alliance for Zero Extinction aims to select and conserve priority sites that contain species currently evaluated as either Critically Endangered or Endangered by IUCN's Red Data list, and have a global population limited to a single functional population in a discrete area (www.zeroextinction.org). AZE sites form a subset of key biodiversity areas - those that need the most urgent conservation attention if species extinctions are to be avoided.

The key biodiversity area criteria use ecological considerations to design a conceptual system of protected areas. However, the process of identifying priorities for immediate on-the-ground

Box 1: Key biodiversity area criteria

Each of the four main categories contains one or more criteria with an associated list of eligible species. These categories can, by relaxing the thresholds, be used to designate sites in a hierarchy spanning global, regional and sub-regional levels. Descriptions of and main application principles of the global criteria are presented below:

Globally threatened species (Criterion A1): *The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.*
A site qualifies under this category if it is known, estimated or thought to hold a population of a species classified as Critical or Endangered. Population-size thresholds may be set for those species classified as Vulnerable, Data Deficient or Near Threatened, as appropriate.
The words 'regular' and 'significant' in the criterion definition are to ensure that instances of vagrancy, marginal occurrence, and ancient historical records are excluded. Sites may be included, however, where the species' occurrence is seasonal – or where suitable conditions for it prevail only episodically, for example, temporary wetlands.

Restricted-range species (Criterion A2): *The site is known or thought to hold a significant component of one or more species with a restricted range.*
The species covered by this category may be considered as local endemics – endemic species with limited distribution. Such high specialisation in distribution pattern generally affects also the conservation status of species and these species often fall into the first category (Criterion A1) as well (Stattersfield *et al.*, 1998).

ICBP (1992) and Stattersfield *et al.*, (1998) defined bird species with a restricted range as those with an historical breeding range of 50,000 km^2 or less. We propose that final thresholds for other taxonomic groups are set on the basis of further desk studies as well as discussions between wider groups of experts.

For all restricted-range species, irrespective of taxonomic group and range threshold, it is necessary that a system of sites is chosen to protect them such that all species are represented. This can be achieved by undertaking complementarity analysis where the distributions of a number of restricted-range species overlap. The "significant component" term in the criterion is not narrowly defined as it is intended to avoid selecting sites solely on the presence of a few restricted range species which are common and adaptable within their range and, therefore, occur at other chosen sites. However, the criterion has to allow site selection on the basis of the presence of one or a few species which would otherwise be under-represented, for example because of their narrow habitat requirements.

Biome-restricted assemblages (Criterion A3): *The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.*
This category applies to assemblages of species whose ranges are mostly or wholly confined within all or part of a particular biome. A biome may be defined as a major regional ecological community characterised by distinctive life forms and principal plant species. More than one habitat type and species community may occur within one biome. Therefore, the set of sites chosen to protect the species assemblage will usually cover all the main habitat types found within the biome.

This criterion may be thought of as seeking to protect 'contextual' species richness, by selecting sites to protect characteristic assemblages within a biome using species richness as an indicator. This is primarily to ensure that a large number of sites each holding only a few biome-restricted species are not chosen. The contextual species richness analysis has to be made separately for each targeted taxonomic group because otherwise the analysis will be weighted towards groups that are more species-rich.

Some sites may, however, be chosen for irreplaceable populations of one or a few species which would otherwise be under-represented – such as populations confined to a restricted habitat type within the biome or those that have an exceptionally high density. Sites that embrace two or more biome-restricted assemblages may also qualify under this criterion.

Congregatory species (Criterion A4): This category applies to those species that are (or are perceived to be) vulnerable at the population level to the destruction or degradation of sites, by virtue of their congregatory behaviour at any stage in their life-cycles. These may comprise breeding colonies or other sites used during the non-breeding season, such as foraging, roosting and migratory stop-over sites. Stop-over sites may not hold threshold numbers at any one time, but nevertheless do so over a relatively short period due to the rapid turnover of individuals on passage.

action must also evaluate human considerations, such as threats, opportunities, costs, benefits and resources. Where there is flexibility, a combination of threats and opportunities assessment and economic cost-benefit analysis may be used to choose between different sites (or sets of sites) which would contribute equally to conservation goals. It is important that the pressures (threats) analysis considers both current and future threats within a time-frame of 10 to 20 years. Preferred sets of sites are those that provide the greatest benefits for biodiversity, and generate sustainable economic and social services and/or imply the lowest opportunity cost to local stakeholders. Where there are a large number of sites and/ or considerations (ecological and/or human-based) to be evaluated, conservation planning software, such as C-Plan and Marxan, can be used to identify different sets of sites which all meet specific conservation targets.

The types of considerations chosen for priority-setting will vary according to agreed conservation goals. Prioritisation is inevitably a dynamic process. Although irreplaceable areas will remain to be so, priorities need to be revisited as some areas are secured and the pattern of threats evolves.

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6 GLOBAL GAP ANALYSIS: TOWARDS BUILDING A COMPREHENSIVE NETWORK OF PROTECTED AREAS

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1. Introduction

The twentieth century witnessed an extraordinary growth of the world's human population – from 1,650 million to 6,000 million people, with almost 80 percent of that increase having occurred since 1950 (UN, 2001). Such increasing human pressure is severely impacting biodiversity, with current species extinction rates at least one thousand times higher than the rates typical through Earth's history, unprecedented since the last mass extinction event, 65 million years ago (Pimm *et al*., 1995). The most effective way to conserve biodiversity is to maintain native species in natural ecosystems: extinction can be fought with less expense and more chance of success in the long term by maintaining self-sustaining populations in their native habitats (Balmford *et al*., 2003). This approach requires the protection of areas where conservation is a priority over other land uses.

The practical value of protected areas in shielding areas of land from destructive use has been clearly demonstrated (e.g. Bruner *et al*., 2001, Sánchez-Azofeifa *et al.,* 2003). Protected areas have therefore received wide recognition as core components of conservation strategies, and their designation is a requirement of several multilateral environmental agreements (e.g., the Convention on Biological Diversity, http://www.biodiv.org/; the Ramsar Convention on Wetlands, http://www.ramsar.org/), as well as national and international legislation (e.g., European Birds and Habitats Directives, http://europa.eu.int/comm/environment/).

In 1992, the Fourth Congress on National Parks and Protected Areas (Caracas, Venezuela) called for protection of at least 10% of each major biome by the Year 2000 (IUCN, 1993), and this has become a major national and international guideline. In 2003, the Fifth World Parks Congress (Durban, South Africa) witnessed the announcement that this target has been surpassed for nine out of 14 major terrestrial biomes. At the global scale, 11.5% of the Earth's land surface is now under some form of protection (Chape *et al*., 2003). Most Governments have invested in the creation of protected areas systems, with more than 100,000 being recognized by the 2003 United Nations List of Protected Areas (Chape *et al*., 2003). However, we still do not know enough about how adequate the global network of protected areas is in representing and ensuring the long term-persistence of biodiversity in the face of increasing human pressure.

2. A global gap analysis: methods and results

Recently compiled data on the distribution of species and protected areas makes possible a first global assessment of the representativeness of the global network, i.e. a *global gap analysis*. This analysis was presented at the Fifth World Parks Congress as part of Workshop Stream 7 "Building the Global System of Protected Areas" (Rodrigues *et al*., 2003; the full report can

be found online at http://www.biodiversityscience.org/). Here we present an overview of the main results of this analysis (Figure 1) and the implications for global and national-scale conservation planning.

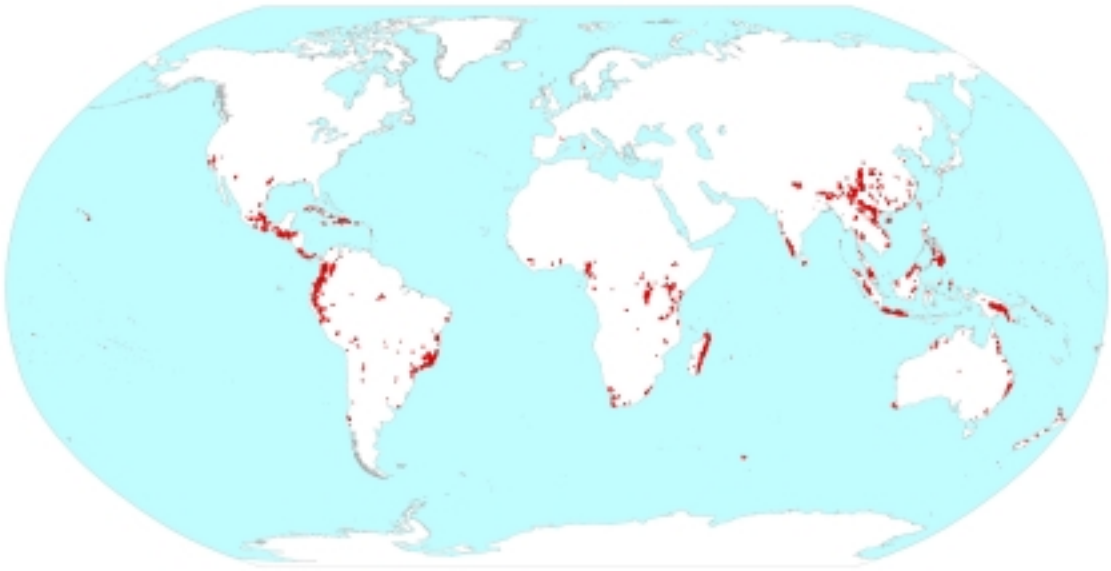

Figure 1: Areas identified by the global gap analysis as being of high priority for the expansion of the global protected area system for the representation of mammals, amphibians and threatened birds.

Four major data sets were used for the global gap analysis:

(i). Data on the *distribution of protected areas* were obtained from the World Database on Protected Areas (WDPA, 2003), compiled by the WDPA Consortium building upon Version 5 of the database on protected areas compiled by the United Nations Environment Program's World Conservation Monitoring Centre (UNEP-WCMC).

(ii). Data on the world's *globally threatened bird species* were compiled by the BirdLife International partnership (BirdLife, 2000). Of the 1,183 globally threatened birds included in this analysis, 182 are Critically Endangered, 321 are Endangered, and 680 are considered Vulnerable species.

(iii). Distribution maps for all *mammal species* were compiled, as part of the IUCN Global Mammal Assessment. In total, 4,734 mammal species were analyzed, including 131 Critically Endangered species, 229 Endangered, and 618 Vulnerable species. These data were compiled by Wes Sechrest (W. Sechrest, *unpublished*), Luigi Boitani (Boitani *et al*., 1999, for large mammals of Africa; L. Boitani and G. Amori, *unpublished* for rodents of Africa), Marcelo Tognelli (Patterson *et al*., 2003, for rodents of South America) and Gerardo Ceballos (Patterson *et al*., 2003, for bats of Central America). Because all these maps are still being

formally reviewed, only draft maps were available for this global gap analysis.

(iv). Distribution maps for *amphibian species* have been compiled by the on-going IUCN Global Amphibian Assessment (IUCN-SSC and CI-CABS, 2003), with NatureServe providing the distribution maps for species in North America (Blackburn *et al*., 2001). This analysis was based on 5,254 amphibians, including 291 Critically Endangered, 494 Endangered, and 682 Vulnerable species.

A simple overlay between species and protected areas data shows that more than 1,300 species (out of more than 11,000 analyzed) *gap species*, that is, species not protected anywhere within their mapped range. More than 700 of these gap species have been identified by IUCN - The World Conservation Union as facing high extinction risk, out more than 3,500 threatened species included in the analysis (BirdLife, 2000; IUCN, 2003). Amphibians, overall, are worst covered than birds or mammals. This is mainly due to their smaller ranges (higher levels of endemism), but also because they have received much less conservation action than either birds or mammals.

While these results demonstrate that a significant number of threatened species remain unprotected, it is important to note that the numbers of gap species identified in this study are an underestimate. On the one hand, many species whose range apparently overlaps one or more protected areas are not truly present in those areas. This is because species ranges are mapped as polygons that encompass many areas of unsuitable habitat where the species are absent. On the other hand, many species are not or cannot be adequately protected in protected areas where they are truly present, either because the protected area does not offer effective protection against threats or because the species are not viable in those areas (because, for example, the habitat is only marginal, or the protected area is too small). As an example of this underestimate, over 1,000 of the *covered species* (not gaps) resulting from this analysis are only covered by protected areas that are very small (smaller than 1,000 ha) and/or areas that have relatively low levels or protection (areas not classified as IUCN I-IV; IUCN, 1994).

3. Implications for global conservation planning

The first conclusion that can be extracted from the global gap analysis is that the global network of protected areas is far from complete, even though it is already providing an invaluable service to conserving global biodiversity. It is incomplete even for the representation of terrestrial vertebrates, which are the most charismatic and best studied of all species (Gaston and May, 1992), and those which have received most conservation attention up to now. Other taxonomic groups with high species diversity and endemism, such as plants and insects (which represent most of global biodiversity) are likely to be even worse covered (Rodrigues and Gaston, 2001).

The analysis also identifies, on a coarse scale, areas of high *irreplaceability* and high *threat*. The irreplaceability of a given area measures the likelihood that the area needs to be protected to ensure that species are represented at the global scale, or, conversely, how options for achieving representation of specific species are reduced if the area is not conserved (Pressey *et al*., 1994; Margules and Pressey, 2000). Irreplaceability is higher in regions of high levels of species endemism. Area threat, or vulnerability, is a measure of the likelihood that the area will be disturbed or destroyed (Pressey and Taffs, 2001), and it was calculated as the number of threatened species present at a site, giving more weight to those with higher extinction risk. Hence, irreplaceability highlights regions containing species for which there are few alternatives

for conservation elsewhere, while threat highlights regions that are unlikely to be available for conservation in the future unless urgent action is taken. Sites of both high irreplaceability and high threat are those that require immediate conservation attention in order to prevent the loss of unique biodiversity values, and therefore correspond to the highest conservation priorities (Margules and Pressey, 2000, Pressey and Taffs, 2001).

The regions highlighted by this analysis as urgent priorities for the expansion of the global network are mainly located in regions long recognized to be centers of endemism (e.g. Stattersfield *et al*., 1998, Myers *et al*., 2000) and correspond to areas suffering high levels of habitat destruction (Sanderson, 2002). These are mainly concentrated in tropical forests, especially in areas of topographic complexity, and on islands. In the Western Hemisphere, these include Mesoamerica, the Caribbean, the Andes, and the Atlantic Forest. In Africa, these are mainly located in eastern Madagascar, the Cape Fynbos, the Succulent Karoo, Maputaland-Pondoland, the Eastern Arc, the Albertine Rift, the Ethiopian Highlands, the Cameroon Highlands and the Kenyan Highlands. In Asia, highlighted areas include the Western Ghats and Sri Lanka, the eastern Himalayas, southwest, southeast and central China, and continental and insular Southeast Asia. In Australia, urgent priority areas are mainly around coastal areas, particularly the Queensland Wet Tropics, the Kimberley tropical savannah, and the southeastern and southwest regions.

The results obtained in this analysis demonstrate that the percentage of area already protected in a given country does not inform how much more protection is needed (Soulé and Sanjayan, 1998; Rodrigues and Gaston, 2001). This means that percentage-based targets, such as the recommendation that each country should dedicate 10% of its area to protected areas, are not useful to assess the completedness of each country's network, nor to establish global conservation priorities amongst countries. Instead, countries with higher levels of endemism require higher percentages of their area protected (Rodrigues and Gaston, 2001). This is because neither biodiversity nor the threats to biodiversity are evenly distributed throughout the world, and consequently protected areas should not be either.

The vast majority of the regions identified as priorities for the expansion of the global protected area network are located in low-income countries in the tropics – those that can least afford the costs of establishing and enforcing protected areas (James *et al.,* 1999). This is the case even if the significant local benefits of protected areas are factored in (Balmford *et al.,* 2003), because much of the benefit of the establishment of protected areas is realized at a global scale (Kremen *et al.,* 2000). Thus, our recommendation for the rapid establishment of protected areas in regions requiring urgent conservation action comes hand-in-hand with a recommendation that the costs of this conservation are largely borne by the global community. Donor country governments, through bilateral and multilateral institutions, as well as NGOs, foundations, and private corporations and individuals all have an important role to play in financing conservation (Balmford and Whitten, 2003).

4. The global gap analysis and previous global priority assessments

The global gap analysis is certainly not the first global assessment of priorities for conservation action. Previous studies, mainly lead by international nongovernmental organizations, include Endemic Bird Areas (Stattersfield *et al.,* 1998), Global 200 ecoregions (Olson and Dinerstein, 1998), and biodiversity hotspots (Myers *et al.,* 2000). These approaches diverge from each other and from this global gap analysis in the criteria applied for prioritization, and in the biodiversity features targeted. Nevertheless, all of them have in common the premise that

conservation resources are scarce and should be allocated strategically, which explains the remarkable degree of overlap between the areas identified as priorities in this and previous global analyses. Hence, most areas highlighted in the global gap analysis overlap with Endemic Bird Areas, Global 200 ecoregions (particularly the tropical ones) and biodiversity hotspots.

The contribution of this global gap analysis towards this bigger picture comes from two characteristics that distinguish it from previous assessments at the global scale: it is based on relatively detailed geographical data on the distribution of thousands of species, covering three classes of vertebrates; and it explicitly accounts for the existing global protected area network in defining priorities for future action that are complementary to existing conservation efforts.

5. Implications at the regional and national scale

Interpretation of the results of the global gap analysis needs to take into account that this is an assessment at the global scale, which refers to a small fraction of species diversity (excluding for example plants, invertebrates, marine and most freshwater diversity) and which is mainly about *representation* rather than *persistence* or species in protected areas. Indeed, the nature of the data does not allow for a reliable estimate of the fraction of analyzed species whose long-term persistence is ensured by protected areas. This means that, while there is good evidence to support the claims that regions highlighted in this analysis are conservation priorities, little can be said regarding the areas that have *not* been highlighted. Most certainly, the results of this study are not evidence that protected area networks should be considered completed for any of these regions. While several regions are well ahead in the development of their networks of protected areas, gap analyses at the national or regional scale demonstrate that even for these the task is far from finished (e.g. Pressey *et al*., 1996, Australia; Williams *et al*., 1996, United Kingdom; Nantel *et al*., 1998, Canada; Scott *et al*., 2001, USA).

This global gap analysis highlights regions where the expansion of the global network of protected areas is an urgent task at the global scale. However, each of the Parties to the Convention on Biological Diversity has committed to conserve its share of biodiversity. The same basic principles underlying the global gap analysis are applicable to defining conservation priorities at the regional and national scales. A systematic assessment of the representativeness of the existing national protected area network is key to guide its strategic strengthening and expansion. In doing so, each nation should bear in mind its increased responsibility for the protection of its share of biodiversity which is unique (i.e. species that are endemic) and/or globally threatened.

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7 SOME CONSIDERATIONS ON MARINE AND COASTAL PROTECTED AREAS NETWORK DESIGN

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1. Introduction – what's in a network?

While ocean and coastal environments cover most of the earth, and contain all of marine biodiversity, their current level of protection is extremely low. According to recent (2003) estimates based on data in the World Database on Protected Areas, only approximately 0.45% of the entire ocean is protected. One third of this figure consists of two very large marine and coastal protected areas (MCPAs): the Great Barrier Reef Marine Park and the Northwest Hawaiian Islands Coral Reef Ecosystem Reserve, indicating that the level of protection accorded to the rest of the ocean is even smaller.

At the same time the benefits of MCPAs to biodiversity and fisheries, as well as to various stakeholders, are being increasingly recognized, and are supported by the results of numerous scientific studies and practical experiences. These MCPA benefits provide a considerable contribution towards the three objectives of the Convention on Biological Diversity, including its target of achieving by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level. It is also recognized that while isolated MCPAs have many benefits, they will only be able to protect a limited fraction of marine and coastal biodiversity. A well-managed network of MCPAs is needed to achieve the full range of biodiversity benefits.

The concept of MCPA encompasses a diverse set of approaches for area-based protection, serving a variety of objectives and consisting of differing levels of protection. The CBD Ad Hoc Technical Expert Group on marine and coastal protected areas (AHTEG)[2] concluded, however, that while all types of MCPAs provide potential benefits, some benefits can only be achieved through the use of highly protected areas where extractive uses are excluded ("no-take" areas) (see report of the AHTEG: UNEP/CBD/SBSTTA/8/INF/7). Such benefits can include the enhancement of fisheries in surrounding areas, and as a result, the enhancement of the livelihoods of local communities dependent on the fisheries resources. In addition, highly protected areas can provide a boost for tourism by allowing divers to experience a relatively pristine marine environment complete with large and numerous fish.

Highly protected areas on their own may not be enough, though. Due to the nature of the marine environment, MCPAs are vulnerable to "up-stream" activities and events, such as coastal development, which have an effect on water quality through, for example, the release of pollutants, nutrients, and sediments. Therefore, establishment of MCPAs needs to be undertaken in the context of integrated marine and coastal area management (IMCAM), and becomes, in essence, an application of the ecosystem approach.

[2] The members of the AHTEG were as follows: Margarita Astralaga, James Bohnsack, Juan C. Castilla, John Collie, Phillip Da Silva, Beatrice Padovani Ferreira, Miguel D. Fortes, Sarah George, Kenneth Grange, Dalia Gudaitiene-Holiman, Thomas Hourigan, Nelson Kile, Dan Laffoley, Robin Leslie, Mohamed Menioui, Per Nilsson, Arthur Patterson, Mary Power, Aprilani Soegiarto, Murray Hosking, Paula Warren, Marjo Vierros, Eduardo Villouta and Kathy Walls

Given these considerations, the AHTEG concluded that a national framework for the management of marine and coastal biodiversity should comprise the following three elements representing, respectively, high, intermediate, and low levels of resource protection for biodiversity:

- A representative network of highly protected areas where extractive uses are prevented, and other significant human pressures are removed (or at least minimized) to enable the integrity, structure, functioning, and exchange processes of and between ecosystems to be maintained or recovered;
- An ancillary network of areas that support the biodiversity objectives of the highly protected network, where specific perceived threats are managed in a sustainable manner for the purposes of biodiversity conservation and sustainable use; and
- Sustainable management practices over the wider coastal and marine environment.

2. Designing a network – the principles

As stated by the AHTEG, the aim of the MCPA network should be to create a coherent whole, with emergent properties and values, not simply a collection of individual MCPAs and regulatory controls. In this respect, connectivity between MCPAs is critical, given the presence of mobile life stages in most marine organisms. This means that the viability of a given area may be dependent on what happens elsewhere. Larvae of certain species may travel long distances to reach a given MCPA, and juveniles and adults regularly migrate between habitat areas. There is also strong connectivity between marine and terrestrial processes, particularly in relation to movement of water, sediments, seabirds and all other organisms that use both environments.

As indicated above, a representative network of highly protected areas is at the core of a national framework for the management of marine and coastal biodiversity. The following scientific principles for establishment of networks of highly protected areas were originally conceived by Ballantine (1997), and were elaborated upon by the AHTEG.

Principle 1: Representativeness

All biogeographic regions should be represented. Within each region, all major habitats should be represented. Conservative and widely accepted definitions should be used when identifying regions and habitats.

Principle 2: Replication

All the habitats in each region should be replicated within the network, and these should be spatially separate, to safeguard against unexpected failures or collapse of populations. Where replication is not possible then other design principles may need to be reconsidered, such as size and number.

Principle 3: Viability

The ultimate objective is to create a network of geographically dispersed sites that are self-sustaining, independent (as far as possible) of what happens in the surrounding area (Murray et al 1999). The network should be ecologically viable with MCPAs achieving viability collectively and avoiding (genetic) isolation.

Principle 4: Precautionary design

In designing the network, a precautionary approach should be taken wherever there is uncertainty (e.g. regarding habitat diversity, species habitat needs, threats by human activities, connectivity processes, etc). The precautionary approach in this circumstance is to use best available information to make decisions rather than delaying to await more and better information. Where there is uncertainty, the precautionary approach would favour erring on the side of biodiversity protection. While it is important to maintain as natural an IMCAM as possible, the network of MCPAs should

ideally be designed so that complete failure of the management regime in the IMCAM will not significantly affect the viability of the MCPA network (Lauck *et al*., 1998).

3. Designing a network – From principles to practice

The AHTEG suggested that network design should be considered holistically in an ecosystem context, taking into account each national or regional area, including the exclusive economic zones and the High Seas. The network should incorporate ancillary MCPAs as support for a primary network of highly protected MCPAs. Given the unique characteristics of the marine environment, the network should be designed in such a way that potential connections between MCPAs are maximized.

To assist the design of a network of priority MCPA sites, Beck and Odaya (2001) identified the following basic steps that need to be undertaken

1. Identification of conservation targets (i.e. species and habitats)
2. Collection of data on their ecology and distribution
3. Determination of conservation goals for the amount of targets that must be protected
4. Identification of a set of sites that meet these goals for all targets

The following discussion looks at each of these steps in more detail.

Identification of conservation targets

Conservation targets define the features that are to be conserved, and generally consist of a combination of ecosystems, communities or species, although the inclusion of cultural features can also be considered. In general, Beck and Odaya (2001) recommend that it is best to first identify targets on the community and ecosystem level, with attention paid to ecological processes that affect their viability. In most marine classification schemes, communities and ecosystems are combined under the concept of habitats. If the overall goal is the creation of a representative MCPA network, all habitats should be included as conservation targets, and not only the rare ones (Beck and Odaya, 2001).

Individual species should be included as conservation targets if they are imperiled and conservation of their habitats would not produce sufficient results, or if they are declining faster than their habitats (Beck and Odaya, 2001).

Collection of data on their ecology and distribution

Both biological and physical data may be relevant in this process, as is local and traditional knowledge. Some potential data sources include existing marine and coastal habitat maps, inventories and assessments. In many cases, existing data may be sufficient for the purpose, and there may be no need to collect new data. The challenge will then lie in locating these data and converting them into a usable format (including georeferencing). It should be noted, too, that in many cases existing datasets may be incomplete, out of date, geographically imprecise or poorly documented. Ardon *et al.* (2001) provide an excellent discussion on the use of disparate datasets for designing a network of marine protected areas. If the existing data is not sufficient, new data may need to be collected and habitat maps produced.

If no habitat or bioregional classification exists for the area, it will need to be developed based on existing or new data. In developing their Representative Areas Programme, for example, the Great Barrier Reef Marine Park used a comprehensive range of biological and physical information to define 30 reef and 40 non-reef bioregions across the Park (Day *et al*., 2003). Bioregions are relatively large areas of land and water that contain geographically distinct assemblages of natural communities.

Determination of conservation goals for the amount of targets that must be protected

A conservation goal is the amount of target (habitats and species) that must be preserved to protect the full range of diversity within an ecoregion (Beck and Odaya, 2001). Unfortunately the rationale for setting specific goals is not well developed. Most recent studies indicate that at least 20-30% of each habitat type should be included in highly protected areas in order to ensure fisheries benefits (e.g. Bohnsack *et al*., 2003; Roberts *et al.,* 2002; Botsford and Gaines, 2001; Lindholm *et al*., 2000; Bohnsack, 2000). Although there is no clear agreement on how much habitat should be protected in order to preserve biodiversity (Cabeza and Moilanen, 2001 and Sala *et al.*, 2002), the 20-30% figure might provide a good starting point within the context of adaptive management, provided that it is applied as part of an overall framework for management of marine and coastal biodiversity, as discussed in section 1of this paper. It should be noted, though, that each area and situation is unique, and that there is no one-size-fits-all solution for the percentage of area that should be set aside in highly protected areas (Agardy *et al.*, 2003).

The 20-30% figure is being increasingly put into practice, however. As a result of a new (2003) zoning plan, no-take areas cover approximately 30% of the Great Barrier Reef Marine Park, which has as its primary objective the maintenance of biodiversity. The rarity or threatened status of a particular habitat may also play a role in setting conservation goals. In another example from the Gulf of California, Sala *et al.* (2002) set a goal of protecting 20% of each representative habitat and 100% of rare habitats. It has also been shown that the potential connectivity between sites increases greatly as the amount of protected areas approaches or exceeds 20% (Roberts and Hawkings, 2000).

Identification of a set of sites that meet these goals for all targets.

The process of identifying priority MCPA sites will, in most cases, need to take into account both ecological, and socio-economic and cultural criteria. There are a number of tools available to identify a network of MCPA sites based on ecological criteria. In particular, computer selection algorithms have been developed specifically for this purpose. Some algorithms choose areas with most abundance of habitats or species, and are therefore called "greedy" algorithms. These algorithms do not take into consideration representativeness or rarity, and are consequently not best suited for network design. Other algorithms choose sites using rarity and irreplaceability as guiding principles. An improvement upon these algorithms are those using a random, iterative component, resulting in the identification of a range of possible solutions for meeting the conservation goals for all targets (Possingham *et al*., 2000). The advantage of this approach is that managers and other stakeholders can consider a variety of options to find the one, which is most suitable for the given circumstances. Two specific examples of reserve selection tools using random, iterative algorithms are MARXAN, which was developed and tested at the Great Barrier Reef Marine Park (http://www.ecology.uq.edu.au/marxan.htm) and SITES, developed by the Nature Conservancy (http://www.biogeog.ucsb.edu/projects/tnc/toolbox.html).

Numerous studies have highlighted the importance of stakeholder involvement in the design and management of MCPAs, and such participation will, for example, increase compliance and shape more culturally sensitive regulations (Friedlander *et al*., 2003). Therefore consideration of the purely ecological results from reserve design tools by all involved stakeholders will ensure the input of invaluable information about the biological, socioeconomic and cultural properties of ocean use (Johannes, 1997, Agardy *et al.*, 2003). Two recent examples highlight this process. Extensive public consultations were held in the re-

zoning of the Great Barrier Reef Marine Park (Day *et al*., 2003) and in designing the Seaflower Biosphere Reserve in Columbia (Friedlander *et al*., 2003).

4. Design and establishment are not enough - the importance of adaptive management

Once established, the effectiveness of the individual MCPAs as well as the entire network will need to be evaluated against their management objectives, and necessary adjustments made in the context of adaptive management. As stated by the AHTEG, adaptive management has been identified as the most appropriate approach toward the management of biological resources because of its ability to deal with uncertainty and natural variation (more flexible than other systems), its iterative nature (acquires information on the biological resource through the management cycle), and its feedback mechanisms. This is particularly important because establishment and management of MCPAs is always undertaken in the context of scientific uncertainty, given our limited understanding of the functioning of most marine ecosystems (Agardy *et al*., 2003). Successful application of adaptive management is strongly dependent on monitoring. The results of monitoring will provide a feedback mechanism through which management action, including the specific percentage of areas set aside as highly protected areas where extractive uses are excluded, can be adjusted as appropriate.

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8 PROTECTED AREAS AND INLAND AQUATIC ECOSYSTEMS

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1. Introduction – inland waters in peril

Inland aquatic ecosystems are very diverse and include rivers, their flooded plains and estuaries, lakes, bogs, swamps, marshes and coastal wetlands such as mangrove forests and lagoons. They include all of the world's freshwater ecosystems but many are also brackish-water or saline (as, for example, with some inland seas).

In many parts of the world inland water ecosystems continue to be intensely modified and degraded by human activities. The rapid proliferation of dams, river and stream embankments, and the draining of wetlands for flood control and agriculture, for example, have caused widespread loss of freshwater habitats, especially waterfalls, rapids, riparian floodplains and related wetlands. Habitat loss has been accompanied by a decline and loss of freshwater species, to a point where the biodiversity of inland water ecosystems is currently in far worse condition than that of forest, grassland, or coastal ecosystems (World Resources Institute *et al*., 2000). The combination of pressures on freshwater systems has resulted in more than 20 percent of the world's freshwater fish species becoming extinct, endangered, or threatened in recent decades and even this is a serious underestimate according to some authors. Future extinction rates are believed to be five times higher for freshwater animals than for terrestrial species (Ricciardi and Rasmussen, 1999). By far the greatest threat to the biological diversity of inland waters is habitat loss and degradation.

