A Global Network of Forest Protected Areas under the CBD: Opportunities and Challenges

Proceedings of an international expert workshop held in Freiburg, Germany, May 9-11. 2007

Christine B. Schmitt, Till Pistorius,
Georg Winkel

Impressum:
© Verlag Kessel, Eifelweg 37, 53424 Remagen
1. Auflage 2007
Tel.: 02228-493
Fax: 01212-512382426
eMail: nkessel@web.de

Homepage: www.forstbuch.de, www.forestrybooks.com
Druck: www.business-copy.com

Fotos Einband: G. Winkel (links oben), C.B. Schmitt (rechts oben),
D. Tyczewski (links unten), M. Denich (rechts unten)

ISBN: 3-935638-90-6

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Preface

The current rate of species extinction is one of the most challenging environmental problems of the 21st century. Above all, the continuing process of deforestation and forest degradation, particularly in less developed tropical countries but also in boreal and temperate regions, has severe impact on biodiversity because forests harbor a great share of all terrestrial plant and animal species. The Convention on Biological Diversity (CBD) aims at reducing the current rate of biodiversity loss. Concerning forests, the creation of protected areas with core and buffer zones constitutes an important conservation strategy as pointed out by the CBD expanded program of work on forest biodiversity (decision VI/22) and the CBD program of work on protected areas (decision VII/28). Establishing a global network of forest protected areas until 2010 will also be an important issue on the agenda of the next Conference of the Parties (COP9) of the CBD in Germany in May 2008.

In the forefront of COP9, the German Federal Ministry for the Environment (BMU) initiated the project "Conservation of Forest Biodiversity under the CBD: Options for a Global Network of Forest Protected Areas" in order to develop policy options for selection, financing and implementation of such a network. In the framework of this project, the Institute of Forest and Environmental Policy, University of Freiburg, hosted the international expert workshop "A Global Network of Forest Protected Areas under the CBD: Opportunities and Challenges". The objective of the workshop was to discuss and evaluate the ecological, socio-economic and political issues related to the establishment of a global forest protected area network. Altogether, more than 40 biodiversity and forest policy experts from 13 different countries attended the workshop, representing universities, government agencies and non-governmental organizations. The proceedings include the working papers initially prepared as background information for the workshop (Chapter 1), give an overview of the presentations held (Chapter 2) and summarize the discussions of the different working groups (Chapter 3). They should be understood as a comprehensive and interdisciplinary basis for the international discussion process leading up to COP9.

Workshop and proceedings were made possible by financial support of the German Federal Agency for Nature Protection (BfN) and the BMU. We are also grateful to the Stihl Stiftung for a generous financial contribution. Our special thanks go to Ms Sabine Reinecke for her great support in organizing this workshop and to Ms Dinah Tyczewski for editing the proceedings. Finally, we would like to acknowledge our colleagues at the Institute of Forest and Environmental Policy and all workshop participants who contributed with their time and effort.

Christine B. Schmitt, Till Pistorius, Georg Winkel

Institute of Forest and Environmental Policy
University of Freiburg

Part I

Introduction

Political background

Till Pistorius, Christine B. Schmitt, Georg Winkel[1]

1 Background

1.1 Global loss of forest biodiversity

Forests harbor a great share of the total amount of terrestrial plant and animal species. Especially tropical forests are extremely rich in endemic biodiversity compared to other ecosystems and are estimated to be home to 70% of the world's plant and animal species. This variety is at risk to shrink tremendously within decades due to the transformation, isolation, fragmentation and destruction of forest ecosystems. During the past 8,000 years about 45% of the original global forest cover has disappeared, cleared mostly during the last century.

Today there are app. 1.3 billion hectares of primary forest left, accounting for 36.4% of the combined forest area of the reporting countries (FAO 2006a). The FAO assessment revealed for the period between 2000 and 2005 a worldwide annual deforestation rate of 13 M ha with a net loss of forest cover of 7.3 M ha. The net loss of primary forests only in the tropics accounts for 6 M ha per year (LINDSEY 2007). Forest conversion is not only caused by deforestation, mainly through slashing and burning, but also by the slower process of forest degradation[2], mainly through logging, which later often leads to deforestation. The human-induced conversion of forests into alternative land uses is one of the main direct drivers responsible for the irrevocable loss of habitats, species and genetic resources.

MAY and TREGONNING (1998) estimate the current rate of species extinction to be 1,000 to 10,000 times higher than the natural rate. This rate is even expected to increase due to global changes associated to climate change. The IPCC (2007) estimates that 20 - 30% of plant and animal species are likely to face extinction with temperature rises exceeding 1.5 - 2.5°C. The MILLENIUM ECOSYSTEM ASSESSMENT (2005) also developed four scenarios which indicate that the rates of biodiversity loss will continue or even accelerate. It points out several direct

[1] Institute of Forest and Environmental Policy (IFP), University of Freiburg; e-mail:
Till.Pistorius@ifp.uni-freiburg.de, Christine.Schmitt@ifp.uni-freiburg.de, Georg.Winkel@ifp.uni-freiburg.de

[2] As defined by SBSTTA (CBD) a "degraded forest is a secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests includes many non-tree components, which may dominate in the undercanopy vegetation." (www.cbd.int/programmes/areas/forest/definitions.asp)

drivers and underlying causes which are responsible for this trend. The most important direct drivers of biodiversity loss are habitat change, climate change, invasive alien species, overexploitation and pollution. Underlying causes are mainly demographic, economic, socio-political, scientific and technological developments.

With regard to forests, the drivers for deforestation and forest degradation vary according to the region where these processes take place – the consequences, however, are similar: The depletion of biodiversity is accompanied by other negative effects like land and soil degradation, alteration of water regimes, loss of cultural identities and reduced income possibilities for local and indigenous people. Furthermore deforestation and forest degradation cause significant amounts of CO_2-emissions, accounting for more than 18% of the total anthropogenic greenhouse gas emissions (STERN 2006) and thus contributing significantly to climate change. This creates a loop, because the alteration of climatic conditions is itself one of the main factors for the loss of habitats and species.

Apart from deforestation, forest biodiversity is endangered by unsustainable forest management practices. The conversion of primary forests into commercial forests has been causing losses of wilderness areas in the tropics as well as in the boreal zone. Changing management practices can also endanger culturally evolved biodiversity in "traditional" secondary forests, e.g., in the temperate forests of Europe.

1.2 Protected areas and biodiversity conservation

One of the most important instruments to achieve progress in slowing down the loss of biodiversity is in-situ protection in protected areas (PA). The amount and area of PA have significantly increased by 32% since 1990 to more than 12% of total land surface (Fig. 1) (BALMFORD *et al.* 2003; FAO 2006b).

However, despite of the increase in terms of PA number and area, this development has to be evaluated critically: For instance, there is no common understanding of the term "protected area" – especially regarding the extent to which resources may be utilized within these areas and under which conditions this may take place. Thus the real state of conservation inside PA remains often unclear. Furthermore, (DUDLEY and PRESSEY 2001) show that landscapes of high economic value are under-represented while other landscapes, i.e. ice and rock fields, are overrepresented. Moreover, existing PA are often too small and frequently neither well planned nor managed. Insufficient financing plays a key role in this context and often leads to so-called "paper parks" (CBD and UNEP 2005).

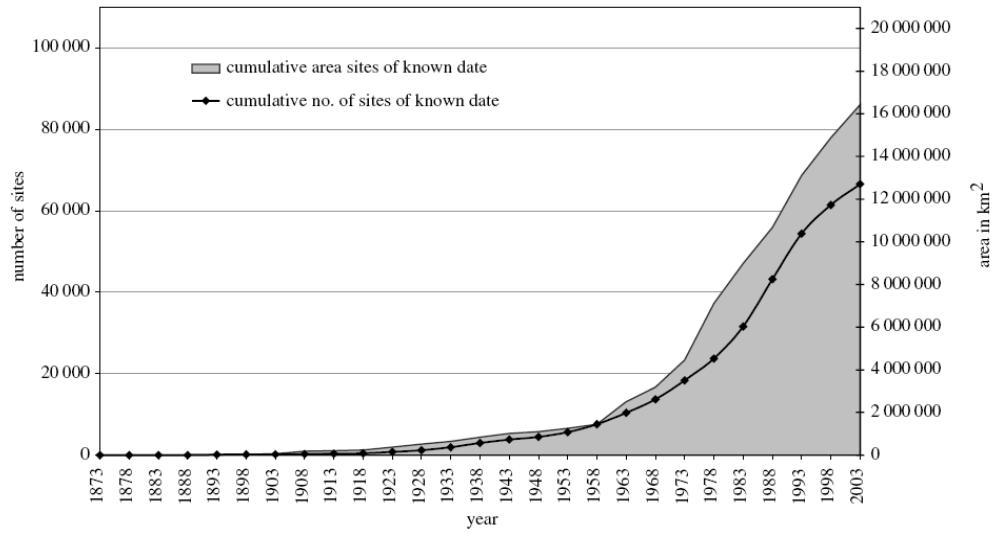

Figure 1: Increase of total area and number of PA worldwide (CHAPE et al. 2005)

2 Biodiversity conservation under the CBD

Alongside other multilateral agreements, slowing down the current loss of biodiversity is one of the major objectives of the Convention on Biological Diversity (CBD). It has three major goals, as stated in Art. 1 of the Convention text:

- Conservation of biological diversity.
- Sustainable use of its components.
- Fair and equitable sharing of the benefits arising out of the use of genetic resources.

2.1 The 2010 biodiversity target

The CBD mission is expressed in the 2010 Biodiversity target many countries committed themselves to during the World Summit for Sustainable Development in Johannesburg 2002. It has been reiterated at several occasions and states:

"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."

Focal area 1 of the 2010 target is protecting the components of biodiversity, e.g.:

- Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.

- Target 1.2: Areas of particular importance to biodiversity protected.

The goals and targets for 2010 have been applied to the thematic programs of work of the convention (UNEP/CBD/COP/8/15), including the expanded program of work on forest biodiversity.

2.2 The expanded program of work on forest biodiversity

The expanded program of work on forest biodiversity, adopted at COP6 in 2002 (UNEP/CBD/COP/6/22), is of particular relevance for the conservation of biodiversity in forests. It incorporates sustainable use, underlining that a certain degree of utilization following principles of sustainability is an integral part of conservation.

One of the goals of the work program on forest biodiversity is to apply the ecosystem approach (EA) to the management of all types of forest. The EA is a strategy for integrated land and resource management in order to promote both, conservation and sustainable use, and to balance the three objectives of the CBD (UNEP/CBD/COP/7/11 2004). It recognizes that mankind, with its cultural diversity, is an integral component of ecosystems.

The expanded program of work on forest biodiversity further calls for the establishment of "adequate and effective protected forest area networks". It is thus strongly linked to the subject of PA, which is a cross-cutting issue under the CBD and thus relevant to all thematic areas of the Convention.

2.3 Article 8 and the program of work on protected areas (PA)

The program of work on PA was adopted during COP7 in 2004 (UNEP/CBD/COP/7/28) in order to operationalize Art. 8 of the CBD on in-situ conservation[3]. This Article states, for example, that each party shall, as far as possible and as appropriate:

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

(d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;

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

(i) Endeavor to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components;

[3] "*In-situ* conservation" is defined by the CBD as the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties (http://www.cbd.int/convention/articles.shtml?a=cbd-02).

(m) Cooperate in providing financial and other support for in-situ conservation (…), particularly to developing countries.

The program of work on PA further elaborates the objectives of Art. 8. One of its targets is:

"By 2010, terrestrially and 2012 in the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area system is established as a contribution to (i) the goal of the Strategic Plan of the Convention and the World Summit on Sustainable Development of achieving a significant reduction in the rate of biodiversity loss by 2010; (ii) the Millennium Development Goals - particularly goal 7 on ensuring environmental sustainability; and (iii) the Global Strategy for Plant Conservation."

The work program on PA takes into account the ecosystem approach and promotes multiple-use PA. They can, for example, consist of core zones with conservation as primary objective and buffer zones where limited and sustainable use of resources is promoted. The aim is to protect natural ecosystems in a way that allows for biodiversity conservation and, at the same time, ensures that they continue to provide a basis for the livelihood of indigenous and local people (FAO 2006a).

3 Outlook

Establishing a PA network for forests until 2010 will be an important issue at COP9 in May 2008. If mutual interest in fostering this vision can be achieved, such a network has a large potential to improve current conservation efforts. However, many questions have yet to be resolved concerning selection, management, financing and implementation of a network of forest PA under the CBD. These questions are further elaborated in the two following papers, which were initially prepared as working papers for the Freiburg expert workshop.