Rivers have been altered since historical times, but such modifications skyrocketed in the early to mid-1900s. Modifications include river embankments to improve navigation, drainage of wetlands for flood control and agriculture, construction of dams and irrigation channels, and the establishment of inter-basin connections and water transfers. At the same time, these physical changes in the hydrological cycle disconnect rivers from their floodplain wetlands and slow water velocity in riverine systems, converting them to a chain of connected reservoirs. This, in turn, impacts the migratory patterns of fish species and the composition of riparian habitats, opens up paths for exotic species, changes coastal ecosystems, and contributes to an overall loss of freshwater biodiversity and inland fishery resources. Humans withdraw about 4,000 km^3 of water a year, or about 20 percent of the world's rivers' base flow. Between 1900 and 1995, water withdrawals increased by a factor of more than six, which is more than twice the rate of population growth (WMO, 1997). The rates of water extraction are not evenly distributed. Whilst some systems retain their near natural flows, in river basins in arid or populous regions, extractions can reach 100%, leaving no water at all to maintain natural river functions. This has implications for the species living in or dependent on freshwater systems, as well as for future human water supplies.

With population growth, industrialization, and the expansion of irrigated agriculture, the demand for all water-related goods and services will continue to increase dramatically, thereby

increasing pressures on freshwater species and habitats. Many experts, governments, and international organizations around the world predict that water availability will be one of the major challenges facing human society in the 21st century and that the lack of water will be one of the key factors limiting development (UNESCO, 2003). A major consideration for protected areas for inland waters is that the water itself, not just the biodiversity it supports, is in high demand. There are, therefore, significant challenges to adequately balancing the *in-situ* and *ex-situ* uses of freshwater.

Inland water ecosystems are also very vulnerable to the impacts of climate change. Most physical impacts of climate change will be manifested through alterations to the water cycle (e.g., rainfall patterns) which will obviously be a major influence on inland aquatic ecosystems. Because most wetlands lack adaptation options, many can be considered to be particularly vulnerable to climate change. Those most at risk are located at high latitudes and altitudes, e.g., Arctic and Sub-Arctic bog communities, or alpine streams and lakes. Wetlands that are isolated are also particularly vulnerable, primarily because if they experience species loss, the chance of recolonisation would be very low (Pittock *et al.* 2001).

2. Inland Water PA's – how many, where and are there enough?

Inventories of inland aquatic ecosystems are incomplete, inconsistent in coverage and difficult to undertake for a number of reasons including: difficulties with definitions, limitations of maps, ill-defined boundaries and the limitations of remote sensing. Many important ecosystems are heavily vegetated (e.g., swamps or naturally flooded forests) and difficult to inventory. A particular feature of many inland aquatic ecosystems is their highly seasonal nature (especially the expansion and contraction of many wetlands, such as on river floodplain, due to seasonal changes in flooding). This marked temporal dimension complicates classification systems, including legal descriptions, across spatially and seasonably variable land-water interfaces.

The status and trends of biodiversity depended upon inland water ecosystems have recently been reviewed for the CBD (Revenga and Kura, 2003). This concludes that based upon existing information it is not possible to reliably estimate the total extent of wetlands at a global scale. An overall global estimate, including coastal wetlands in some countries, of about 1,280 million hectares for total extent of aquatic ecosystems is quoted. However, there is a potentially large error in this estimate for the aforementioned reasons. Similarly, global figures for the area and distribution of different inland wetland types are not generally available, mainly due to problems with standardising terminology and the lack of inventory data. National and regional data for Oceania, Asia, Africa, Eastern Europe, and the Neotropics allow just a cursory assessment of wetland extent and location. Only for North America and for Western Europe have more robust estimates of wetland extent been published. Of 206 countries or territories for which the state of inventory was assessed, only seven percent had adequate or good national inventory coverage. Of the remainder, 69 percent had only partial coverage, and 24 percent had little or no national wetland inventory. Vegetated wetlands cover perhaps 6.6 percent of the global land area (excluding Antarctica and Greenland), and lakes and reservoirs cover 2.1 percent. Overall, there is very poor data availability for the extent of river habitats, which, if small tributaries and streams were to be included, would be significant.

The most systematic registry of protected areas for inland water ecosystems is the list of sites maintained under the auspices of the Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar, Iran, 1971). There are presently 138 Contracting Parties to the Convention, with 1328 wetland sites, totalling 111.9 million hectares, designated

for inclusion in the Ramsar List of Wetlands of International Importance. A number of Ramsar sites are also declared jointly with the World Heritage Convention. Data for protected areas at the national or local levels have not been adequately compiled. Despite the poor availability of data, there is some confidence that a relatively high proportion of inland water ecosystems is included within areas designated as protected. For example, based upon the aforementioned figures it would appear that about 10% of global wetlands are designated as Ramsar sites. The proportion (although not total area) is certainly higher than for marine ecosystems although it is noted that inland waters are under considerably greater threats and are more variable.

The problem, therefore, is not so much one of total area officially protected but (i) inconsistencies in regional coverage, (ii) gaps in coverage by ecosystem type, and (iii) the level of protection afforded. Regarding the latter, by far the most important consideration is the extent to which protected areas for inland waters include protection against, or management of, the impacts of activities outside the protected areas. Inland waters are very dynamic in nature and all activities within the catchment (watershed or drainage basin) can have an impact within a "protected area". For example, water pollution or abstraction upstream will result in downstream impacts upon "protected areas" in rivers. Likewise, soil erosion in the catchment of a lake will undermine the effectiveness of lake protection if the catchment is not managed appropriately in conjunction with the specific area to be protected.

3. Improving effectiveness

Managing beyond borders

The ecosystem approach is essential to the effectiveness of protected area systems for all inland waters. This is probably more important than for any other ecosystem category. The absence of effective management beyond the boundaries of protected areas in inland waters is the single most important factor contributing to reducing their effectiveness. With larger catchment areas, significant transboundary considerations are often involved. The need for co-ordinated management efforts between countries is probably the greatest for inland water ecosystems. Although some excellent examples of river basin co-operation exist, including between less developed countries, transboundary co-operation regarding water resources, let alone the biodiversity supported, remains a significant challenge in too many regions.

Inland water ecosystems, and in particular rivers, are also characterised by a high degree of migratory species. The dynamic nature of such ecosystems results in many species occupying and utilising different parts of the ecosystem at different times during their life cycle. For example, many animals feed and grow mainly on river floodplains during the flood season and migrate up to upper reaches, or the estuary or sea, to reproduce. This makes protected area networks very important. In most cases it is not enough to simply maintain a number of protected areas which adequately cover the required habitat types – but the connections between these must also be maintained if they are to be effective. For most aquatic animals (with the notable exception of birds) the required corridors between habitats are along rivers which must be free from obstruction and carry water of sufficient biological quality and quantity.

People are important

The extent of dependency of people upon the biological diversity of inland water ecosystems is seriously under-estimated world-wide. In developed countries, *in situ* uses of inland waters include for sport and recreation, and especially recreational fisheries. Reliable estimates of the economic value of these activities are generally lacking but powerful interest groups have emerged that have already stimulated public

demand for the rehabilitation of inland waters in many areas, including the establishment of protected areas at the local level. However, in developing countries, there is generally pronounced livelihoods dependency upon inland water ecosystems and particularly of poor communities of people. Wherever inland water ecosystems and people co-occur, livelihoods dependency upon the biodiversity that inland waters support is invariably high. People use biodiversity directly for food (including nutrients and vitamins), building and medicinal products and for cash income, employment or subsistence. In most areas, the biodiversity of inland water ecosystems is also crucial for local and often regional food security (Coates, 1995). This dependency is particularly marked, for example, on the floodplains of the world's major river systems, such as the lower Ganges River.

The extent of dependency of livelihoods upon inland waters, and the water itself as a multiple-use resource, requires the involvement of local communities of people in the establishment and subsequent management of protected areas as critical to their success. They have the most to gain from improved management and are often the best placed to undertake it. An effective ecosystems approach should include attention to the social, cultural and economic dimensions of natural resources management within which the livelihoods of people is the paramount consideration. "Protected area systems" (or networks), need to consider ecological and socio-economic linkages between protected areas together with their setting within the overall management of the broader ecosystem, and its resources.

Does size matter?

Experiences with inland water ecosystems clearly show that to be effective, areas which protect biodiversity need not necessarily be large or be government sponsored. For example, a survey of traditional aquatic resources management systems in the Lao P.D.R. revealed that over 50% of villages had effective local systems in place which included limiting access (by activity or category of person, both spatially and seasonally) and clear boundary demarcations and management objectives to enable them to function as protected or conservation areas (Sjørslev, 2000). None had any government inputs or status. Some were also very small; for example, for specific spawning areas for fish (only a few hundred metres along their boundary). On very heavily exploited floodplains in Bangladesh, where space is at a premium, well targeted and managed community-based protected areas, only a few hundred square metres in extent within a wetland of several square kilometres, have contributed to over a four fold increase in fisheries production and a 30% increase in fish species diversity across the entire area within two years (Rhaman *et al.*, 2003).

4. Tools for managing better

The most comprehensive guide to the design, placement, establishment and management of protected areas for inland water ecosystems are those provided under the Convention on Wetlands (www.ramsar.org), and its Secretariat. This now has over thirty years of experience with the subject. Tools available include classification systems for wetlands, criteria for site selection, examples of best practice, extensive management guidelines and wise use principles. All of these are backed-up with a comprehensive reference library. A practical Ramsar "toolkit" provides guidance based upon measures adopted by the Conference of the Parties.

The definition of "wetland" under the Ramsar Convention is very broad and includes most types of area that could be recognised for inland waters. Also, the technical resources, including wise-use principles and the various guidelines etc., are equally applicable to the management of any wetland site (whether designated under the Convention or not). The Convention of

Biological Diversity and the Convention on Wetlands work closely together through a joint work programme. On issues relating to protected areas of international importance for inland water ecosystems, the Convention on Wetlands is regarded as the lead mechanism.

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9 PROTECTED FOREST AREAS: THEIR REPRESENTATIVENESS AND EFFICACY FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY

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1. Introduction[3]

Forests represent a considerable share of the protected areas in the world. Assessing the representativeness of protected forest areas, to ensure that all types of forest in a given geographical area are sufficiently represented, requires a number of definitional and classification problems to be solved. First of all the question "what is a forest" has a number of different answers; a main criterion is the percentage of canopy cover, but different sources use a different threshold value: The data used in the Global Biodiversity outlook are based on a canopy cover of >30 %, while data of FAO are based on a canopy cover of 10 %. This difference in threshold leads to different forest areas, especially in open forest types with a natural low cover, such as thorn scrub.

The second question, "what is a protected area" can also cause confusion. In this article the term is defined according to Article 2 of the Convention on Biological Diversity: "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives". An even stricter definition would only include those areas that belong to one of the six IUCN categories of protected areas. IUCN has developed a comprehensive system of six categories of protected areas for conservation management (IUCN, 1994). The IUCN categories provide a common language and enable the comparison and summary of management objectives for the world's protected areas. Very confusingly, the term protected forest area is sometimes used to indicate a forest area under forest management laws, not necessarily for biodiversity purposes.

The third question relates to the classification of the great variety of forest types found throughout the world. A number of global classification systems of forests are available, but unfortunately none of them has received universal acceptance. In the Global Biodiversity Outlook forests are broadly aggregated into five categories: temperate and boreal needle-leaf forests; temperate broad-leaved mixed forests; tropical moist forests; tropical dry forests; and sparse trees and parklands. A total of 22 main forest types (Table 1) have been identified in these five categories; plantation forests are not included in these forest types. (SCBD, 2001). In the Global Forest Resource Assessment (FAO, 2001) the forests are regrouped into four main climatological categories: tropical, subtropical, temperate and boreal forests, which unfortunately are not identical to the 5 categories distinguished in the Global Biodiversity Outlook.

The lack of consensus on classification types complicates the interpretation of the available information on protected forest areas under various forest types. This situation has a bearing on the assessment of comprehensiveness, representativeness and adequacy of protected forest areas.

3 This article is based on a parts of a background document prepared for the International Workshop on protected forest areas, 6-8 Nov. 2003 Montreal, Canada.

Table 1: Main forest types (forest with > 30 % canopy cover) according to the Global Biodiversity outlook (SCBD, 2001)

Forest Type	Area (km^2)
Boreal and Temperate Needleleaf	**12,511,062**
Evergreen needleleaf	8,894,690
Deciduous needleleaf	3,616,372
Temperate Broadleaf and Mixed	**6,557,026**
Mixed broadleaf/ needleleaf	1,803,222
Broadleaf evergreen	342,892
Deciduous broadleaf	3,738,323
Fresh water swamp forest	126,963
Sclerophyllous dry forest	485,093
Disturbed	60,533
Tropical Moist	**11,365,672**
Lowland evergreen broadleaf rainforest	6,464,455
Lower montane forest	620,014
Upper montane forest	730,635
Fresh water swamp	516,142
Semi-evergreeen moist broadleaf	1,991,013
Mixed needle-leaf and broadleaf	17,848
Needle-leaf	61,648
Mangrove	121,648
Disturbed	842,269
Tropical Dry	**3,701,883**
Deciduous/ semi-deciduous broad-leaf	3,034,038
Sclerophyllous	405,553
Thorn	262,292
Sparse trees and park lands	**4,748,694**
Temperate	2,407,735
Tropical	2,304,959
TOTAL	**38,808,671**

2. Sources of information

The most comprehensive dataset on protected areas world-wide is managed by the UNEP World Conservation Monitoring Centre in the form of a world database on protected areas, maintained in partnership with the IUCN World Commission on Protected Areas. The world database currently holds more than 100,000 records of protected areas and was launched into the public domain at the Fifth World Parks Congress in September 2003.

The United Nations List of Protected Areas is compiled from information provided by national protected area agencies and other organizations to the world database of protected areas and through literature search. The 2003 version (Chape *et al*., 2003) was also launched at the Fifth World Parks Congress. The 2003 United Nations List of Protected Areas includes all protected areas from all countries and territories, provided that they comply with the IUCN protected areas definition, with or without IUCN management categories assigned, regardless of the size, and including international and regional designated sites.

Another important source of data on forests is the FAO Global Forest Resource Assessment 2000 (FAO, 2001). It is based on national reports from country correspondents. Unfortunately, many countries have not provided information on protected areas, so the general overview on protected forest areas in the report is based on additional information submitted by industrialized countries and an updated map of the UNEP WCMC protected forest areas.

3. Protected forest areas: distribution and geographical variation

The Global Forest Resource Assessment estimated that around 12% of the world's forests are included in IUCN protected areas categories I- VI. However, the draft 2003 *State of World's Protected Areas* (in prep.) suggests that globally the total area within these management categories may be somewhat lower (around 10.5%), and the global total of protected forests, including areas not assigned to management categories, is around 16%. This assessment was done using recent version of the world database on protected areas in combination with an approximate map of global forest cover derived from the Global Land Cover Database. According to this analysis, the most protected forests are tropical moist forests and temperate needle-leaf forests, which have over 11% of their area included in protected areas. Tropical dry forests are the least protected with less than 9% of their area included in protected areas belonging to management categories I-VI. About 10% of the temperate broad-leaved forests are included under protected area of various IUCN categories. The draft *State of World's Protected Areas* also states that total amount of forest area protected is higher than these figures suggest, as about two million km^2 of these forest types are also included under protected areas that do not fall under any of the IUCN management categories. Protected areas not belonging to any IUCN management categories have particular significance in tropical moist forests. In this forest type, the area of these undetermined management category protected areas is almost equal to that of IUCN management category protected areas.

Regarding regional variation, Central America, South America, Eastern and Southern Africa and Australia/New Zealand have 25% or more of their forests within some kind of protected area. If only protected areas in IUCN management categories are considered, only Australia /New Zealand and Central America have more than 20% of their forests under protection. Forests in North Africa and the Middle East and in the Pacific are particularly poorly protected with less than 5 % of their area included within protected areas in IUCN categories I-VI.

While the forest categories included in the draft *State of World's Protected Areas* are very broad, a previous analysis carried

out by WCMC stated that freshwater swamp forests in both tropical and temperate regions, mixed needle-leaved and broad–leaved forests in tropical regions and sub-tropical thorn and sclerophyllous dry forests are poorly protected.

The total number of sites and their extent in different forest biomes according to the 2003 United Nations list is given in Table 2.

Table 2: Number and area of different protected forest sites according to the 2003 United Nations List (Chape *et al.*, 2003)

Biome (UNEP-WCMC)	Total area of biome ($km^{2)}$	Total number of protected sites *	Protected area ($km^{2)}$	Protected area (% of total area)
Tropical humid forests	10,513,210	3,422	2,450,344	23.3
Tropical dry forests/woodlands	17,312,538	5,746	2,210,563	12.8
Sub-tropical/temperate rainforests/woodlands	3,930,979	6,196	665,174	16.9
Temperate needle-leaf forests/woodlands	15,682,817	13,297	1,350,221	8.6
Temperate broad-leaf forests	11,216,659	35,735	856,502	7.6
Evergreen sclerophyllous forests	3,757,144	5,334	399,587	10.6
Total	62,413,347	69,730	7,932,387	12.7

* including sites where no information on area is provided

There are some differences in the percentage of protected areas of different forest types between data sets of the draft *State of World's Protected Areas* and the 2003 United Nations list. This is due to the fact that the 2003 United Nations list includes all protected areas irrespective of IUCN management categories, whereas the draft *State of World's Protected Areas* only considers protected areas that fall within IUCN management categories. According to the United Nations list, the maximum number of protected forest sites occurs in the temperate broad-leaf forest type, whereas tropical humid forests have least number of sites. However, a diametrically opposite situation emerges in terms percentage of the total forest type protected (7.64% and 23.31 % respectively).

FAO estimates that about 12% of the world's forests fall within protected areas (FAO 2001). The extent of the different biomes and the area protected is given in table 3. A comparison of Tables 2 and 3 indicates that there is some discrepancy between the FAO assessment and the 2003 UN list both in the biome areas and in the areas protected. Because of the different classification systems used, these differences in areas are difficult to explain.

According to the data compiled by the WCMC, the percentage of protected temperate forest biomes is small when compared to tropical humid forests. In temperate zones (temperate needle-leaf forests and temperate broad leaf forests) the percentage of biome protected is well below 10%, but 23% in tropical humid forests.

Table 3: Protected forest area estimation (forest with > 10 % canopy cover) according to the Global Forest Resource Assessment 2000 (FAO 2001)

Ecological domain	Total area (km^2)	Protected area (km^2)	Protected area (% of total area)
Tropical	19,970,000	3,040,000	15.2
Subtropical	3,700,000	420,000	11.3
Temperate	5,070,000	830,000	16.3
Boreal	9,950,000	490,000	5.0
Total	38,690,000	4,780,000	12.4

4. Representativeness, comprehensiveness and adequacy of protected forest areas

To be effective, forest protected areas must include the full range of forest ecosystems across a landscape (comprehensiveness), reflect the diversity within ecosystems by sampling different areas of the same ecosystem type across the geographical area (representativeness), and the network of protected areas must maintain ecological viability and integrity of populations, species and communities (adequacy) (Kanowski *et al.,* 1999; Frankel *et al*., 1995).

The foregoing account shows that about 12% of the global forest area is under a protected category (with geographical and forest type variations). The question then is: what are the criteria for assessing comprehensiveness, representativeness and adequacy? Do the existing forest protected areas meet this criteria?. How effective are protected forest areas in conserving forest biological diversity? Practical approaches for assessing representativeness, comprehensiveness and adequacy are still not available and this is further clouded by the lack of consensus on forest classification systems. Although some general studies about the efficacy of protected areas in conserving the species and landscapes are available, specific studies or reports pertaining to forest protected areas in different geographical regions and for different forest types are lacking.

The general data on the extent of protected areas in different biomes are relevant to measure the progress towards the increase in protected areas, but they provide only limited information on (insight into) the actual conservation of biological diversity. Information on protected area coverage of global rare and exceptional forest types, like montane tropical cloud forests, mangrove forest, riparian forests and temperate rain forests, and of vulnerable types like semi-arid and Mediterranean forest ecosystems is still not available. For mangrove forests, for instance, the total area has decreased by 1%, from 16.3 million hectare in 1990 to 14.6 million ha in 2000 (FAO, 2003). How much of these mangrove forests are included in protected areas is not known. Only when forest associations or vegetation communities have been thoroughly surveyed and mapped, will it be possible to assess the contribution to the overall conservation of forest biological diversity and the main gaps that exist.

It is also generally agreed that the existing systems of protected areas are not sufficient to meet the role anticipated by the Convention of conserving representative components of biodiversity and of meeting

the target of significantly reducing the rate of biodiversity loss by 2010. Many of the planet's important forest areas are either not represented or inadequately represented by protected areas. In addition many unique sites and biodiversity hotspots are not, or not adequately, protected. The "Global Gap Analysis", as recently carried out by Conservation International, provides an overview of important areas for threatened and endangered species, not yet covered by officially protected areas.

To evaluate the efficacy of protected areas, an understanding of the various threats to protected areas is essential, since many threats undermine the maintenance of ecological viability and integrity of populations, species and communities. Direct and indirect threats to protected areas as well as their underlying causes have been reviewed by many authors (e.g. WRI *et al.* 1992, UNEP, 1995; Carey *et al*. 2000). A detailed account of threats to protected areas is also available in the report of the Ad Hoc Technical Expert Group on Protected Areas and the Durban Action Plan of the World Parks Congress. The annual loss of about 12.5 million hectares of natural forest as result of changes in land-use and unsustainable logging is an important threat factor. Deforestation and subsequent fragmentation of the remaining forest areas, has a negative impact especially on species with large home range and enhance the effect of other negative impacts. Additional threat factors include the impact of climate change, hunting and wildlife trade of the species living in protected areas.

An IUCN survey conducted in 1999 (IUCN, 1999) in 10 key forest countries identified inadequate management as another key issue that severely affects the effectiveness and the long term security of protected areas. Another study (Brunner *et al.*, 2001) is more optimistic about the management of protected areas, but also emphasizes structural under funding and ever increasing pressure on land use as two main reasons for the limited effectiveness of the management of protected areas.

Threats to protected areas are not confined to developing countries or to the tropics. Loss of old-growth forest in Europe and North America, for example, has been nearly complete in most areas except the boreal north, and remaining forest fragments within protected areas are under threat from air pollution, acid rain, overuse of national parks, and other threats.

5. Conclusion

From the foregoing account, it can be concluded that more than 10% of the world's forest area is protected. However, there is only limited information available on the representativeness of the current protected areas with regard to different forest types.

To evaluate the representativeness of the protected forest areas there is a need to further promote the work on the development of harmonized regional and national forest classification systems, based on harmonized and accepted forest definitions (as mentioned under programme element 3, goal 1, of the programme of work on forest biological diversity), and to complement this forest vegetation type approach with a gap analyses based on threatened and endangered forest species.
There is also a need to develop a practical methodology for assessing the comprehensiveness, adequacy and efficacy of protected forest areas, taking into account different geographical and socio-economic conditions and the specific management problems.

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10 PROTECTED AREAS IN DRY AND SUB-HUMID LAND ECOSYSTEMS - THE NEED TO MAKE THE PEOPLE CONNECTION: KEY ISSUES AND CHALLENGES

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Challenging the myth

Under the Convention on Biological Diversity (CBD), dry-land, Mediterranean, arid, semi-arid, grassland and savannah ecosystems are characterized as dry and sub-humid lands. An explicit programme of work on the biological diversity of dry and sub-humid lands was initiated at the 5th meeting of the Conference of the Parties (COP) to the Convention (CBD, 2000; Zeidler and Mulongoy, 2003). Contrary to popular myth that dry and sub-humid land ecosystems contain low levels of biodiversity, they can be extremely species rich and, from a conservation point of view, amongst the most significant in the World (CBD, 2003; Chapin *et al*., 2001; Henwood *et al*., *forthcoming*).

The people connection

Two billion people (one third of the total population), mainly in developing countries, rely on the resilience of dry and sub-humid land biodiversity to provide their daily livelihood needs. These people are particularly vulnerable to climatic fluctuations and biodiversity loss. Major uses of dry and sub-humid land biodiversity include existing crops and livestock and their wild relatives, potential new crops (e.g. salt tolerant species), wild foods, medicine, aromatics and stimulants, ornamental, pastoral, soil stabilisation, and tourism (CBD, 2001). Farming and pastoral systems in the harsh and stressful environments, particularly those in mountain areas, still mostly depend on a diversity of traditional crops, farmers' varieties (landraces) and local breeds. Furthermore, the continued provision of essential ecosystem services, including ecosystem functions such as sustained soil fertility, clean water and air and energy supplies are largely depending on biological diversity.

Of major concern is that human-induced change is increasing dramatically especially in developing countries. Here land-use change (which is one of the key drivers of biodiversity loss and land degradation/desertification) is taking place at an accelerating rate[4] and the capacities to efficiently manage the increasing pressures are limited. It has been estimated that about 70% of the total dry-land areas worldwide are affected by increased desertification (UN, 1992). This severe environmental degradation, including biodiversity loss, directly threatens the livelihoods of many people, especially the poor.

Protected areas and biodiversity hotspots - can they make the match

Recent assessments of the extent of protected areas (Spalding and Lysenko, *forthcoming*) indicate that between 1997 and 2003 the percentage of individual biomes protected has almost doubled. This trend also holds for dry and sub-humid land ecosystems included in the assessment. However, there are great discrepancies in the proportion of ecosystem types protected

[4] Land-use change has occurred over the past centuries, especially in Europe and North America, which has led to major changes and potential losses of biodiversity (Chapin *et al*., 2001; Pimm, 2001).

on a biome or sub-regional basis (Spalding and Lysenko, *forthcoming*). This raises important issues for the establishment of global protected areas networks. There are various approaches to identify global "biodiversity hotspots", or areas of high biodiversity conservation value, which primarily aim to ensure adequate representation of characteristic and unique biodiversity assemblages5. Most use measures such as species richness, endemism, rarity and level of threat. However, in the context of maintaining biodiversity and ecosystem services for sustainable livelihoods, it is clear that a very different approach to the identification of areas where biodiversity has significant socio-economic value is needed, together with action for its conservation and sustainable use.

Alternative "hotspots" and conservation approaches

The continued establishment and management of protected areas are undisputably of great importance to biodiversity conservation, including the maintenance of ecosystem services, in dry and sub-humid lands. However, it is clear that, especially in countries with increasing population pressures striving for livelihood security and development, it will become increasingly more difficult to set aside formally protected areas which largely exclude human populations from them. In some regions, historically protected areas are associated with oppressive political regimes and the exclusion of local inhabitants, putting wildlife conservation goals ahead of human needs. This image has been changed over the past decade, especially through the increased efforts of promoting community-based natural resources management. However, it is apparent that conflicts of land use still thrive. Countries are challenged with a need to integrated conservation priorities with other land use and development options. The ecosystem approach of the CBD, for example, provides a useful and practical framework in this regard. Recognizing the importance of conserving biodiversity so its use can be sustained is crucial to livelihood security, particularly in dry and sub-humid lands. Despite the difficulty of the concepts and management requirements it is important that the interconnectivities of various factors are addressed6.

Some ways ahead

Priority actions required that relate to protected areas in dry and sub-humid land ecosystems include the identification of areas of particular biodiversity value and/or under threat and the successful implementation of key conservation and sustainable use actions, especially through applying the ecosystem approach. The CBD programme of work on dry and sub-humid lands was developed to support action on such priorities.

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6 An example of an innovative approach to conserving ecosystem function is the concept of the ecological reserve to water management in South Africa. Water extraction from a catchment first has to honor the needs of human consumption and the ecological requirements before other commitments, e.g. of industrial use, can be considered. This aims to avoid over-abstraction of water, which would damage the ecosystem including the natural water cycles.

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11 PROTECTED LANDSCAPES, CORRIDORS, CONNECTIVITY AND ECOLOGICAL NETWORKS

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> *"An ecological network is … a coherent system of natural and/ or semi-natural landscape elements that is configured and managed with the objective of maintaining or restoring ecological functions as a means to conserve biodiversity while also providing appropriate opportunities for the sustainable use of natural resources." (Bennett and Wit, 2001, p5)*

1. Introduction

Ecological networks and broad-scale approaches to biodiversity conservation planning are essential to ensure that wide-ranging species have access to sufficient habitat to support viable populations, that there is sufficient connectivity to support movement between core areas, that core areas are sheltered from edge effects and advancing threats, and that essential ecological processes are maintained. These approaches are an important mechanism for achieving the objectives of the Convention on Biological Diversity (CBD) - the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of its benefits. Both the World Summit on Sustainable Development in 2002 and the Vth World Congress on Protected Areas called on the 7th Congress of the Parties to the CBD to promote ecological networks as a strategy for reducing biodiversity loss (WPC Recommendation 5:10).

The concept of ecological networks has been strongly developed in Europe, particularly in countries such as the Netherlands and Germany where opportunities for biodiversity conservation in semi-natural areas outside the protected area system are supported by strong land use planning traditions (Bennett and Wit, 2001; Sanderson and Harris, 2000). The approach is being readily adapted to less developed regions where the persistence of threatened species and ecosystems also requires an expansion of conservation efforts that needs to be reconciled with demands for sustainable development. In these varied contexts, a number of different frameworks have evolved, such as ecological networks (Bennett and Wit, 2001), wildlands networks (Soulé and Terborgh, 1999), ecoregion-based conservation (WWF, 2000), bioregional planning (Miller, 1996) and biodiversity conservation corridors (Sanderson *et al*., 2003). All are designed to contribute to a similar set of goals – the conservation and long-term persistence of threatened species, representative ecosystems and ecological processes, together with the maintenance of ecosystem services and sustainable development. The different frameworks also share a common structure of core areas, connecting linkages, and buffer zones or areas of compatible land/ resource use. The frameworks may be applied at a range of different scales, but this paper will focus on broad-scale initiatives -

at the ecoregional and sub-ecoregional scale (Poiani *et al*., 2000; Sanderson *et al*., 2002). (For the sake of simplicity, all these frameworks will be referred to as ecological network approaches for the rest of this paper.)

2. Key elements of ecological networks

Bennett and Wit (2001) recognise five common elements of these approaches:

(i) ***A focus on conserving biodiversity at the ecosystem, landscape or regional scale***
Broad-scale approaches to biodiversity conservation planning have evolved in response to concerns that isolated protected areas are too small to protect viable populations of wide-ranging species or maintain essential ecological processes. Island biogeography theory indicates that the size of core habitat areas and distance to sources of replenishment influence the number of species that these areas can support in the long-term (MacArthur and Wilson, 1967; Diamond, 1975). Small isolated populations are vulnerable to extinction due to inbreeding depression and random demographic and environmental variation (Soulé, 1986). Habitat fragmentation is proving a major threat to biodiversity and to the ability of protected areas to support functioning communities of species (IUCN, 2003). Even the largest protected areas may be too small to meet the needs of wide-ranging species and to support viable populations over time (Newmark, 1995). Even where conservation targets have more limited ranges, their long-term survival in the wild will depend on functioning communities - viable populations of associated species, such as plants, pollinators, seed dispersers, prey and predators - that may include wide-ranging species.

Ecological processes that are essential to the long-term survival of species and ecosystems, such as water cycling, pollination and predation, operate at a range of scales – in some cases, far broader than core habitat areas. For example, conservation planners need to take into account the size of area necessary to enable species and ecosystems to recover from expected disturbances, such as fire and drought. (Pickett and Thompson, 1978).

(ii) ***An emphasis on maintaining or strengthening ecological coherence, primarily through providing for ecological interconnectivity***
Metapopulation analysis indicates that regional populations are more likely to persist where there is sufficient movement between local populations to supplement them before they disappear or to ensure that the recolonisation rate exceeds the extinction rate. Linked fragments are therefore expected to support greater numbers of species in the long-term than isolated fragments of the same size. Indeed, Fahrig and Merriam (1994) argue that, in the context of complex patch dynamics, replication and connectedness of patches may be more important than their overall size. For many species, individuals and populations must move from one core area to another, whether as part of periodic or seasonal migrations between sites, or to disperse to new territories. Connectivity may also be critical for adaptive responses to long-term change. For example, allowing for the movement of species and ecosystems in response to climate change may require a broad scale approach characterized by high levels of connectivity (Hannah et al, 2002).
Some ecological processes require connectivity – the classic example being the transport of water, energy and nutrients along riverine corridors. The diversity of core areas is often dependent on disturbance patterns that modify habitat structure and open new niches. Isolated core areas may be more or less vulnerable to these disturbance patterns (for example, less vulnerable to fire because natural fires started outside the core area are unable to pass through barriers to reach the core area) (Pickett and Thompson, 1978).

(iii) ***Ensuring that critical areas are buffered from the effects of potentially damaging external activities***

The resilience of core areas can be enhanced by a surrounding matrix of compatible land/ resource use designed to protect them against edge effects and expanding human activities. Threatened species are often particularly vulnerable at the edges of core areas (for example, forest birds may suffer higher rates of nest predation (Wilcove, 1985)). As wide-ranging individuals move in and out of protected areas, core area populations become vulnerable to threats beyond protected area boundaries, such as hunting and fishing. Changes in resource and land use in areas surrounding protected areas influence the structure and species composition of habitat at the edges, eroding core areas of natural habitat. (Gascon *et al.*, 2000). Edge effects can be reduced through protected area designs that minimize edge-to-core ratios, but resilience is strengthened by surrounding core areas with buffers of compatible land/ resource use.

A buffer of compatible land/ resource use can also provide a forward defensive line against the incursion of aggressive dynamic threats, such as migration and colonization or the expansion of timber operations, livestock or agricultural plantations.

(iv) ***Restoring degraded ecosystems where appropriate***

While in some regions it will be possible to design appropriate broad-scale conservation plans based on remaining natural ecosystems and habitat, ecological restoration will be necessary in others.

Following Aldo Leopold, the Wildlands Network approach to landscape restoration focuses on six goals:

- protection and recovery of native species;
- protection and restoration of native habitats;
- protection, restoration, and maintenance of ecological and evolutionary processes;
- protection and restoration of connectivity between wilderness core areas;
- control of exotic species;
- reduction of pollution and restoration of areas degraded by pollution (Soulé and Terborgh, 1999).

(v) ***Promoting complementarity between land uses and biodiversity conservation objectives, particularly by exploiting the potential biodiversity value of associated semi-natural landscapes***

From a biodiversity perspective, the ideal response to the need for broad-scale conservation and connectivity would be the expansion of existing protected areas. But in heavily impacted regions, this is often no longer feasible, and conservationists must work with land/ resource users outside protected areas to create new opportunities for biodiversity conservation. In some heavily impacted regions, growing recognition of the need to maintain ecosystem services and environmental stability for sustainable development generates valuable support for conservation planning and these objectives are integrated into standard planning goals.

Even in less heavily impacted regions, there is often a need to significantly expand biodiversity conservation efforts and this can best be achieved by designing biodiversity conservation plans that are consistent with sustainable development. The broad scale of ecological network approaches provides greater flexibility for reconciling biodiversity conservation with sustainable development than site-based approaches.

3. Species-based and landscape approaches

The principles of broad-scale conservation planning – scale, connectivity and resilience - are the same wherever planning takes place, but the appropriate approach will depend on the local context, available data and technical expertise and the type of

information necessary to convince decision-makers and other stakeholders.

4. Boundaries

Once a region has been identified as a conservation priority through a global or regional prioritisation process, the initial boundaries of the planning region will generally follow topographic or biogeographic boundaries (such as the limits of macro-watersheds or ecoregions). These may be adjusted to coincide with administrative or political boundaries, especially where the approach is led by government agencies or integrated into other land-use planning exercises.

5. Core areas

The backbone of an ecological network approach is a system of protected areas designed to conserve core areas. The first step in designing an ecological network is therefore the identification and prioritisation of core areas in line with the established goals. This process involves identifying a clear set of conservation targets that need to be represented in core areas (such as globally threatened and restricted range species and/ or ecosystems, depending on planning goals), mapping these species or ecosystems, and then systematically identifying the sets of core areas that would meet the specified conservation targets.

The final system of core areas should include all the areas required to meet the conservation targets (for example, effective protection of threatened species and/or representative ecosystems). Wherever possible conservation targets should be met in more than one core area (to provide insurance against the risk of destruction of any particular area). Each area should also be complementary to the other selected areas (that is, it should add value in terms of targets or their replication).

Once the system of core areas has been finalized, then protected areas are designed to conserve these areas. Protected areas should be sufficiently large to be viable over time, and boundaries should be designed to minimize edge effects so that the area is resilient in the long-term (Scott and Csuti, 1997)

6. Scale

For many species, the resulting system of protected areas will provide adequate habitat and connectivity to support viable populations, but there may be some wide-ranging species of conservation concern that are not adequately protected by the system of protected areas. The conservation plan therefore needs to be expanded to include adequate habitat to support these species. Many wide-ranging species are tolerant of a wide range of habitats, so that these additional areas may not need to be relatively intact, but could include semi-natural areas (such as some types of grazing land and managed woodland) that meet the habitat or resource needs of the species in question (Sanderson *et al*., 2002).

Identification of additional areas is based on an assessment of the habitat requirements of minimum viable populations of wide-ranging species of conservation concern. This is used to determine whether these will be adequately met through the effective protection of the selected core areas (see for example, Foreman *et al*., 2003). If not, then the next step is to describe, identify and map the additional areas required to secure the persistence of the wide-ranging species of conservation concern. Considerable research may be required as different species groups are likely to have very different needs. For example, canopy bird species may be satisfied with intermittent patches of natural or semi-natural canopy in an agroforestry landscape, whereas ground-dwelling species may need more continuous natural or semi-natural groundcover. A first approximation can be achieved by overlaying information on the home ranges of wide-ranging species on vegetation cover/ habitat maps and seeking expert recommendations on the

areas required to support the persistence of these species.

The system of protected areas will also be sufficient to protect a large number of important ecological processes and ecosystem services. However, there may be some essential ecological processes or important ecosystem services that operate at a broad scale and will not be adequately maintained by the protected area system. For example, top-level predators and megaherbivores are often wide-ranging species, and viable populations are often not supported within the system of protected areas. Broad-scale hydrological processes are often critical for the persistence of conservation targets, and are often also identified as important ecosystem services.

As discussed above, considerations of scale should also take into account disturbance patterns, such as fire and flooding. The first step is to identify those ecological processes and ecosystem services that are critically important for achieving conservation planning goals (focusing on those that occur at a broader-scale than the core areas within the system), then determine what would be necessary for their maintenance and map this where possible. As with minimum habitat requirements for viable populations, the additional area requirements for ecological processes or ecosystem services may by satisfied by semi-natural areas or compatible land/resource use areas rather than additional core areas.

7. Connectivity

While the movement patterns of many target species will be fully captured within single protected areas, some species will require some form of connectivity between core areas. For different species, connectivity may be provided by biological corridors (linear strips of habitat) or stepping stones (small patches of habitat) or, for more tolerant species, may be provided by compatible land/resource use already designated to meet scale requirements (Beier, 1993; Bennett, 1999). Connectivity networks are designed based on ecological studies and metapopulation analyses that indicate the connectivity needs of target species, combined with studies of the actual movement patterns of these species and supplemented by modelling of migration or dispersal pathways when necessary (Walker and Craighead, 1997). A useful first approximation may be gained by mapping current movement patterns for wide-ranging species, and combining this with maps of potential connecting features based on vegetation cover/ land use maps.

Designing connectivity networks is particularly challenging when there are a number of species of conservation concern that are expected to use the connectivity network (Simberloff *et al.,* 1992; Beier and Noss, 1998). One approach has been to focus on distinct biological corridors or movement pathways between core areas for a limited number of target species; another approach has been to incorporate these linkages into a wider region of connectivity across a landscape or seascape.

8. Resilience

Resilience to edge effects is built into the design of protected areas by minimising edge-to-core ratios, but the persistence of core areas can be further enhanced by promoting compatible land/ resource uses in the surrounding area. For this goal to be achieved, it is critical that these buffer areas expand the area available for biodiversity conservation rather than reduce the core area allocated to strict protection. The delineation of edge effects has proved challenging. The preferred approach is to identify the pressures on species of conservation concern associated with edge effects, seek to understand the causes of these pressures (such as micro-climatic changes that lead to increased vulnerability to fire, or increased competition from invasive species), then develop recommendations on the type and extent of compatible land/ resource use required based on this analysis. In the

interim, it may prove useful to identify potential buffer zones for core areas use based on vegetation cover/ land use maps, and to work to secure these.

The delineation of areas of compatible land/ resource use to provide buffers against advancing threats has also proved challenging. Some inferences can be made from analyses of the extent and rate of progression of impacts associated with similar threats in the past (for example, areas of habitat modification associated with infrastructure development) and areas of compatible land/ resource use designed to provide adequate buffers against these threats in the future.

9. Context matters: fragmented vs. relatively intact areas

The appropriate design process will clearly depend on local context. In particular, in regions that are already highly fragmented, such as much of Europe and densely populated or utilised regions of the tropics (for example the Atlantic Forest in Brazil), the emphasis will be on protecting remaining habitat patches, consolidating these where possible and restoring connectivity, ecological processes and ecosystem services. In many cases, some investment in the ecological restoration of critical landscape elements will be necessary (see Box 1).

Box 1: Ecological restoration

'Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.' (SER, 2002; p2)

The aim of ecological restoration is to restore an ecosystem to its pre-disturbance state or to the trajectory it was following prior to disturbance. Ecological restoration must therefore have a clear reference point – a clear description of the key characteristics of the desired ecosystem following restoration. In the simplest case, ecological restoration may require nothing more than the removal of a specific disturbance (such as pollution or a harmful and invasive exotic species), and then allowing ecological processes to bring about recovery of the ecosystem on their own. In other cases, ecological restoration will require the reintroduction of native species or other intervention to restore ecological processes. Where the reference ecosystem is associated with traditional and sustainable cultural practices, such as traditional grazing or fire management on grasslands or traditional coppicing in woodlands, ecological restoration may require restoration of these practices. In many cases, the restored ecosystem will require continued management to prevent the resumption of the disturbances that necessitated restoration in the first place.

Ecological restoration is complex and costly – it should therefore be carefully targeted at high priority ecosystems at strategic points within the conservation plan. Existing connectivity should be maintained where possible, as it is much more complex and costly to restore connectivity once it has been lost.

In contrast, in areas that are still relatively intact, such as the Congo Basin, the emphasis will be on maintaining connectivity and broad-scale ecological processes. The identification of core areas, connecting linkages and areas for compatible land use is often more straight-forward in regions that are already fragmented, as the limits of these areas are already defined and there is less flexibility. In regions that are less fragmented, planning is likely to depend more on identifying the appropriate size of core areas, based on the minimum area required to support viable

populations of wide-ranging species or to sustain broad-scale ecological processes, and on identifying and addressing threats to connectivity, such as infrastructure development plans.

10. From design to implementation

Integrating broad-scale conservation planning into other land-use planning initiatives and sectoral policies (such as agriculture, livestock and forestry policies) is critical. Ideally, conservation planning will be proposed or officially led by the relevant land use planning authority, even if conservation organisations and ecologists take the lead in actual design. Broad scale conservation planning can play an important role in integrating conservation objectives into development planning, and the design process should be designed to support that. This relationship needs to be cultivated from the beginning as it is unlikely that planning authorities will simply adopt a plan once completed. At the very least, the information needs to be made available to local land use planning authorities and integrated into base maps used for land use planning purposes. In countries that do not have a strong planning culture, other mechanisms for embedding the conservation plan into land use decision-making need to be found. In all cases, other important land use decision-makers and stakeholders need to be identified and brought into the process from an early stage.

All efforts should be made to ensure that core areas are legally recognised with biodiversity conservation as a primary goal. The preferred management category will depend on the local or national context, and the core areas may be owned and managed by government, non-governmental organizations, private landowners or local communities, but biodiversity conservation should be a management goal and this status should have legal backing. Ecological networks are an essential complement to protected areas, not a substitute.

Connectivity networks also need legal protection, with biodiversity conservation as a recognized goal, to protect them from incursions that erode their contribution to connectivity, but in many cases some level of human use will be compatible. In some countries, it may be possible to develop special regulations protecting certain landscape features (such as restrictions on development along streambanks, or conversion of remaining natural forest patches). Targeted conservation service payments, agro-environmental schemes and conservation easements, may also prove useful here.

Where the policy framework allows, planning restrictions or special planning requirements (such as more rigorous requirements for environmental impact assessments or more stringent environmental quality standards) can help to secure compatible land/resource uses in designated areas. Again, conservation easements, conservation service payments and agro-environmental schemes can be employed to promote compatible land/ resource uses. For example, Conservation International has targeted its Conservation Coffee Program at coffee farmers in high biodiversity areas, such as those in the El Triunfo Biosphere Reserve in Mexico. Local farmers receive access to higher and more stable coffee prices in return for eliminating agrochemical use, diversifying the shade canopy with native tree species, conserving on-farm forest and respecting the rules and regulations of the adjacent protected area.

In most cases, spatially specific strategies such as those described above will be strengthened by policy action at a higher level, in particular action to address perverse incentives or subsidies that encourage non-sustainable resource use. For example, where important habitat for target species is threatened by land/ resource use conflict as a result of insecure land/ resource tenure, then an appropriate strategy may include changes to national land/ resource legislation together with targeted efforts to support land/ resource titling in this habitat area.

Finally, it is important to identify potential threats to core areas and connectivity, such as new infrastructure and development zones, in advance, and to engage with government decision-makers and the private sector to develop alternatives that would meet the objectives of infrastructure/ development with less impact on conservation goals or mitigating measures.

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12 TRANSBOUNDARY PROTECTED AREAS: ISSUES FOR CONSIDERATION

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1. Introduction

Development has resulted in over-exploitation of natural resources, including biodiversity, with high levels of pollution, major changes in biomes, landscapes and ecosystems, and negative impacts on human health. Despite substantial efforts during recent decades, as witnessed by the large number of international and regional initiatives, including conventions, programmes and projects, the degradation of biological diversity continues through the impacts of unsustainable development. .

Political changes during the last decade have presented new opportunities for sustainable development under which the more sound use of natural resources is promoted. The process of social development and/or transition to the market economy in some regions has also resulted in some negative economic and social consequences, including financial crises and unemployment (Movchan Ya., 1999). Environmental matters should, therefore, be considered in a holistic manner taking into account social, ecological and economic conditions.

One of the interesting areas to which more holistic approaches can be applied is to the development of protected areas and ecocorridors (Eco-nets). Within this context, here I discuss in particular the development of transboundary protected areas (TBPAs).

2. Transboundary protected areas as instrument for biodiversity conservation.

International cooperation on establishment of the global system of transboundary protected areas, as components of programmes to strengthening or restore ecological networks, started quite recently (within the past 15 years). IUCN defines a transboundary protected area as “an areas of land and/or sea that straddles one or more boundaries between states, sub-national units such as provinces and regions, autonomous areas and/or areas beyond the limits of national sovereignty or jurisdiction, whose constituent parts are especially dedicated to the protection and maintenance of biodiversity, and of natural and associated cultural resources, and managed co-operatively through legal or other effective means”. These are essential in many areas because ecosystems and species do not always respect political boundaries.

Evidently, as the focus of conservation has moved towards landscape-scale and ecosystem approaches, together with the recognition of the importance of ecological corridors and connectivity, interest in the practical conservation benefits of transboundary protected areas has increased.

As of 2002, there were more then 170 complexes of two or more adjoining protected areas divided by international boundaries, involving a total of 669 protected areas representing 113 countries. No doubt, status of the areas and cooperation over their management vary. Some were established as official transboundary areas, but all have the potential to become formally recognised as TBPAs.

TBPAs may be established through high-level political initiatives of governments, local efforts in the field, or by intervention of the third parties such as NGOs, United Nations and academic institutions, or international conventions.

TBPAs may be single units formally declared as transboundary through legislation, but many involve two or more distinct, but adjoining, protected areas with or without cooperative management arrangements.

TBPAs are valuable in that they can combine and coordinate biodiversity conservation efforts between countries and promote the conservation of ecological services at a scale that is larger than what can be accomplished within national boundaries.

The important benefits of TBPAs, as described by the *ad hoc* technical experts on protected areas established by the CBD Conference of the Parties in 2002 include:

a) enhancing conservation of ecoregions, landscapes, ecosystems and species;

b) promoting a holistic approach with respect to zones and biomes;

c) facilitating the management of transboundary natural resources;

d) promoting international cooperation at different levels and in different fora;

e) attracting additional financing from international sources;

f) enhancing commitment from partners on local, regional and global scales;

g) facilitating more effective research;

h) bringing economic benefits to local and national economies; and

i) ensuring better cross-border control of problems such as fire, disease, biological invasion, poaching, pollution and smuggling.

Whilst TBPAs can have many benefits, their establishment must overcome difficulties related to differences between countries in legal systems, culture and capacity levels.

3. TBPAs in practice: conflicts and difficulties

The designing, establishing, management and governance of TBPAs are facing several constraints including:

- incompatible policies with regard to resource use *versus* resource protection;
- imbalances in power between partners due to different commitments of resources;
- misunderstandings based on religious or cultural differences, or language barriers;
- political tension or armed conflict;
- a lack of parity with regard to the ratification of international protocols or conventions;
- differences or conflicts in legal frameworks and provisions;
- impediments to rapid response to emergency situations where transnational consultation is required;
- difficult terrain, inaccessibility, and lack of transboundary transportation links;
- different level of professional standards in protected areas agencies and variable levels of authority given to protected area directors on each side of the border;
- technical incompatibilities in communication, fire suppression equipment, GIS systems, etc.

In the light of the process of rapid degradation of biodiversity, in common with PAs more generally, the crucial concern is maximum protection of virgin areas and minimizing the human impact on other areas as much as possible. Solutions include strengthening existing, and establishing new, TBPAs, implementation of the ecosystem approach and improving international cooperation. The following requirements can be identified:

(a) Positive dialog concerning the establishment of new TBPAs between adjacent parties bearing in mind the ecosystem approach and the importance of ecological networks.

(b) Development of collaboration with adjacent parties and countries with the aim of strengthening effective collaborative management of existing TBPAs.

(c) Harmonization of relevant national legislation with a view to facilitate the establishment and management of TBPAs, and to develop mechanisms for equitable

sharing of the costs and benefits arising from the establishment and management of TBPAs.

4. TBPAs: The Ukrainian case-study

Ukraine re-gained its independence in 1991. As a typical representative of a post-communist society, it inherited from the previous system substantial problems related to the environment, including over-exploitation of natural resources (particularly mineral deposits and bioresources), water, air and soil pollution, land erosion, and radionuclide contamination. Agricultural activity seriously degraded steppe landscapes.

It is difficult to implement sustainable development policies under favourable conditions let alone to pursue this goal in the Ukraine. The basic Ukrainian environmental policy documents have been adopted at different levels and take into consideration in principal the necessity of biodiversity conservation, maintenance of productive capacity of forest ecosystems, enhancing the contribution of natural ecosystems to the global cycle and climate stability, decreasing acidification and air pollution, and the elimination of the consequences of nuclear contamination.

Ukrainian Eco-net.

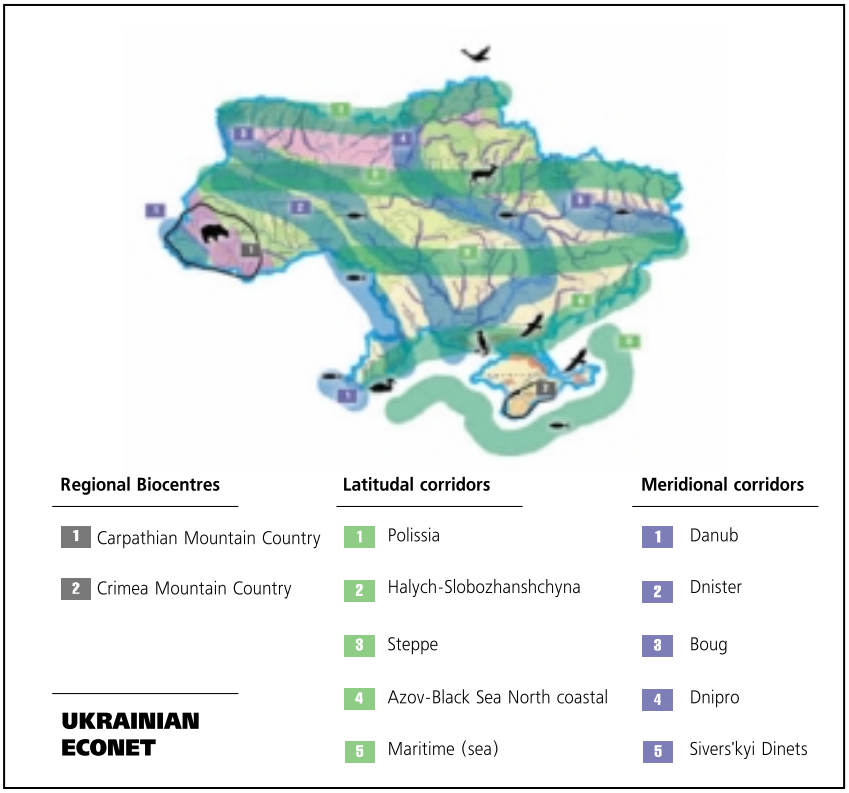
In reality, overall, environmental considerations still play a subordinated role to economic development. However, the Ukrainian environmental management system is developing rapidly and its main goal during this transitional period is to incorporate environmental concerns into economic and social development policies of the country. The State Programme of Ukraine's National Eco-network Development for Years 2000-2015 has been developed in the context of requirements related to the further refinement, improvement and development of the environmental legislation of Ukraine. This has been in line with recommendations of the Pan-European Biological and Landscape Diversity Strategy in respect of the issue of the development of pan-European Eco-net as a single spatial network of areas of European countries with natural or partly altered landscape conditions.

The conceptual scheme of Ukrainian Eco-net is represented in Figure 1.

The principal objective of this programme is to increase the area of lands under natural landscapes to a level sufficient for the preservation of their diversity close to their natural conditions. This includes the development of a territorially integrated system built to maintain natural corridors for the migration and propagation of plants and animals. The National Eco-network should meet the requirements of the Pan-European Eco-net and perform the leading functions in respect of biodiversity conservation (Мовчан Я.І., 1997). The Programme should also contribute to the balanced and sustainable use of bioresources in the economy.

One of the main tasks of the Programme is to agree upon the issues related to the transboundary integration of Eco-net elements of the neighbouring countries with elements of the National Eco-net in order to develop the Pan-European Network. The Programme provides for establishing transboundary protected areas of international importance, integration of the National Eco-net with Eco-nets of neighbouring countries that are members of the Pan-European Eco-net. This is done, for example, by setting up common transboundary elements of Eco-net within natural regions and natural corridors and agreeing upon the land use projects in border areas. The common transboundary elements of the national Eco-net will be set up in cooperation with Republic of Poland, Republic of Belarus, Russian Federation, Romania, Republic of Moldova, Slovak Republic and Hungary. The regional Convention on the Protection and Sustainable Development of the Carpathian Region (Carpathian convention) could serve as good example of a successful attempt to

Figure 1: The conceptual scheme of Ukrainian Eco-net.



co-operate in solving common environmental problems at a regional level.

Regional cooperation – Carpathian case-study:

Context:

Because of their geographic position, the Carpathian mountains are extremely important for Central Europe from social, economic, resource, climatic, hydrological and ecological viewpoints. The population of the whole Carpathian region is more than 25 million people.

The Carpathian Mountains are among the last large mountain ecosystems of Europe still preserved almost entirely in their natural state. This mountain system is a hotspot for European biological and landscape diversity. It houses more than half of the whole biodiversity of Central Europe. The largest areas of European virgin forests are preserved there, its biodiversity, as well as relief and landscape diversity, is extremely rich. The main woodland areas, which support the ecological balance, improve the climate, and together with mountain ranges, protect the sub-Carpathian southern Europe from cold winds. Several of the largest and cleanest European rivers originate there: the Tisza, Dnister (Nistry), Prut, Wisla (Vistula) and the Danube (in part). The Carpathians are also the home of many relict and endemic species of the natural flora and fauna of Central Europe. Thus, the Carpathian mountains have a Pan-European heritage.

Anthropogenic pressures in the region have reached their critical limits. The progressive destruction of forests, poaching, industrial pollution, intensification of agriculture, development of tourism, expansion of region's transport network and

other adverse impacts of economic activities have become serious threats to the unique diversity of the Carpathians and the conservation of the whole mountain ecosystem.

The situation is complicated by the lack of an effective legal mechanism for uniting efforts of all Carpathian countries under the purpose of strengthening co-operation in the field of preservation and sustainable use of the Carpathians.

Mountain ecosystems are preserves of natural biological diversity often with significant economic values. They are extremely sensitive to any anthropogenic intervention or impact. These disrupt the unstable ecological balance and result in adverse and destructive processes.

The whole Carpathian region, by its physiographic, geomorphological, hydro-logical and ecological characteristics, represents a uniform, natural ecosystem. Hydrological conditions of the area greatly depend on its vegetation, mainly forests, within the catchment. Most of the mountain landscape is sloping. Thus, economic activities in the region should be based on uniform, mutually coordinated principles and approaches.

Political setting:
The Carpathian mountains are mainly located in the territories of eight European countries: Ukraine, Slovakia, Romania, Poland, Hungary, the Czech Republic, Austria, Serbia and Montenegro. Almost all these countries face similar environmental problems in the Carpathians. Transboundary environmental impacts are also common between them.

Political borders divide the Carpathian Mountains into several distinct parts. In each of these parts, economic activities are conducted according to a level of economic development of each country and the level of its existing environmental legislation.

Due to the efforts of the countries and international organizations, including those working under auspices of the United Nations (UNEP/ROE) and the Council of Europe, significant progress was achieved during the last decade in solving the problems of environmental management in the Carpathians. Some Carpathian countries have signed bilateral and multilateral agreements on concerted actions for environmental management and sustainable use. In some Carpathian countries (including Ukraine) environmental projects were implemented for solving specific problems. Most Carpathian countries have economies in transition. The Global Environment Facility (GEF) recently outlined a framework for another important project aimed at the preservation of natural resources there. Previous international efforts did not solve the whole set of existing problems. The ecosystem of the Carpathian Mountains is still maintained in a largely uncoordinated way. There is often a lack of coordination in actions of neighbouring countries, insufficient exchange of information and many other contributing factors. The concept of a regional transboundary project, which unites scientific, public and governmental sectors of the Carpathian countries in funding joint solutions, was born in Ukraine several years ago under the preliminary title “Preserving the “Green heart” of Europe”.

Progress – a regional Convention emerges:
The Ministry of Environment and Natural Resources of Ukraine made considerable efforts in searching for possible better coordination of economic activities and environmental management in the whole Carpathian region. There were consultations, negotiations and discussions with the participation of experts and the top government officials of Hungary, Romania, Slovakia, Poland, the Czech Republic, Romania, UNEP/ROE and the GEF. Subsequently, the Carpathian Convention was signed between these countries, which Serbia and Montenegro later also joined.

The Convention includes requirements and provisions of the Convention on Biodiversity, the Pan-European Bio- and Landscape Diversity Strategy, multilateral

cooperation defined in Article 13 (vulnerable ecosystems) of Agenda 21, the Programs of Sustainable Development of mountain Regions, the Green Backbone of Central and East Europe Conference (1998), developments of the Pan-European Eco-net in Central and East Europe (preservation of natural and cultural heritage of the Carpathian Mountains), and the European Landscape Convention amongst others. Other relevant stakeholders, international organizations and funds (UNEP/ROE, UNDP, WB, GEF, WWF, IUCN, Carpathian foundation, Foundation for Development of the Carpathian region and other institutions) are invited to cooperate.

The idea was supported at many different levels. There was already an urgent need of uniting the efforts of Carpathian countries in the noble cause of preservation of this Central European mountain system and a consensus on the need for biodiversity conservation and developing sustainable environmental management in the Carpathian Mountains. Ukraine's proposals are being further developed and advanced by UNEP, which through its Regional Office for Europe, provides organizational, logistic and expert support. UNEP/ROE also agreed to act as interim Secretariat of the Convention until the Permanent Secretariat is created. Substantial support was also provided by Italy, Austria, Lichtenstein, Germany, the Netherlands and WWF.

The initiative of Ukraine in improving preservation and sustainable use of the "Green heart" of Europe (Carpathians, 2003) culminated in the Signing of the Carpathian Convention, at the Ministerial Conference "Environment for Europe" in Kyiv (May, 2003).

5. New more holistic approaches

Protected areas are being promoted that incorporate adequate attention to natural core areas, buffer zones and corridors. Attention to the following is also included: integration of conservation in sector activities such as agriculture and forestry (including using traditional management approaches), tourism (maintenance of village tourism taking into account the interests of local populations), transport (i.e. in the determination of transport corridors), fisheries based on the principles sustainability, land-use planning (establishing of zones of so-called "green lungs", taking into account urbanization and also the geographic focus of Eco-net); and the development of suitable legal frameworks.

The general approach to Eco-net is to create a framework for biodiversity conservation that includes social and economic benefits to populations and thereby promotes sustainable development.

The role of Eco-net for ecologically susceptible and strongly degraded territories, where ecological capacity is exhausted, is of a great importance. For such areas it is the only solution to crisis situations for the foreseeable future.

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13 CONSERVATION AMID CONFLICT: PROTECTED AREAS FOR PEACE AND CO-OPERATION

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Keywords: World Heritage Convention, protected areas, peace, cooperation

1. Introduction

Co-operation among protected area personnel from two or more countries sharing an international border has been attracting greater attention over the last few years. Even where relationships between national Governments are tense or have deteriorated into outright war, park staff, far away from national capitals, communicate and work across political boundaries. They, more than any others, know that species and ecosystem conservation cannot succeed within protected area boundaries set solely on the basis of political considerations. Guards, rangers and directors in sites that share transboundary ecosystems often put aside national tensions and build local and site-level relations for effective conservation.

The relationships between conservation, conflict, and peace and co-operation including in transboundary protected areas, based on experience accumulated within the framework of the Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972)is reviewed in this paper. We describe three case studies where the Convention was used to promote on-site conservation amid conflict and war. We emphasize the value-added of international co-operation made possible through the use of the Convention as a tool for conservation action.

2. The World Heritage Convention

The Convention was adopted by the General Conference of UNESCO in 1972 (UNESCO, 1972). To date, 177 States are Parties to the Convention. Articles 6 (paragraph 1) and 7 enjoin the Parties for promoting international cooperation. The Convention's contributions to nature and biodiversity conservation and protected area management are significant and have gained international recognition particularly during the last five years:

- In 1999, the United Nations Foundation (UNF) decided to target sites, designated on the basis of, or having the potential to meet natural heritage criterion (iv) and conditions of integrity described in the Operational Guidelines as a priority for grant-making under its biodiversity portfolio; and
- The Fifth World Parks Congress (8-17 September 2003; Durban, South Africa) considered World Heritage as one of the three cross-cutting themes. Links between World Heritage and protected area management figured in most of the plenary and workshop sessions convened throughout Congress.