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Approaches for setting global conservation priorities

Christine B. Schmitt[1]

1 Introduction

The urgent need for the conservation of the world's forests has been postulated by many decisions of the Convention on Biological Diversity (CBD). The expanded program of work on forest biological diversity aims to *"further the conservation of endemic and threatened species"* and to ensure *"adequate and effective protected forest area networks"* (decision VI/22). Likewise, the program of work on protected areas demands for *"protected areas in any large, intact or relatively unfragmented or highly irreplaceable natural areas"* and mentions *"large remaining forest areas"* as common conservation priority (decision VII/28). SBSTTA 11 developed outcome-oriented targets for forest biodiversity based on the 2010 biodiversity target, e.g., *"at least 10 % of each of the world's forest types are effectively conserved"* and *"areas of particular importance to biodiversity protected in the most threatened and vulnerable forest ecosystems (…)"* (decision VIII/15). The question remains, however, which forest areas actually are the most irreplaceable and threatened ones at global level.

A number of governmental and non-governmental organizations developed different methodologies for identifying the natural environments with highest conservation priority from a global perspective. Some of these approaches were developed as early as 1988, and their number has been increasing in recent years as a reaction to the ever more rapid loss of global biodiversity. Although most initiatives not only consider forests but the earth's biodiversity as a whole, all of them highlight different forest ecosystems as important areas for immediate conservation action.

This paper gives an overview of approaches for setting global conservation priorities (Table 1). In addition to the concepts developed by NGOs, it presents some renowned intergovernmental agreements dealing with the establishment of protected area systems at global and regional levels. The paper was initially intended as working paper to provide a basis for discussion at the Freiburg expert workshop on a global network of forest protected areas under the CBD.

[1] Institute of Forest and Environmental Policy, University of Freiburg; e-mail: Christine.Schmitt@ifp.uni-freiburg.de

Table 1: Approaches for setting global conservation priorities presented in this paper

Concepts developed by NGOs	Intergovernmental agreements
• Alliance for Zero Extinction (AZE) • Biodiversity Hotspots (BH) • Centres of Plant Diversity (CPD) • Crisis Ecoregions (CE) • Endemic Bird Areas (EBA) • Frontier Forests (FF) • Global Gap Analysis of Protected Areas • High Biodiversity Wilderness Areas (HBWA) • Important Bird Areas (IBA) • Key Biodiversity Areas (KBA) • Last Intact Forest Landscapes (LIFL) • Last of the Wild (LW) • Megadiversity Countries (MC) • The Global 200	• Biosphere Reserves (BR) • NATURA 2000 • The Mesoamerican Corridor • UNESCO World Heritage (WH) sites • Wetlands of International Importance (Ramsar)

2 Concepts developed by NGO

2.1 Representative approaches

Representative approaches have the objective to highlight all regions considered as important for conserving a representative part of global biodiversity. Sites are primarily selected for their high species richness, particular species composition and other outstanding ecological features. Whether a site is under immediate human threat or in rather undisturbed condition is not a key criterion during the selection process.

2.1.1 Centres of Plant Diversity (WWF / IUCN)

The Centres of Plant Diversity (CPD) project identified the areas, which could safeguard the greatest number of plant species globally (Figure 1). These sites are considered conservation priorities due to their pristine botanical importance. The CPD project also outlined a strategy for CPD conservation with particular reference to their potential value for sustainable development. It was anticipated that this global assessment will be followed by further assessments at local level, so that the crucial tasks of conserving plant diversity can be integrated into more detailed national and regional conservation and development strategies (DAVIS and HEYWOOD 1994-1997).

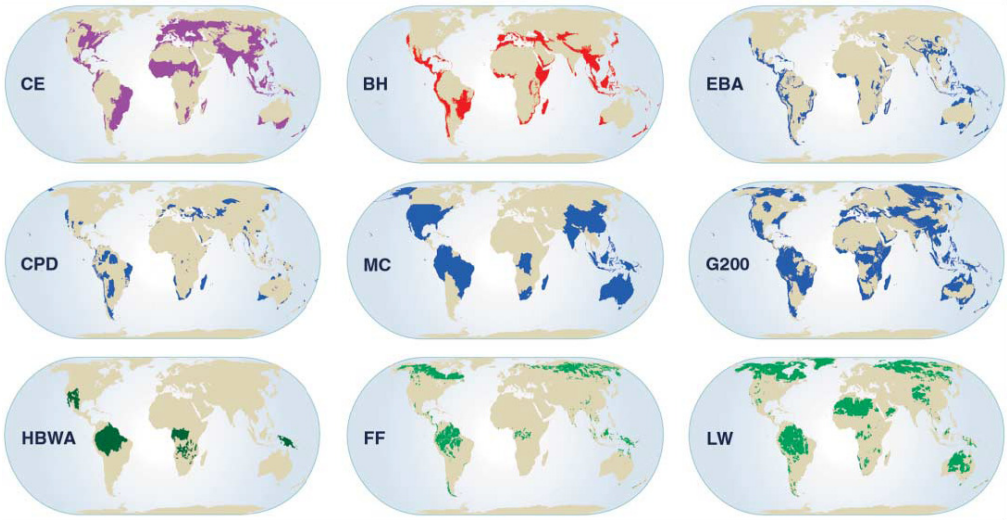

Figure 1: Maps of nine global biodiversity conservation priority templates: CE, Crisis Ecoregions; BH, Biodiversity Hotspots; EBA, Endemic Bird Areas; CPD, Centers of Plant Diversity; MC, Megadiversity Countries; G200, Global 200 Ecoregions; HBWA, High Biodiversity Wilderness Areas; FF, Frontier Forests; LW, Last of the Wild (BROOKS et al. 2006)

Selection criteria (DAVIS and HEYWOOD 1994-1997)

The sites were selected partly on the basis of floristic studies, but especially with reference to the detailed knowledge of botanists familiar with the respective regions. Sites and vegetation types must each have one or both of the following two characteristics:

a) High species richness

- the area is evidently species rich, even though the number of species present may not be accurately known; e.g., mainland sites with more than 1,000 vascular plant species

b) Many endemic species

- mainland: sites with at least 100 (= 10 %) species endemic either to the site (strictly endemic) or to the phytogeographical region in which the site occurs
- island: flora with at least 50 endemic species or at least 10 % of the flora endemic

It was also considered if the site

- contains an important gene pool of plants of value to humans or that are potentially useful;
- contains a diverse range of habitat types;

- contains a significant proportion of species adapted to special edaphic conditions; and,
- is threatened or under imminent threat of large-scale devastation.

Results

234 CPD sites were identified worldwide. Their sizes vary greatly between 53 and 1,010,000 km^2 (DAVIS and HEYWOOD 1994-1997).

2.1.2 Endemic Bird Areas (BirdLife International)

The aim of the Endemic Bird Areas (EBA) approach is identification of the most important places for habitat-based conservation of restricted-range birds worldwide (Fig. 1). EBA are considered as priorities for conservation action because half of all endemic bird species are globally threatened or near-threatened and the other half are vulnerable to the loss or degradation of habitat due to the smallness of their ranges. In addition, the majority of EBA support many of the world's more widespread bird species and are important for the conservation of restricted-range species from other animal and plant groups (BIRDLIFE INTERNATIONAL 2006a; WRI 2000). The EBA Program is complemented by BirdLife's Important Bird Area (IBA) Program (section 2.3.5 of this paper), which carries out the identification of representative key sites for conservation within EBA at the local level.

Selection criteria (BIRDLIFE INTERNATIONAL 2006a)

Area that encompasses the overlapping breeding ranges of two or more restricted-range (less than 50,000 km^2) landbirds, such that the complete ranges of at least two species fall entirely within the boundary of the EBA.

Results

BirdLife International has so far identified 218 EBA worldwide, 83 % of which are located in forest areas mostly in the tropics and subtropics (BIRDLIFE INTERNATIONAL 2006a; WRI 2000). The EBA contain nearly all of the world's restricted-range bird species, because only 7 % of restricted-range species do not overlap with other such species and therefore do not occur in EBA. Geographically, EBA are often islands or mountain ranges. Most are smaller than 30,000 km^2, but their size varies widely, from small islands of a few square kilometers to the southeastern Chinese mountains with more than 600,000 km^2.

2.1.3 Megadiversity Countries (Conservation International)

The concept of Megadiversity Countries was developed in 1988 to draw attention to the fact that the world's biodiversity is unevenly distributed between countries (Fig. 1). As a consequence, megadiversity countries play a crucial role in any global conservation strategy (MITTERMEIER *et al.* 1997).

Selection criteria (MITTERMEIER *et al.* 1997)

Countries were ranked according to their number of species of higher plants, mammals, birds, reptiles and amphibians.

Results (MITTERMEIER *et al.* 1997)

17 countries account for more than two-thirds of all life forms and for the vast majority of tropical rainforests, coral reefs and other priority systems. They also harbor as much as 80 % of the world's most endangered plant and animal species. Brazil, Indonesia and Colombia top the list, followed by Australia, Peru, Mexico, Madagascar, China and in random order Democratic Republic of Congo, Ecuador, India, Malaysia, Philippines, South Africa, Papua New Guinea, United States and Venezuela.

In February 2002, the Ministers in charge of the Environment and the Delegates of Brazil, China, Colombia, Costa Rica, Ecuador, India, Indonesia, Kenya, Mexico, Peru, South Africa and Venezuela assembled in Cancun, Mexico and developed the Cancun Declaration of like-minded megadiversity countries.

2.1.4 The Global 200 (WWF)

The Global 200 concept aims to represent the world's biodiversity by identifying outstanding ecoregions in all biomes and biogeographic realms (Fig. 1). The specific location and boundaries of the Global 200 ecoregions are not intended to represent exact target areas for detailed conservation planning, but are primarily meant to spotlight regions of exceptional importance for strategic decision-making (OLSON and DINERSTEIN 2002).

Data set

Ecoregions were defined by using widely recognized global biogeographic maps, published regional classification systems and expert consultations (OLSON *et al.* 2001). An ecoregion is defined as a large area of land or water that contains a geographically distinct assemblage of natural communities, which (1) share a large majority of their species and ecological dynamics; (2) share similar environmental conditions, and (3) interact ecologically in ways that are critical for their long-term persistence. Altogether there are 825 terrestrial ecoregions nested within 14 biomes and 8 biogeographic realms (WWF 2007).

Selection criteria (OLSON and DINERSTEIN 2002)

The Biological Distinctiveness Index was the basis for selecting the Global 200. It was calculated by summing up the points of the following parameters for each ecoregion:

- species richness and endemism
- higher taxonomic uniqueness
- unique ecological or evolutionary phenomena
- global rarity
- intactness
- representation

The weight assigned to the different parameters varied by biome to better address specific patterns of biodiversity and ecological dynamics. Within each biome and biogeographic realm, the Biological Distinctiveness Indices of the ecoregions were then translated into a Category of Relative Importance:

- globally outstanding,
- regionally outstanding,
- bioregionally outstanding, or
- locally important

The Global 200 ecoregions are the ones that were classified as globally outstanding or regionally outstanding within each biome.

Each ecoregion was further assigned a Conservation Status Index falling into one of five categories (critical, endangered, vulnerable, relatively stable, or relatively intact over the next 40 years) (OLSON and DINERSTEIN 2002). The specific parameters and thresholds used for assessing conservation status were tailored to the characteristic patterns of biodiversity, ecological dynamics, and responses to disturbance of different biomes. For terrestrial ecoregions the main parameters used were estimations of:

- habitat loss,
- size of remaining habitat blocks,
- degree of fragmentation,
- degree of degradation, and
- degree of protection

Results (OLSON and DINERSTEIN 2002)

The prioritization yielded 238 priority ecoregions including 142 terrestrial ones. The majority of these constitute aggregations of regional ecoregions reflecting the coarser level of biogeographic resolution applied at global scale.

70 % of the terrestrial Global 200 are located within forest regions and the largest number falls within the tropical and subtropical moist forests biome (Table 2). While forests in this

biome were prioritized according to their biological richness and ecosystem complexity, forests in circumboreal and circumpolar ecoregions with relatively low species richness and endemism were prioritized according to the presence of intact ecological phenomena. The percentage of critical or endangered Global 200 varies considerably between forest biomes.