754 sites in 129 countries are now World Heritage; 582 are cultural, 149 natural and 23 mixed (comprising cultural as well as natural World Heritage values) sites, respectively. 35 (including 18 natural sites) of the 754 sites are "World Heritage in Danger"; they face imminent threats and are priorities for international co-operation for conservation action. A World Heritage Fund, established under Article 15 of the Convention, is used to support and consolidate States Parties efforts to conserve World Heritage. The Fund currently stands at about US$ 3.5 - 4 million/year.

Substantially more financing options are necessary for establishing effective World Heritage conservation support systems. For

potential and designated sites relevant to natural heritage criteria (iv), UNF and a growing range of NGO and private sector partners play an important role in mobilizing support.

3. Protected areas for peace and co-operation

World Heritage is an important tool to identify and strengthen the management of protected areas of outstanding universal value. The 172 natural and mixed sites together include more than 500 protected areas and make up 12-13% of the world's protected areas coverage.

The Convention has been used to influence and resolve country and site-specific policy and management conflicts benefiting sites. Examples include: a Special Law enacted via Presidential Decree in the Galapagos to control and eradicate alien, invasive species; a US President intervened to compensate a mining company to prevent mineral exploitation just outside the boundary of Yellowstone; a Mexican President intervened to abandon proposals for expanding a salt-production facility that would have impacted Mexico's El Viscaino Whale Sanctuary. A compilation of these and other cases illustrating the Convention's successes could be found in Thorsell (2003).

The three cases below describe the use of the Convention as a tool for conservation in conflict zones. Two of them include opportunities for transborder co-operation that have only been partially realized so far. When peace and normalcy return these opportunities could be better exploited to generate a range of benefits.

***Plitvice Lakes National Park (Croatia)*:**
Plitvice was declared World Heritage when Croatia was still part of Yugoslavia. The site's outstanding universal value is the beauty of its cascading lakes and its old-growth forests. As Croatia declared independence from Yugoslavia in the early 1990s, Plitvice became a zone of conflict.

As the war began, Croatian park personnel were moved to Zagreb. Rumours and unconfirmed reports on the integrity of the Park circulated rampantly; rebels occupying the site were allegedly planning to blast the natural dams that regulated water flow and sustained the scenic values of the cascading lakes. Other reports alleged that old growth forests were being illegally logged.

The World Heritage Committee declared Plitvice a site in Danger in 1991 and called for an international mission to the site. In 1992, a 3-person team from UNESCO-World Heritage, IUCN and the Federation of Nature and National Parks of Europe (PNPPE) visited Zagreb and Plitvice. UN Protection Forces (UNPROFOR) in Zagreb facilitated the mission and negotiated with the rebel-groups occupying Plitvice and their commanders to allow the international team full access to the Park. UNPROFOR had placed a unit of Czech Army Officers in the Park, partly because the site was World Heritage.

The mission enabled regular follow-up contacts between UNPROFOR, UNESCO, IUCN and the Croatian authorities for regular verification of information on the state of conservation of Plitvice. The armed forces stationed at Plitvice played an important role in minimizing damage to the site during the period of conflict. When the Croatian army ultimately recaptured the region and Plitvice in 1995, there was a brief interlude when no one was responsible for law enforcement and anarchy prevailed resulting in damage to parts of the old growth forests. These violations were quickly brought under control and improvements to site-protection put in place rapidly and effectively.

In 1996, the World Heritage Committee decided that the threats to the integrity of the site were mitigated and removed Plitvice from the List of World Heritage in Danger. Plitvice is now well on its way to regain its reputation as a popular tourist destination

and contribute towards regional economic development.

Manas Wildlife Sanctuary (India):
The Manas River straddles the Bhutan-India border. This Sanctuary on the Indian side is in the State of Assam, and preserves a diverse array of forest and riparian ecosystems. It is home to important endangered species including the Asian one-horned rhino and the tiger.

In the late 1980s militants from the Bodo tribe began a campaign for a separate Bodoland in Assam. They used Manas for hiding and moved freely across the India-Bhutan border within the Park to build up an insurgency. Between 1989 and 1992, 33 rhinos were poached. The World Heritage Committee declared Manas a site "in Danger" and called for continuous monitoring and an international mission to the site.

A UNESCO-World Heritage Centre-GOI/MOEF mission to Manas was fielded in early 1997. Ecosystems of the Park were largely intact; but GOI/MOEF and Park officials conceded that the frequency of seeing wildlife had significantly reduced. Rhinos were suspected to have been totally wiped out from the Park.

The mission came up with a rehabilitation plan for the Park estimated to cost US$ 2.35 million. GOI/MOEF and the State Government of Assam agreed to provide up to US$ 2.1 million. At its annual session in 1997, the World Heritage Committee agreed to contribute US$ 235,000 from the World Heritage Fund over a 3-year period for the implementation of the plan. The Fund's contributions were earmarked for specific types of purchases and reconstruction of infrastructure that were urgent. But frequent recurrence of insurgent activity since 1997 delayed the implementation of the plan, originally expected to be completed by 2000.

At the time of the 1997 mission, rebel activity was largely confined to the World Heritage site in India. Royal Manas National Park of Bhutan across the Manas River had been minimally impacted by the insurgency. This situation changed after 1997 as the rebels began to set up camps on either side of the Manas River.

At the invitation of the GOI and the State Government of Assam a second mission to Manas was fielded in February 2002. Staff control of the Sanctuary had been re-established in the Central Bansbari Range; but Eastern and Western Ranges of the Park continued to be insurgent enclaves. Illegal felling of trees and collection of non-timber forest products were suspected to proceed unchecked in the Eastern and Western Ranges. The mission's discussions with the Royal Manas National Park in Bhutan indicated serious security concerns on the Bhutan side of the border.

Bodo militants and the Government of India have reportedly signed an agreement on 6 December 2003 and the militants are expected to lay down their arms. This is indeed good news for the conservation and rehabilitation of the Manas World Heritage site in India. Bhutan ratified the Convention in 2002 and hence possibilities for India-Bhutan co-operation under the framework of the Convention may become a reality in the coming years and the protection of the transborder Manas ecosystem as a whole could improve in comparison to the past.

The Democratic Republic of the Congo (DRC): DRC has always been a keen promoter of the Convention as a tool for international co-operation for conserving its rich biodiversity. DRC's five World Heritage sites, i.e. Virunga, Garamba, Kahuzi Biega and Salonga National Parks and Okapi Wildlife Reserve, protects ome of the most unique and biodiversity rich places on the planet. Salonga (36,000 sq. km) is perhaps the largest tropical forest protected area in Africa; it is home to the unique bonobo chimpanzee, the closest relative to man and found only in DRC. Virunga National Park is the oldest national park in Africa. It covers 8000 sq. km of savannas, lakes, mountain rainforests, active volcanoes and the snowcapped Ruwenzori "Mountains

of the Moon" and is home to the extremely rare mountain gorilla. The 6000 sq. km mountain and lowland rainforest of Kahuzi-Biega are home to the other subspecies of eastern gorilla, Grauer's gorilla, which is endemic to DRC. The 20000 sq. km Ituri forest of the Okapi Faunal Reserve, not only is the main stronghold of this endemic forest dweller that is related to the giraffe, but is also the home area of the Bambuti pygmies. Garamba National Park, on the border with the Sudan, protects the last remaining population of the northern white rhino, currently at about 30 specimens.

The "Institut Congolais pour la Conservation de la Nature" (ICCN), the national conservation agency, has long struggled to conserve the country's five World Heritage sites in the context of a deteriorating economy and weakening governance. Since 1994 conflicts in the Great Lakes region have provided an incentive for arms and ammunition to pour into DRC, threatening amongst others the integrity of all five of DRC's World Heritage sites. Displaced people, invading armies and DRC-based rebel factions have all contributed to the breakdown of law and order, uncontrolled exploitation of natural, mineral and land resources and frequent influx of refugees into sites such as Virunga.

In 1999, ICCN, in collaboration with its partner NGOs and the UNESCO World Heritage Centre began launching actions to support its staff who chose to remain and continue to perform duties in the five sites despite risks to their life and property. An experimental period of emergency assistance from the World Heritage Fund was followed by the launch of a 4-year programme: "Biodiversity Conservation in Regions of Armed Conflict: Protecting World Natural Heritage in the Democratic Republic of Congo". Most bi- and multi-lateral donors left the war-torn country; GTZ of Germany continued to support ICCN and the Salonga and Kahuzi Biega National Parks but was not ready for investments to support a new programme. Fortunately, the newly established UNF, focussing on "World Heritage Biodiversity sites" made a bold move and granted US$ 2.9 million for the 4-year programme (2000-2004).

A detailed account of the useful ways in which the UNF supported programme has contributed to World Heritage conservation in DRC could be found in Debonnet and Hillman-Smith (2003). In brief, the 4-year programme has:

(a) delivered monthly allowances and food and medical rations to site staff in all five sites; efficiency and timeliness of delivery of allowances has varied from site-to-site but the guards *know* that funds due to them for a period of 4 years have been secured;

(b) successfully tested a collaborative mechanism for establishing and implementing management priorities at the site-level; site-coordination committees or "CoCosis", have been welcomed by site staff, NGO partners and ICCN and helped designing community support activities for a Belgian project for the five sites managed by the UNESCO World Heritage Centre under the same arrangements used for the UNF programme;

(c) helped ICCN to maintain cohesion and institutional continuity by serving as an interlocutor between ICCN-Kinshasa and other ICCN-Units in Eastern DRC which were under the control of various rebel regimes between 1998 and 2001;

(d) trained staff at the site-level and in South Africa to develop skills and competencies and uplift morale during a period of uncertainty and high risks;

(e) supported biodiversity status and law enforcement performance monitoring; assessments and studies have confirmed that the northern white rhino (in Garamba) and mountain gorilla populations (in southern parts of Virunga) were stable up to 2002; encroachments in Virunga were mapped and a rehabilitation plan developed;

(f) organized several technical/ diplomatic missions to DRC, Uganda and Rwanda and provided annual state of conservation reports on the 5 DRC to the World Heritage Committee; Committee

recommendations and appeals for respect to the integrity of World Heritage sites were widely disseminated among Governments and all other parties involved in the conflict; an example of the impact of such basic communication and diplomatic work is the eviction of illegal coltan miners from Okapi by joint actions of an NGO partner and the occupying army in the Okapi Wildlife Reserve; and

(g) provided continuous encouragement to staff in Southern Virunga to continue co-operating with counterparts in Uganda (Bwindi, a World Heritage site and Maghahinga National Park) and Rwanda (Volcans National Park) to undertake studies, surveys and field operations for the conservation of the mountain gorilla; UNESCO World Heritage Centre was able to influence a UNESCO-European Space Agency (ESA) programme to focus on mountain gorilla habitat change as a pilot project. The latter project has attracted Belgian Universities and now provides training on satellite imagery and GIS based mapping techniques for ICCN staff and other specialists from DRC, Rwanda and Uganda.

4. Lessons learned as conclusions

- Each conflict zone is different and has its specific opportunities and limitations for conservation action. Even where the Government in power had lost control of large parts of the country, as in DRC, long-term NGO/ICCN/site-staff alliances could work with UN to launch conservation actions. Site-based long-term NGO partnerships that have international linkages seem to insure against isolation during periods of conflict. World Heritage status provides a better justification for UN sponsored conservation interventions in conflict zones;
- Verifiable information on conservation status of sites in conflict zones is important. Regular reporting on sites to intergovernmental bodies like the World Heritage Committee to derive and communicate recommendations for specific actions from concerned Governments and other parties involved in the conflict is necessary and useful;
- In conflict zones maintaining minimal law enforcement for protection of designated areas, though difficult, is essential; presence of site staff, NGOs and partners and other conservation and community support groups could minimize the damage to World Heritage and protected area values. Both in Manas and in the DRC continued presence of staff had played a critical role in limiting damage during the conflict periods. In Plitvice the special UNPROFOR Unit had the same effect;
- In India and DRC strong institutional framework and commitment from staff had been built over a long-period of time and played a significant role in ensuring site-presence during times of conflict. Role of protected area staff in biodiversity conservation is often undervalued in international forums. The case of DRC and India clearly call for more emphasis on building sound protected area management institutions and committed professionals at site and country levels;
- The "CoCoSi" in DRC is turning out to be a unique and unexpected achievement. ICCN Kinshasa is adopting it as a model for developing a "CoCoCongo" (Conservation Coalition for Congo) at the national level for co-ordinating all donor negotiations related to protected area management in DRC;
- UN based institutions and networks can be effective in conflict zones, particularly if they work Government agencies that have a long-term history within the country and with NGO partners who are committed to the protection of sites; UN sponsored diplomatic and technical missions can have an impact on decision making of civilian and military leaders; and

- Opportunities for actively pursuing transborder co-operation in conflict zones are limited. Attempts must be made to keep the status quo of activities that existed prior to the onset of conflict. Transborder co-operation between India and Manas would be easy to facilitate if the Bodo insurgency ends. Discussions between DRC, Rwanda and Uganda to explore ways and means of including Maghahinga (Uganda) and Volcans (Rwanda) as part of Virunga (DRC) and Bwindi (Uganda) World Heritage sites have started. If successful such a measure would greatly strengthen transborder protection of mountain gorilla habitats. It would also provide a good example of how an international convention could serve as a tool for promoting transborder co-operation for protected areas planning and management in post-conflict zones.

We conclude by placing special emphasis on the critical need to better support the role of protected areas staff in biodiversity conservation. Considerations of human dimensions of protected area management are skewed towards communities and protected area personnel are often left out of the people part of the equation. One of the ways by which protected areas can contribute to sustainable development of regions and nations is through being an employment generator in rural and marginal areas. If protected areas management is a field that provides competitive career options for current and future generations, then its role in sustainable development could become clear and evident. Improving working conditions and career prospects of parks personnel demand innovations if the 12% of the world's area now contained in protected areas is to serve as anchors for sustainable development.

14 PROTECTED AREAS AND PEOPLE: PARTICIPATORY CONSERVATION

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1. Introduction

Parties to the Convention on Biological Diversity (CBD) are considering, at the 7th meeting of the Conference of Parties (COP) in Kuala Lumpur, a Programme of Work on protected areas. One key element of this is on Governance, Participation, Equity, and Benefit-sharing. This element contains a number of specific recommendations for action, and it is important for parties to have adequate guidance on how they can move forward to implement these.

It is also important to place the COP discussions on this Programme of Work in the context of the recently held World Parks Congress (September 2003). Here, about 4000 delegates issued a declaration that squarely put indigenous peoples and local communities at the centre of conservation planning. They also strongly emphasised the need to put protected areas (PAs) in the context of the larger landscape, addressing issues of poverty and development, governance and empowerment, benefit- and cost-sharing all of this in order to achieve more effective protection for threatened ecosystems and species.

2. Why participatory conservation?

Participatory conservation has become an imperative for the following reasons:

- Local people have had long-standing traditions of conservation and restrained resource use, which the conventional model of PAs tends to ignore. The opportunity of utilising such traditions and knowledge is being lost, as is the chance of actually making conservation a mass movement.
- In most situations, communities have customary and traditional rights to land and resources, and the denial of such rights is unjust and violative of basic human rights.
- The negative consequences of PAs on local people (physical displacement, denial of access to resources that have been traditionally used, alienation from sites of cultural value, and human rights violations), have generated considerable hostility and decreasing public support for PAs. Unless it can be shown that PAs have benefits for people, or are in some way linked to their lives, this decline could continue to the detriment of the PAs themselves.
- The focus on PAs as islands of conservation, with increasingly destructive land use around them, is becoming self-defeatist. Classic examples include wetlands that are protected, only to have their biodiversity being destroyed by pesticide and fertiliser run-offs from their agricultural surrounds. Involving people in surrounding areas, in land/water uses that are compatible, therefore becomes a necessity.

Evidence from a range of situations around the world (see box below) suggests that these issues can be effectively tackled by involving indigenous peoples and local communities in the conceptualisation and management of PAs, and recognising their own diverse initiatives towards conservation.

3. Towards participatory conservation: collaborative management and community conserved areas

There are two broad trends in participatory conservation (as illustrated in the box below):

(i). The increasing role of indigenous peoples and local communities in the management of government-managed PAs, with sharing of decision-making power (*Collaborative Management of Protected Areas*);

(ii). The recognition of the biodiversity significance of territories managed by such peoples and communities largely on their own (*Community Conserved Areas*).

Of these, the concept of "community conserved areas" (CCAs) is relatively new. These are sites of biodiversity significance that are effectively conserved by indigenous peoples or local communities (many of them pre-dating modern PAs by several millennia!). There are probably thousands of such CCAs around the world, with significant coverage of natural ecosystems and wildlife populations. Yet they have remained largely neglected by governments and international conservation NGOs. Box 1 contains some examples of case studies on collaborative protected area management (CMPA) and community conserved areas (CCAs) 7.

7 For a compilation of several more such cases, please see *Policy Matters* (Journal of the IUCN Commission on Environmental, Economic, and Social Policy), No. 12, 2003 (available at http://www.iucn.org/themes/ceesp/Publications/Publications.htm). For a synthesis report of regional reviews, see "Community conserved areas (CCAs) and co-managed protected areas (CMPAs)-towards equitable and effective conservation in the context of global change", Report of TILCEPA for the Ecosystem, Protected Areas and People (EPP) project (April 2003 draft), by Grazia Borrini-Feyerabend (http://www.iucn.org/themes/ceesp/Wkg_grp/TILCEPA/community.htm#epp). The cases in this box draw on documents written by Marco Bassi, Gonzalo Oviedo, J.P. Gladu, Vivienne Solis and colleagues, J. Nelson, N. Gami, Dermot Smyth, M. Merlo and colleagues, S. Jeanrenaud, Neema Pathak, and Ashish Kothari.

4. Tips for successful participatory conservation

The above and other examples have yielded valuable lessons on what to do, and what to avoid, while moving towards participatory conservation. Some key lessons that would be relevant for national protected area agencies:

Learn from history: In particular, PA managers can learn from the successes and failures of the past, especially of the wise traditional use of resources by many communities, of the record of centralised state control that often alienated such communities from their resources, and of the changes taking place in land/water use and people-nature relations over centuries.

Provide secure tenure to survival and livelihood resources: In many countries, communities have been dispossessed of their lands or resources, leading to breakdown of conservation and sustainability traditions and institutions. Reviving or providing security of access to lands and resources, is therefore an essential (though not necessarily sufficient) step in creating long-term stake in conservation.

Clarify roles of all partners: All partners to a participatory conservation arrangement, and in particular the local communities and the official agencies, need to be clear about their respective roles. This would need to include the customary/traditional rights of local communities to land/resources and concomitantly, their responsibility for conservation.

Box 1: Collaborative Protected Area Management and Community Conserved Areas: Case Studies from Six Continents

Gurig National Park (Australia)
In 1981, the establishment of Gurig National Park was agreed to by the Northern Territory Government and the Aboriginal traditional owners, to resolve a pending land claim under the Aboriginal Land Rights Act. The traditional owners consented to the establishment of the National Park in return to regaining title and the right to use and occupy it. A Board of Management comprising traditional land owners and Northern Territory Government representatives, prepares the management plan, enforces the rights of local owners, determines rights of access to others, and ensures protection of sites important for the aboriginal population. Australian law also recognises several Indigenous Protected Areas, controlled by aboriginal peoples.

Alto Fragua-Indiwasi (Colombia)
The Alto Fragua-Indiwasi National Park was created in February 2002, after negotiations amongst the Colombian government, the Association of Indigenous Ingano Councils and the Amazon Conservation Team, an environmental NGO. The Park protects endangered humid sub-Andean forests, endemic species such as the spectacled bear (*Tremarctos ornatus*), and sacred sites of unique cultural value. The Ingano are principal actors in the design and management of the park, the first such instance in the country.

Tayna Gorilla Reserve (Democratic Republic of Congo)
The Tayna Gorilla Reserve of 800 sq km was created in 1999 through a formal agreement between the customary landholders, government and NGOs. Communities have been directly involved in the development of the Reserve's management plan, which emphasises conservation with rural development. Key challenges are the prevention of unauthorized resource uses by outsiders during periods of political instability, and the engagement of the local Pygmy population, so far been neglected in the co-management process.

Forole (Kenya-Ethiopia)
Forole is a sacred mountain between Kenya and Ethiopia, whose trees are totally protected by the Gabbra people. The lower part of the mountain provides permanent water and it is used as reserve grazing area by Gabbra and Borana pastoralists. Although there is sometimes tension over pastoral resources, the Borana fully respect the sacredness of Forole mountain and the inherent restrictions. This is an example of a community conserved area not univocally associated to a single ethnic group, and engaging local actors in complex economic and symbolic relationships.

Gwaii Haanas (Canada)
The Gwaii Haanas National Park Reserve, located in Queen Charlotte Islands, was established in 1986 under an agreement between Parks Canada and the Council of the Haida Nation. The Haida initiated the process, after their land and culture started to disappear due to heavy logging. Gwaii Haanas is now governed by a joint Management Board, and its establishment park has promoted a shift in the local economy from logging to tourism. Employment opportunities have also been created by the Park, with over 50% of staff being Haida people.

Mendha-Lekha and Jardhargaon (India)
Mendha-Lekha village in central India protects nearly 2000 hectares of forest containing threatened wildlife species. The forest belongs to the state, but it is the village that has staved off threats including timber logging and submergence by a dam. Mendha-Lekha's inhabitants have also declared "tribal self-rule", and practice a strong form of consensus democracy involving all adult members. Jardhargaon village in the Himalayan foothills of northern India, has over the last two decades protected 600 hectares of broad-leaved forest through a self-initiated Forest Protection Committee. Several dozen villages in other parts of the Himalaya conserve hundreds of square km of forest, under traditional arrangements of their own or

recognised by the state. These examples represent thousands of community conserved areas across South Asia, mostly not part of the government PA system.

Val di Fiemme (Italy)
Long-established traditions of community forestry in the North of Italy date from the Middle Ages, and in some places such as the Val di Fiemme (Magnifica Comunità di Cadore), were maintained thanks to the struggles of local residents against the state that wished to incorporate all forests into the national *demanio*. The forest-managing institutions are still strong and characterised by a spirit of mutual assistance and solidarity. Legally, the forest is owned by all people of the Vald di Fiemme. Community forests are inalienable, indivisible and collectively owned and managed, and the result is a continuing high quality of the ecosystems, with significant biodiversity values.

Initiate a process of dialogue: Oft-times, genuine and open dialogue amongst various 'rightholders' and stakeholders is missing, leading to misunderstandings and lost opportunities to bring their respective strengths together. Such regular dialogue at local, regional, and national levels is needed to reduce stereotypes, increase understanding, and arrive at mutually acceptable ways forward.

Encourage ecologically sensitive livelihoods: Clearly some traditional livelihoods are compatible with conservation objectives, while others may be detrimental. The former need encouragement and support, the latter need alternative approaches. In all cases, the search for secure livelihoods is important to tackle real poverty, and to link people's lives with conservation.

Distribute costs and benefits more equitably: Given that most costs of conservation are borne by local people and most benefits go to 'outsiders', a more equitable sharing of costs and benefits is urgently needed. This should include tackling human-wildlife conflicts, channelling conservation benefits to local people, and other such steps.

Create empowered institutions: A single bureaucratic or scientific agency managing PAs is often not sustainable. There is a need for much more participatory institutions**,** such as joint management boards, village conservation committees, and so on. These should provide a clear say to local people in decision-making, and build on relevant traditional institutions.

Provide firm legal backing to the initiative: Informal participatory conservation initiatives can be powerful and successful, but don't often last long. Legal backing**,** through statutory or customary law or both, can be one element in providing such long-term sustenance.

Build on traditional knowledge, provide modern inputs sensitively: There is much in traditional practices and knowledge from which modern conservation can learn, and much in modern conservation science that traditional communities can benefit from**.** A judicious mix of the two, with neither dominating, needs to be attempted.

Set up accessible and transparent dispute resolution mechanisms: Disputes amongst community members, or between communities and others including official agencies, are commonplace in participatory conservation initiatives. Transparent and accessible mechanisms to resolve such disputes, including through third party mediation, are a good investment.

Ensure public right to information: Secrecy about conservation and development programmes (including budgets) is one major reason for suspicion and misunderstanding. Citizens, in particular

local communities, must have full access to all aspects of the conservation initiative, and developmental inputs that have a bearing on it.

Consider various forms of PA governance: One of the clear messages from the World Parks Congress was that PAs can be governed not only by the federal or central government of a country, but also by communities, NGOs, local governments, private entities, and combinations of these. A country's PA network should therefore be able to accommodate, as appropriate to the situation, collaboratively managed PAs, community conserved areas (CCAs), private reserves, etc. (see, for instance, note on how CCAs fit each of the IUCN PA categories, at www.iucn.org/themes/ceesp/wkg_grp/TILCEPA/WPC/TILCEPA%20CCA%20mandate%20and%20work06.03.03.doc)

Adapt to site-specific situations: Given the enormous ecological, cultural, economic, and political diversity within which PAs are located, a uniform legal and programmatic approach for an entire country or region is counter-productive. PA policies and programmes need to be open and sensitive to such local conditions, perhaps by prescribing only a broad framework of values. This built-in flexibility should promote creativity, but also contain checks against misuse.

Build capacity: Participatory conservation being a relatively new phenomenon in many countries, capacity of several kinds needs to be built, of officials to deal with community issues, of communities to deal with conservation responsibilities and new institutions, and so on.

Be sensitive to cultural and spiritual values: While the scientific value of PAs is undoubtedly important, there are often also intangible cultural and spiritual values assigned by communities to landscapes/seascapes, ecosystems and species. These need to be respected and promoted.

Resist destructive 'development' and commercial pressures: Many participatory conservation initiatives have failed due to the larger pressures of 'development' or commerce that the site or participatory agencies have been subjected to. Such processes that impinge on the conservation values of protected areas, or undermine community abilities to conserve and manage, need to be strongly resisted. Given that in many cases some parts of the government itself are promoting such destructive processes, this can be quite tricky, but conservation agencies need to put their foot down on such matters!

Treat conservation as a process, not a project: Short-term projects aimed at achieving participatory conservation are often unsuccessful because they try to force an artificial pace or achieve impractical targets. Experience from successful community-based initiatives strongly suggests that a long-term *process* is important, keeping in mind the varying pace of communities, the need to build sustainable institutional arrangements, and so on.

Integrate steps to tackle inequities within and outside communities: Communities are not internally homogenous; many of them can contain severe inequities of gender, class, caste, ethnicity, age, and other factors. Conservation initiatives need to consciously understand and attempt reducing these inequities, such as for instance providing special decision-making status or benefits to the 'disprivileged' sections.

Monitor the results of the initiative: From the first step itself, monitoring of the ecological, social, economic, and political impacts of the initiative needs to be initiated. This necessitates good baseline information, and continuous, participatory assessments of the changes in this baseline. It also means

the ability to change elements of the initiative should it be found that conservation and livelihood objectives are not being met.

Be aware of pitfalls, challenges, and threats: Participatory conservation is not a panacea to fit all situations; it needs to be put into place and in a way that is appropriate to the local situation. And in particular, caution is warranted regarding vested interests that could undermine the initiative.

5. What next?

Adoption of a forward-looking Programme of Work on PAs, by the 7th meeting of the Conference of Parties, will lead to a strong push for participatory conservation around the world. The following steps could be taken by national conservation agencies:

- Document and learn lessons from existing initiatives at participatory conservation, including from case study material already available;
- Exchange experience and information related to successful and failed attempts, with each other (perhaps through the clearing-house mechanism, and of course bilaterally);
- Invite indigenous peoples and local community organisations, NGOs, and individual experts to provide evidence and ideas that would help build strong national programmes;
- Adopt or strengthen policies, laws, and programmes of participatory conservation; in particular, move towards more equitable relationships with indigenous peoples and local communities, and the recognition of the importance of Community Conserved Areas.

15 GOVERNANCE OF PROTECTED AREAS, PARTICIPATION AND EQUITY

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1. Introduction

The management of protected areas (PAs) has often been based on models that exclude the local resident populations and perceive their concerns as incompatible with conservation. While the IUCN PA categories V and VI are conceived to be more inclusive of human communities, virtually all IUCN categories (i.e. all main PA management objectives) can be compatible with resident or user communities, whose presence can be regarded as a conservation asset rather than a liability. How can this be?

A relatively new concept in the conservation field, which rose to prominence in the Vth World Parks Congress in Durban (September 2003), can help us understand this. This is the concept of "governance" of protected areas.

2. Description of governance

Governance is about power, relationships, responsibility and accountability. Some define it as "the interactions among structures, processes and traditions that determine how power is exercised, how decisions are taken on issues of public concern, and how citizens or other stakeholders have their say" (Graham et al., 2003). In a protected area context, a basic understanding of governance refers to "who holds management authority and responsibility and can be held accountable according to legal, customary or otherwise legitimate rights". In this sense, governance is crucial for the achievement of protected area objectives (management effectiveness), determines the sharing of relevant cost and benefits (management equity), is key to preventing or solving social conflicts, and affects the generation and sustenance of community, political and financial support.

In a bold way we could affirm that one of the main messages coming from the 2003 Durban Congress is the following: *the interests and concerns of indigenous, mobile and local communities are likely to be compatible with conservation if and when fair and effective PA governance mechanisms are in place.*

Two main aspect of PA governance i.e. (i) type and (ii) quality (the so-called "good governance" principles) have been examined in the literature and at the Durban Congress.

2.1 PA governance "types"

Defined on the basis of "who holds management authority and responsibility and can be held accountable", four main PA governance "types" can be identified, including:

A. Government managed protected areas;
B. Co-managed protected areas;
C. Private protected areas;
D. Community conserved areas.

Most conservationists are familiar with ***type A governance***, where a government body (such as a Park Agency or a para-statal institution responding directly to the government) is in charge of management and often also owns the PA's land and relevant resources. Recently, sub-national and municipal government bodies have also become prominent in declaring and managing their own protected areas. In some cases, the state retains control of

protected areas but delegates their management to an NGO.

Type B governance is also quite common, responding to the variety of interlocked entitlements recognised by democratic societies. Complex processes and institutional mechanisms are generally employed to share management authority and responsibility among a plurality of actors—from national to sub-national government authorities, from representatives of indigenous, mobile and local communities to user associations, private entrepreneurs and land-owners. An emerging subgroup of type B comprises land recently "restituted" by the state to their legitimate community owners and still retained under a protected status under explicit contractual agreements. Other sub-types of type B governance can be identified, but all are characterised by the need to achieve some form of consensus/ compromise among a plurality of social actors.

Type C governance has a relatively long history, as kings and aristocracies always preserved for themselves certain areas of land or the privilege to hunt wildlife. Such private reserves had important secondary conservation benefits. Today, private ownership is still an enormously important force in conservation. NGOs have been buying and dedicating large territories to conservation purposes. And many individual landowners pursue conservation objectives out of respect for the land, a desire to maintain its beauty and ecological value or utilitarian purposes, such as gaining from ecotourism or reducing their levies and taxes.

The governance type with which many conservation professionals may not be entirely familiar is ***type D***, i.e. governance by indigenous, mobile and local communities. Yet, this is the oldest form of governance of natural resources on the planet, and it is still widespread. Throughout the world and over thousands of years, human communities have shaped their lifestyles and livelihood strategies to respond to the opportunities and challenges presented by their surrounding land and natural resources. In so doing, they simultaneously managed, conserved, modified, and often enriched their environments.