Table 2: Forest biomes with total number and number of critical or endangered Global 200 ecoregions (data from OLSON and DINERSTEIN 2002)

Biome	**Global 200**	**Critical or endangered Global 200**	
	No.	**No.**	**%**
Tropical and subtropical moist broadleaf forest	50	28	56
Tropical and subtropical dry broadleaf forest	10	10	100
Tropical and subtropical coniferous forest	3	3	100
Temperate broadleaf forest	8	2	25
Temperate coniferous forest	9	7	78
Boreal forest / Taiga	5	0	0
Mediterranean forests, woodlands and scrub	6	6	100
Mangroves	8	5	63
Total (ecoregions in forest biomes)	99	61	62
Total (all terrestrial ecoregions)	142	75	53

2.2 Proactive approaches

Proactive approaches prioritize areas of low vulnerability that still harbor large and undisturbed ecosystems (BROOKS *et al.* 2006). They recommend starting conservation actions before a region is actually threatened. Two of these approaches consider only forest ecosystems: Frontier Forests (WRI) and Last Intact Forest Landscapes (Greenpeace).

2.2.1 Frontier Forests (World Resources Institute)

Frontier forests are "large, ecologically intact, and relatively undisturbed natural forests" (Fig. 1). They harbor large amounts of the global diversity, provide many ecological services and are thus considered a conservation priority (BRYANT *et al.* 1997).

Data set (BRYANT *et al.* 1997)

Maps of the Earth's closed forest cover as it was 8,000 years ago (original forest) and as it was in 1996 (BILLINGTON *et al.* 1996), Sierra Club's map of "wilderness areas" (MCCLOSKEY and SPALDING 1989) and expert opinions.

Selection criteria (BRYANT *et al.* 1997)

- primarily forested
- large enough to support viable populations of all indigenous species associated with the forest type, measured by the forest's ability to support wide-ranging animal species
- large enough to keep these species' populations viable even in the face of natural disasters that might occur such as hurricanes, fires, pest or disease outbreaks
- structure and composition mainly determined by natural events, though limited human disturbance by ancient traditional activities such as low-density shifting cultivation is acceptable
- in forests where patches of trees of different ages would naturally occur, the landscape exhibits this type of heterogeneity
- dominated by indigenous tree species
- home to most, if not all, plant and animal species that typically live in this forest type

Results (BRYANT *et al.* 1997)

Three countries, Russia, Canada, and Brazil, house almost 70 % of the world's remaining frontier forests. 39 % of these are under serious threat from logging, agricultural clearing, and other human activity. Only 3 % of the world's frontier forests are located in the temperate zone and today, they are the most endangered frontier forests of all.

Non-frontier forests containing patches of primary forest should also receive conservation attention because they include some of the world's most endangered forest types, e.g., the biologically rich but highly fragmented forests of Madagascar and Central Europe's last stands of old-growth forest.

2.2.2 Last Intact Forest Landscapes (Greenpeace)

The Greenpeace map of Last Intact Forest Landscapes was inspired by WRI's Frontier Forests concept but is based on later satellite data and follows rather standardized interpretation rules (GREENPEACE no year). Greenpeace considers as crucial to protect and preserve forests within large, intact landscapes because they harbor high biodiversity, including large forest animals with vast area requirements. They also provide many ecosystem services and are less vulnerable to threats beyond their boundaries.

Data set (GREENPEACE no year)

MODIS and Landsat 7 satellite imagery, mostly from 2001 and 2002

Selection criteria (GREENPEACE no year)

a) Forest zone

- areas with tree canopy cover density > 20 %, including areas < 20 % tree canopy cover density which are fully surrounded by the forest zone

b) Intact forest landscapes

- blocks of mostly forested, but also non-forested (e.g., swamps), areas > 500 km^2 and a minimum width of 10 km within the forest zone that show no visible sign of significant human impact (e.g., logging, burning)
- excluded were 1 km buffer zones around human infrastructure (e.g., roads, waterways, settlements) and fire scars in the vicinity of human infrastructure where most fire regimes have been significantly altered

Results (GREENPEACE no year)

49 % of the remaining intact forests are the tropical forests of Latin America, Africa and Asia Pacific. 44 % are made up by the great boreal forests of Russia, Canada and Alaska. Overall, only 8 % of the world's remaining intact forest landscapes are strictly protected (Table 3).

Table 3: Distribution of the world's remaining intact forest landscapes (IFL) by continent and proportion of strictly protected IFL (data from GREENPEACE no year)

	% of all IFL	**Main forest biome in the IFL**	**Strictly protected IFL (%)**
Europe	3	Boreal (taiga) forest (>92 %)	15.5
North America	28	Boreal (taiga) forest (>89%)	6.7
Northern Asia	19	Boreal (taiga) forest (>85%)	4.4
Patagonia	}35	Temperate broadleaf and mixed forest (>89%)	32
Tropical Latin America		Tropical / subtropical moist broadleaf forest (>95%)	8
South Asia Pacific	7	Tropical / subtropical moist broadleaf forest (>68%)	12
Africa	8	Tropical / subtropical moist broadleaf forest (>93%)	8.7

2.2.3 Last of the Wild (WildLife Conservation Society)

The Last of the Wild (LW) (Fig. 1) were selected based on Human Footprint Analysis, which provides a flexible tool for identifying areas of interest for conservation at different points along the human influence continuum, i.e. at different levels of threat (SANDERSON *et al.* 2002). They represent the largest, least influenced areas in each biome in each realm of the world (compare OLSON *et al.* 2001). The LW are considered as opportunities for effective conservation of a wide range of biodiversity due to the notion that low human influence means minimum of conflict when implementing conservation measures.

Selection criteria (SANDERSON *et al.* 2002)

a) Human Influence Index (HII)

The HII was determined by using geographic information systems (GIS) and data for the following factors (resolution of 1 km^2):

- human population density (year 1995),
- land transformation through agricultural land use and built-up areas (years 1960 - 1993),
- human access by roads, major rivers or the coastline (years 1960 - 1990s)
- electrical power infrastructure (years 1994 - 1995)

b) Human Footprint Analysis

In a second step, normalization of the human influence within each biome of each biogeographic realm was done by assigning a revised score of 0 to the grid cell (size = 1 km^2) with minimum HII value in each biome in each realm and a score of 100 to the cell with maximum value, stretching intermediate values linearly between these extremes.

Results (SANDERSON *et al.* 2002)

The Human Footprint expresses as a percentage the relative human influence in every biome on the land's surface. A score of 1 in moist tropical forests in Africa indicates that the grid cell is part of the 1 % least influenced or "wildest" area in its biome, the same as a score of 1 in North American broadleaf forest. It is important to keep in mind, however, that the absolute amount of influence in those two places may be quite different.

The 568 LW are the 10 largest contiguous areas within the set of the 10 % wildest areas in each biome in each realm (Fig. 1). Some of the areas are well over 100,000 km^2 in some biomes while in other biomes, there were not even 10 areas larger than 5 km^2. The size of areas depends on the spatial pattern of human influence above the 10 % level; in most biomes roads or patterns of settlement are sufficient to divide one wild area from another.

The proportion of area represented by the LW varies strongly among biomes, depending on the statistical distribution of human influence. Thus, over 67 % of the area in the North American tundra is captured as LW, while the 10 % wildest area of the Palearctic tropical and subtropical moist broadleaf forests (all in China) encompasses less than 0.03 % of that biome.

The LW forests mainly consist of tropical and subtropical moist broadleaf forests and boreal forests.

2.2.4 Wilderness Areas (Conservation International)

Wilderness areas (WA) are considered the world's last ecosystems that are large in size, relatively intact, and face comparatively low immediate pressure from human populations (Annex II/ Fig. 1). Conservation International (CI) stresses the importance to start early conservation actions in WA to avoid that they become threatened in the future.

Selection criteria (MITTERMEIER *et al.* 2003)

a) Wilderness areas (WA)

- should be greater or equal to one million hectares (10,000 km^2) in size with at least 70 % of their historical habitat extent (500 years ago) remaining and a human population density of less than 5 people / km^2 (year 2000 data)

b) High biodiversity wilderness areas (HBWA)

- WA with at least 1,500 endemic vascular plant species (0.5 % of the global total), the same threshold used for Biodiversity Hotspots

Results

There are 24 WA, which collectively cover 44 % of the earth's land but are inhabited by only 3 % of the world's human population (GORDON *et al.* no year; MITTERMEIER *et al.* 2003). They were largely based on the WWF terrestrial ecoregions. Where these ecoregions could be combined into broader biogeographic units, such as Amazonia, they were aggregated into single units (MITTERMEIER *et al.* 2003).

Most wilderness is not speciose: only 18 % of plants and 10 % of terrestrial vertebrates are endemic to individual wildernesses, the majority restricted to the five HBWA (Amazonia, Congo forests, New Guinea, North American deserts, Miombo-Mopane woodlands of southern Africa). 11 WA, including 4 HBWA cover forest areas.

2.3 Reactive approaches

Reactive approaches prioritize areas of high vulnerability (BROOKS *et al.* 2006). Most of these approaches also postulate that the selected areas should have high species richness and a particular species composition. The notion is that conservation measures are most crucial in the biodiverse regions on earth that are under immediate threat of destruction.

2.3.1 Alliance for Zero Extinction Sites

The Alliance for Zero Extinction (AZE) is a joint initiative of 52 biodiversity conservation organizations. It aims to identify and protect key sites, each one of which represents the last

remaining habitat of one or more Endangered or Critically Endangered species. These sites are considered conservation priorities because their protection could prevent the extinction of the world's most endangered species (GORDON *et al.* no year; RICKETTS *et al.* 2005).

Selection criteria (RICKETTS *et al.* 2005)

A site must meet all three of the following criteria:

a) Endangerment:

- contains at least one Endangered (EN) or Critically Endangered (CR) species, as listed on the IUCN Red List

b) Irreplaceability:

- sole area where an EN or CR species occurs or habitat of the overwhelmingly significant known resident population of the EN or CR species (> 95 % of the species global population) for at least one life history segment, e.g., breeding or wintering

c) Discreteness:

- definable boundary within which the character of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas

Results (RICKETTS *et al.* 2005)

In 2005, AZE had recognized 595 sites for those taxonomic groups that had been globally assessed for threat level: mammals, birds, some reptiles (crocodilians, iguanas, turtles, and tortoises), amphibians, and conifers. The actual size and boundaries have not yet been identified for all key sites. So far, the median size of the sites is 117 km^2.

In 2005, 83 % of the AZE sites were located in forest areas and the large majority of those in tropical moist forest. 34 % of the sites were already protected and 14 % were partially protected, while 43 % of the sites were unprotected and for 8 % the protection status was unknown.

2.3.2 Biodiversity Hotspots (Conservation International)

According to Conservation International (CI), Biodiversity Hotspots (BH) are the Earth's biologically richest yet most threatened places (Fig. 1).

Selection criteria (Mittermeier et al. 2004)

To qualify as a hotspot, a region must contain at least 1,500 species of vascular plants (> 0.5 % of the world's total) as endemics, and it has to have lost at least 70 % of its original habitat.

Results

Since 1988, 34 biodiversity hotspots have been defined (MITTERMEIER *et al.* 2004). With an average size of 787,760 km^2 they are usually larger than WWF ecoregions but their boundaries were harmonized to match the overall ecoregion cluster (GORDON *et al.* no year; OLSON *et al.* 2001). Except one (Succulent Karoo in Namibia / South Africa) all hotspots include forest areas.

2.3.3 Crisis Ecoregions (The Nature Conservancy)

Crisis Ecoregions are the world's terrestrial biomes and ecoregions with extensive habitat conversion but limited habitat protection (Fig. 1). The selected regions are considered as urgent conservation priorities due to the notion that the greater disparities between habitat loss and protection the greater the threat to biodiversity and ecosystem functions (HOEKSTRA *et al.* 2005).

Data set (HOEKSTRA *et al.* 2005)

- WWF ecoregions (OLSON *et al.* 2001) except the mangrove biome and the Antarctic realm
- Global Land Cover Area 2000 dataset (European Commission Joint Research Centre, Institute for Environment and Sustainability)
- 2004 World Database on Protected Areas (WDPA CONSORTIUM 2004)

Selection criteria (HOEKSTRA *et al.* 2005)

a) Percentage habitat conversion:

- percent of land area in each biome and ecoregion classified as cultivated and managed areas, artificial surfaces and associated areas assuming that historically the percent area converted in each biome and ecoregion was zero

b) Conservation Risk Index (CRI):

- calculated for each biome and ecoregion as the ratio of percent area converted to percent area protected by a designated protected area (IUCN I-VI)

c) Crisis ecoregions were classified as:

- vulnerable: habitat conversion > 20 % and CRI > 2
- endangered: habitat conversion > 40 % and CRI > 10
- critically endangered: habitat conversion > 50 % and CRI > 25

Results (HOEKSTRA *et al.* 2005)

At biome level, temperate grasslands, savannas and shrublands and Mediterranean forests, woodlands and scrub stood out as being at greatest risk because the extent of habitat conversion exceeded that of habitat protection by a factor greater than 8. Temperate broadleaf and mixed forests, tropical dry forests, and tropical conifer forests were at intermediate risk with CRI > 4 while in all other biomes CRI is < 2.

At ecoregion level, 161 ecoregions were classified as vulnerable, 80 as endangered and 64 as critically endangered. They were found on every continent and represented every biome except tundra and boreal forests (Fig. 1).

2.3.4 Global Gap Analysis of Protected Areas (Conservation International)

This global gap analysis was carried out with the objective to recommend where to locate new protected areas so that representatives of all vertebrate species analyzed are covered. Given the scale of the assessment and the coarseness of the data, the areas identified as urgent are, above all, regions that deserve immediate finer-scale assessments to investigate the feasibility of the expansion and consolidation of the global protected area network (RODRIGUES *et al.* 2003; RODRIGUES *et al.* 2004 a,b).

Data set

World Database on Protected Areas:

- more than 100,000 spatial records of protected areas

IUCN Red List distribution maps:

- 1,183 globally threatened birds
- 4,734 mammals (978 threatened), and
- 5,254 amphibians (1,467 threatened)

Selection criteria (RODRIGUES *et al.* 2003)

The project overlaid species distribution maps onto protected area maps using GIS to assess how well each species is represented in protected areas.

a) Scenario A assumed:

- all protected areas are equally adequate for the protection of each species, and
- species can be equally well protected in any part of their range by the protection of any fraction of this range

Consequently, species were classified as “covered species” and “gap species”.

b) Scenario B assumed:

- only protected areas > 100 ha are adequate for the protection of each species

- representation target for each species defined as the species' extent of occurrence that must overlap protected areas in order for the species to be considered covered

Scenario B results were used to calculate the urgency of conservation for each site by taking into account its area threat and the likelihood that it is needed for achieving each species' representation target (irreplaceability). The following methodology was applied:

Irreplaceability of each site for achieving the representation targets defined for each species was estimated using statistical techniques (see FERRIER *et al.* 2000). It depends on: (1) the species occurring in the site, (2) the conservation targets set for each of those species, (3) how many other sites contain each of the species occurring in the site, and (4) the percentage of each species' range that is within the site in relation to the other sites where the species occurs. Irreplaceability ranges from 0 % (if a site is not needed to achieve target goals) to 100 % (the targets can only be achieved with protection of that specific site).

Area threat or vulnerability was measured as the weighted number of threatened species per site. Weights were defined according to IUCN threat categories: 3 for Critically Endangered, 2 for Endangered, and 1 for vulnerable species.

Sites of high conservation urgency were highlighted by selecting all sites that had irreplaceability $\geq$ 90 % and were included in the top 5 % in terms of weighted numbers of threatened species. This procedure was applied separately to unprotected and protected sites in order to highlight unprotected areas of high conservation urgency on the one hand, and protected areas that require special management attention on the other.

Results (RODRIGUES *et al.* 2003)

a) Scenario A

More than 1,000 "gap species" have so far been identified, mainly in tropical countries where there are many endemics and low coverage by protected areas. Mostly amphibians, but a few hundred birds and mammals also fall outside any reserve.

b) Scenario B

The tropics hold the majority of the protected areas that have high conservation urgency for mammals, amphibians and threatened birds. The most urgent of the protected areas of Asia are smaller and more dispersed than those of Africa, a simple function of the small average size of Asian protected area.

The degree to which urgent unprotected areas are concentrated in the tropics is even greater than that seen for important existing protected areas. They are heavily dominated by tropical and subtropical moist broadleaf forests (67.9 %).

In general more than 50 % of the highlighted areas are forests and many of those are tropical montane forests, because the same conditions that make these regions favorable to vertebrate diversity often render them adequate for human settlement.

2.3.5 Important Bird Areas (BirdLife International)

The Important Bird Areas (IBA) program aims to identify, monitor and protect a global network of IBA for the conservation of the world's birds and other biodiversity (BIRDLIFE INTERNATIONAL 2006b). BirdLife partners take responsibility for the IBA program nationally, with the BirdLife secretariat taking the lead on international aspects and in some priority non-partner countries. The main difference between the IBA and EBA approach is that EBA are identified regardless their conservation potential (section 2.1.2 of this paper) whereas IBA are intended to be sites where conservation objectives can reasonably be achieved (GORDON *et al.* no year).

By definition, IBA are internationally agreed priorities for conservation action because they are small enough to be conserved in their entirety and are often part of an existing protected area network. They usually not only contain high bird diversity but also large numbers of other animals and plants (BIRDLIFE INTERNATIONAL 2006b). Emphasis of the IBA program is currently moving more and more from site identification to site monitoring and protection.

Selection criteria (BIRDLIFE INTERNATIONAL 2006b)

An IBA must be amenable to conservation action and management and should fulfill at least one of three criteria:

- site holds significant numbers of one or more globally threatened bird species,
- site is one of a set of sites that together hold a suite of restricted-range bird species or biome-restricted bird species,
- site has exceptionally large numbers of migratory or congregatory bird species.

Results (BIRDLIFE INTERNATIONAL 2006b)

In 2004, over 7,500 sites in nearly 170 countries were identified as IBA, but the analysis was not yet complete globally. The aim is to get all IBA protected under national and/or international law in order to ensure their adequate legal safeguard. In the European Union member states and accession countries IBA are designated as Specially Protected Areas (SPA) under the EU Wild Bird Directive. They vary in size between 0.1 - 19,000 km^2.

2.3.6 Key Biodiversity Areas (Conservation International, BirdLife International, Plantlife International)

The Key Biodiversity Area (KBA) approach is considered as a simple and effective means to help implement the protected areas elements of the CBD (EKEN *et al.* 2004). It aims to identify, document and protect networks of sites critical for the conservation of global biodiversity. Site-scale KBA are complementary to large-scale conservation initiatives and should be nested within a broader ecosystem approach to conservation. Site identification is still ongoing and relies on collaboration with organizations and governments across the world. Important Bird Areas and Alliance for Zero Extinction sites form KBA subsets.

Selection criteria (EKEN *et al.* 2004)

By definition, KBA are "areas of any size that contain viable populations of the target species, can be delimited and can, potentially, be managed for conservation". They have to meet at least one of the following criteria, which were adopted from already existing approaches developed by Birldlife International, the Ramsar Convention and WWF. The thresholds for each criterion are still subject to further testing and revision.

a) Criterion based on vulnerability

Criterion 1 - Globally threatened species (adopted from IBA):

- Sites in which a globally threatened species (IUCN Red List) regularly occurs in significant numbers, i.e., one inividual for highly threatened species and 10 pairs or 30 individuals for vulnerable species.

b) Criteria based on irreplaceability

Criterion 2 - Restricted-range species (adopted from EBA):

- Sites that hold a significant proportion, i.e. > 5 %, of the global population, of one or more restricted-range species (range < 50,000 km^2 on a regular basis).

Criterion 3 - Congregatory species (adopted from Ramsar):

- Sites that hold a significant proportion, i.e., at least 1 %, of the global population of a congregatory species on a regular basis.

Criterion 4 - Biome-restricted assemblages (adopted from WWF classification):

- Sites that hold a significant proportion of the group of species whose distributions are restricted to a biome or a subdivision of it.

Criterion 4 still requires further development and testing in order to adapt it to the characteristic extent of occurrence of different taxa. For species with coarse-grained distribution (e.g., tetrapod vertebrates) species assemblages should be assessed at biome level, while for species with fine-grained distributions (e.g., plants) assessments should consider subdivisions of ecoregions such as individual habitats.

Results (EKEN *et al.* 2004)

KBA identification has begun in a number of countries and regions, including the tropical Andes, Turkey, Indochina, East Africa, and Madagascar.

3 Intergovernmental agreements

3.1 Global level

3.1.1 Biosphere Reserves (UNESCO Man and the Biosphere Program)

The Biosphere Reserves (BR) concept was developed under the UNESCO Man and the Biosphere Program (MAB) in 1974. Collectively, BR form a world network linked by exchanges of experience, knowledge and personnel. They are internationally recognized through the Statutory Framework of the World Network of Biosphere Reserves adopted by the UNESCO General Conference. BR promote solutions to reconcile the conservation of biodiversity with its sustainable use and are thus considered as a tool for implementing the main environmental conventions such as CBD, Ramsar and World Heritage (UNESCO 2007). The core areas require legal protection and hence can correspond to an existing protected area such as nature reserves, national park and in some instances, World Heritage sites.

Selection criteria

(Statutory Framework of the World Network of Biosphere Reserves, UNESCO 2007)

By definition, BR have three mutually reinforcing functions: conservation, sustainable development and logistic support. To qualify for designation as BR, an area should:

- encompass a mosaic of ecological systems representative of major biogeographic regions (as defined in UNESCO-MAB 2004), including a gradation of human interventions
- be of significance for biological diversity conservation
- provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale
- have an appropriate size to serve the three functions of biosphere reserves
- include these functions through appropriate zonation, i.e., a legally constituted core area, a buffer zone and a transition area
- provide organizational arrangements for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and carrying out the functions of a biosphere reserve
- make provisions for the implementation of a management policy or plan and programs for research, monitoring, education and training

Commitments of the Contracting Parties

(Statutory Framework of the World Network of Biosphere Reserves, UNESCO 2007)

BR are nominated by national governments and remain under sovereign jurisdiction of the states where they are located. It is the responsibility of each country, through its MAB

National Committee or Focal Point, to ensure that the BR respond to the criteria and function properly.

Reports for a periodic review have to be prepared by the concerned authority every 10 years, and forwarded to the UNESCO Secretariat. Non-functional sites can be voluntarily withdrawn or officially de-designated.

Results

In March 2007, there were 507 BRs in 102 countries (UNESCO 2007). 392 (77 %) encompassed forest vegetation and 248 (almost 50 %) were located in Europe and Northern America.

3.1.2 UNESCO World Heritage Sites

The Convention Concerning the Protection of the World Cultural and Natural Heritage, World Heritage (WH) Convention was adopted by the General Conference of UNESCO in 1972. It seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. Permanent protection of the designated WH sites is considered as being of "highest importance to the international community as a whole" (WHC 2005).

Selection criteria (MAGIN and CHAPE 2004; WHC 2005)

Outstanding universal value:

- "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity"

Ten criteria define outstanding universal value for cultural, natural as well as mixed cultural and natural WH sites. Natural WH sites must:

- contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
- be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features
- be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals
- contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation

In addition, WH sites must meet conditions of integrity and/or authenticity and must have adequate protection and management systems, e.g.:

- sites must be delineated and have a management plan
- an adequate buffer zone should be provided wherever necessary
- sites must have adequate long-term legislative, regulatory, institutional or traditional protection
- any uses should be ecologically and culturally sustainable; for some properties, human use would not be appropriate

Commitments of the Contracting Parties

"Each State Party to the Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage (…) situated on its territory, belongs primarily to that State. (…)" (Article 4)

Every six years, parties are requested to submit reports to the UNESCO General Conference through the WH Committee on the legislative and administrative provisions they have adopted and other actions which they have taken for the application of the Convention, including the state of conservation of the WH properties located on their territories. Sites can be put on the List of WH in Danger or may be deleted from the WH List as described in the Operational Guidelines (WHC 2005).

Results

In April 2007, the WH List included 644 cultural, 162 natural and 24 mixed properties in 138 state parties. 91 of the mixed and natural properties were forest sites, i.e., they had 20 % or more forest cover or the amount of forest cover was a primary reason why the sites were nominated. The size distribution of forest protected areas inscribed on the WH List range from 0.2 to 90,000 km^2, most being larger than 1,000 km2 (THORSELL and SIGATY 1997; WHC 2007).

The WH Convention aims to consolidate the existing WH forest sites as strictly protected core areas, alongside the integration of their management, in a broader landscape (UNESCO MOSCOW OFFICE 2006).

3.1.3 Wetlands of International Importance (Ramsar Convention)

The Convention on Wetlands, signed in Ramsar / Iran in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It considers wetlands as high conservation priority because wetland ecosystems are extremely important for biodiversity conservation in general and provide a wide array of ecological functions and economic benefits for the well-being of human communities (RAMSAR CONVENTION SECRETARIAT 2006).

Selection criteria (RAMSAR CONVENTION SECRETARIAT 2006)

"Wetlands should be selected […] on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology" and "in the first instance, wetlands of international importance to waterfowl at any season should be included".