2.2. Community Conserved Areas (type d governance) - compatibility with protected area definitions

In many cases, community interaction with the environment generated a sort of symbiosis, which some refer to as "bio-cultural units" or "cultural landscapes/seascapes". Importantly, much of this interaction happened not for the intentional conservation of biodiversity but because of a variety of interlocked objectives and values (spiritual, religious, security-related, survival-related) which did, however, result in the conservation of ecosystems, species and ecosystem-related services. In this sense, the governance type D or Community Conserved Areas (CCAs)— comprises "natural and modified ecosystems including significant biodiversity, ecological services and cultural values voluntarily conserved by concerned indigenous, mobile and local communities through customary laws or other effective means". In CCAs, authority and responsibility rest with the communities through a variety of forms of ethnic governance or locally agreed organisations and rules. Land and resources are usually collectively managed, a fact that may or may not have been legally sanctioned in the specific national context, but is fully compatible with the CBD definition of protected area.

2.3. "Re-discovering" community conserved areas

Community conserved areas can only be understood within a particular historical and social context, often as indicators of institutional continuity, strength or change.

Modernization processes occurring throughout the world have devalued the existence of indigenous, mobile and local communities and the roles they play in natural resource management. Their current "re-discovery"— which should remain critical and aware of the constraints and pitfalls faced by communities and their CCAs— is part of a movement that uplifts cultural diversity and human rights. With the renewed acknowledgement of CCAs, Co-managed Protected Areas (CMPAs) are also being increasingly appreciated as crucial for the engagement of communities in conservation. The governance of CMPAs is generally process-oriented and based on sophisticated institutional settings, often combining consensus-based and majority-based decision-making by various organisations at various levels.

3. Human communities: assets or liability?

Getting back to the crucial question of how the presence of resident or user human communities in protected areas can be regarded as conservation asset rather than a liability, we shall first consider whether the governance type in place is fair and effective in the light of historical conditions, customary and legal rights and impact on the relevant communities. As demonstrated by the case examples presented in the Durban Congress and described in the literature (Borrini-Feyerabend, 2003; IUCN, 2003), many conflicts between PAs and communities could be avoided and replaced by cooperation if the latter would be recognised as rightful co-managers or managers of the natural resources on which they depend for livelihoods and cultural identity. In other words, what makes the difference is the effective and meaningful participation of the relevant communities in the governance of the land and resources to be conserved. Secondly, we shall address the quality of PA governance in place. For both individual sites and national system this can only start from an assessment of the PA governance situation in place by the actors most directly interested and affected (Abrams *et al.*, 2003).

3.1. Principles of "good governance"

A number of ***principles of "good governance"*** (see Table 1) can provide useful criteria for this exercise as compared to the United Nations Principles and other broadly accepted goals and rules of conduct on which they are based8. Paramount among those is the principle of "*do no harm!*" through the respect of human rights, including the rights of indigenous, mobile and local communities. As the Millennium Development Goals explicitly aim at the eradication of poverty, conservation policy and practice also need to follow suit, and refrain from being a cause of impoverishment for disadvantaged communities.

Other useful principles, developed primarily by UN bodies, are "*legitimacy and voice*"— the capacity of men and women to influence decisions, built on freedom of association and speech, and "*subsidiarity*"— attributing management authority and responsibility to the institutions closest to the resources at stake. This latter tenet derives from a number of religious and cultural traditions and is now enshrined in European Community Law. Further principles include "*fairness*"—the equitable sharing of costs and benefits of conservation and possibility to recourse to impartial justice, "*accountability*"— ensuring a transparent flow of information on processes and institutions, with decision-makers assuming responsibility for their choices; "*performance*"—meeting the needs and concerns of all stakeholders while making a wise use of resources, and "*direction*"— grounding long-term conservation strategies on ecological, historical, social and cultural

8 See, among others, the Universal Declaration of Human Rights, the Convention on Biological Diversity, the Arhus Convention, the ILO Convention No 169, the UN Draft Declaration on the Rights of Indigenous Peoples, the UN Conference on Governance for Sustainable Growth and Equity.

complexities. All of the above can be subsumed under the principle of *equity*. Practicing equity in conservation can be effectively understood as *"striving towards policy, practice and institutions that respect and uphold the good governance principles"*.

Table 1: Practising equity in conservation—proposed principles of good governance for Protected Areas

Principles of good governance for protected areas	The United Nations Principles and other broadly accepted goals and rules of conduct on which they are based
1. "Do no harm! "	Universal Declaration of Human Rights. Millennium Development Goals.
2. Legitimacy and voice	Participation in governance (Millennium Declaration). Consensus orientation.
3. Subsidiarity	Subsidiarity.
4. Fairness	Fair and equitable sharing of the benefits arising out of the utilization of genetic resources (CBD). Rule of law.
5. Accountability	Accountability and transparency.
6. Performance	Responsiveness. Effectiveness and efficiency.
7. Direction	Strategic vision. Embracing complexities.

4. Types of governance and IUCN management categories

How the analysis of governance type and quality can best fit the existing understanding of protected areas? In Table 2, governance type is described as a complementary dimension to the IUCN/WCPA category system (see also chapter 4 in this volume; IUCN, 1994). In fact, the main governance types are category-neutral, as protected areas exist that fill each possible combination of management category and governance type. This is true even for the extreme cases, such as category I (wildness area) as some of the most valuable wilderness areas correspond to the territories under the control of un-contacted peoples, in the Amazon and other forests in the Tropics. It can also be considered that "adhering to good governance principles" represents an aim for the governance dimension as "achieving management effectiveness" does for the category dimension.

Table 2: A classification system for protected areas comprising both management category and governance type

Governance type / IUCN Category (key management objective)	A. Government Managed Protected Areas			B. Co-managed Protected Areas			C. Private Protected Areas			D Community Conserved Areas	
	Federal or national ministry or agency in charge	Local/ municipal ministry or agency in change	Government-delegated management (e.g. to an NGO)	Trans-boundary management	Collaborative management (various forms of pluralist influence)	Joint management (pluralist management board)	Declared and run by individual land-owner	…by non-profit organisations (e.g. NGOs, universities, etc.)	…by for profit organisations (e.g. individual or corporate land-owners)	Declared and run by Indigenous Peoples	Declared and run by Local communities
I - Strict Nature Reserve/ Wilderness Area											
II – National Park (ecosystem protection; protection of cultural values)											
III – Natural Monument											
IV – Habitat/ Species Management											
V – Protected Landscape/ Seascape											
VI – Managed Resource											

What are the advantages of seeking equity in conservation by embracing different governance types and good governance principles? Many national protected areas systems are ambitious—they have been enlarging their size and scope while development initiatives kept restricting the space for community livelihoods and cultural survival. Globally, the conservation challenge involves uplifting and improving the management of existing protected areas, closing the gaps for specific ecosystems and species and ensuring physical connectivity among PAs. At the national level, a system comprising protected areas under various governance

types and mindful of good governance principles would have better chances of accomplishing all that. As it could include indigenous territories and areas under community control and/or private ownership, it would be more complete and able to address connectivity gaps. In turn, a more complete system would be more resilient, responsive and adaptive, i.e. more sustainable. In situations where communities have a direct or shared governance responsibility, the system would benefit from otherwise unavailable local knowledge, skills, resources and institutions. And it could better promote respect, communication, support and joint learning amongst PA managers under different governance types. Last but not least, the system could allow more people to benefit from conservation, including through more secure livelihoods.

The engagement towards equity in conservation through more and better attention to PA governance is not a panacea. But it can make the difference between social harmony and conflicts, and between decent livelihoods and destitution for the relevant communities. The parties in the CBD demonstrated great foresight in electing this as a full element of their work plan for protected areas.

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16 PROTECTED AREAS AND INDIGENOUS AND LOCAL COMMUNITIES

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1. Introduction[9]

Many of the world's most biodiverse areas are also the most culturally diverse. Indigenous and local communities around the world have developed complex cultures and lifestyles in response to the many rich and diverse ecosystems on which they depend for their livelihoods. In doing so, they have also modified these ecosystems to suit their own needs and purposes over many generations to the extent that both the people and the ecosystems have become mutually dependent. Effectively, what has been created are "biocultural landscapes" in which humans should be considered as necessary components of the ecosystems which comprise such landscapes. Ecosystem changes, such as those induced by clearing of vegetation, unsustainable harvesting of bushmeat, and poaching can create changes in the lifestyles of the people that depend on them. Likewise, removal of the traditional inhabitants and their traditional ways of managing their local environments can precipitate changes in local ecosystems, for example, through changes in species composition, unchecked pest infestations, and relationships between species.

2. Indigenous and local community involvement in protected areas

Indigenous peoples are owners and co-managers of considerable areas of land designated as protected areas. As yet no systematic, complete data exist on how many protected areas around the world overlap with traditional lands and resources of indigenous and traditional peoples (Oviedo 2002). Nevertheless, it is estimated that perhaps more than 50% of existing protected areas have been established on the ancestral domains of indigenous and local communities. Millions of indigenous people live within protected area boundaries. This is particularly the case in the developing world. One review concluded that 86% of protected areas in Latin America, 69% in India, and 70% worldwide are inhabited, and the great majority of these inhabitants are indigenous or traditional peoples practising subsistence economies. In South America, 80% of the protected areas, and 85% in Central America have indigenous peoples living inside them. This situation is also true in a number of countries in the developed world, such as Canada, the United States, Australia and New Zealand.

In a review of 82 protected areas overlapping with lands and waters traditionally occupied or used by indigenous and local communities classified by international category and region, Oviedo (2002) reported that the largest group of areas corresponds to Category II (National Parks) with 33 areas representing 40% of the total. This contrasts with Categories Ib, III and V, in which only one area was recorded in each. Categories following in importance in this classification are Category IV: Habitat/Species Management Areas (12.2%), Category VI: Managed Resource Areas (8.5%) and Category Ia: Strict Nature Reserves (7.3%). Oviedo also notes that there is a group of areas not classified by

9 This paper is based on document UNEP/CBD/AHTEG–PA/1/INF/3 on "Protected areas: Their role in the Maintenance of Biological and Cultural Diversity". Accessible at http://www.biodiv.org/doc/meetings/pa/tegpa-01/information/tegpa-01-inf-03-en.pdf

international category as per the 1997 list (14.6%), in most cases because their national category doesn't have a clear correspondence with the International System according to the criteria of the respective governments, or because they have been declared after compilation of the 1997 list (Oviedo, 2002).

Oviedo, while noting that Category II: National Parks has by far the highest proportion of protected areas overlapping lands and waters traditionally occupied or used by indigenous and local communities, and also explicitly addresses issues relating to indigenous and local communities in its description, suggests that Categories V and VI seem to be the most useful ones for addressing the interests of indigenous and local communities, given their emphasis on sustainable practices and the humans-nature relationship that is built into their definitions (Oviedo, 2002)

However, the establishment of protected areas has often been carried out with little regard for the situation of the indigenous and local communities that inhabit them. Traditional customary land and resource rights have often been sacrificed to the narrow conservation objectives of protected areas, and newly-imposed management and control systems have frequently overridden traditional authorities and institutions, and in some instances have led to confrontation and violence (see Oviedo, 2002). As a result, many indigenous and local communities have been left in a situation in which the establishment of protected areas has very often aggravated their conditions of deprivation, poverty, marginalization, social exclusion and cultural erosion, not only because of the restrictions or loss of access to natural resources, but also because of disadvantages when relocated to other marginal lands or moving to cities as migrants (Oviedo and Sylva, 1994; Oviedo, 2002).

The irony of this situation cannot be ignored. Indigenous and local communities in many parts of the world traditionally set aside and restricted access to certain areas, for example, for religious, ceremonial and conservation purposes, in effect creating their own systems of protected areas. These predate by many centuries, if not millennia, the Yellowstone model which has dominated national and international legislation and policies on protected areas throughout most of the last century. The strategy behind the establishment of protected areas based on the Yellowstone model lies in setting aside lands and waters and forbidding or strictly regulating human access and uses of them. The groves, mountains, rivers and lakes held sacred by indigenous and local communities, or areas subject to seasonal closures because of their importance as nesting, breeding or spawning grounds, were often particularly important for biological, ecological, landscape, or fragility reasons. In other words, very much the same criteria were often applied for the identification of protected areas as underwrite the declaration of contemporary protected areas by national and sub-national governments. Similarly, areas of particular traditional significance would normally be under the authority of traditional institutions or spiritual leaders vested with "statutory" powers, and a body of customary regulations and norms would usually be defined and enforced to ensure compliance with rules governing traditional access to and use of the resources of such areas (Oviedo, 2002).

Protected areas are one of the primary tools for *in situ* biodiversity conservation, yet in situations where they overlap lands and waters traditionally occupied or used by indigenous and local communities, they face conflicts that could seriously threaten their effectiveness. However, the protected-areas model is experiencing rapid and profound evolution, and there is nowadays growing support for a new protected-areas paradigm of social sensitivity and inclusiveness, flexibility in approaches, and integration with local development aspirations (Oviedo, 2002). Properly planned and managed, and with the participation and involvement of the traditional inhabitants at all stages of planning, implementation and management,

such protected areas can have mutually beneficial outcomes for both the people themselves, and the ecosystems targeted for protection.

In the establishment and management of protected areas, governments might therefore consider constructing alliances with the indigenous and local communities inhabiting them to solve existing problems, improve management effectiveness, secure the very survival of those areas as valuable receptacles of biodiversity, and expand national protected area networks to include ecosystem types so far under-represented (Oviedo, 2002). This will help to serve the twin objectives of both biodiversity and cultural maintenance.

Indigenous and local communities are themselves considering in many cases the establishment of new protected areas in lands traditionally occupied or used by them because they are increasingly finding protected areas useful for their own purposes, for example, as a means to gain greater recognition and protection for the natural resources in those areas, as a way of attracting financial and other support, and as a way of increasing the security of such areas against the interests of developers (Oviedo, 2002). In Australia, for example, a new category of protected area is now recognized, namely Indigenous Protected Areas. In a number of instances, both national and sub-national governments have enabled indigenous traditional owners to gain title over existing protected areas on the condition that they lease them back to the government as national parks. However, as part of this arrangement, the traditional owners have significant authority and responsibilities in how the parks are to be managed, and enjoy a significant share of the revenue derived from, for example, park entrance fees.

3. Financing protected areas that overlap lands and water traditionally occupied or used by indigenous and local communities

It is now widely recognized that in the developing world, protected-area agencies are, with a few exceptions, becoming increasingly weaker, and their managerial capacities are downsizing due to economic crises, while at the same time being stretched by growing human pressures. The problem of "paper parks", or protected areas affected by ineffective management and therefore increasingly vulnerable to growing, powerful threats, has become more real than ever (Oviedo 2002), citing Carey *et al.*, 2000). In the presence of weaker protected-area institutions, it is argued, a variety of actors, including traditional communities, should be considered assets for improving management effectiveness (Oviedo, 2002)

. Local communities often suffer direct economic losses when their access to biological resources (such as bushmeat, timber, non-timber forest products and access to agricultural land) is cut off by establishment of a protected area. Protected areas may be the only source of employment in an area, or may provide a critical source of timber, or of animal protein in local diets. Converted to dollar values on open markets such measurements may appear trivial in economic terms, but their loss could be devastating to large numbers of people. While the protected area may be producing considerable economic benefit to society at large in the form of ecosystem services or ecotourism revenues, the affected local people are in essence subsidizing those flows of values to the state and the wider society. Thus there is a need to ensure that the burdens of protected-area establishment are not disproportionately visited on local communities and that the tangible financial costs to them are factored into the equation

It should also be recognized that, in monetary terms, indigenous and local communities are often among the poorest groups in their countries. They have few of the resources necessary for the successful management of the protected areas, even though they may have significant responsibilities in such management.

Therefore special attention should be paid to ensuring that the long-term financial needs of the protected areas and the peoples involved with them are met, for example, through an appropriate share of park revenues, the establishment of conservation trust funds.

Protected areas are also proving to be an essential element of efforts to eradicate poverty, hunger, disease, and environmental degradation. Numerous studies and meetings have produced a wealth of analysis and case-studies illustrating the linkages between conserving biodiversity and alleviating poverty, hunger and disease. However, these positive outcomes in many cases can only be achieved through changes in the traditional economic and subsistence activities of the indigenous and local communities concerned. New forms of culturally appropriate employment that builds on traditional skills may need to be introduced to replace, for example, unsustainable traditional resource-use practices, remembering that some of these practices may have become unsustainable in more recent times due to indirect pressures on indigenous and local communities and their resource bases. Protected-area status can offer a whole new range of employment opportunities (as park rangers, tourist guides, interpretive centres, tourist-oriented artefact production, infrastructure provision and maintenance). Many of these jobs will also require training. Local people can acquire, for example, scientific management skills to complement their traditional knowledge, so that they can better carry out such tasks as strategic planning, environmental/social/cultural impact assessments, biodiversity monitoring, parataxonomy, habitat rehabilitation, species surveys, and so forth.

There is considerable potential to harness private financial flows to support local conservation efforts. Properly designed, new environmental business opportunities (e.g., ecotourism, organic agriculture, shade-grown coffee, certified forestry, etc) can contribute significantly to biodiversity conservation by shifting local employment away from more destructive livelihood activities (e.g., blast fishing, large-scale commodity crop monoculture). Yet major barriers exist to scaling up such environmental businesses, including lack of technical business planning capacity, lack of investment capital, lack of a pipeline of viable enterprises for investment, and difficulties with engaging the financial services industry.

In tropical developing countries—where biodiversity is richest and the threats to it are greatest—public development assistance provided by the developed countries through their bilateral agencies and the multilateral financial institutions must remain a cornerstones of protected-areas financing, and must increase if protected areas in those countries are to survive. For this to happen, protected areas must come to be seen as an essential part of sustainable development, not a "luxury good" that only rich countries can afford. Much of this development assistance must target the capacity-building needs of the indigenous and local communities whose territories overlap protected areas in order for them to take on prominent roles as managers, as well as enable them to diversify into other forms of economic activity that will relieve pressure on local biological resources.

4 Principles and Guidelines on Indigenous and Traditional Peoples and Protected Areas

The World Commission on Protected Areas and the World Wide Fund for Nature developed in 1999 Principles and Guidelines on Indigenous and Traditional Peoples and Protected Areas. This document is essentially a development and application of WWF and IUCN respective policies on indigenous peoples and conservation, in the context of the existing WCPA guidelines on protected areas, and in response to claims of indigenous and traditional peoples' organizations (Oviedo, 1999). The Principles and Guidelines, comprising five

principles and 22 guidelines for their implementation, should be considered as a framework aimed at providing guidance, not as a blueprint. It is intended that they should be adapted to the particular situation, legislation, and policies of each country, and used together with other complementary approaches and tools, to ensure effective management of protected areas in partnership with indigenous and other traditional peoples living within and around borders.

CONCLUSIONS

Special consideration should be given to the interests of indigenous and local communities in both current and future protected areas which overlap with lands and waters they have traditionally occupied or used and whose natural resources they have traditionally relied for their sustenance and livelihoods, in order to ensure that their customary uses of biological resources in accordance with sustainable use requirements are maintained. There is a need to:

(i) Involve more indigenous and local communities;
(ii) Develop a set of guidelines which may be used in the development of co-management agreements involving protected area agencies and affected indigenous and local communities for the management of protected areas that overlap lands and waters traditionally occupied or used by such communities;
(iii) Provide financial assistance for the management protected areas that overlap lands and waters traditionally occupied or used by indigenous and local communities, targeting the capacity-building needs of such communities for the effective management of those protected areas;
(iv) Gain experience with the IUCN/WCPA and WWF Principles and Guidelines on Indigenous and Traditional Peoples and Protected Areas (1999) in terms of their capacity to meet the objectives of the Convention on Biological Diversity;
(v) Undertake an assessment of the IUCN International System of Protected Area Categories and examine how its existing categories may be made more accommodating of indigenous and local community interests in protected areas which overlap lands and waters they have traditionally occupied or used, also giving consideration to the adoption of a new category specifically addressing indigenous and local community protected areas, and to the establishment of criteria for such a category taking into account the objectives of the Convention on Biological Diversity, and relevant decisions of the Conference of the Parties.

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17 PROTECTED AREAS AND THE GLOBAL ENVIRONMENT FACILITY

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1. Introduction

The Global Environment Facility is the major source of funding for conservation and sustainable use of earth's biodiversity. As the financial mechanism for the Convention on Biological Diversity, GEF receives guidance from the Conference of Parties on policy, strategy, program priorities, and eligibility criteria related to the use of resources. Projects generally deal with one or more of four critical ecosystem types and the human communities found there: arid and semi-arid zones; coastal, marine, and freshwater resources; forests; and mountains.

In its first decade of operation, GEF provided nearly $1.1 billion for approximately 200 biodiversity projects involving parks and other types of protected areas. This portfolio supports more than 1,000 sites covering more than 226 million hectares -- just over a quarter of the total global area under protection. The $1.1 million for protected areas directly contributed by the GEF helped leverage almost $2.5 billion in co-financing from project partners. Performance against investment has also been high. The *Second Overall Performance Study of the GEF*, an independent review completed in early 2002, found that "GEF's biodiversity program has made significant advances in demonstrating community-based conservation within protected areas," and that "GEF has steadily improved standards of management of protected areas through participatory approaches."

In many corners of the globe – Africa, the Asia-Pacific region, Central and Eastern Europe, Central and Western Asia, and Latin America and the Caribbean – individuals and institutions are working to extend and sustain protected area systems through results-driven GEF projects. They are assisted by GEF's three implementing agencies: the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank. Other GEF initiatives such as the Small Grants Programme, administered by UNDP, and the Critical Ecosystem Partnership Fund led by Conservation International, are also contributing to this growing mosaic of community-based, high-priority protected areas. GEF projects are also implemented through seven executing agencies: the United Nations Food and Agriculture Organization (FAO), the United Nations Industrial Development Organization (UNIDO), the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), and the International Fund for Agricultural Development (IFAD).

In 2002 the GEF received commitments of $3 billion for its third replenishment, an unprecedented vote of confidence in its efforts to safeguard the global environment and support sustainable development. To effectively program and disburse these funds, the GEF has developed a series of strategic priorities for biodiversity conservation. .

Bolstering the sustainability of protected area systems is one of four main directions in which the GEF will seek to develop its portfolio. This priority targets not just ecological sustainability, but also institutional, social, political, and financial

sustainability in the context of national protected area systems. Support for individual protected sites will be grounded in the long-term vision countries have for their protected area systems.

Objectives include expanded engagement of the private sector, further development of innovative financial mechanisms, intensified capacity building and comprehensive stakeholder participation, and an emphasis on *in-situ* conservation through the conservation of globally important and threatened sites and ecosystems. The GEF will also continue to increase its assistance to "mainstream" biodiversity conservation in landscapes where the primary emphasis is on economic uses.

In all these ways and more, the GEF will strive to extend its record of achievement in the ten years between this World Parks Congress and the next.

2. Links to land and sea

Protected areas are important storehouses of genetic, species, habitat, and ecosystem diversity. The list of benefits and services they provide is long. Experience shows that the full potential of these areas is realized only when they are linked to their surrounding geographic, economic, and social contexts. Greater awareness must be created among protected area managers and government agencies of the necessity of establishing, understanding, and managing protected areas in light of the larger landscape or seascape.

A good example is found in a GEF project implemented by UNDP in the northern archipelago of the Sabana-Camagüey ecosystem in central Cuba**.** Cuba's offshore cays, 60 percent of which are located in the project area, are among the country's most important tracts for the preservation of terrestrial and marine biodiversity of global significance. Large number of invertebrates, and 46 vertebrate taxa, are found on these isolated islands.

The project identified eight areas for priority protection. It also consolidated institutional capacities for integrated coastal zone management, educated people about biodiversity conservation and sustainable use, and directly addressed problems caused by conventional tourism development, over-fishing, and agro-industrial pollution

From a scientific standpoint, the scope for biodiversity conservation is enhanced in moving from the concept of "islands" of conservation to networks. This entails the adoption of a mosaic of land uses, pairing production landscapes with protected ones. The biggest challenge may stem from the fair allocation of costs, benefits, and trade-offs related to biodiversity conservation. Local stakeholders must contribute to the development and implementation of institutional, organizational, and legal frameworks that support good decision-making at all local levels, factoring in economic, social, and environmental concerns.

GEF projects work to link protected areas and their surroundings in a myriad of ways —among them, buffer zones, corridors, cultural linkages, integrated ecosystem management, integrated coastal zone management, and transboundary protected areas.

Buffer zones create a transition between protected areas and the surrounding landscape, where planners and managers can work with neighbouring communities to address their needs and expectations. Forty-four GEF-financed biodiversity projects have incorporated buffer zones, and these projects include at least 209 protected areas. Ecological corridors multiply the conservation benefits of protected areas by linking them within the larger context of surrounding ecosystems. Thirty-two GEF-funded biodiversity projects, involving at least 207 protected areas, include corridor components (Table 1).

An outstanding example is the Program for the Consolidation of the Meso-American Biological Corridor, coordinated by the Commission for Environment and

Development in Central America and Mexico's National Commission for Knowledge and Use of Biodiversity (CONABIO). Co-implemented by UNDP, UNEP, and the World Bank, the program seeks to establish interconnected biological corridors throughout a region that has been a wellspring for biodiversity for thousands of years. GEF-supported national and regional projects are working to mainstream biodiversity conservation into agriculture, trade and investment, and other economic development priorities.

Table 1: The GEF's Protected Areas Portfolio — Linking Natural Landscapes

	Number of GEF projects	Number of protected areas included in the projects
Buffer Zones	44	209
Corridors	32	207
Cultural Linkages	8	24
Transboundary Protected Areas	5	29
Integrated Coastal Zone Management	7	15

To complement these efforts, the GEF's Small Grants Programme is using the Meso-American Biological Corridor to prioritize grant selection and approval in Central America. Some 70 of the 81 grants in Costa Rica, for example, have been implemented in priority geographic areas linking national parks. This enables local and indigenous communities to contribute to conservation efforts while improving their livelihoods.

Another example can be found far to the north in the vast landscapes of Arctic Russia**,** some of the last remaining wilderness on earth. The region serves as the feeding and breeding ground for millions of migratory birds and mammals from Asia, Africa, and Europe. However, its rare and endemic plants and wildlife are beginning to be imperilled by over-harvesting, illegal harvesting, and habitat fragmentation. Only a few species are currently protected.

A GEF-supported project implemented by UNEP is contributing to the conservation and sustainable use of biodiversity in these wilderness areas. Its immediate objective is to adopt strategies and initiate action plans for integrating ecosystem management in three model areas — that is, carefully combining conservation and sustainable use of forests, tundra, freshwater, and marine resources. Protected area management is part and parcel of the larger landscape conservation and ecosystem management effort.

Each model site represents different patterns of ecosystems and types of people pressures. The project seeks to enhance and incorporate the use of traditional indigenous knowledge. By building on national policies and priorities, it promises to show how integrated ecosystem management can fulfill ecological, economic, and social goals and generate local as well as global benefits.

Georgia's Caucasus region is a recognized global biodiversity hotspot -- home to unique and threatened large mammals like the Caucasian tur. A GEF-financed project implemented by the World Bank is working to develop the country's system of protected areas and link them to the broader landscape. The desired result: a viable ecological network of habitats for *in-*

situ biodiversity conservation and the sustainable use of biodiversity.

The project places particular emphasis on ecosystem management and corridor conservation. Corridor plans that link management activities in protected areas and similar activities on adjacent state forest lands are being tested in high priority areas. These plans promote habitat management practices consistent with the needs of key threatened species.

Corridor plans are also integrating recommendations for range management in specific alpine habitats, and provide detailed performance indicators to monitor the effectiveness of management efforts. By strengthening the management of Georgia's protected areas and linking them to each other and the surrounding land-use management, this project can help conserve biodiversity while supporting sustainable livelihoods in the Caucasus region.

3. Protected areas in the mainstream

While better known national parks and seashores are often swamped with visitors, there is a continuing need to build broad-based constituencies for protected areas and the values they represent.

"Mainstreaming" protected areas increases their effectiveness and integrates biodiversity conservation in national and international policy frameworks.[The challenge is to identify sectors directly related to protected areas, and to develop new partnerships in support of protected area values**.** When protected area considerations are incorporated into policies governing these sectors, the result can be a win-win for environment and development.

Nearly all GEF-supported biodiversity projects with protected area components emphasize education and awareness raising through a variety of activities. Recent GEF initiatives encourage looking beyond the project in question to systematically target the country's enabling environment. How well is it positioned to address biodiversity conservation across the board and mainstream it into the wider development context?

A good example of mainstreaming concerns the Cape Floristic Region, an entire plant kingdom – one of six worldwide – situated on South Africa's Cape Peninsula. Seventy percent of its more than 9,000 plant species are found nowhere else on earth. The region's marine environment contains over 11,000 species.

The GEF is supporting the Cape Action Plan for the Environment (CAPE), the first bioregional plan produced for the conservation of an entire floral region — marine, terrestrial, and aquatic environments. The plan lays out key conservation activities over a 20-year period. These include a system of formally protected areas of varying sizes, as well as buffer zones and biological corridors critical to sustain the region's unique evolutionary processes. A strong multi-stakeholder partnership is supporting the mainstreaming of biodiversity conservation into economic activities, as well as through integrated development planning.

The GEF is also capitalizing the Table Mountain Fund, an endowment which provides small amounts of seed funding to support community-based conservation activities in the Cape Floristic Region.

Another GEF-supported mainstreaming initiative in Costa Rica seeks to improve the sharing of benefits from biodiversity conservation, as well as education and awareness about its importance. Implemented by the World Bank, the Biodiversity Conservation in Cacao-Agroforestry project is upgrading the management of small, cacao-based Bribri and Cabecar indigenous farms in the Talamanca-Caribbean corridor through the introduction of market-savvy organic production principles. These techniques ensure conservation and sustainable use of on-farm plant and animal diversity and provide a reliable source of family income.

The GEF outlook

- Protected areas are the most important tool to achieve biodiversity conservation and ecological integrity. As such, they will remain a target area for future GEF support
- The conservation community has made commendable progress in expanding protected area systems, and made some gains in new collaborations with actors not typically associated with biodiversity conservation. Maximizing the contribution protected areas make to healthy ecosystems and sustainable livelihoods requires further mainstreaming of values associated with them.
- Protected areas must increasingly be linked to their surroundings and the environmental context in which they are found. Thus, the GEF will continue supporting the expansion of protected areas to the larger production landscape for increased biodiversity conservation benefits and sustainable use.
- The GEF will continue to support innovative approaches to building the public, private, non-governmental, and local community support needed to incorporate biodiversity conservation and protected area values into the broad multi-sectoral public policy planning process.

18 ENABLING ACTIVITIES TO ENSURE EFFECTIVENESS OF PROTECTED AREAS

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1. Introduction

Protected areas are the cornerstone for biodiversity conservation around the globe. Their importance has been recognized at multiple levels, from international bodies, to national governments, local groups, and communities. Important progress has been made in the last few decades in expanding and consolidating protected areas, and today they cover approximately 11.5% of the planet's land surface. However, even though progress has been made, much still needs to be done to ensure the effectiveness of protected areas in the long-term. A series of activities can contribute by enabling this effectiveness.

'Enabling activities' in the context of protected areas refers to those activities that allow for the design and implementation of effective response measures to achieve conservation objectives. These activities or conditions can significantly facilitate the effectiveness of conservation in protected areas. In other words, if a series of conditions are not in place, the effectiveness of conservation efforts can be significantly hindered.

This section briefly highlights some of the key activities that can contribute in enabling the conservation effectiveness of protected areas.

2. Key activities to enable the effectiveness of protected areas

Information for decision making

Sound decisions require solid information. This is no different in the field of biodiversity conservation. To the contrary, given the limited amount of human and financial resources available for conservation, it is critical to ensure that the right decisions be made, for which it is crucial to have the right information.

Specific needs vary case by case, but in general, the most important information needs to enable biodiversity conservation are those that allow decision makers to understand the biodiversity assets and the options for their management and conservation. These require a minimum level of knowledge of the biodiversity resources themselves, the threats to their conservation and the causes of those threats. Such knowledge depends on information from various fields, a very good understanding of local conditions, and ongoing research and analysis. Resources like biodiversity inventories, maps of basic key features in the terrain, and socio-economic censuses can all contribute significantly to make better decisions.

With a basic level of information and understanding, decision-makers can make plans for conservation activities and establish priorities for resource allocation. The basic information allows for exercises like ecoregional plans, national biodiversity strategies, and conservation gap analysis to take place. At the same time, a constant feedback of information into decision making enables for adaptive management. As new information becomes available, management decisions can be adjusted accordingly.

Capacity building

Capacity building refers to the development of an organization's core skills and

capabilities which in the long-term enable the organization's effectiveness and its sustainability. Effective protected areas call for capable management, which in turn depends on effective institutions, trained professionals, and staff with multiple technical skills. Building the capacity of local stakeholders, both governmental and non-governmental, is therefore one of the most effective means to secure the ability to meet local conservation needs. This strengthening process gives local institutions the ability to achieve conservation results by ensuring they have the technical and financial resources required to address the challenges of abating threats and improving biodiversity health at conservation sites.

Capacity building needs vary widely, and are important at all levels, from training park guards on the ground to preparing high-level staff to participate in complex global negotiations. Similarly, many different types of skills are needed to enable effective management of protected areas, from leadership, fundraising, and scientific knowledge to administrative expertise in areas such as human resources and bookkeeping. These human and institutional capacities are often scarce, particularly in developing countries and in remote areas. Given the usual personnel turnover and the quick evolution of some technical fields like computing and genetics, capacity building programs continuously have to be built, reinforced and expanded.

The long-term requirements to build the capacity of institutions and individuals need a significant commitment. Donors seldom have a mandate to provide long-term funding for such programs, so a challenge for capacity building is ensuring that it is taken up by local actors who can provide the services in the long-run. There are cases in which this has been achieved by pairing up with academic institutions, through government training centers, and by contracting private service providers. Whatever the means, the effectiveness of protected areas is closely linked to assisting the individuals and groups responsible for their management to identify and address issues and gain the insights, knowledge and experience needed to solve problems and implement change.

Financial support

Long-term funding is an essential component to enable effective protected area management. Unfortunately, most developing countries lack mechanisms to ensure adequate funding levels for their protected area systems. At the same time the recent shift of bilateral and multilateral assistance away from strictly environmental issues has affected many countries, particularly those more reliant on development assistance. Overall, funding for protected areas is exposed to fluctuations, inhibiting the ability to cover recurrent costs and the implementation of management plans. Diversification of funding sources is needed to provide a buffer against unanticipated events such as abrupt declines in tourism, deterioration of financial markets, and shifts in donor priorities.

Experience and diversity of contexts shows that no single source of funding is likely to cover all recurrent and investment costs for protected areas. A packaged approach has to be developed and custom fit to each situation. As countries try to shift from a pattern of financing short-term conservation projects to sustaining conservation results over the long-term, funding for protected areas also needs to shift from a pre-dominantly external towards a pre-dominantly domestic funding base, at least for covering the minimum basic operating costs. This is a significant challenge, especially for developing countries, where conservation competes with other pressing needs like health and education.

In addition to increased funding, other critical aspects of financial support for protected areas include making an effective use of available resources through financial planning. In most cases, individual protected areas and protected area systems

have not developed financial management plans. Long-term financial plans can be useful in generating accurate estimates of funding requirements over the long-term. They are useful tools for decision making that provide the foundation for developing basic financial management strategies such as identifying cost reduction measures and cash flow problems, as well as indicating how resource re-allocation could best support established protected area management priorities. Long term financial plans can also lead to the systematic assessment of the viability of new revenue sources as part of a broader business-based approach to improve protected area management.

Governance and policy

Another critical condition to enable effective protected area management is a conducive governance and policy framework in which to operate. This includes aspects like political will and the regulatory framework. Broadly speaking, policy and governance refer to the processes and systems which determine how power is exercised, how decisions are made, and how civil society participates in these processes. These issues are relevant because they have great influence in how protected areas meet conservation objectives and contribute to social, economic and environmental goals.

Governance and policy are therefore relevant at all scales, from local, to national, regional, and global. For example, legal, policy, and regulatory frameworks are critical in defining the linkages between practical site-based conservation and the formulation of national-level policies and strategies. Similarly, it is critical to secure political support for protected areas, which is key for decisions on budget allocations and other policy issues. One way to generate such support can be to highlight the economic and social values of goods and ecosystem services produced by protected areas – such as fisheries, non-timber forest products, genetic resources, tourism revenues, water security, and flood and storm control. These are generally not recognized by decision-makers, local communities and other stakeholders, and are not being fully captured through markets or financial instruments. Also, conservationists should strive to demonstrate the linkage between conservation and poverty alleviation to decision-makers who are naturally more interested in specific contributions to alleviate poverty at the national and sub-national levels.

Clarity in the legal framework is also important, not just by having sufficient environmental laws but also by ensuring that environmental legislation fits well within the broader national legal framework. Once laws are in place, the lack of their enforcement frequently becomes a limiting factor that hinders effective management of protected areas. Also, because protected areas function within the constraints dictated by the existing policy framework, inhibiting policies can present significant barriers. These include, for example, laws and regulations that limit income generation at protected areas, alternative management options like co-management, and redirection of private sector royalties and other financial flows toward earmarked purposes such as protected areas management. Therefore a constant updating of the legal framework to ensure it incorporates best practices and minimizes inhibiting policies, combined with follow up to ensure enforcement takes place, is a critical governance and policy issue for protected areas.

19 MAINTAINING PROTECTED AREAS FOR NOW AND FUTURE: EVALUATING MANAGEMENT EFFECTIVENESS OF PROTECTED AREAS

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How well are protected areas meeting their conservation objectives and protecting their biological and cultural values? Are they being managed to cope with increasing threats such as climate change, hunting and invasive species? How do we measure this and adapt management so that protected areas will be maintained for now and the future?

1. Introduction

All over the world, huge investments of money, land and human effort are being put into protected area acquisition and management, and into specific intervention projects. More than ten percent of the world's land surface is now in some form of protected area. This demonstrates the tremendous importance the global community places on this form of conservation. However, declaration alone does not guarantee the conservation of values. In most cases we have little idea of whether management of individual protected areas, or of whole systems, is effective. And more importantly, what little we do know suggests that many protected areas are being seriously degraded. Many are in danger of losing the very values for which they were originally protected.

We clearly need to find out what is happening and then carefully manage protected areas to cope with escalating threats and pressures. An increasing number of people have been developing ways to monitor and evaluate the effectiveness of protected areas. There is a growing awareness that evaluating management effectiveness and applying the results is at the core of good protected area management. Essentially, evaluation enables managers to reflect on experience, allocate resources efficiently, and assess and plan for potential threats and opportunities.

2. What is meant by "Management Effectiveness Evaluation"?

Management effectiveness evaluation measures the degree to which a protected area is protecting its values and achieving its goals and objectives. The main objective of evaluation is to enable managers to improve conservation and management of protected areas.

Three main components of management effectiveness can be evaluated:

Design of individual protected area or protected area systems - important elements include size, shape, external interactions and connectivity. Evaluation may highlight design problems such as, exclusion of critical habitat areas, isolation, and lack of protection from external pressures.

Adequacy and appropriateness of management - examines how management is being undertaken: whether plans are in place, whether the number of staff and amount of funds are sufficient to meet basic needs and whether management meets best practice standards for the region

Delivery of protected area objectives– assesses whether protected areas are

achieving their stated aims. Measures include biological elements (such as whether key species are surviving, recovering or declining) and social aspects (such as recreational use and the attitudes of local communities).

3. What is the purpose of protected area management evaluation?

Management effectiveness evaluation can be undertaken for many reasons and it is important that the purpose of evaluation is made clear at the beginning of the process. Four broad purposes for evaluation are outlined below:

- promoting better protected area management including a more reflective and adaptive approach;
- guiding project planning, resource allocation and priority setting;
- providing accountability and transparency;
- increasing community awareness, involvement and support.

Evaluating management effectiveness should be seen as a positive process which allows us to correct and learn from our mistakes instead of repeating them as well as to celebrate and build on past success. Evaluation will also enable managers to anticipate future threats and opportunities.

There are many benefits of management effectiveness evaluation in the face of threats and pressures. For example, monitoring and evaluation can:

- give 'concrete' evidence of success in managing pressures such as hunting and poaching;
- enable park managers to quantify impacts such as over-use and adapt management to minimise this;
- indicate effects to protected areas from global threats such as climate change. This in turn may help park managers from a network of sites, develop buffers and test hypotheses to cope with change;
- demonstrate the effectiveness of different management programs such as control programs for weeds and feral animals;
- provide indicators of overall ecosystem health and methods of managing global threats on the wider landscape;
- indicate the success or failure of initiatives beyond park boundaries such as corridors and transfrontier parks;
- enable Indigenous and other local communities to become actively involved in assessing protected area management and guiding its future;
- involve Indigenous and local communities to facilitate a greater feeling of ownership and support for the park;
- enable practitioners to share ideas and experiences, and make cross-site comparisons with consistent data (especially when using the same general evaluation framework;
- give early warning signals of protected areas in danger – and help to argue for funding and international support for these areas;
- provide a mechanism for incorporating scientific and traditional knowledge as well as the perceptions and experience of park managers into decision making;
- provide a mechanism for maintaining management standards as governments and their priorities change;
- assist in times of political turmoil and conflict by providing a focus for international pressure or presence to protect the park;
- provide data on economic and other benefits of protected areas which can be used to build public and political support.

4. The IUCN World Commission on Protected Areas Framework for assessing management effectiveness of protected areas

Following a recommendation at the IVth World Parks Congress in Caracas in 1992 that called for IUCN to develop a system for monitoring management effectiveness of

protected areas, IUCN convened an international Task Force with broad regional representation within its World Commission on Protected Areas (WCPA) to address the issue. The work of the Task Force resulted in a publication *Evaluating Effectiveness: A framework for assessing management of protected areas* (Hockings *et al*. 2000) which provides a framework and principles for evaluation of management effectiveness.

It is clear that different situations require different types of assessment. In particular, there will be major differences in the amount of time and resources available for assessment in different parts of the world. Issues of scale, nature of management objectives and differences in threats and impacts and available resources all affect the choice of evaluation methodology. Therefore, the WCPA Task Force developed a 'framework' rather than a standard global methodology. The framework aims to help in the design of assessment systems, provide a checklist of issues that need to be measured, suggest some useful indicators, and encourage basic standards for assessment and reporting.The WCPA framework is based on the premise that the process of management starts with establishing a vision (within the context of existing status and pressures), progresses through planning and allocation of resources and, as a result of management actions, produces results that (hopefully) lead to the desired outcomes. Monitoring and evaluation of these stages provide the link that enables planners and managers to learn from experience. It also helps governments, funding agencies and communities to measure how well their project or area is doing.

Figure 1 presents a common framework within which evaluation and monitoring programmes can be established, combining context, planning, input, processes, outputs and outcomes.

5. The elements to be measured

The following section provides a brief description of each of the elements in the management cycle which are open for evaluation and explains why they are important.

Design elements

Context - Where are we now?

What is the protected area's current status -

- its global, national or local significance;
- its conservation and other values;
- its broad policy and managerial environment; and
- the particular threats affecting it.

Figure 1: Evaluation in the management cycle

This information helps put management decisions in context. This may be the main assessment used to identify priorities within a protected area network, or to decide on the time and resources to devote to a special project. It may also provide information on management focus. For example, if poaching is a major problem and there are no anti-poaching measures in place, then an important discrepancy has been identified. Conversely the existence of extensive anti-poaching brigades when the poachers have

moved on elsewhere may be a waste of resources.

Planning - Where do we want to be and how are we going to get there?

What are the intended outcomes for the protected area system or the individual protected area?

How adequate is protected area

- legislation and policy;
- design; and
- management planning?

The selected indicators for evaluation will depend on the purpose of assessment and whether a system of reserves or an individual protected area is being evaluated. With systems, issues of ecological representativeness and connectivity will be particularly important. The focus of assessment of individual protected areas will be on the shape, size, location and detailed management objectives and plans.

Appropriateness of management systems and processes

Inputs– what do we need?

How adequate are the available resources in relation to the management needs of an area. This is based primarily on consideration of staff, funds, equipment and facilities required.

Process - how do we go about it?

How well is management being conducted in relation to relevant standards of management for a system or a site? Assessment will involve a variety of indicators, such as issues of policy development, enforcement, facility and equipment maintenance, administrative processes or the adequacy of local community involvement and systems for natural and cultural resource management.

Delivery of protected area objectives

Outputs – What did we do and what products or services were produced?

What has been done by management, and to what extent have targets, work programmes or plans been implemented? The focus of output monitoring is on whether targets (set through management plans or a process of annual work programming) have been met as scheduled and what progress is being made in implementing long-term management plans.

Outcomes – What did we achieve?

This question evaluates whether management has achieved the objectives in a management plan, or national plans and ultimately the aims of the IUCN category of the protected area. Outcome evaluation is most meaningful where concrete objectives for management have been specified either in national legislation, policies, or site-specific management plans. Approaches to outcome evaluation involve long-term monitoring of the condition of the biological and cultural resources of the system or site, socio-economic aspects of use, and the impacts of the management of the system/site on local communities. Outcome evaluation should also consider whether the values of the site have been maintained and whether threats to these values are being effectively addressed.

Outcome evaluation is the true test of management effectiveness. But the monitoring required is significant, especially since little attention has been given to this aspect of protected area management in the past. The selection of indicators to be monitored is critical so that resources are not wasted monitoring features that cannot help manage the most critical issues.

The WCPA evaluation framework is summarised in Table 1.

Ideally, assessments should cover each of the above elements, which are complementary rather than alternative approaches to evaluating management effectiveness. Monitoring inputs and outputs over time can be especially useful to show changes in management efficiency and may highlight the effectiveness of a particular change to management. However, assessments are driven by particular needs and resources and a partial evaluation can still provide very useful information. The framework provides a structure for designing an evaluation system. A process is outlined in Figure 2.

Table 1: Summary of the WCPA Framework

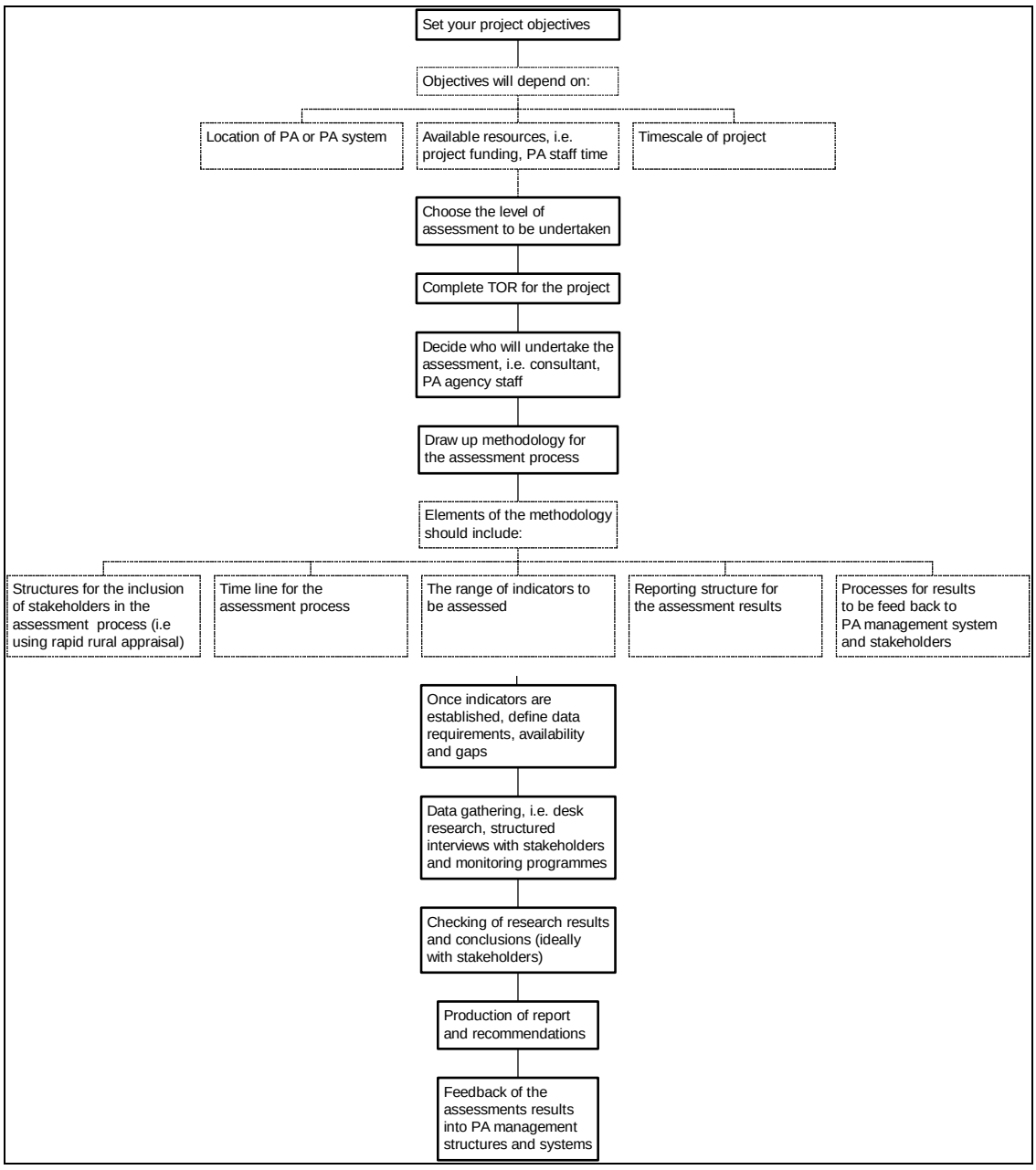
Elements of evaluation	Explanation	Criteria that are assessed	Focus of evaluation
Context	*Where are we now?* Assessment of importance, threats and policy environment	- Significance - Threats - Vulnerability - National context - Partners	Status
Planning	*Where do we want to be?* Assessment of protected area design and planning	- Protected area legislation and policy - Protected area system design - Reserve design - Management planning	Appropriateness
Inputs	***What do we need?*** Assessment of resources needed to carry out management	- Resourcing of agency - Resourcing of site	Adequacy
Processes	*How do we go about it?* Assessment of the way in which management is conducted	- Suitability of management processes	Efficiency and appropriateness
Outputs	*What were the results?* Assessment of the implementation of management programmes and actions; delivery of products and services	- Results of management actions - Services and products	Effectiveness
Outcomes	*What did we achieve?* Assessment of the outcomes and the extent to which they achieved objectives	- Impacts: effects of management in relation to objectives	Effectiveness and appropriateness

6. Application of management effectiveness evaluation

Several methodologies for evaluating management effectiveness are now being applied all over the world. Many of these are based on the WCPA framework. The basic framework can be used to develop methodologies across a range of environments and scales, from rapid assessments of national and international protected area systems to detailed monitoring of individual protected areas. Depending on available time and resources and the objectives of evaluation, the processes range from complex to simple and cheap.

Samples of methodologies that have been developed and applied at various scales are outlined below.

Figure 2: Creating a methodology to assess the management of protected areas or protected areas systems



The enhancing our heritage: monitoring and managing for success in natural World Heritage sites project

This is a four-year United Nations Foundation, IUCN and UNESCO project working in ten World Heritage sites in south Asia, Latin America and southern and eastern Africa. A monitoring and assessment toolkit based on the WCPA framework has been developed. Evaluation is being used to improve management and reporting at World Heritage Site level. The project aims to improve management of World Heritage sites by providing managers with a consistent program for assessing and

reporting on management effectiveness and conservation values.

Evaluation involves field monitoring, workshops and interviews. The process is participatory and involves many stakeholders from local communities and field staff to international NGOs. Improved communication has been established between park managers, local communities and other key experts. Responses to identified deficiencies are now being implemented to improve management.

The Rapid Assessment and Prioritisation of Protected Areas Management (RAPPAM) Methodology

WWF International has developed and field-tested a tool for assessing the management effectiveness of protected area systems at a national level. It is intended to:

- identify strengths and weaknesses;
- analyse threats and pressures;
- identify areas of high ecological and social importance and vulnerability;
- indicate the urgency and conservation priority for individual protected areas; and
- help to improve management effectiveness.

Evaluation consists of review of available information and a workshop based assessment using the Rapid Assessment Questionnaire, analysing findings and making recommendations. The process involved park staff, local communities, scientists and NGOs. The objectives of assessment were developed individually for each country. Detailed case studies for each area were developed and used to improve management in ways such as conservation planning, priority setting, and increasing focus on threatened areas.

The "State of the Park" Program to assess natural and cultural resource conditions in U.S. National Parks

This on-going project was initiated by the National Parks and Conservation Association to raise public awareness about the state of national parks and to show the actual resource conditions of the 387 units of the US system. The methodology examines critical indicators of both natural and cultural resource conditions and management practices. It particularly focuses on outcomes. Immediate benefits included prioritised funding and increased stakeholder awareness of park issues.

Reporting progress in protected areas: A site-level management effectiveness tracking tool

The World Bank/WWF Alliance for Forest Conservation and Sustainable Use has developed a simple, site-level assessment system for tracking progress in management effectiveness. The methodology, which is also being used by the Global Environment Facility, is designed to provide a relatively quick, easy and consistent system for reporting progress on management effectiveness in a diverse range of protected areas. It is not, however, designed to replace more thorough methods of monitoring and assessment for purposes of adaptive management.

WWF/CATIE and PROARCA/CAPAS evaluation methodologies

Both the WWF/CATIE and PROARCA/CAPAS methodologies for evaluating management of protected areas have been developed, tested and refined over a number of years within Latin America. These methodologies involve scoring systems based around a hierarchy of indicators of different aspects of management performance. For each indicator used, a number of conditions are established – the optimum condition being given the maximum value. Results are presented in the form of a percentage of the maximum obtainable score. This can be calculated as an overall figure for the protected area and as scores for each field of activity (eg. planning, legal etc) and can be presented in matrix format. The methodologies focus principally on management inputs and process with some

assessment of management outputs and outcomes.

7. General conclusions from studies on management effectiveness

While significant progress has been made on developing methodologies for evaluating management effectiveness, assessments of management effectiveness have so far been undertaken in only a small percentage of the world's protected areas. Case studies presented at the recent World Parks Congress documented the results of assessments in nearly 1000 protected areas, undertaken using a variety of the evaluation methodologies. Comprehensive analysis of this disparate dataset is yet to be undertaken. Nevertheless some consistent trends are emerging from these studies. Some preliminary conclusions are:

- Protected areas are, in general, chronically under-funded in relation to the perceived needs for adequate management. This is generally consistent across both developed and developing countries although the amount of funding available (and perceived needs) varies significantly (James, 2001; Beeton, 2002; Ervin, 2003; Mallarach, 2003);
- The majority of protected areas are subject to multiple serious threats (Carey *et al*., 2000; Mallarach, 2003; Dudley *et al*., 2003; Ervin, 2003) The most significant threats are common across many sites and regions, although this result may reflect the fact that most assessments have, to date, been carried out in forest protected areas in the developing world. Major threats identified across a range of studies (Ervin, 2003, Dudley *et al*. 2003) include:
  - poaching;
  - encroachment and fragmentation;
  - logging;
  - agriculture and grazing;
  - alien invasive species; and
  - mining.

General guidelines for evaluating management effectiveness

A number of general guidelines have been developed, based on experience in management effectiveness evaluation over the past decade. These guidelines are listed in brief, grouped according to the aspect of evaluation that they relate to:

The process

- The process should have clearly defined objectives and plan;
- Methodology should be based on an accepted framework;
- Methodology used should be simple, repeatable, and transparent;
- The level and complexity of evaluation depends on the scale, scope and purpose of the project;
- Assessment should focus on the most important values and significant threats identified for that area;
- Evaluation should be based on the best available information and may be both qualitative and quantitative;
- Limitations to the process including knowledge gaps should always be identified;
- Any performance indicators should cover either social, environmental or management issues;
- Indicators should be measurable and results should reflect on important aspects of management.
- Management effectiveness evaluation needs to be supported by park managers and project leaders and become part of core business.

Reporting

- Limitations and flaws in the process should be identified in the assessment report;
- Improvement to the process should also be recommended
- Strengths and weaknesses of management should be identified

- Clear recommendations for improving management should be outlined after the evaluation process

Applying results

- The process does not end with evaluation - results should be fed into future management and decision making;
- Evaluation results should highlight any changes over time;
- Results should help to set management priorities and guide resource allocation.

Participation

- Involve the community, stakeholders and all levels of park staff;
- Build a team where necessary to carry the project and encourage ownership as well as increasing communication between of park managers and stakeholders;
- Findings should be accessible to park managers and stakeholders.

8. Conclusion - Where to Now?

This paper provides an introduction to the issue of management effectiveness evaluation. The framework and existing guidelines should help managers adapt and apply existing methods or design and implement their own evaluation methodology. As experience with evaluation accumulates, we can expect these guidelines to be extended and improved.

The next step in the evolution of management effectiveness evaluation will be increased focus on results of assessment rather than the development of methodologies.

The major challenge for the future however, is to have these tools widely used and to have monitoring and evaluation established as core business within protected area management. To achieve this there needs to be a further increase in

- awareness of the benefits of evaluation;
- willingness to use such systems;
- capacity of often under-resourced areas to conduct evaluation.

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20 PROTECTED AREA COVERAGE – A BIODIVERSITY INDICATOR

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1. Introduction

The Strategic Plan for the Convention on Biological Diversity, which was adopted in decision VI/26 of the sixth meeting of the Conference of the Parties, includes the target "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth". This target was endorsed by the World Summit on Sustainable Development, which also recognized and emphasized the key role played by biodiversity in poverty eradication.

When in November 2003 the ninth meeting of the Convention's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) considered ways of integrating outcome-oriented targets into the programmes of work of the Convention, it took into account the 2010 biodiversity target, the Global Strategy for Plant Conservation, and relevant targets set by the World Summit on Sustainable Development. SBSTTA recommended that the Conference of the Parties at its seventh meeting agrees that a limited number of trial indicators, for which data are available from existing sources, be developed, tested and reviewed by SBSTTA prior to the eighth meeting of the Conference of the Parties in 2006. One of the five indicators recommended for trial was the "coverage of protected areas".

2. Protected area coverage indicator

The surface area of protected areas reflects measures taken to safeguard biodiversity. The majority of Parties to the Convention list protected areas as the most obvious contribution towards the achievement of the first principal objective of the Convention, i.e. to conserve biodiversity10. In most cases, protected areas are created to ensure the long-term conservation of the biota, habitats and landscapes contained within its boundaries. Protected area coverage can therefore serve as an indicator of the efforts made at national, regional, global or biogeographic/bioregional levels to maintain biodiversity.

Protected area coverage has several advantages as an indicator: data are regularly compiled and stored; the surface area can be calculated and analysed at various scales and in relation to different political or biogeographic features and protected area types; and the concept of protected area coverage as a means towards biodiversity conservation can be effectively communicated.

On the other hand, one needs to recognize some shortcomings. The proclamation of an area as protected does not automatically guarantee the conservation of the biodiversity it contains. Nor does it necessarily coincide with an objective analysis of protected area needs.

The following paragraphs discuss the strengths and weaknesses of using protected area coverage as an indicator of status and trends in biodiversity.

3. Data availability

Since 1962, the United Nations has compiled, and regularly updated, a list of the

10 See for example information in thematic reports on protected areas (UNEP/CBD/SBSTTA/9/INF/2)

world's national parks and reserves. Since the 1990's this UN List of Protected Areas has been made available both as printed publications and as web-based databases that can be queried. The 2003 UN List, released at the 5th World Parks Congress in Durban, South Africa, provides the latest reference information. The 2003 UN List has benefited from the establishment in 2002 of the World Database on Protected Areas Consortium. The Consortium has integrated the UN List into a Geographic Information System and made it available on CD-Rom as the World Database on Protected Areas (WDPA). In the 2003 edition of the WDPA, more than two-thirds of the over 100,000 protected areas are fully geo-referenced. As this work continues the accuracy and precision of the information increases. Over the coming years, data gaps arising from the lack or inaccuracy of polygon data for a significant number of protected areas and errors in the attribute data are expected to be filled. In many cases, this will allow the correction of protected area coverage information for the recent past.

The global protected area coverage, currently estimated at 11.5 percent of the land and 0.5 of the marine surface, is expected to increase as information on some 36,000 protected areas, for which boundary information is not available, is entered. Depending on the base map used, the Geographic Information System allows analysis according to political or biogeographic boundaries and/or by management category. The data would also allow analysis of the protection of specific sites important for particular species and habitats. This ability greatly enhances protected area planning and gap analysis. Based on vectorized data, the analysis on protected area coverage and gaps can be conducted at all different scales from local zonation planning, through national protected area network analysis to global statistics.

4. Communication

Indicators are particularly powerful when the information they provide is meaningful to the users. Only when the message they contain is understood by the general public, decision makers can be lobbied to translate the information into action. The indicator on protected area coverage is particularly suitable because most people can relate to protected areas as places set aside for conservation, education, research, spiritual values and/or recreational enjoyment. Protected areas can attract tourism and, in many cases, generate income to local residents. Some protected areas are associated with prestige, particularly those that are part of an international network, e.g. World Heritage sites, Biosphere Reserves recognized under the Man and the Biosphere (MAB) Programme, Wetlands of International Importance (Ramsar sites), Natura 2000 areas etc. Accordingly, the general public perceives protected areas as something valuable and desirable. The greater the protected area coverage the better.

The Caracas Declaration resulting from the IVth World Congress on National Parks and Protected Areas, held in Caracas, Venezuela, in 1992 expressed a goal to ensure that at least 10 percent of all important ecosystems are safeguarded by the year 2000. Because people could understand this figure this goal was considered both appealing and – initially - unrealistic. Now that 10 percent coverage have been exceeded as a global average for terrestrial systems, efforts can focus on ensuring that underrepresented ecosystems and oceans also attain appropriate coverage. Although national conditions and priorities vary, the 10 percent protected area coverage will also serve as a mark for national protected area planning processes. Stakeholders will question their governments if the area under protected is much lower in their country. Exceeding the mark will be a matter of national pride. And the global community will greet an increase in protected areas as an achievement for conservation.

5. Effectiveness of protection

While the availability of data and the ease to communicate information about protected area coverage are important advantages as indicator, the area under protection alone is not sufficient. There are large tracts of land under protection, which are not particularly valuable for biodiversity conservation while many biodiversity hotspots are unprotected (Myers et al. 2000). There are also areas, which, while officially under protection, have been and continue to be degraded. The enforcement of an effective protection status requires adequate staffing, equipment and long-term planning security. Protected areas, however, are frequently neglected in difficult financial, socio-economic and/or political situations (e.g. Balmford *et al*., 2000; Hart and Hart, 1997; Hamilton *et al*., 2000; Rodriguez, 2000). The draft programme of work on protected areas of the CBD and the Vth World Parks Congress, held in Durban, South Africa, in 2003, therefore emphasizes *inter alia* the need for an enabling environment, stakeholder participation in protected area planning and management as well as preventive measures to mitigate the negative impacts of key threats to protected areas.

6. Protected area representativeness

Besides the lack of a measure of protected area effectiveness the representativeness of the sites under protection must also be considered. The Caracas goal of 1992 specified that all important ecosystem types should enjoy a similar level of protection. This objective was taken up in the Global Strategy of Plan Conservation (Decision VI/9), which, in its target 4, calls for at least 10 percent of each of the world's ecological regions to be effectively conserved. The analysis carried out in the 2003 UN list of protected areas, uses the broad biogeographic classification of Udvardy (1975). However, it has been recognized that it would be important to use finer categories, such as WWF's ecoregions (Olsen and Dinerstein, 1998) to ensure that appropriate portions of particularly valuable ecosystem types are protected. The draft programme of work on protected areas of the CBD places emphasis on planning protected areas as part of a network and within the broader land- and seascape context. Major advances have been made on protected area planning to ensure that important ecosystems and hotspots are covered and that protected areas are planned as a network of connections sites which facilitate migrations and exchange of genepools (e.g., Margules and Pressey, 2000; Cowling and Pressey, 2003; Mulongoy and Chape, 2004). More than capacity and resources, it is a matter of political will to ensure that these approaches and principles are fully taken into account at the national and regional levels.