Group A of the criteria: Sites containing representative, rare or unique example of wetland types found within the appropriate biogeographic region.

Group B of the criteria: Sites of international importance for conserving biological diversity.

Criteria based on species and ecological communities:

- e.g., vulnerable, endangered, or critically endangered species or threatened ecological communities; populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region; plant and/or animal species at a critical stage in their life cycles; sites that provides refuge during adverse conditions

Specific criteria based on waterbirds:

- e.g., supports 20,000 or more waterbirds; regularly supports at least 1 % of the individuals in a population of one species or subspecies of waterbird

Specific criteria based on fish:

- e.g., supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values; important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend

Specific criteria based on other taxa:

- e.g., regularly supports at least 1 % of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species

Commitments of the Contracting Parties (RAMSAR CONVENTION SECRETARIAT 2006)

- at least one wetland designated for inclusion in the Ramsar List
- promotion of wise use of wetlands in their territory (as defined in the Ramsar Handbooks for the Wise Use of Wetlands, third edition, 2006)
- reserves and training, e.g., contracting parties have undertaken to establish nature reserves in wetlands, whether or not they are included in the Ramsar List
- international cooperation

Contracting parties report on progress in implementing their commitments under the Convention by submission of triennial National Reports to the Conference of the contracting parties. The National Reports become part of the public record.

Results

In April 2007, there were 154 contracting parties to the Convention with 1,651 wetland sites (average size: 900 km^2) designated for the Ramsar List of Wetlands of International Importance (RAMSAR 2007). Forests are included under three wetland types (RAMSAR CONVENTION SECRETARIAT 2006):

- intertidal forested wetlands: mangrove swamps, nipah swamps, tidal freshwater swamp forests
- freshwater, tree-dominated wetlands: freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils
- forested peatlands: peatswamp forests

3.2 Regional level

3.2.1 NATURA 2000

Directive 92/43/EEC (the 'habitats directive') from 1992 sets the goal of establishing a European network for nature conservation, called Natura 2000. It consists of special protection areas (SPA) under the Birds Directive 79/409/EEC and the forthcoming special areas of conservation (SACs) under the habitats directive (EC 2003). Natura 2000 is considered as an important joint effort by the EU member states to comply with international conventions and agreements in the field of biodiversity protection such as the CBD. The underlying idea is that nature conservation should not be impeded by administrative borders but requires to think and act on an international scale.

Selection criteria

Natural habitat types of community interest (Article 1c):

- are in danger of disappearance in their natural range; or
- have a small natural range following their regression or by reason of their intrinsically restricted area; or
- present outstanding examples of typical characteristics of one or more of the six following biogeographical regions: Alpine, Atlantic, Continental, Macaronesian, Mediterranean and since 1995 Boreal (EC 2003).

Such habitat types are listed or may be listed in Annex I.

Species of community interest (Article 1d):

- are endangered, except those species whose natural range is marginal in that territory and which are not endangered or vulnerable in the western palearctic region; or
- are vulnerable, i.e. believed likely to move into the endangered category in the near future if the causal factors continue operating; or
- are rare, i.e. with small populations that are not at present endangered or vulnerable, but are at risk. The species are located within restricted geographical areas or are thinly scattered over a more extensive range; or
- are endemic and requiring particular attention by reason of the specific nature of their habitat and/or the potential impact of their exploitation on their habitat and/or the potential impact of their exploitation on their conservation status.

Such species are listed or may be listed in Annex II and/or Annex IV (Species in need of strict protection) or Annex V (Species whose taking in the wild and exploitation may be subject to management measures).

Commitments of the Contracting Parties (EC 2003)

The responsibility for proposing sites within Natura 2000 lies first and foremost with the member states:

1. Member states propose a list of sites of Community importance for their territory (pSCI).
2. From these national lists, the commission establishes, in agreement with each member state, a European list of sites of Community importance (SCI).
3. The member states designate these sites as special areas of conservation (SAC).

For the birds directive the member states designate sites directly as special protection areas (SPA).

It is up to the member states to decide how to conserve the sites in order "to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status"(Article 1a). Member states have a choice of mechanisms for managing a site:

- statutory (e.g., making a nature reserve);
- contractual (e.g., signing a management agreement with the landowner);
- administrative (providing the necessary means).

Results

The habitats directive identified ca. 200 animal and over 500 plant species, the birds directive over 180 bird species as being of Community interest (EC 2003). The establishment of Natura 2000 has progressed to varying degrees in all member states. In December 2006, 4,617 sites

(total of 454,723 km^2) were designated as SPA and 20,862 sites (total of 560,445 km^2) were classfied as SCI (EC 2007).

Amongst others, it is the explicit aim of the European Commission to ensure that Natura 2000 includes a coherent network of forest areas. In 2002, 59 forest habitat types were listed in Annex 1 and approximately 50 % of all pSCI had at least some forest cover (EC 2003)

3.2.2 The Mesoamerican Corridor

The Mesoamerican Biological Corridor (MBC) is a region-wide initiative of seven Central American countries plus Mexico which joined later. Following a series of national consultations promoted by the CCAD (Central American Commission for Environment and Development), the MBC was publicly endorsed by the heads of state at a summit in 1997. Its political agenda is based on a vision of the common good of the various countries involved with the specific aims to (a) protect key biodiversity sites; (b) connect these sites with corridors managed in such a way as to enable the movement and dispersal of animals and plants; and (c) promote forms of social and economic development in and around these areas that conserve biodiversity while being socially equitable and culturally sensitive (HERRERA 2003; MILLER *et al.* 2001).

Selection criteria (MILLER *et al.* 2001)

The MBC initiative proposed a landuse scheme consisting of four categories: core zones, buffer zones, corridor zones, and multiple-use zones. The relative extent of each of these zones varies depending on the social, economic, biological, and institutional context within which they are situated. Where extensive wildlands still remain, relatively large core zones can be established, while in densely settled areas they will be limited in extent.

Commitments of the Contracting Parties (HERRERA 2003; MILLER *et al.* 2001)

The Regional Office Coordinating Unit (ROCU) in Nicaragua is responsible for working with the designated national technical liaisons to plan, coordinate, monitor, and evaluate strategic policies and actions for MBC implementation, including the MBC's regional strategy for forest development and consolidation.

Results

a) Core zones

Core zones must be designated as protected areas. They include protected areas already existing in each of the countries and newly proposed ones. In 2002, 568 protected areas had been legally proclaimed. Most of these were established during the last four decades because they contain species of flora and fauna that are endemic or in danger of extinction, samples of unique natural ecosystems, and landscapes that either appeal to the public or produce goods and services of use to society such as water. Almost 63 %, however, were classified under the less restrictive "multiple use" IUCN categories IV, V and VI. Until now, many endemic

species or unique ecosystems are not well represented in Central America's protected areas system and research suggests that core zones should cover at least 10 % of each of Mesoamerica's 22 distinct ecoregions (HERRERA 2003; MILLER *et al.* 2001).

b) Buffer zones

Buffer zones consist of the geographic areas surrounding protected areas. Some countries in the region have legislation providing for buffer zones within protected areas, others have established such zones to define a specific management category. Nonetheless, existing buffer zones are often not clearly demarcated and few are designed specifically to filter out negative influences flowing between protected areas and surrounding lands (MILLER *et al.* 2001).

c) Corridor zones

Corridor zones should provide land or water pathways that link core zones with one another, allowing plants and animals to disperse and migrate, and adapt to the pressures of changing climate and habitat conditions (MILLER *et al.* 2001). Ideally, land use within corridor zones is natural, or "rewilded". In practice, however, they are often subject to human use or settlement and in these cases sustainable management practices are encouraged. Most corridor zones were selected for their forestry potential, e.g., forests lying outside of the protected areas, or for the effective tree cover they provide such as coffee plantations with shade (HERRERA 2003).

e) Multiple-use zones

Multiple-use zones are used to distinguish areas featuring wildland from those devoted to agriculture, managed forests and human settlement. They can be established within buffer and corridor zones to denote geographic areas that will be dedicated to direct human occupation and use, or in wider areas beyond these three zones to encourage diversity in general land-use practices (MILLER *et al.* 2001).

4 Conclusions and remaining questions

The various approaches for setting global conservation priorities show the consensus amongst many governmental and non-governmental initiatives that protected areas are crucial to conserve global biodiversity. The exact location of priority areas for conservation, however, is a controversial issue. The approaches highlight rather similar or contrasting regions depending on their underlying philosophy, i.e. representative, proactive or reactive conservation objectives.

All approaches use measures of vulnerability and irreplaceability for priority area selection. Diverging results arise because different definitions for these criteria are used, and because the weighting of these criteria also differs. For instance, location and size of prioritized areas depend on the biological targets used by the approaches, e.g., plants, animals or ecosystems.

Most NGOs developed sets of criteria that can be used to screen the planet for ecological conservation priorities. The selection of priority areas is usually done without considering

their conservation potential and the highlighted areas can be of vast size. They are intended to draw attention to regions that urgently require more detailed assessments and conservation planning at local levels. In contrast, Alliance for Zero Extinction (AZE) sites, Important Bird Areas (IBA) and Key Biodiversity Areas (KBA) consider site manageability during the selection process. They prioritize concrete sites at local level with the aim to achieve legal protection for these areas. Site identification for AZE, IBA and KBA is still ongoing and relies on cooperation with national governments and many other organizations.

The intergovernmental agreements consider ecological criteria and site manageability when selecting protected areas for their programs. Sites are selected in an iterative process depending on their compliance with certain requirements regarding legal conservation status and management activities. The agreements differ greatly in terms of implementation mechanisms although they have in common that the responsibility of selecting, proposing and managing the sites lies primarily with the contracting parties.

Further analysis of the approaches presented was carried out at the Freiburg expert workshop. In particular, they were evaluated regarding their suitability as role model for a global network of forest protected areas (FPA). At the workshop, some crucial issues for discussion were:

- Selection criteria for FPA in a global network under the CBD, e.g., exhaustive list of criteria for the selection process; consistent definitions for vulnerability and irreplaceability; variations in selection criteria regarding different countries or biomes?
- Requirements regarding conservation status and management of FPA, e.g., consideration of forests strongly modified by human management activities; required conservation status (IUCN categories); area relation of core and buffer zones; integration of the ecosystem approach and sustainable forest management?
- Implementation mechanisms, e.g., cooperation with other organizations and agreements; integration of existing FPA?
- Need for additional research

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A global network of forest protected areas under the CBD: Financing and implementation

Till Pistorius[1]

1 Introduction

The loss of biodiversity is a tragic example of market failure because natural resources are treated like a public good of unlimited availability. This is one of the main flaccidities of economic theory: Natural goods like biodiversity or the atmosphere appear to have no value since there is no market price attributed to them. Their overexploitation it is often furthered by short-term profit-seeking interests of actors who do not have to internalize the external costs arising from their activities. If those who profit from unsustainable use had to internalize these negative effects according to the polluter-pays-principle, a large share of today's unsustainable land-use practices would most likely not occur. Many studies show the tremendous dimension by quantifying the economic damage related to the loss of natural resources (COSTANZA *et al.* 1997; PIMENTEL *et al.* 1997; JAMES *et al.* 2001).

The introduction and implementation of new financing mechanisms and strategies are needed for creating positive incentives in order to enable and support governments to protect their natural resources. In many decisions and meetings of the CBD as well as other international processes it has been pointed out that there is a need for additional funding to foster the conservation of biodiversity, especially in developing countries[2]. To be able to implement its work programs, CBD asked donors and the international community to contribute through financing and technology transfer and called for the generation of new and additional finances from public, private, domestic or international sources (UNEP/CBD/COP/6/22).

2 Current situation of financing conservation

Although amount and area of protected areas (PA) have increased significantly during the last decades, official funding has declined or remained stable. Reasons for this development are tighter public expenditures due to global economic liberalization and deregulation, as well as the shift of official development assistance (ODA) towards social and poverty reduction goals

[1] Institute of Forest and Environmental Policy, University of Freiburg; e-mail: Till.Pistorius@ifp.uni-freiburg.de

[2] i.e. art. 20 CBD, art. 4 & 5 World Heritage Convention, goal 7 of the Millennium Development Goals (MDG), World Summit on Sustainable Development (WSSD) 2002

(VERWEIJ and DE MAN 2005). The resulting shortfalls in PA funding threaten the effectiveness of conservation efforts.