7. Development needs for the protected area coverage indicator

Many concerns exist over the inconsistent quality and frequency of data reporting on protected areas worldwide. National authorities may require support and encouragement to allow them contribute to the updating of information on protected areas under their jurisdiction. The advantages for adaptive management of protected area systems and for strategic planning must be highlighted to engage all relevant stakeholders in the reporting on protected areas. This information can also highlight resource needs and facilitate the release of financial and technical support to strengthen the protected area system.

Furthermore, a purely area-based indicator cannot be satisfactory in the long term. The general lack of information about, and ways to measure, management effectiveness must be overcome. Such information must be integrated into the indicator on protected area coverage. This will require a transparent system of objective self-assessment or independent third party assessment which measures protected area effectiveness on a numerical scale and the

incorporation of this information, on a regular basis, into the database.

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21 PROTECTED AREAS AND MINING – SCOPE FOR CONSERVATION AND DEVELOPMENT

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1. Introduction

Mining and biodiversity conservation have traditionally been viewed as mutually exclusive activities. For those of us working within the mining industry, it is clear that this need not be the case. We believe that there is considerable scope for the industry to help alleviate pressure on protected areas due to poverty as well as to contribute directly to biodiversity conservation, while minimising environmental impacts. However, the challenges in realising this potential are formidable as a deep lack of trust characterises the relationship between the conservation community and the mining industry. This paper highlights key issues related to the conservation and mining interface as well as recent industry initiatives to address the trust deficit. It also identifies possible areas for future collaboration to enhance the industry's contribution to biodiversity conservation and to sustainable development more generally.

2. Biodiversity conservation and sustainable development: Key issues and challenges

The world's biodiversity is under threat. This is as much due to root causes such as poverty, social change and lack of government capacity, as to the more obvious proximate causes including habitat loss, invasive species and pollution.

Many of the most acute conservation problems occur in biodiversity-rich developing countries that are also facing pressing human development needs. The challenge of sustainable development will be to alleviate poverty in these countries while sustaining the environmental foundations of the economy. It is clear that without economic development there can be no poverty reduction. Experience also shows that without economic development there can be little improvement in environmental protection.

Worldwide systems of protected areas will need to be expanded and strengthened in order to conserve biodiversity and natural and cultural heritage. However, as recent analysis of gaps in protected area coverage has shown, much of the most threatened biodiversity lies outside protected areas. This suggests that a broader approach to in-situ conservation, involving a wide range of stakeholders, is needed.

The World Summit on Sustainable Development, the World Parks Congress and the Convention on Biological Diversity have called for fresh innovative and integrated approaches to reducing the unacceptably high rate of biodiversity loss. The important role of business in advancing this agenda has been increasingly recognised by governments and the conservation community.

3. Conservation and development: The role of mining

The capacity of mineral development to contribute to conservation is not intuitively obvious. Mining is an extractive industry and, by its very nature, can have significant direct and secondary environmental and social impacts. The negative legacy of past practices has created a deep level of mistrust of the industry in conservation circles and

raised questions about the industry's role in society's transition to sustainable development.

Minerals are essential to modern life. Assured supplies will be required to meet the needs of the world's growing population and to help fulfil expectations of improvement in the quality of life, notably in developing countries. The challenge before us is to ensure that mining is part of the solution that enables better outcomes for biodiversity conservation and sustainable development.

The industry has a number of strengths with which to work. One of the most important is that exploration and mining create wealth and employment opportunities. If properly integrated into regional development and biodiversity conservation strategies, mineral-related investment can help alleviate pressures from poverty on biodiversity-rich areas as well as foster sustainable improvements in the health, education, and the standard of living of local and indigenous communities.

Mining comprises a diverse range of activities, scales, techniques and impacts. Proactive community development programmes can provide sustainable economic and social benefits even after mine closure. New technologies can reduce energy use and significantly reduce air and water emissions. State of the art land rehabilitation and ecosystem reconstruction techniques have been developed and are being applied by many responsible companies. These factors signal the need for a risk-based approach to decision-making as some responsibly operated mining activities can be compatible with even the highest conservation objectives.

Today, both onsite and offsite opportunities are being pursued by leading companies to enhance their contributions to biodiversity conservation. These include assessments and conservation of unique flora and fauna, research and development and support for protected area site management programmes (see Box 1). A number of companies have also established partnerships with conservation groups and these are beginning to deliver real on-the-ground conservation outcomes.

4. Addressing the trust deficit

Earning trust is not easy. Industry leaders recognise that this can only be done by delivering the beneficial outcomes of mineral development while improving environmental and social performance.

While much more remains to be done, progress is being made along this path. The Global Mining Initiative and the Mining Minerals and Sustainable Development project signalled the intent of leading companies to contribute to society's transition to sustainable development. The recent establishment of ICMM has also been a major step forward as it has already provided leadership to the industry in a number of important areas (see Box 2).

In May 2003, the ICMM Council adopted a set of ten principles on sustainable development. The principles provide an important framework to drive continuous improvement in industry performance. ICMM and the Global Reporting Initiative (GRI) have recently signed a Memorandum of Understanding to develop a Mining and Metals Supplement to the GRI 2002 Sustainability Reporting Guidelines through a multi-stakeholder process. ICMM is also working with UNCTAD, UNEP and the UK Department of International Development on a good practice library web site.

As a result of these leadership initiatives, the mining and metals industry is one of the few industrial sectors that have a comprehensive Sustainable Development Framework against which its corporate members are committed to measuring performance (see Box 3 and 4).

5. The IUCN-ICMM dialogue

The IUCN ICMM Dialogue on mining and biodiversity announced at the WSSD represents a further important step towards

Box 1 : Positive Industry Contributions to Biodiversity Conservation

Onsite

(a) Carry out full scientific assessments of biodiversity to inform decisions on new projects, existing operations and closure options;

(b) Establish Biodiversity Action Plans on each site, integrate these into management systems and implement programmes that protect priority species and habitats

(c) Create refuges for important species through effective control on land-use within owned/managed land (control hunting, development, resource use, access, vehicles, etc)

(d) Monitor biodiversity components to track the effects of mine activities and presence against predictions and to characterise the effect of other processes (climate change, demographic change, etc).

(e) Enhance conservation value of owned/managed land by undertaking reclamation programmes on degraded land, including the reconstruction of functioning ecosystems of higher value where appropriate.

(f) Develop and implement sustainable arrangements for biodiversity management upon closure, taking into account scientific and community priorities.

Offsite

(a) Engage in formal offset land swaps to compensate for the unavoidable loss of biodiversity value at the project or operation

(b) Provide biodiversity data obtained by survey and monitoring to the scientific public to enable better decision-making and priority setting across the region.

(c) Contribute to training and other capacity building for national academic, regulatory and NGO staff, in technical and managerial skills.

(d) Support local, national, regional and global biodiversity priority-setting processes and assessments (e.g., Protected Area Management Plans, National Biodiversity Strategies and Action Plans, meetings of the Convention on Biological Diversity, Millennium Ecosystem Assessment, etc).

(e) Undertake community conservation initiatives (sustainable harvesting, equitable marketing etc.)

(f) Contribute financing towards priority conservation actions, including management of protected areas.

addressing the trust deficit. Intended to provide a forum for a full exchange of views and perspectives, it is hoped that the Dialogue can establish a foundation of trust and, in so doing, catalyse further performance improvements in the mining industry (More on the Dialogue can be found at www.iucn.org).

One of the Dialogue's priority areas is to develop best practice guidance to raise levels of industry performance in the way biodiversity is assessed and managed. A joint workshop was held in July 2003 (see www.iucn.org), the draft report of which was discussed at a side event during the Vth World Parks Congress in Durban. An IUCN-ICMM team will be established to take the draft operating principles recommended by workshop participants and develop related performance criteria and implementation guidance in a number of priority areas.

6. ICMM's Landmark 'No-Go' Pledge

A key outcome of the Dialogue to date has been the landmark ICMM Position Statement on Mining and Protected Areas approved by ICMM Council in August 2003. This decision signals ICMM's commitment to engage with the conservation community on the contentious issue of 'no-go' areas. It also contains a number of important undertakings that establish key precedents not only for the

Box 2: GMI, MMSD and ICMM

Global Mining Initiative (GMI) was a leadership initiative by the CEOs of 10 of the world's leading mining and metal producing companies to develop the industry's role in the global transition to sustainable development. The work of GMI culminated with the global policy conference, *Resourcing the Future*, which was held in Toronto in May 2002.

Mining Minerals and Sustainable Development (MMSD) project was undertaken by the International Institute for Environment and Development (IIED) and the World Business Council for Sustainable Development (WBCSD) as part of the GMI. Based on an extensive program of stakeholder consultations, the MMSD report, entitled 'Breaking New Ground,' came forward with a number of recommendations for all constituents aimed at improving performance and enhancing the sector's contribution to sustainable development.

The International Council on Mining and Metals (ICMM) is an industry-based organisation that was established in October 2001 to provide leadership to the mining and metals industry in meeting the challenges of sustainable development. Its membership is currently comprised of 15 of the world's largest mining and metal producing companies as well as 26 industry associations worldwide. ICMM is an outcome of the Global Mining Initiative (GMI) and has been mandated to take forward the recommendations of the Mining Minerals and Sustainable Development (MMSD) project (see www.icmm.org).

Box 3: Creating a national park

In 2000, the Canadian Nature Federation (CNF) approached the Mining Association of Canada (MAC) to see if the two organizations could agree on proposed boundaries for a new national park on northern Bathurst Island. The proposed area is particularly sensitive. To the east lies a rich geological fold belt, but the island is also home to critical calving grounds for the Peary caribou, an endangered species.

After consulting extensively with industry, including Teck Cominco and Noranda (two MAC members that have explored the area), MAC and the CNF reached common ground. MAC proposed an eastern boundary that excludes lands with rich mineral potential, and at the same time suggested a temporary moratorium on those lands until the caribou herd has recovered

MAC's proposal was something of a breakthrough, since federal departments could not previously agree on the park's boundaries. The final outcome is subject to negotiation of an impact benefit agreement with the Inuit.

mining industry but also other extractive industries.

ICMM recognises the role of properly designated and managed protected areas in conservation strategies and that, in some cases, exploration and mining development may be incompatible with the objectives for which areas are designated. To give effect to this principle, ICMM members have undertaken 'not to explore or mine in World Heritage properties' and to take all possible steps to ensure that operations are not incompatible with the outstanding universal values of World Heritage properties. ICMM members have also made a commitment to respect all legally designated protected areas.

ICMM will also continue to work with IUCN to strengthen its system of protected area categorisation. ICMM members recognise that sufficient reform of this system will lead to recognition of categories of protected areas as 'no-go' areas and others with a multiple-use designation. This work is intended to influence the way decisions are taken in ICMM member companies, so that potential confrontations over land use with the conservation community are minimised.

Box 4: Use of offsets to mitigate on-site habitat losses

In the mid 1990s, Kennecott, a wholly owned subsidiary of Rio Tinto, needed to develop additional tailings storage capacity at its open pit mining operation in Bingham Canyon, Utah. Since the proposed site contained designated wetlands, Kennecott was required under US law to provide an offset of 1,055 acres of similar or enhanced wetland habitats as compensation.

The wetland mitigation plan was developed in coordination with representatives of Utah Division of Wildlife Resources, US Fish and Wildlife Services, the US Environmental Protection Agency, the Nature Conservancy, National Audubon Society and the US Corps of Engineers. The enhanced site became operational in February 1997 and is officially referred to as the Inland Sea Shorebird Reserve (ISSR). Based on initial positive wildlife response the ISSR was expanded from 2,500 to over 3,600 acres with a total of nine shallow ponds.

After eight cumulative years of environmental monitoring the data establish that the ISSR provides an abundance of food and amenable water quality able to support shorebirds and other wildlife. Post enhancement water bird detections exceed baseline conditions by margins of 1,000% to over 3,000%. Kennecott is committed to maintaining the wetland functions and values in perpetuity. At some point in the future, Kennecott is considering ISSR long-term management to be turned over to a conservation group.

The use of offsets to mitigate on-site habitat losses associated with development is controversial. But, as the ISSR experience shows, offsets can be a very successful biodiversity conservation tool for all parties in some cases.

7. Transparent, informed and fair decision-making processes

The ICMM Position Statement demonstrates that industry accepts the principle of 'no-go' areas. What is of vital concern are the decision-making processes used by governments in establishing land-use priorities and protected areas, generally, and 'no-go' areas more specifically. From the industry's perspective, much needs to be done, principally by governments.

Society's ever increasing demand for minerals will require industry to have access to large amounts of land for exploration, though the area retained for advanced exploration and mining is only a small fraction of what was originally explored11. New exploration leases are increasingly located in isolated locations including some in biodiversity-rich and socially sensitive areas. This could bring mining into greater competition with alternative land-uses, including protected areas.

ICMM believes that more strategic approaches are needed to assist governments in negotiating responses that enable equitable resolution of different land-use, conservation and development objectives. Such approaches need to be transparent, informed by mineral development potential assessments, among others, based on the principles of sustainable development and must take into account the opinions of and consequences for local communities, including indigenous peoples, and the regions involved.

11 Only about 1 in 1000 exploration targets results in mine development. Also, the total land disturbed to mine an ore body (a measure of the likely impact on biodiversity) is relatively small compared to other land-uses.

In coming months, ICMM hopes to build on the results of a scoping paper now being prepared under the dialogue with IUCN. The intention is to bring together other interested organisations (e.g., international organisations, governments, environment and development NGOs) to develop decision-making models and assessment tools that better integrate conservation and mining into land-use planning strategies and regional development plans. Such work would only be a first step as a concerted programme of international cooperation will be required to help build government capacity in developing countries and economies in transition. Ultimately, such collaboration will seek to develop clear and equitable rules for land access as well as establish the basis for determining 'no-go' areas for exploration and mining activities.

8. Conclusion

ICMM members are committed to providing leadership aimed at improving the industry's performance and enhancing the contribution of mineral development to poverty alleviation and biodiversity conservation objectives. ICMM commitments offer governments and other stakeholders a clear basis for choice when they consider how to translate mineral potential into sustainable development outcomes. They also set industry standards that can be used to influence better performance in other parts of the mining industry.

Advancing conservation and development objectives will require close cooperation between governments, multi-lateral organisations, industry, communities and NGOs. Partnership opportunities with companies offer environmental NGOs considerable potential to achieve on the ground conservation outcomes. Governments can also foster real progress by establishing clear criteria for project outcomes, including biodiversity conservation results, when seeking commercial partners in mineral development projects or when inviting bids on new mining licences.

Collaboration is required to assist in the development of decision-making models and assessment tools that integrate conservation and mining into land-use planning strategies. A concerted programme of international cooperation will also be required to build government capacity to implement these tools and ensure the application and enforcement of equitable rules regarding land access.

The Parties to the Convention on Biological Diversity (CBD) are striving to ensure progress in aligning the conservation and development agenda, based on the ecosystem approach. The CBD and other international bodies also have an important role to play in advancing the Durban Plan of Action developed at the Vth World Parks Congress. It is hoped that the products of the IUCN-ICMM Dialogue can contribute to the CBD's proposed work programme on protected areas and ecosystem management. ICMM looks forward to future collaboration with those organisations interested in advancing the mining industry's contribution to biodiversity conservation.

22 MEETING THE CHALLENGES BETWEEN ENERGY NEEDS AND BIODIVERSITY: SHELL CASE STUDY

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1. Needs for greater energy demand?

Recent UN population forecasts point to 8.5 billion people by 2050 and a maximum global population of 10 billion by 2075. Populations are ageing and it is estimated that over 80% of people are likely to live in urban environments by 2050. We are also likely to see increasing and more widespread affluence with estimated annual economic growth of 3.5% over the next 50 years – this should raise global average per capita incomes above $20,000 by 2050.

Energy is essential for economic development and raising living standards. Changes in economic and social development mark transitions in the energy systems used, resulting in greater energy demand per capita as the economic and social welfare of a society improves.

Shell's long-terms energy scenarios cite that global primary energy demand could ultimately saturate at either around 100 or 200 GJ per capita, depending on how much investment is made in energy efficiency. At 100 GJ per capita energy consumption by 2050 would be just over twice what it is now, and at 200 GJ per capita, three times as much.

There is a real concern that in order to meet this future energy demand there will be a scarcity of energy resources. Just how quickly the traditional forms of energy (coal, oil and gas) will become scarce (if at all) depends on a number of factors such as the advent of new technology, customer preference, and government choices. What is clear though is that a large proportion of the energy needed to meet future demand will come from these traditional energy sources with renewable forms of energy (solar, wind, biomass, geothermal etc) contributing around 30% of the energy portfolio by 2050. That leaves 70% coming from coal, oil and gas.

2. Needs for greater biodiversity conservation?

Biodiversity is fundamental to human welfare and economic development. It plays a critical role in meeting human needs by maintaining ecological processes upon which our survival depends – whether it be providing food, shelter or medicines or regulating our climate, purifying our water or maintaining our watersheds. Healthy ecosystems help maintain a sufficient and diverse gene pool for both wild and domesticated species and also allow species to more easily cope with variations (e.g. climate). Biodiversity also provides people with spiritual, aesthetics and cultural benefits.

The conservation of intact, healthy ecosystems is therefore paramount to maintaining the full range of benefits that humans derive from nature. It is recognised however, that biodiversity is becoming increasingly under threat. Human activities of all kinds from logging, agriculture, mining and fishing to infrastructure, urbanisation and energy development threaten the integrity and health of the world's ecosystems – both terrestrial and marine. Some scientists believe that we are

on the brink of another mass species extinction – best estimates indicate that the current extinction rates are 1,000-10,000 times faster than the average extinction rates over geological time.

Society has responded to the threat to biodiversity and taken action in many ways. The principal international instrument targeted towards the conservation of biodiversity is the Convention on Biological Diversity (CBD) launched at the Rio Summit in 1992. Over 180 governments have since ratified this Convention. There are numerous other biodiversity related conventions such as the Convention on Migratory Species, the Convention on World Heritage Sites, the Convention on Wetlands of International Importance (Ramsar) or the Convention on the International Trade of Endangered Species (CITES). More than 145 countries have either drafted or completed their National Biodiversity Strategies and Action Plans (NBSAPs) outlining how they each plan to meet the objectives of the CBD.

Government signatories to the CBD are required to establish areas to protect biodiversity as part of their obligations under international law. There has been an exponential increase in the numbers of terrestrial areas falling under protection over the last century. There are over 110,000 protected areas (PAs) today covering some 12% of the earth's land surface. In the marine environment, the target is to have 15% of the world's oceans and seas, falling under some level of protection by 2015.

These PA's range from areas strictly designated for conservation and off-limits to any human intervention to areas where multiple land-use activities are allowed. Nevertheless, there are many areas that contain some of the world's highest biodiversity values that remain unprotected. Conservation organisations are working hard to address this and have been working on defining their own areas of priority, such as IUCN's Centres of Plant Diversity, WWF's Global 200 Ecoregions, The Nature Conservancy's Last Great Places, BirdLife's Important Bird Areas or Conservation International's Biodiversity Hotspots and Wilderness Areas.

3. The challenge

The challenge to society in the coming years will be to ensure continued economic and social development given the increasing global population, while at the same time maintaining the health and integrity of the world's ecosystems. Part of this challenge is the need for increasing energy supply. If global energy demand is to be met, and much of it through traditional forms of energy, then this inevitably means access to new acreage and resources, some of which will undoubtedly be sourced from beneath areas having high biodiversity value or sensitivity. This presents a very real issue to industry, governments, conservation organisations and civil society in general - whether energy development and conservation can co-exist? Can the extraction of coal, oil and gas resources be carried out in such a way as to not compromise the integrity of that area's biodiversity values, whether it falls under protection or not? As one would expect the issue is somewhat complex and emotive.

Shell's response to this challenge is to do three key things:

- play a role in the public policy debate around protected areas;
- work to minimize our operational footprint, and
- make a positive contribution to biodiversity conservation.

(i) The public policy debate

At Shell, protected areas are explicitly highlighted in our Group Biodiversity Standard, published in July 2001, and the first to emerge from an energy company. We recognize however, that biodiversity is important everywhere and not only in protected areas and that the statement that 'we respect the basic concept of protected areas' did not go far enough for some NGO's. IUCN (The World Conservation

Union) passed a Recommendation at its 2000 Conservation Congress in Amman, Jordan, where it called upon governments to prohibit mining (including oil and gas operations) from certain categories of protected areas, namely the IUCN Category I-IV protected areas.

We have spent the last two years defining what this 'call' means for us and have recently announced a number of commitments with regard to protected areas. First, Shell will not explore for, or develop, oil and gas resources from within natural World Heritage Sites. This is the first time an energy company has publicly declared where it will not operate. We recognise the outstanding universal value that these sites represent for society.

Second, we will further upgrade our operational practices wherever we operate in IUCN category I-IV protected areas or where an environmental, social, health impact assessment (ESHIA) indicates high biodiversity values. We will become involved in spatial/regional planning exercises, assess our secondary impacts, implement Biodiversity Action Plans, and conduct appropriate baseline and monitoring studies.

Third, we will publicly report on our activities in IUCN Categories I-IV, and finally, we will work with IUCN and others to develop and pilot ways of strengthening the management effectiveness of protected areas through the provision of key skills, creation of sustainable livelihoods and by exploring options for sustainable financing.

While defining what we meant by our reference to protected areas in our Standard, we have been given the opportunity to also contribute to the wider policy debate. Shell is a member of the Steering Committee for the *"Speaking a Common Language"* project. The objectives of the project are:

- establish the impact and effectiveness of the 1994 IUCN guidance;
- examine what needs to be done to develop and promote the objectives-based system of protected area categories itself, and consider how it should be linked to other initiatives in protected area planning and management;
- guide the programme of work on protected areas of the CBD, and
- provide technical advice on the Category System to a proposed programme of work on protected areas for IUCN.

The project outputs will provide a review of progress of the implementation of the IUCN protected area management categories system, leading to the recommendations for the system's refinement and development (see http://www.cf.ac.uk/cplan/sacl/ for more details).

Shell has been working to strengthen its relationship with the IUCN, both with the Secretariat and its regional offices. Shell benefited from a two-year IUCN secondment that helped Shell to work on the protected area issue and on specific projects on the ground. Shell will be providing a return secondment to IUCN in 2004 for a period of 2-3 years. IUCN's unique membership of government, government agencies and NGOs has provided Shell with access to a wide range of stakeholders and views. One example is the role Shell played at the recent World Parks Congress, the first time industry was allowed to contribute to the Congress proceedings.

Shell has also been keeping a close eye on what is going on with the CBD process through its consultations with key stakeholders and through the industry trade associations, IPIECA (International Petroleum Industry Environmental Conservation Association) and OGP (Oil and Gas Producers Forum).

(ii) Reducing our Footprint

We are currently working hard to imbed our Biodiversity Standard into business operations and systems. Spatial information of protected areas and other sensitive regions (World Heritage sites, IUCN Categories I-VI protected areas, Ramsar wetlands, WWF Global 200 Ecoregions and

Conservation International's Biodiversity Hotspots) have been loaded on to an internal Geographical Information System (GIS). This 'Early Warning System' helps staff developing new business opportunities to identify risks related to protected areas and other areas of biodiversity value/ sensitivity. Early engagement with key stakeholders such as WWF is now institutionalized.

Biodiversity has also been integrated into our internal ESHIA guidelines as well as into our internal assurance process, by which each Operating Company has to ensure our Committee of Managing Directors that they are complying with HSE policies and underlying standards we have in place. We are working on developing guidance to have in place Biodiversity Action Plans at sites in or near areas with high biodiversity value. We are also producing a number of tools to internally communicate the biodiversity message – a note to Shell managers, internal website, guidance notes, posters, CD's, magazine articles, guidance on how to implement the Standard etc.

(iii) Making a Positive Contribution

We recognise that to be taken seriously, we must demonstrate our commitments by taking action on the ground. Shell has over 100 biodiversity related projects worldwide ranging from conservation, science, environmental education to capacity-building and communication type projects. We provide below just a few examples of projects that relate to protected areas where we are putting our policy into action and making a positive contribution.

Gabon: In September 2002, President Omar Bongo of Gabon declared 10% of his country under protection and created 13 new national parks. Two of these parks surround Shell's infield oil operations, where we have been present for over 20 years. Through a grant of US$ 2.8 million, the Shell Foundation (together with Shell Gabon) has facilitated a unique partnership between science and industry. Scientists from the Smithsonian Institution's Monitoring and Assessment of Biodiversity Program (SI/MAB) have been independently assessing the impact of Shell's operations on biodiversity and comparing this to that of the adjacent national parks. Early results have indicated that the biodiversity within Shell's operations remains intact with healthy ecosystems and for certain taxa the biodiversity is even higher than the surrounding areas. The scientific information collected will be used to help drive improvements in operational performance and will be used to contribute towards the longer-term conservation of the general region. Shell is working with SI/MAB and others to determine whether our area of operation could fall under some sort of protection to form an important biological corridor between the two adjacent national parks.

Oman: Shell as shareholders of Petroleum Development Oman are helping to preserve the Arabian Oryx Sanctuary (AOS) through a strictly documented procedure that spells out how to operate in sensitive environments and what employees must do when they spot rare and endangered species. The sanctuary is home to the first free-ranging ranging herd of Arabian Oryx since the global extinction of the species in the wild in 1972 and its reintroduction in 1982. PDO has been helping to protect the AOS, the core of which is a UNESCO World Heritage Site in all operations. In particular the company has agreed to stop activities in the core sanctuary area, help develop and agree to guidelines on how to operate in controlled zones of the sanctuary and participate in an education partnership with the AOS management to further environmental awareness. Central to the PDO and AOS education programme is the development of a visitor information centre to help promote eco-tourism and act as resource for students. Posters and books on the AOS and desert ecology have been produced to support environmental awareness.

Canada: A further way Shell supports conservation efforts has been through its partnership with the Nature Conservancy of Canada (NCC). Shell pledged US$ 160,000 for the three-year project to secure properties and conservation easements on ecologically-important lands in the Alberta Rocky Mountain region. Shell is looking at other opportunities for enhancing or creating new areas under protection in the US, Latin America and Africa.

Pakistan: Shell Pakistan is working with a local NGO to help conserve the forests in the Ayubia National Park. This is one of the few remaining moist temperate forests left in Pakistan - a country, which has 4% of forest cover left. However even what is left is being cut down at an alarming rate due to the dependence of the local population on this resource for firewood, fodder and timber for construction. The purpose of the project is to implement a conservation strategy in Ayubia Forest to prevent deforestation through the introduction of Liquefied Petroleum Gas (LPG) as an alternative to the consumption of firewood. Initially, Shell will subsidise the equipment cost of LPG for 150 local households. This will gradually be extended to approximately 3,500 households in the surrounding area. Shell and a local NGO are co-operating to build community awareness and outreach.

4. Conclusion

Shell sees biodiversity as a real business issue: if not addressed properly it increases our risks and potentially jeopardizes our licence-to-grow. On the other hand biodiversity presents great opportunities for us to work in partnership, empower staff, make a positive contribution, and to play an active role in the public policy debate.

Shell supports protected areas as an important component of the conservation agenda, delivering conservation objectives set out in international conventions such as the CBD. Shell recognises the years of hard work invested by the conservation community in their efforts to establish and maintain protected areas.

Shell sees the need for pragmatic and yet innovative approaches when it comes to addressing the needs for energy and biodiversity conservation. Shell does believe that there are some areas too sensitive to operate in, namely natural World Heritage Sites. But also feels that it is possible through a transparent process, working in partnership and with stringent operating practices, that it is possible to operate responsibly in some areas under protection and other areas of high biodiversity value.

23 TOURISM IN PROTECTED AREAS: REDUCING CONFLICTS AND ENHANCING SYNERGIES.

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Protected areas need tourism and tourism needs protected areas. Though the relationship is complex and sometimes adversarial, tourism is always a critical component to consider in the establishment and management of protected areas (Eagles et al., 2002)

1. Is there a "sustainable" solution to conflicting functions?

According to the World tourism Organization, tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited. This description misses the explanation of the type of industry supporting the travelling and lodging of tourists, which is comprehensively captured by the definition provided by the Government of Australia (http://www.parkweb.vic.gov.au), which describes tourism as "the service based industry comprising a number of tangible and intangible components. The tangible elements include transport, foods and beverages, tours, souvenirs and accommodation, while the intangible elements involve education, culture, adventure or simply escape and relaxation".

If with "protected area" it is meant an "area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN definition, 1994), it becomes apparent that tourism and parks might have conflicting functions. The tangible components of the tourism activity, which generally have a direct and physical impact on the surrounding environment, can be of potential conflict with the main functions of protected areas. Indeed the challenge is to harmonize a development activity, seeking physical and economic growth, with *in-situ* conservation and protection of the natural and cultural heritage of a site.

Although it is clear that the main goal for protected areas is the protection and preservation of the environment, the understating of the possible functions played by a protected area has evolved throughout the last two decades. What has also evolved is the understanding of the ways and means that can be used for the conservation of biodiversity, which have often included the sustainable use of the resources, including tourism. Thus, the apparent conflict of functions between tourism activities and conservation is often solved when the park is not considered as a mere wild area set aside for conservation purposes, but as an ecosystem composed of several interacting elements and actors which have to live in harmony. The increased appreciation of environmental services provided by biological diversity in protected areas has highlighted the economic value that these

areas could have for the community living therein.

2. Potential conflicts should not be ignored

As highlighted by the Conference of the Parties to the Convention on Biological Diversity (Annex to decision V/25), historical observations indicate that self-regulation of the tourism industry for sustainable use of biological resources has only rarely being successful.

The first reason is linked to the fact that tourism businesses are driven by interests which do not necessarily coincide with those of protected areas. In the first instance, generally the tourism industry is generally controlled by financial interests located away from tourism destinations. Secondly, many tourism operators view local environmental conditions as a type of common property resource. Therefore, they do not consider necessary to invest revenues generated by the tourism activity in the maintenance and conservation of the environment. Moreover, very often tourism business instead of managing and reducing as much as possible their impact on the surrounding environment, simply export the adverse impacts outside the tourism site. For protected areas this means that although tourism activities might not have a direct impact on the site, they might simply export impacts such as refuse, waste and sewage to surrounding areas unlikely to be visited, but nevertheless important for the well-being of the ecosystem of the protected area (for instance buffer zones).

Indeed, the impact of tourism facilities on the environment is the most important fact to consider while planning for tourism activities in a protected area. Tourism has very often had a direct impact on species composition of vegetation on the ground, increased the risk of the spread of pathogens from humans to wild species and the risk of introducing invasive alien species. Unsustainable consumption of natural resources and pollution caused by tourism facilities has altered habitats, seriously depleted certain species and damaged entire ecosystems. In general the most serious impacts are due to the construction of facilities and infrastructures, which cause vegetation removal and elimination of habitats. Other activities cause disturbance to animals.

In many instances it has emerged how there are limits set by environmental and social conditions which should be respected by developers, and this is particularly true in protected areas. In addition, tourism activities should respond to local conditions, otherwise it could also cause adverse impact on the socio-economic structure of the local community living in the surroundings or in the protected area itself.