JAMES *et al.* (2001) calculated that in the mid-nineties app. US $ 6 billion were spent annually for the management of all global PA, 90% of which accounted for PA in the developed regions of the world. While most of the conservation costs actually needed are covered in the US and Australia/New Zealand, there is a much greater lack of funding in developing countries (Fig. 1). Europe and developed Asia also meet a relatively small share of the necessary conservation costs; however there are large regional discrepancies. The overall funding shortfall for existing PA is estimated by JAMES *et al.* (2001) to be as high as US $ 2.3 billion per year.

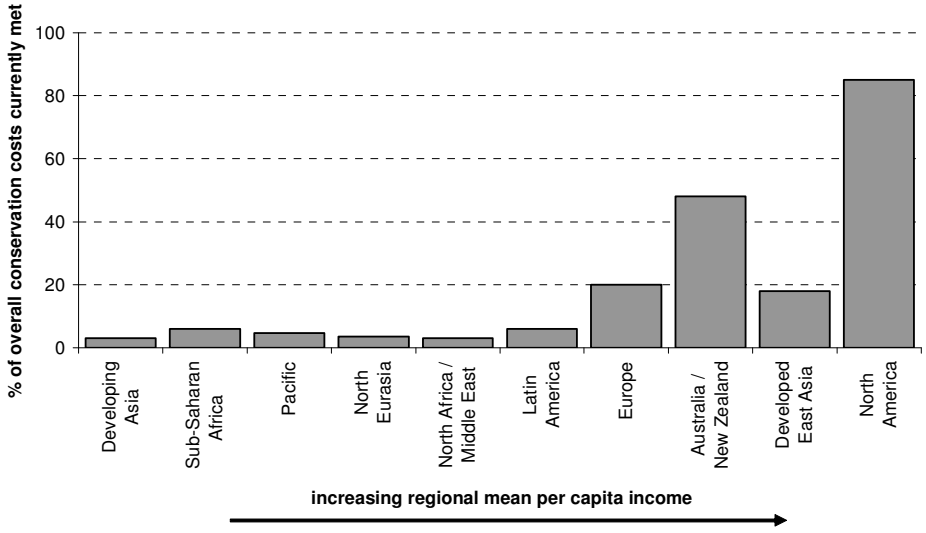

Figure 1: Financing gap of existing PA (BALMFORD et al. 2003)

Conservation in developing countries tends to be significantly cheaper than in developed countries: As BALMFORD *et al.* (2003) showed, worldwide the annual cost of effective field-based conservation varies between US $ 0.1 and US $ 1,000,000 per km², mainly depending on the degree of development – implying that the cost-benefit ratio of conservation is significantly higher in less developed regions, which often tend to be rich in biodiversity, especially in the tropics. According to their study, typical costs for in-situ conservation in little developed areas in Latin America, Asia and Africa vary between US $ 130 and US $ 5,000 per km², with an average of app. US $ 1.000 per km². Examples for developed countries from the UK and USA show costs ranging between US $ 5.000 and US $ 50.000

per km². This puts into perspective the current funding spent on conservation especially concerning conservation in biodiversity-rich developing countries.

Considering a network of effective forest protected areas (FPA), it is important for the design and evaluation of new financing mechanisms to have an idea about how much money is needed. Financing in the context of FPA is required for three main purposes:

- Endowing existing and future FPA with adequate funds in order to enable more effective conservation and to avoid "paper parks".
- Funding sustainable resource use in the buffering zones of PA and offering alternative options for livelihood – in other words compensate for opportunity costs arising to those who depend on using the resources in such areas.
- Establishing institutions that support a global network and enable the implementation and sound management of PA.

There are several studies on the costs of conservation, which of course are only estimations depending on many factors. The results of these studies cluster around an annual figure of several billion US $ per year (EMERTON *et al.* 2006). BALMFORD (2002), for example, estimates that overall costs for the creation and effective management of a representative terrestrial network of PA would cost more than US $ 20 billion per year in order to function effectively. Although such figures should be used carefully, they are valuable for getting an impression on the dimensions of input necessary (in terms of funding) if the agreed objectives are to be met.

The costs that have to be taken into consideration consist of immediate active costs, i.e. for establishing new PA, managing habitats and passive (indirect) costs like opportunity costs resulting from enforced land use restrictions (BALMFORD and WHITTEN 2003). The inclusion of the latter is of particular importance since opportunity costs are often internalized by the local populations. This is counterproductive because without their support (and specific knowledge) many conservation efforts are doomed to fail in the long run.

James *et al.* (2001) calculated the additional finances needed for an expansion of the protected area to 10% of the earth's land area. Since there are different interpretations on what is meant by the term "protected area" two scenarios were developed on the basis of the six IUCN protection categories (IUCN 1994b): Scenario I refers to an expansion of PA to 10% of the total area; no differentiation is made between the protection categories. This scenario implies an expansion by app. 3 Mio. km². Scenario II refers to an expansion to 10% in the stricter protection categories I to III. If this scenario is to be implemented there would be a need for a much greater extension of app. 7.4 Mio. km². It is necessary to mention that these figures are estimations and refer to the year 1996.

The costs for such an expansion comprise acquisition of land and management costs. Compensation payments for local populations evolve mainly for people living in areas which belong to the protection categories II, III and IV; Areas of category I are sparsely populated and categories V and VI allow for sustainable use of resources. These opportunity costs are

derived from fair land prices which are roughly equal to their discounted future value. Costs for the wider landscape matrix are excluded from these figures. Given the increasing land use pressure in the developing countries and the climate change scenarios, a core system of reserves covering 10% of the lands surface will most likely not be sufficient to preserve biodiversity (SOULÉ and SANJAYAN 1998). Thus these calculations are likely not to overestimate the costs needed for meeting the objective of reducing the current loss of biodiversity. Recognizing the character of the estimations (Tab. 1 and 2), the figures lead to the conclusion that there is a large financing gap concerning conservation in existing PA and a need for financing additional forest protected areas.

Table 1: PA worldwide and necessary expansion in two scenarios (JAMES et al. 2001)

	scenario I			**scenario II**		
	expansion of PA to 10% of total land area, proportional to existing relation of IUCN categories			*expansion of PA to 10% of total land area in IUCN categories I - III*		
	developing regions	**developed regions**	**total**	**developing regions**	**developed regions**	**total**
existing area of PA in Mio. km²	7,48	5,67	13,15	7,48	5,67	13,15
additionally needed area in Mio km²	3,01	0,04	3,05	6,8	0,64	7,44
total area in Mio. km²	**10,49**	**5,71**	**16,2**	**14,28**	**6,31**	**20,59**

Table 2: Estimated global conservation costs (JAMES et al. 2001)

	scenario I			**scenario II**		
	expansion of PA to 10% of total land area, proportional to existing relation of IUCN categories			*expansion of PA to 10% of total land area in IUCN categories I - III*		
	developing regions	**developed regions**	**total**	**developing regions**	**developed regions**	**total**
annual current spending in Mio. $	695	5.271	5966	695	5.271	5966
annual shortfall for existing PA in Mio. $	1.375	915	2.290	1.375	915	2.290
annual land cost in Mio. $	2.820	623	3.443	5.888	4.768	10.656
annual management cost in Mio. $	886	196	1.082	1850	1498	3.348
annual compensation payments (opportunity costs)	4.947		4.947	4.947		4.947
additional costs per year	**10.028**	**1.734**	**11.762**	**14.060**	**7.181**	**21.241**

3 Classification of financing mechanisms

There are various options to generate financing for conservation through PA in the forest sector (GUTMAN 2003; EMERTON *et al.* 2006). The most important existing sources at the time are international assistance, domestic government budgets, multilateral funds, bilateral

donors and private funds. Figure 2 gives an overview of potential financing sources, categorizing them in three groups: external financing sources, funding for conservation and market-based mechanisms which attribute prices to using PA goods and services.

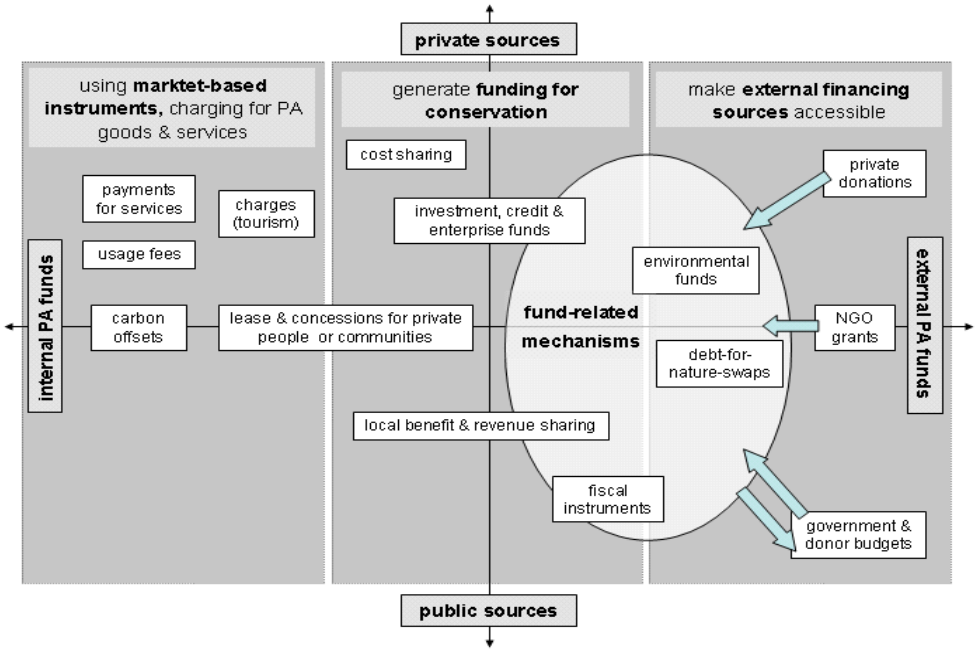

Figure 2: Classification of financing mechanisms (EMERTON et al. 2006)

Presently the most important group in terms of size and significance for PA financing in developing countries are external financing sources. The main share is provided by domestic government budgets and official development assistance (ODA), but NGO funds denote rising significance, especially in the tropics. ODA is expected to continue being the most important source for PA. Bilateral donor countries tend to focus their support on specific countries and regions with respect to their economic and political interests as well as historical ties. There are universally observable trends in bilateral donor priorities and policies:

- ODA has shifted attention to the objective of poverty alleviation. Therefore, environmental and sustainable development issues should be combined with poverty reduction strategies.
- Participation of developing countries concerning the formulation, framing and implementation of policies has become an increasingly important aspect.

- Development co-operation should contribute to mitigating and preventing violence and conflicts.

Bilateral assistance has the advantage of being less bureaucratic and having fewer restrictions than multilateral assistance and therefore tends be more efficient. In the context of financing conservation the Global Environment Facility (GEF) and the World Bank are the important multilateral sources. Multilateral funding engages predominantly in larger geographic contexts and tends to be more inflexible, timely and complicated than bilateral assistance. The complicated procedure of replenishing GEF and the long process for projects to be initiated underlie this observation.

Other mechanisms related to ODA are so-called "debt-for-nature-swaps" (DfNS). They are defined as a set of transactions in which an actor (i.e. a NGO) buys the public debt of a country at a discount and swaps this debt with the government for commitments to fund PA (SPERGEL 2001). DfNS are based on renegotiating debts owed by a developing country with the creditor in order to fund conservation. Bilateral or commercial debts can be subject of these swaps; the resulting payments are used, e.g., to finance local conservation trust funds which then distribute grants to projects or PA. DfNS produce win-win-situations for all involved parties: Significant amounts of money can be dedicated to long term funding which is often a precondition for other potential donors to get engaged. Debtors benefit from the reduction of their debt and additionally enjoy domestic support for sustainable development and conservation and creditors can reduce uncollectible debts.

Private donations come from philanthropic foundations, corporate entities or private persons. Foundations and private donations are considered to have a large potential for additional contributions to funding of PA, though they are often related to regional and domestic projects in the donor's country – which is in most cases a developed country. The increasing awareness of consumers leads to more corporate funding for their public relations purposes.

Environmental funds (= conservation trust funds) are usually independent, privately operated funds, often financed through national government grants and international donor agencies. The idea of setting up environmental funds is to create a stable financial basis for PA[3] or to support suitable projects of local actors[4].

The second category, generating funding for conservation, comprehends the generation of funds with the objective to encourage conservation by creating stronger incentives and raising funds. Possible mechanisms include fiscal instruments, benefit sharing, cost sharing and conservation trusts. Fiscal instruments can also be used as instruments to generate revenues or for the purpose of changing behavior by imposing special taxes or subsidies, respectively removing them if they foster activities competing with conservation (EEA 2006). They intend

[3] So-called "park funds" are dedicated to financing specific PA.

[4] So-called "grant funds" finance community-operated projects or local NGO.

to steer activities and behavior of both, consumers and producers, by influencing the price of goods and services: The costs of unsustainable activities are increased while environmentally sound practices are rewarded by incentives and higher income. An example are modified Tobin taxes on certain financial transactions or harmful products like bunker fuels.

Fiscal reforms with a focus on the environment are considered to have an enormous potential to decrease negative impacts of human-induced destruction and pollution of natural habitats. The necessary funds for more effective conservation of biodiversity make only a small fraction of the money spent worldwide on environmentally harming subsidies, especially in the land use sector (OECD 2003). Instruments are (EEA 2006; OECD 2003):

- Removal of land use and product subsidies that foster unsustainable use of the environment.
- User charges and new taxes.
- Modification of existing charges and taxes towards sustainable management practices (i.e. tax relief for environmentally sound practices).

Another mechanism belonging to this category is benefit sharing (IUCN 1994a). It refers to making conservation projects interesting for local people and communities by indirectly sharing benefits and revenues. This means that the community profits as a whole through improved development which is an important contribution to poverty reduction. Also belonging to this group of mechanisms are investment, credit or enterprise funds. The allocation of capital and technical advice to enterprises dedicated to biodiversity conservation aims at combining the ecologic, the economic and the social dimension of sustainability and create synergy effects.

The third category are market-based instruments (MBI) which generate cash flows by charging for goods and ecosystem services from PA (BRÄUER *et al.* 2006). Payment schemes for environmental services can be tradable quota systems such as carbon offsets, payment of licenses for bio-prospecting, entrance fees for parks or concession payments for tourist operations in the case of ecotourism (SPERGEL 2001; UNEP 2004a). The common element of MBI is the decentralized character through their impact on market signals: from an economic point of view, shifting the costs and responsibilities associated with pollution back to the polluter is more efficient than "command and control mechanisms" (UNEP 2004b). The idea is to reduce market distortions resulting from the public good character of PA products and services (EEA 2006).

Concessions for resource extraction can refer to PA and their buffer zones directly, i.e., activities like sustainable harvesting of wood, hunting, and plant collecting have an immediate value and thus a price can be charged for these goods and services. These activities must of course be in accordance with the particular PA objectives and can be implemented in combination with benefit sharing efforts to enable local people to profit from their allocation. Regulations on the extraction of resources from PA are an effort to correct the mentioned market distortions but always bear the danger of leakage. This means that

protecting a certain forest could result in deforesting neighboring forests with no benefit (SCHWARZE *et al.* 2002). The problem of leakage should therefore be considered carefully. Creating new markets and pricing for ecosystem goods and services is estimated to be a very powerful tool for future financing of PA, especially since it is suitable for the internationally agreed conservation goals of the CBD.

The extraction of non-renewable natural resources often causes deep impacts on ecosystems, i.e., extracting fossil fuels and mining. They usually do not take place in protected sites but can alter conditions in PA directly and indirectly. These activities are often carried out by multinational corporate groups and tend to deplete the natural stocks of a country. They provide employment, income and taxes – but only until the site is exhausted, often leaving behind devastated areas with large environmental damages and serious consequences for the population. Therefore there are good reasons for dedicating a share of the revenues from such activities to sustainable development and conservation according to the polluter-pays principle (UNEP 2004b). It could be considered as a reinvestment in the environment which produced the resources in the first place. Depending on the geographic distance to PA sharing the resulting benefits for conservation purposes can take place at local or national level.

4 Linking the CBD and the UNFCCC: Making use of synergies, avoiding perverse incentives and adverse effects

During the last years, high expectations developed towards successfully linking the protection of biodiversity with other globally important goals, especially poverty alleviation and climate protection. The COP of the CBD stressed in several decisions that future activities under the UNFCCC should be "consistent with and supportive of the conservation and sustainable use of biological diversity" and cooperation should therefore be strengthened (decision V/4 §11, §§16-20; decision V/21 §3). While each of the conventions has its own clearly defined objectives, there is a common basis consisting of numerous official decisions, recommendations, guidance documents and studies (CBD 2003; DE VREDE *et al.* 2005). Their objectives are to improve cooperation and to identify activities and areas suitable for promoting synergies. For successful implementation however, the costs and benefits of cooperation and coordination need to be understood (VELASQUEZ 2007).

The international climate community of the UNFCCC presently discusses on how a climate policy after 2012 should be designed to thwart climate change more effectively. Some of the old issues under Kyoto have the potential to be the new ones, e.g. the role of developing countries and the issue of reducing deforestation. By not addressing deforestation in the 1st commitment period, one of the major sources for GHG-emissions remained uncared of. Deforestation and degradation in developing countries are actually responsible for app. 18 to 25% of the global carbon emissions (STERN 2006; WATSON 2001). Since COP11 of the UNFCCC several approaches have evolved on how reducing emissions from deforestation (RED) could be integrated in a post-2012 climate regime. SBSTA has the mandate to investigate potential options and to report to COP12 by the end of this year.

Some of the suggestions come from developing countries and are therefore considered as an opportunity for their integration. They have in common that initial participation should be on a voluntary basis fostered by positive financial incentives. The actual discussion focuses on three main issues:

- the type of incentives, i.e. whether a market-based solution or a fund mechanism should compensate countries successful in reducing their deforestation rates,
- methodological issues on monitoring, verification, leakage, permanence, and the inclusion of forest degradation (REDD) which is not part of the mandate for SBSTA so far, but very important in the context of deforestation and emissions from land use, and
- the relation to other processes such as CBD or UNFF.

It appears that there is great potential for synergies concerning REDD and conserving biodiversity in forests, and thus also for financing FPA. Increasing their extent can help countries reducing their deforestation and degradation rates – provided they receive positive financial incentives to do so. For a market-based approach, EBELING (2006) estimates compensation for a 10% reduction of deforestation to range between US $2 and US $12.1 billion per year, depending upon the price paid per t CO_2. Halving deforestation rates in ten large tropical countries – including Brazil and Indonesia – could lead to accumulated revenues between US $10.1 and US $60.7 billion per year. Despite their estimation character, these figures show that large revenues could be generated which at least partly could be used for financing FPA. The assumed prices will only develop if there will be sufficient demand. In order to avoid a flooding of the carbon market there is a need for more ambitious emission reduction targets. Otherwise there is the danger of a similar development as in the European trading scheme for emission allowances during its initial phase: Due to over-allocation the market collapsed and prices for carbon dropped from € 30 to below € 0.12 within 12 months. Such a development could lead to adverse effects concerning land use. Two important questions arise concerning conservation:

- How can a share of these funds, which are being directed to governments, be made available for conservation purposes?
- Which adverse effects regarding conservation might arise from regulations concerning RED carbon credits and how can they be avoided?

Therefore making use of synergies between CBD and UNFCCC should be accompanied by an investigation on important aspects (VELASQUEZ 2007) like transaction costs, risks of creating perverse incentives, loss of accountability, initiative and motivation, competing priorities and resource constraints.

5 Criteria for the evaluation of financing mechanisms

Expansion of FPA, establishing a global network structure and challenges such as less public spending on conservation require a multi-scale approach for raising the necessary resources and guaranteeing their steady flow. The principles by which financing strategies should be designed follow those promoted by the international community, manifested in the conventions and their programs, i.e., in the AGENDA21 (1992):

- The user should pay, if possible: those actively using resources should be involved in bearing the costs of their maintenance.
- Participation: Development and implementation of financing mechanisms is discussed to be as participatory as possible and therefore should include all relevant stakeholders. This is expected to be helpful to ensure their acceptance, to promote benefits and responsibilities for the involved and to be a source for meaningful contributions, i.e., making use of local expertise.
- Equity: This principle should find entrance in the design of finance mechanisms. Many benefits of biodiversity flow to all citizens of the world, while the costs tend to fall on countries with only limited financial resources (MCNEELY and WEATHERLY 1996).

In the context of financing biodiversity there is a need for reliable long-term sources. At the same time adverse impacts are supported by public and private financial flows. Subsidies supporting land use change for agricultural purposes or financing of unsustainable forestry for example thwart the efforts of conserving biodiversity and should be abolished.

Financing mechanisms should be evaluated by a set of criteria to decide whether they are suitable for raising funds for the described tasks. The following list does not claim to be complete, but the author believes that these aspects should be taken into account when developing a financing strategy. Criteria for the evaluation could be:

- reliable and sufficient mobilization of capital to ensure stable and sustainable financing of the PA network,
- political acceptance, feasibility: given the sovereignty of the parties some mechanisms bear the potential for becoming a crunch issue in negotiations, i.e. Brazil's stand on tradable carbon credits,
- flexibility according to regional and local circumstances,
- international distribution issues: "fair" distribution among countries (different conditions, differing degree and need for conservation demands flexibility),
- participation and integration of indigenous and regional populations (CBD, MDG),
- avoiding perverse incentives of the mechanisms to conservation goals,
- contribution to other objectives such as poverty alleviation, equity issues, and
- attribution of prices to goods and services from PA.

6 Conclusion and remaining questions

There is little time for establishing a global network of FPA until 2010 as demanded by the CBD. Existing FPA often lack a clearly defined protection status like the attribution of an IUCN protection category, and, despite their increase during the last decades, are neither representative nor sufficient for complying with the objective of significantly reducing the loss of biodiversity. At the same time existing funds for conservation decrease for several reasons or remain stable at best. It seems unrealistic to hope that this trend will reverse in the near future, making it necessary to find new sources for financing conservation. Estimations indicate a need of app. US $ 20 billion per year, depending on the objectives and the scope of the network.

Where could new money come from? As shown by many studies there is no lack of innovative ideas for new funds. Suggested promising ideas are environmental taxes, DfNS, and PES or other market-based solutions like carbon credits, concessions and fees. They vary concerning who is charged for conservation – private sources versus public funds – and whether they have proven effectiveness in practice. Some are of significance in certain regions or types of PA, depending on many factors such as the degree of development, population density, land use pressure etc.

Given the enormous financing gap, the lack of time and the differing needs and circumstances of countries and even specific PA, it seems that a financing strategy for such a global network should be flexible and open for input from different sources in the sense of a portfolio approach. There are many questions that should be dealt with in the context of a global network of FPA; they concern both, the financing issues as well as the challenge of implementing the network:

Financing mechanisms

- Which (combination of) mechanisms have the most promising potential to raise sufficient and stable cash flows for financing the FPA?
- Should carbon credits from RED-measures under the UNFCCC be used for financing the FPA? If so, how could this look like in practice?
- How can perverse incentives and adverse effects on the conservation of biodiversity through financing mechanisms be avoided (i.e. carbon credits, concessions)?
- Should private capital be considered designing the financial architecture of a network of FPA? If so: How can the financing strategy and the network be designed in order to be attractive for private capital to increase its willingness to fund?

Funding and distribution

- What should be funded: New and existing PA, only new PA, network structures and institutions? Which types of costs should be financed (activities, areas, opportunity costs)?

- How should funds be distributed among global regions, nations, existing networks, individual PA? Based on actual costs vs. certain amounts per ha? How to deal with the imbalance between countries rich and poor in biodiversity?
- Who should receive funding? Governments only (they distribute) or governments, other institutions and communities as well?
- How to differentiate funding between the different protection categories (i.e. more funding for strict conservation due to higher opportunity costs and less options for application of market mechanisms)?

Implementation

- If countries participate and receive considerable funding, should there be some type of compliance mechanism (i.e. reporting and monitoring responsibilities, reduced funding for non-compliance)?
- Since participation of countries is voluntary, how can participation be made attractive for member states?
- How to deal with imbalance between those countries leading in conservation and already spending a lot of money on conservation versus those who should increase their efforts by enlarging their areas (large need for additional funding)?
- How can indigenous and local communities participate in implementing PA and how to ensure that at least a share of the funds reaches these stakeholders in order to compensate for their opportunity costs?
- Which institution(s) could be asked / charged with raising, administering and distributing funds for the FPA / countries participating network?