Unsustainable tourism activities may increase social degradation and enhance phenomena like local prostitution and drug abuse. In addition, due to the unstable nature of international tourism, communities that come to rely heavily on tourism in economic terms are vulnerable to the changes in the flow of tourist arrivals and may face sudden loss of income and jobs in times of downturn. Moreover, when tourism development occurs, economic benefits are usually unequally distributed amongst members of local communities. There is evidence suggesting that those who benefit are often limited in number and that those who benefit most are often those who were at an economic advantage to begin with, particularly landowners who can afford the investment.

Tourism has also a highly complex impact on cultural values. Tourism activities may lead to inter-generational conflicts through changing aspirations of younger members of communities who may have more contact with, and are more likely to be affected by, the behaviour of tourists. Furthermore, they may affect gender relationships through, for example, offering different employment opportunities to men and women. Traditional practices and events may also be influenced by the tourist preferences. This may lead to erosion of

traditional practices, including cultural erosion and disruption of traditional lifestyles. Additionally, tourism development can lead to the loss of access by indigenous and local communities to their land and resources as well as sacred sites, which are integral to the maintenance of traditional knowledge systems and traditional lifestyles.

3. Benefits and synergies should be enhanced.

There are many successful examples of how sustainable tourism clearly has the potential to reconcile economic and environmental concerns and give a practical meaning to sustainable development. Sustainable tourism can indeed generate jobs and revenues, thus providing an incentive for preserving natural areas. It can also raise public awareness of the many products and services provided by natural ecosystems and biological resources and respect for traditional knowledge and practices.

The most direct means of exploiting tourism for the sustainable use of biological resources is through the harnessing of some proportion of tourism revenues for that end. This may be achieved either through a generalized environmental tax on tourists or particular tourism activities or by charging fees for access to biological resources, the revenue from which can then be used for their maintenance. The latter procedure generally means charging entrance fees to national parks and other protected areas, but also includes fees for activities such as fishing, hunting and diving. Voluntary payment from visitors can also assist in conservation and management of places they visit. It may include donation, membership, sponsorship, merchandise and practical tasks.

In general, the contribution of tourism to economic development could have an indirect positive impact on the conservation and sustainable use of biodiversity. Whether tourists are paying access fees or not, they have a major economic impact on the areas that they visit. Tourist expenditures, in net terms, generate income to the host communities by, for example funding the development of infrastructure and services. Tourism also stimulates infrastructure investment, such as construction of buildings, roads, railroads, airports, sewage systems, water-treatment facilities and other tourism-related facilities. Existing infrastructure may also be used in a manner which benefits local communities, where the tourist is using the facility in one way, while the community uses it in another. Improved and cheap transport services might also be brought to local communities by increased tourism.

Also tourism generates job opportunities in the sector and offers various related business opportunities. Tourism can also provide funds for development or maintenance of sustainable practices. Increasing revenue flows in a region may also allow development of more sustainable land-use practices, by allowing, for example, farmers to use improved rotations and some level of fertilizer input, rather than relying on slash-and-burn cultivation to restore soil fertility through fallow periods.

In general, tourism can provide alternative and supplementary ways for communities to receive revenue from biological diversity, as it can also provide a viable economic alternative to unsustainable production or harvesting practices or other activities deleterious to the environment, particularly in marginal areas, helping to eradicate poverty. In some areas, low-input and small-scale agricultural activities that result in both an attractive environment and the maintenance of high levels of biological diversity can also offer an opportunity for tourism. Sale of products derived from sustainably harvested natural resources may also provide significant opportunities for income-generation and employment. Tourists who have travelled to a country associated with clean and green values may be encouraged to select products from that country.

It is accepted that sustainable tourism can make positive improvements to biological diversity conservation especially when local communities are directly involved with operators. If such local communities receive income directly from a tourist enterprise, they, in turn, increase their evaluation of the resources around them. This is followed by greater protection and conservation of those resources as they are recognized as the source of income.

Finally, tourism can serve as a major educational opportunity, increasing knowledge of natural ecosystems and local communities amongst a broad range of people, in particular by tour operators and guides with specialized training in biological diversity conservation, indigenous and local communities. Such education may be reciprocal. In some parts of the world, local people have become more aware of the uniqueness of their local biological resources, for example the presence of endemic species, through the advent of tourism. Better-informed tourists are more willing to pay for the access to natural sites. Tourism can also provide incentives to maintain traditional arts and crafts and opportunities to learn about different cultures. Furthermore, tourism may, under some circumstances, encourage the maintenance or revitalization of traditional practices that are favourable to the sustainable use of biological resources and that would otherwise be in danger of being lost.

4. Different interests should be balanced

The challenge for the development of sustainable tourism activities in protected areas is to correctly assess the trade-offs that occur between tourism development, the protection of resource values for which protected areas are established and the interest of local communities. In general, it should be understood that the conservation of biodiversity, the preservation of cultures and traditional lifestyles as well as the generation of income can bring important benefits to protected areas, the community living herein and the tourism activities taking place on the site. Below is a table presenting shared interests of protected areas, local communities and the tourism industry.

Table 1: Shared interests of protected areas, local communities and the tourism industry

	Protected areas	Local community	Tourism industry
Conservation of biodiversity	Primary function: *in-situ* conservation of biodiversity	Maintenance of goods and ecological services	Preservation of natural resources, commodities on which the industry is based
Preservation of culture	Conservation of traditional practices and knowledge for the conservation and sustainable use of biodiversity	Maintenance of traditions and cultures for social cohesion and livelihood	Preservation of another commodity to offer to tourists
Generation of revenues	Revenues to be invested in conservation	Income generation for the local community	Revenue for the industry

There are several instruments, at the national and international levels, providing guidance on how to balance different interests involved in the planning of tourism activities in protected areas. In particular, the CBD (draft) guidelines on biodiversity and tourism[12] are a tool addressing the planning of tourism activities in vulnerable ecosystems, which governments, decision-makers, managers, developers and the local communities should take into account when planning for tourism development in protected areas. The CBD guidelines focus on making tourism and biodiversity more mutually supportive, engaging the private sector and local and indigenous communities, and promoting infrastructure and land-use planning based on the principles of conservation and sustainable use of biodiversity. They set out what the proponent of a new tourism investment or activity should do to seek approval, how the authorities should manage the approval process, and how to sustain the transition to sustainable tourism through education and capacity building. The main goal of the guidelines is to ensure a sound assessment, planning and management process, which involves the participation of all key stakeholders involved in tourism and biodiversity, in order to balance their interest and coordinate action.

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Eagles P.F., S.F. McCool and C.D Hanynes (2002) "Sustainable Tourism in Protected areas". IUCN, Gland, Switzerland.

12 See SBSTTA recommendation VIII/5 on "Biological diversity and tourism: draft guidelines for activities related to sustainable tourism development and biological diversity and case-studies on the implementation of the guidelines" in document UNEP/CBD/COP/7/3 accessible at www.biodiv.org/doc/meetings/cop/cop-7/official/_Toc35419526

24 ACCESS AND BENEFIT SHARING PERSPECTIVES IN PROTECTED AREA MANAGEMENT

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1. Introduction[13]

Bioprospecting have focused attention on protected areas for many years. Taq polymerase which came from extremophiles found in Yellowstone National park in the US was collected in 1966. And even though commercial use of "natural" genetic resources is cyclical, there are many good reasons why companies will continue to explore the opportunities that the genetic resources of protected areas promise. Protected area managers, as well as others, however, have been slow to develop guidelines and policies that ensure that the protected areas can control bioprospecting in a manner that ensures maximum benefit for protected areas whilst at the same time promoting scientific and commercial use of the genetic resources. In part, this has been due to a lack of national ABS guidance and experience, in this rapidly evolving area of policy.

This paper has been prepared to address this gap in the literature and thereby assist protected area managers in addressing these rapidly evolving issues. Section II considers the role and value of bioprospecting and its relation to protected areas. Section III reviews the international and national policy context for ABS. Section IV outlines some of the key issues that protected area managers need to consider in developing their ABS policies. Finally, the paper concludes with recommendations that aim to assist protected area managers in grappling with this complex field.

2. Bioprospecting and protected areas

Bioprospecting is undertaken by companies in a wide range of sectors. Demand for genetic resources, and the ways they are valued and incorporated into research and development (R&D), varies dramatically within and between sectors. For example, in the pharmaceutical industry, scientific developments in the fields of biochemistry, molecular biology, cell biology, immunology, and information technology continue to transform the process of product discovery and development. New technologies, such as combinatorial chemistry, high-throughput screens, and laboratories-on-a-chip, provide unprecedented numbers of compounds to test in high-throughput screens, with implications for the value of natural products as an alternative route to discovering novel compounds (ten Kate and Laird, 1999) Driven by scientific and technological developments, natural products research has been cyclical in recent decades. However, it continues to form an important, if small, element of industry R&D programmes, and to contribute significantly to company revenues.[14]

13 This is an abbreviated version of a paper published by United Nations University Institute of Advanced Studies entitled "Biodiversity Access and Benefit-Sharing Policies for Protected Areas: An Introduction". UNU/IAS, Tokyo, Japan.

14 For example, 11 of the 25 best-selling blockbuster drugs in 1997, representing 42% of industry-wide sales and with a total value of $17.5 billion, are biologicals, natural products or entities derived from natural products (Newman and Laird, 1999). Of the 87 cancer drugs approved by the US Food and Drug

Moreover, continued growth of the biotechnology sector and the increased pervasiveness of biotechnology in other sectors will likely lead to greater examination of novel genetic resources and biochemical process as part of the product development phase of various sectors.

Bioprospecting in protected areas has yielded valuable commercial products in recent decades. Two well known examples of this are cyclosporine and TAQ. TAQ, mentioned above, has been used in a range of biotechnological applications, with annual sales exceeding US$200 million (ten Kate *et al*., 2002). Cyclosporine, which came from a soil sample taken from Hardangervidda National Park in 1969, was the 33rd top-selling drug worldwide in 2000, with total sales of US$1.2 billion (MedAd News, 2001.).

Another well know example of bioprospecting being linked to the protected area network is the relationship that the National Institute of Biodiversity (INBio) has with the Ministry of Environment and Energy (MINAE) in Costa Rica, where INBio includes a 'conservation overhead' in the budgets of its commercial research partnerships. Ten percent of all bioprospecting budgets, and 50 per cent of all royalties, are donated to MINAE (INBio, 2002). The Great Barrier Reef Marine National Park is also marketing its genetic resources to the biotech industry, through research agreements with CRC, James Cook University and AIMS. Similar arrangements are being explored elsewhere.

Both users and protected area managers are interested in developing this relationship. Users because protected areas offer researchers unique benefits. For example, protected areas hold much of the world's biodiversity and are likely to become increasingly important as repositories of disappearing habitats, species, and genetic resources. They provide a stable site with limited or no exploitation of resources, a critical condition for academic studies that monitor ecological change over time, and for commercial researchers who want to ensure that they can return and re-collect a sample that shows promise in laboratory testing. Protected area staff are knowledgeable about local ecosystems, communities, history and previous research. Protected areas themselves offer infrastructure, services, including help with permitting procedures, and logistical assistance, and can facilitate access to biological and genetic resources and interesting sites. Protected area managers, because bioprospecting promises additional sources of precious funding, promotes research in the biodiversity of the area and promotes collaboration with scientific research and development programmes. This type of benefit is critically important as few protected areas have sufficient budgets to cover their most basic research needs.

3 The policy framework for biodiversity research and prospecting

A range of legal and policy developments at the intergovernmental, national, institutional, company, and community levels create the new framework within which biodiversity research and bioprospecting take place.

National governments, including those of the Andean Pact countries, the Philippines, Brazil, and India, have drafted new ABS measures regulating biodiversity research and prospecting. In total, around 100 governments have implemented or are drafting ABS measures (Mugabe *et al.,* 1997). In addition, countries are beginning to introduce laws regulating access to traditional knowledge, independent of whether it is obtained in conjunction with genetic resources that complement national ABS measures.15 Complementing

Administration between 1985-1995, 62% are of natural origin or are modelled on natural product parents (Cragg *et al*, 1997).

15 For example, see the Philippines' 1997 Indigenous Peoples Rights Act (IPRA) and Peru's Law No 27811 Law Introducing a Protection Regime for the Collective Knowledge of Indigenous Peoples Derived

developments in national and international policy, a range of documents developed by indigenous peoples, researchers, professional research associations and companies have marked a significant shift in the ethical and policy framework for biodiversity research and prospecting partnerships. The activities these documents address are extremely varied and their scope broad. They include basic academic research as well as commercial prospecting for genetic resources.

Access and Benefit-sharing under the Convention on Biological Diversity (CBD)

Coming to grips with this complex and diverse range of policies, interests, claims and uses is daunting and often overwhelming for those with other pressing claims on their time. The Bonn Guidelines and the CBD are the central pieces of international ABS policy with which protected area managers should be familiar. The CBD, which establishes standards for regulating access to genetic resources and the distribution of the benefits arising from biodiversity, is the principle international legal framework concerning the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the utilization of genetic resources.

The key ABS provisions are contained in Articles 15, 16 and 19. Article 15 recognizes the sovereign rights of States over their natural resources and that the authority to determine access to genetic resources rests with the national governments. It also recognises that each State shall endeavour to facilitate access to genetic resources for environmentally sound uses by other Parties. Article 16 requires Parties to provide and/or facilitate access and transfer to developing countries of technologies under 'fair and most favourable terms'. Article 19 stipulates that measures shall be adopted to provide for the effective participation in biotechnology research by countries providing the genetic resources, and that they be given priority access to results and benefits arising from biotechnology. The commitments in the convention to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities are also important aspects of the ABS paradigm promoted by the Convention (see Articles 8(j), 10(c), 17(2) and 18(4)).

The Bonn Guidelines provide voluntary guidance for the CBD's Contracting Parties regarding their obligations under the above provisions.[16] These Guidelines provide operational guidance for 'users and providers' of genetic resources, to assist governments drafting national laws, and to guide governments, communities, companies, researchers and others involved in ABS agreements. The Bonn Guidelines establish a basic model for ABS, whereby individual users and providers of genetic resources are allowed to come to an informed agreement about how the resources will be used and how the benefits will be shared. There are no minimum standards, although Annex I does set the type of elements and issues that one would expect to see in a fair and equitable agreement. The ABS National Focal Point and Competent National Authorities, which are largely envisaged as being governmental departments, provide a central coordination/information exchange in countries.

Protected areas and the CBD

The CBD also contains provisions on protected areas.17 These provisions call upon Parties to establish systems of protected areas, develop guidelines for the selection, establishment and management of protected areas, regulate biological resources important for the conservation of biodiversity and promote environmentally

from Biological Resources (approved by Congress in August 2000).

16 Human genetic resources and *ex-situ* genetic resources collected before the entry into force of the CBD are excluded from the scope of the CBD.

17 See paragraphs (a), (b), (c) and (e) of Article 8.

sound development in areas adjacent to protected areas.

The commitments contained in the CBD are intertwined and mutually supportive, the meaning of each separate provision being influenced and influencing the CBD's other provisions. Thus, the provisions of the CBD regarding ABS apply to activities in and around the protected area network. This means that in developing their management policies, park managers should take note of the relevant provisions contained both in the CBD and in the Bonn Guidelines.

Collectively, the provisions of the Convention and decisions taken by the Conference of the Parties promote a modern approach to protected area system management. They embody a concept that is not dependent upon setting aside or "locking up" resources found within the protected area network, but one which seeks to promote their integration into the national economy in a sustainable manner and to manage the threats to protected areas in a holistic and integrative manner.

Implementation of the CBD ABS provisions

Over 50 Parties have officially reported efforts to develop national legislation or policies to implement the CBD's provisions on the use of genetic resources. Regional efforts to apply these provisions have been made under the Andean Pact, Association of South East Asian Nations, European Union, African Union, South Pacific Regional Environment Programme and the Pan-European Biological and Landscape Diversity Strategy.

Key lessons that have emerged through this process include the importance of bringing on board a wide range of stakeholders as part of national consultations to develop an ABS measure, including the active involvement of local communities and indigenous peoples; the need for effective implementing institutions and clear and transparent regulatory and permitting processes; the importance of partnerships and non-monetary benefits arising from the research process, since financial benefits in the form of royalties may not materialize; the need to build capacity within the country to address this complex new suite of issues18; and the value of collaborating on a regional or international level (SCBD, 2001; SCBD, 2002; Barber *et al.,* 2002). ABS National Focal Points and Competent National Authorities play a pivotal role in developing ABS policies, providing information to potential users and providers, and building the know-how and knowledge about biodiversity that allows countries to successfully capture benefits arising from its use.

4. Developing a protected area ABS policy: Some issues to consider

Protected area ABS policies help protected area managers maximize the potential gains from biodiversity research and prospecting and minimize lost opportunities.

Protected area managers and policy makers can best address ABS issues by drafting protected area ABS policies and collaborating on national ABS consultations, strategies and drafting of measures. The Bonn Guidelines provide a practical starting point for all providers and users. As such, protected area managers should familiarize themselves with these Guidelines. The standardized procedures of the Bonn Guidelines clarify mutual responsibilities of

18 Key capacities that have been identified in the CBD process include: legislative capacities of countries; administrative capacity of key institutions (e.g. national focal points and competent national authorities); taxonomic information and capacities on biological resources; indigenous and local communities' ability to participate in all steps of the process; commercial skills of relevant public institutions (e.g. herbarium, universities and research institutes); development and management of intellectual property systems; and contract negotiation skills. See decision VI/24/B of the Conference of the Parties available at www.biodi.org/cop/6/decisions. Also note document UNEP/CBD/ABS/EW-CB/1/2/CORR, Capacity-building for access to genetic resources and benefit-sharing: Synthesis of submissions received on needs, priorities and existing initiatives, and additional elements for consideration in the development of an action plan.

protected areas and researchers. These include prior informed consent requirements; behaviour in the field; the nature and schedule of benefits to be shared (e.g. training, equipment, provision of research results in locally-relevant forms); and research relationships with local communities living in proximity to protected areas, and whose knowledge and resources are often the subject of research. ABS policies can also require commercial projects to contribute financially to protected area management, or broader national protected area systems in the short, medium and long term. In this way research relationships reflect international standards of best practice as outlined in various codes of ethics, declarations and international and national policy and law.

The Philippines and the Andean Community were the first to introduce ABS measures.19 Protected areas did not feature prominently in these measures, although genetic resources found in protected areas are considered the property of the state.

In the case of the 1994 Executive Order 247 in the Philippines, collectors must obtain the prior informed consent of local protected area management boards and '… the Research Agreement entered into must conform with all the requirements under the Republic Act No. 7586 (The National Integrated Protected Areas System Act of 1992), including conformity with the management plan formulated by the Protected Area Management Board' (Appendix B, EO 247). Although the EO 247 is reported to lead to increased awareness among protected area regulators and local communities about new requirements for more equitable research,20 it has generally resulted in a decline in academic and commercial research. This is because of overly burdensome nature of the processes it has established.

A similar situation has occurred in the Andean Pact. Little attention was given to specific national regulations for protected areas, including the potential to link existing regulations with the new access regulatory system (Ruiz, 2002). Decision 391, combined with national PA legislation, created a complex layer of regulatory obligations in which applicants are not only required to undergo regular access procedures established in Decision 391, but must also comply with the detailed legal framework for protected areas. In practice, however, it is still possible to undertake research through the protected areas legislation and regulations, without going through the Decision 391 process. It also appears that research has either declined, or that it is undertaken outside the Decision 391 process.21

The impact of ABS measures on protected areas in Andean Pact countries and the Philippines appears limited. Research in protected areas in both regions is still guided by protected areas legislation and regulations, and often by-passes the new ABS regulatory processes of Decision 391 and EO 247. It also appears that, in cases where ABS measures are not by-passed altogether, they act as deterrents to biodiversity research and prospecting. In order to address these problems, the Philippines 2001 Wildlife Resources and Conservation and Protection Act (RA 9147), no longer considers academic research as bioprospecting for the purposes of permitting agreements. A simpler Memorandum of Agreement between the DENR and researchers now serves to govern academic research. The Philippines' Protected Areas and Wildlife Bureau expects that these more manageable and streamlined procedures will encourage increased scientific research.22

19 The 1994 Philippines Executive Order 247 on Access to Genetic Resources and The Andean Community's Decision 391.

20 Anson Tagtag, the Philippines Protected Areas and Wildlife Bureau, personal communication, 28 July 2003.

21 Ruiz, SPDA, personal communication, 2003.

22 Carlo Custodio, Philippines Protected Areas and Wildlife Bureau, personal communication, 18 August 2003.

In other countries protected area managers are called upon to take an active role in managing biodiversity research and prospecting partnerships, because it is outlined in the relevant legislation, or more frequently, because they have been bequeathed the responsibility in the absence of anyone else. Either way protected areas managers have become an important part of the evolving international and national ABS policy framework. As a result, they should play an important role in national consultative processes that address ABS issues and that develop national measures to implement the CBD. Their experience can contribute valuable perspectives on effective measures and provide insight into some of the practical ramifications of approaches to ABS regulation. However, effective participation in this process requires capacity and understanding of the elements of equitable research relationships, and international standards of 'best practice' for researchers and commercial use of biodiversity. On-going capacity-building is a necessary precursor to, and by-product of, a protected-area policy consultation and drafting process.

5. Recommendations

Protected area managers and policy makers can best address ABS issues by drafting protected area ABS policies and collaborating on national ABS consultations, strategies and drafting of measures. Recommendations to achieve this include:

- Protected area managers should make contact with the relevant ABS National Focal Point and the relevant Competent National Authorities for the Convention on Biological Diversity.
- The Bonn Guidelines provide a practical starting point for all providers and users. As such, protected area managers should familiarize themselves with these Guidelines.
- Protected area managers should consider developing an ABS policy for their protected areas. The national policy framework and the Bonn Guidelines provide useful guidance for such policies. Experience has shown that particular attention needs to be paid to:
    - distinctions between academic and commercial research;
    - the role of local communities; and
    - the relationship between the protected area and national ABS measures.
- Developing endogenous capacities is the single most important step to capturing a greater share of the benefits.
- Protected area managers should participate in national ABS consultations, joining stakeholder committees set up to consider ABS issues.
- Protected areas, as the sites of original collections, should also be explicitly represented as beneficiaries in any ABS commercial agreements.
- Protected area managers should ensure openness and transparency with stakeholders when considering access applications from companies and academic researchers.
- National permitting procedures for research in protected areas should be streamlined to ensure it is efficient and transparent, and integrates the range of relevant governmental regulations.

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25 SECURING THE FUTURE OF PROTECTED AREAS: A COMMITMENT TO YOUNGER GENERATIONS

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> *"Each Generation understands its historic moment as unique, and its future as rife with novel perils and opportunities. This is as it should be, for history is an unfolding story of change and emergence. Each era is unique-but in unique ways.''(Raskin et al., 2002)*

1. Introduction

As we begin the 21st century, younger generations across the globe are preparing to take on the responsibility of securing the future of our planet. They do so in a unique but daunting era of globalization, which brings with it "both novel perils and opportunities" (Hammond and Lash, 2000; Stiglitz, 2003)23.

Protected areas, as recognized by the Convention on Biological Diversity (CBD), play an important role in the world's efforts to conserve biodiversity and thus, to secure the future of life on earth (CBD, 1992; Carabias et al., 2003). The immediate concern of the parties to the CBD should be to ensure that future generations are bequested the great intergenerational legacy represented by the global network of protected areas. Parties must fully recognize that today's younger generations are tomorrow's managers, rangers, and scientists for protected areas, as well as tomorrow's political leaders and decision makers. To take advantage of this fact the parties need to build support for protected areas among younger generations, and provide opportunities for participation and capacity building so that each rising generation can assume the roles required to sustain protected areas in the future.

This paper, seeks to highlight the issues associated with protected areas and younger generations. It intends to explore ways in which younger generations can become more effectively engaged with protected areas, and with biodiversity conservation issues in general. Also offered are some policy options as examples of ways in which the parties to the CBD could move forward in addressing younger generations' issues.

2. Protected areas, younger generations and global governance

There have been many recent efforts at the local, national, and international level to involve younger generations in different aspects of biodiversity conservation. These include the soliciting of input from younger generations in formulating the principle output documents, the Durban Accord and the Durban Plan of Action, at the Fifth World Parks Congress (WPC) in 2003. However, it is increasingly recognized that greater work must be done to actively

23 Several global backlash demonstrations including Seattle 1999 helped put the inequities of globalization on the international agenda, more recently there has been unification of efforts by younger generations at WPC, World Forestry Congress, WSSD to contribute to efforts of securing a more sustainable environmental future for the planet

incorporate younger generations in conservation in general, and specifically in the context of protected areas. At the opening of the WPC, world leader Nelson Mandela spoke specifically about the immediate need to reach out to younger generations to ensure the future of protected areas (Mandela, 2003).

As the Conference of the Parties to the Convention gathers to review Article 8 of the CBD, there is an opportunity to secure the more effective engagement of younger generations at the global governance level. As we begin to think about new and more effective global governance structures that affect the future of protected areas, we must also ensure that these efforts are based on communication between older and younger generations which enables the combination of experience and wisdom with the energy, open-mindedness and enthusiasm of younger generations.

3. The values of protected areas for younger generations

Protected areas represent many things for today's younger generations, but perhaps most importantly they represent hope for a biologically viable world for the generations to come. Protected areas present opportunities for learning, for action, and they are a means through which younger generations can become directly involved in biodiversity conservation.

In preparing for the Fifth WPC, Yale University conducted a survey of young people in all corners of the world to learn more about their views on protected areas. Survey respondents ascribed the following values to protected areas (Brunton *et al.*, 2003):

- Biodiversity conservation and protection of essential ecosystem services
- Opportunities for scientific research and education
- Income generation for local communities
- Meeting human spiritual and religious needs and ensuring co-existence of humans and nature
- Preservation of cultural heritage

Younger generations recognize that protected areas have spiritual and cultural values, and believe that an overall shift in values away from those which are purely economically based must occur if we are to secure the future of protected areas. Younger generations also understand the social implications of conservation through protected areas, and highlight the need for more scientific and social research, particularly in developing countries.

4. Challenges

Many barriers and challenges exist that reduce the opportunities and incentives for young people to become engaged in the greater effort to maintain and expand the global PA network. Opportunities for younger generations to have first-hand experiences with nature are becoming fewer in the south, and thus the potential for each generation to develop an understanding of and appreciation for the importance of biodiversity is reduced. In the north, more and more younger generations seek more financially rewarding professions. This is true for the younger generations in the south as well. Career opportunities in the environmental sector can be limited, not only in terms of individual salaries, but simply by the number of entry-level job opportunities available to young people (Whitaker, 2003). Much can be done to remove some of these barriers. Greater resources could be allocated to encourage young people to enter fields of study important to conservation, and to assist with stipends for unpaid entry level opportunities. Through the removal of financial barriers to learning younger generations will be more likely to have the opportunities and capacity to contribute to the conservation of the areas that help to ensure ecological sustainability.

Though protected areas have the potential to provide many opportunities for

younger generations, these opportunities can only be taken advantage of if young people have sufficient access to protected areas. When younger generations have no first-hand knowledge of the values of protected areas there is little likelihood that they will be able to appreciate them, and then to act to maintain them. Often the only way that young people are able to interact with and appreciate their natural heritage is through programs that specifically reach out and endeavour to provide experiences in which youth can be exposed to the natural world. Examples of such programs in the US include the San Diego Chapter of the Sierra Club's Inner City Outings and the New York City Urban Park Rangers Youth Program. Internationally, an example can be found in the Bulgarian-based Green Balkans Youth Programs and the Young Park Rangers program in South Africa. Such efforts are to be strongly commended and the scope and number of such efforts should be greatly expanded.

Protected areas also present ideal venues for formative educational experiences. The idea of an outdoor classroom (formalized or not) is not a new idea, and we must continue to expand our use of this tool, and take advantage of the natural learning environment that protected areas provide. Protected areas can serve as a tool for learning about the natural world, but also for learning about oneself. School programs such as "Nature's Classroom", a program for middle school children in the United States, demonstrate the potential of protected areas in this regard. Protected areas, and the conservation issues associated with them, also represent a forum through which younger generations can become engaged in civil society.

5. Building on values and meeting challenges

How then can the international community, particularly sovereign states, take advantage of the values younger generations hold for protected areas, expand the opportunities they provide, and address the barriers young people face in becoming involved in their conservation? The most practical step forward is through the development of policy instruments at the global and national levels that will ensure on-going and strengthened involvement of younger generations in the conservation of protected areas. We believe that appropriate policies can provide incentives for conservation and at the same time reinforce values with young people. Garnering support politically and from funding mechanisms such as the Global Environment Facility (GEF) for such policies is our challenge.

The following list of policy options is intended as a very preliminary selection of policies to support the involvement of younger generations in protected areas, and should not be considered comprehensive. It must be remembered that the success of any policy is dependent on the context and manner in which it is implemented, and the effectiveness of implementation.

Policies that will facilitate better access to protected areas:

- Development of youth programs at national parks.
- Development of mechanisms that will provide working partnerships between protected areas and youth organizations.

Policies that will provide incentives to attract younger generations into environmental careers:

- National internship programs in institutions that address environmental matters.
- Financial mechanisms to support youth in environmentally-related programs which do not offer remuneration.
- Expanded scholarships for natural resource related studies at the university level.

Policies that will provide incentives for public private partnerships and private sector investment into protected areas:

- Development of mechanisms for dialogue between private and public sector young professionals for addressing issues of private sector engagement in protected areas.

Policies that will encourage research, particularly in developing countries:

- Increased resources for research grants.
- Development of mechanisms that will provide technical and scientific partnerships between protected areas in the north and protected areas in the south.
- Creating mechanisms that will bridge information and research gaps between the north and south such as regional information clearing houses.
- Development of north-south and south-south exchange programs between researchers and protected area management and technical staff.

Policies that will ensure that protected area values are instilled in younger generations:

- Support for environmental education at young age.
- Support for school – protected area partnerships.
- Protected areas as living classrooms.
- Partnerships between protected areas and churches or other appropriate institutions and organizations not traditionally associated with conservation.

6. The Parties to the CBD: Securing the engagement of younger generations

The Parties are in a unique position to address the involvement of younger generations in implementing the CBD and in developing new and more innovative global mechanisms for conservation of biodiversity in protected areas (Esty and Ivanova, 2002). The Parties can:

- Ensure that members of the CBD commit to engaging younger generations in the implementation of Article 8 during the review at the 7th meeting of the COP by providing a "younger generations" specific clause or amendment that will encourage Parties to the Convention to begin to fully recognize and acknowledge the role of the younger generations in securing the future of protected areas, and to engage them more effectively at all levels in protected areas and conservation.
- In the same way that NGOs and other constituency groups are represented in national delegations to international conferences, young professionals could be formally engaged by the Parties to the CBD to participate in COP meetings and in the process of policy development.
- Develop global young professionals programs that will encourage participation and the input of young professionals at the global governance level. This could be structured similar to programs adopted by the World Bank and UNDP programs.24
- Develop a global information clearing house where young people can participate in information gathering at the local level across the globe.

7. Conclusion

To secure the future of PAs, Parties to the CBD should take the necessary steps to fully recognize and effectively engage younger generations from all sectors of society in all aspects of the stewardship of protected areas. The challenge for the 7th meeting of the COP 7 is to develop a mechanism which would facilitate the incorporation of concerns voiced by the younger generations in the south and north into global debates and decision making processes. Ultimately, the shared goals of the Parties to the CBD and younger generations across the globe should be to move forward together toward solutions in which conservation of biodiversity and accountability of present generations to future generations becomes the norm within our society (Raskin *et al*., 2002; Speth, 2002). This will ensure that each younger generation fully appreciates and understands the values of protected areas and passes them on to their children in an unimpaired state.

24 World Bank Young Professionals Program and the UNDP LEAD Program

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