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Part II

Contributions of Participants

The WWF Global 200 and WWF Germany's work in particular ecoregions

Jörg Roos, Frank Mörschel[1]

Abstract

Since the 1980s awareness for global biological diversity loss has been rising constantly. The adoption of the Convention on Biological Biodiversity (CBD) at the Rio World Summit in 1992 initiated a large number of measures to protect global biodiversity. However, the observed trend in biodiversity loss has not been reversed yet. WWF's Living Planet Index (WWF et al. 2006) clearly shows that Earth's biological diversity is still declining and it is likely that this decline will continue. We are convinced that the challenge of biodiversity loss has to be dealt with at global scale. A global conservation strategy is needed. The WWF Global 200 concept, which is presented here, could be a blueprint for such a global conservation strategy. The concept is science based and has three characteristics: the use of ecoregions[2], its comprehensiveness in scope and the fact that it is representative. In the last decade, WWF has initiated a broad range of conservation programmes in the Global 200 ecoregions. Activities in the Alps and the Caucasus will be presented as two examples of ecoregional conservation planning.

1 Introduction

Indicators as WWF's Living Planet Index clearly show that Earth's biological diversity has been declining constantly since the 1980s and that current and predicted global consumption patterns will further contribute to the decline of our planet's natural wealth (WWF *et al.* 2006). Global biodiversity loss is probably taking place at a speed higher than ever during the last 65 million years.

In its summary for policy makers, Working Group II of the Intergovernmental Panel on Climate Change came to the conclusion that "approximately 20-30% of plant and animal species […] are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C" (Working Group II of the Intergovernmental Panel on Climate Change 2007), a scenario that seems realistic for the 21st century.

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[1] WWF Germany; e-mail: roos@wwf.de; Moerschel@wwf.de

[2] WWF defines an ecoregion as a "large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions."

In the case of forest ecosystems the Millennium Ecosystem Assessment (MILLENNIUM ECOSYSTEM ASSESSMENT 2005) states that in 25 countries forests have effectively disappeared and in a further 29, 90% of former forest cover has been lost. Net forest decrease remains high and the world's forests in general are not managed sustainably. Even the commitment by the international community for "the achievement by 2010 of a significant reduction in the current rate of loss of biological diversity" could not reverse the alarming trend yet.

WWF has been working for more that 40 years to conserve biological diversity. At the end of the 20th century it became clear that in order to achieve the objective of protecting the major part of global biological diversity it would be necessary to tackle the problem strategically at global scale. WWF therefore developed the Global 200 concept to provide a blueprint for international nature conservation. WWF is convinced that a broad representation of the world's habitats is necessary to conserve a broad spectrum of species and maintain our planet's ecological and evolutionary processes.

2 WWF's Global 200

The Global 200 have been developed in collaboration with a wide range of regional experts and are a science-based representative approach for the protection of the Earth's biologically most valuable regions. Scarce resources for biodiversity conservation at global scale mean that choices have to be made. When choices are made it should be guaranteed that all ecosystems and major habitat types are included, important biodiversity is preserved and that major ecological and evolutionary processes are maintained. The Global 200 are a tool that helps making those decisions by promoting the protection of the world's most outstanding examples of each major habitat type across all continents and oceans. The concept identifies priority ecoregions for conservation at global scale. Effective conservation of those areas would significantly contribute to the preservation of biological diversity across a broad geographic range.

The Global 200 have three distinctive features: the use of ecoregions as unit of scale for analysis and comparison, their comprehensiveness in scope and their representativeness. The following methodology was used when selecting the Global 200.

The terrestrial, freshwater and marine realms were each divided into major habitat types (MHT). A major habitat type is defined by similar environmental conditions, habitat structure, biological complexity and contains similar communities and species adaptations

In a next step, the 24 MHTs were subdivided by biogeographic realms (Afrotropical, Australasia, Indo-Malayan, Nearctic, Neotropical, Oceania, Palearctic) to guarantee that unique fauna and flora of all continents and ocean basins are represented.

Then, the most outstanding ecoregions within each MHT and biogreographic realm were identified. The classification of ecoregions was done according to their biological distinctiveness at global, regional, bioregional and local scale. Parameters for selection were

species richness, endemism, taxonomic uniqueness, ecological or evolutionary phenomena and global rarity of MHTs. It is important to highlight that only the ecoregions within a MHT were compared with regard to their biological distinctiveness. Thus, representation of ecoregions across MHTs was guaranteed. For ecoregions that were considered to be of equal biological distinctiveness, those that had more intact habitats and biota according to their conservation status were selected.

The exact definition of ecoregion boundaries was based on the analysis of regional biodiversity patterns, through consultation of regional experts and literature reviews.

The final selection consists of 238 ecoregions, of which 136 are terrestrial, 36 are freshwater and 61 are marine ecoregions (OLSON and DINERSTEIN 1998).

3 From global vision to ecoregional action

The Global 200 represent a thorough basis for global conservation planning and WWF has initiated initiatives in a sub-set of them. In 2005 the WWF network was active in 59 ecoregions.

Ecoregional conservation planning has four key elements: 1) The reconnaissance phase, in which a rapid assessment is carried out that provides an ecoregional profile. 2) The development of a biodiversity vision, which lays down the basis for a long-term planning of activities, defines goals, objectives and targets and identifies priority areas that are important for the achievement of the conservation objectives. A priority area will, by the way, not automatically be designated as a protected area. Sustainable land use schemes that preserve regional biological diversity are also an option. Conservation has other tools to protect regional biodiversity as e.g. designation for sustainable use. Priority areas are chosen such that representation of native habitats is guaranteed, viable populations of all native species are maintained, essential ecological processes remain functional and resilience to ecological change can be assured. 3) The ecoregional conservation plan is a tool to develop concrete steps and strategies to attain the objectives laid down in the biodiversity vision. 4) The action plan that describes concrete activities that contributes to the implementation of the conservation plan and the achievement of the biodiversity vision (GOLDER 2004).

4 Ecoregional conservation in the Alps

The Alps are probably the most intensively exploited mountains in the world, but at the same time they harbour a large part of Europe's biological diversity: 30,000 animal and 13,000 plant species, of which 20,000 are invertebrates, 200 are breeding birds, 80 are mammals and 417 are endemic plant species.

In 1999, regional WWF organisations assessed the possibility of a conservation initiative and came to the conclusion that a pan-Alpine initiative would be advantageous. In a next step, an ecoregional conservation process was started and the method was applied to the Alps in the borders of the Alpine Convention. The development of the biodiversity vision took three

years, involved approximately 100 experts from roughly 90 institutions and all bordering states. Partners in this exercise were the International Commission for the Protection of the Alps (CIPRA), the International Scientific Committee on Research in the Alps and the Alpine Network of Protected Areas.

As a result of the exercise 23 ecoregional priority areas were identified. These areas are important for biodiversity at pan-Alpine level and permit a strategic approach to conservation. The boundaries of the priority areas were defined at a 1:500.000 scale, which means their boundaries can only be an approximation.

Eventually, they are thought to be a tool for conservation and sustainable development in the Alps. In March 2005, WWF published the Ecoregion Conservation Plan.

This plan is considered to be a living document that will be revised regularly and thus guarantees that the work in the Alps will be a dynamic process. It formulates a long-term 50 year vision statement for the region and identifies 10 year targets and 3-5 years milestones (ARDUINO *et al.* 2006). Even if the plan was initially developed by WWF, it goes without saying that successful conservation in the Alps will depend on the involvement of many local partners. Their role will be crucial for the implementation and further development of the plan. Ecoregion conservation has to become a common endeavour of all players in the region to succeed. In fact one of the key elements for the successful launch of an initiative in the Alps was that the many partners already working in the region were willing to engage.

5 Implementation of the ecoregion in the Caucasus

Due to its outstanding biodiversity the Caucasus region was included in the Global 200 ecoregions in 1997. As a response to the multitude of threats in the region WWF, who had been active in the Caucasus from 1992, decided to develop an ecoregional action programme. In the case of the Caucasus it should be mentioned that the general situation for conservation activities is exceptionally supportive as many international donors are present in the region. The German Federal Ministry for Economic Cooperation and Development (BMZ), for example, started an initiative for the three countries of the Southern Caucasus that inter alia supported the establishment of trans-boundary national parks.

The biodiversity vision, that was developed by experts and stakeholders from Armenia, Azerbaijan, Georgia, Iran, Russia and Turkey identified geographical, ecological and thematic priorities and presents a list of 56 priority conservation areas (14 million ha) covering 24% of the territory. Additionally 5.9 million ha of wildlife corridors were defined in the process. Not all priority areas are considered for strict protection. Sustainable resource management is also an objective for them.

The succeeding Ecoregional Conservation Plan (ECP) was then developed together with local NGOs and governments to provide them with a transboundary strategy for biodiversity conservation and its sustainable use. Its development was supported by WWF, KfW

Development Bank in the context of the Caucasus initiative of the BMZ, the Critical Ecosystems Partnership Fund (CEPF) and the MacArthur Foundation.

The ECP is a comprehensive strategy to protect biodiversity and to support regional development in the Caucasus. Its purpose is to serve governments as well as national and international organisations as a guideline. At the same time, the ECP is a strategic planning instrument to help governments with the implementation of their obligations towards international conventions, especially CBD.

Four implementation instruments exist that are to guarantee proper implementation of the plan. A Caucasus Biodiversity Council coordinates the ECP implementation and tries to improve regional co-operation in this conflict prone region. Each of the six Caucasus range states is represented with one government and non-government representative.

A further building block is a conservation trust fund that will support conservation actions in the countries of Armenia, Azerbaijan and Georgia. The idea for the endowment fund was a joint initiative by BMZ, KFW Development Bank, WWF and Conservation International. The fund will secure long-term funding for conservation in these three countries.

Additionally the CEPF/WWF Small Grants Fund for the Caucasus provides financial support for activities by local NGOs which are in line with ECP-priorities.

The fourth implementation instrument is a Regional Monitoring Network that will evaluate the progress in ECP implementation. It provides the opportunity to adapt the ECP to new threats and challenges. Again this monitoring network is developed jointly with international donors and regional stakeholders.

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Setting priorities for global biodiversity conservation

Daniel Brito[1]

Abstract

While extinction is a natural process, human impacts have elevated the rate of extinction to levels many times greater than the natural rate. The problem of stemming the extinction crisis can best be framed by a question: In which areas would a given dollar contribute the most towards slowing the current rate of extinction? Conservation International uses a dual conservation strategy that always prioritizes endemic-rich areas and ensures that we protect the most threatened places (Biodiversity Hotspots), while preemptively protecting equally unique places that are not yet under extreme threat (High-Biodiversity Wilderness Areas). There are 34 Biodiversity Hotspots and five High-Biodiversity Wilderness Areas, each one of them holding a significant proportion of the world's biodiversity. Even though efforts to identify global-scale priorities for conservation, such as Biodiversity Hotspots and High-Biodiversity Wilderness Areas are important, these broad scale approaches do not allow for the identification of site-scale conservation targets. Key Biodiversity Areas are sites of global significance for biodiversity conservation, identified using globally standard criteria and thresholds, based on the framework of vulnerability and irreplaceability. The Key Biodiversity Areas framework can therefore help provide the fundamental basis of national and regional scale gap analyses. Conservation International also adopts biodiversity corridors as a strategy designed to address the issues of scale and connectivity requirements for species, to ensure ecological resiliency of the landscape, ensure the proper functioning of ecological processes (e.g. pollination, hydrological flow, etc), and proactively tackle broad-scale threats. In order to preserve biodiversity, conservation planning and action must be implemented at all scales, from local, to global, and developing and adopting the concepts of Biodiversity Hotspots, Wilderness Areas, High-Biodiversity Wilderness Areas, Key Biodiversity Areas and Biodiversity Corridors, Conservation International takes front in preserving biodiversity from the local to global scale.

[1] Conservation International; e-mail: d.brito@conservation.org

1 Introduction

Life on Earth faces a crisis of historical and planetary proportions (PIMM and BROOKS 1997). Unsustainable consumption in many northern countries and crushing poverty in the tropics are destroying wild nature. Biodiversity is besieged. Extinction is the gravest aspect of the biodiversity crisis: it is irreversible. While extinction is a natural process, human impacts have elevated the rate of extinction by at least a thousand, possibly several thousand, times the natural rate (PIMM and BROOKS 1997). Mass extinctions of this magnitude have only occurred five times in the history of our planet; the last brought the end of the dinosaur age (JABLONSKI 1986).

The problem of stemming the extinction crisis can best be framed by a question: In which areas would a given dollar contribute the most towards slowing the current rate of extinction? To accomplish this we first need to understand species' distributions. This requires that we measure endemism: the degree to which species are found only in a given place. This can be thought of as a measure of "irreplaceability". Since endemic species cannot be found anywhere else, the area where an endemic species lives is wholly irreplaceable. Our ultimate goal is to keep nature intact, which means that we must stop anthropogenic species extinctions. To approach this goal, we must slow the rate of species extinction as much as possible with whatever conservation resources we have at our disposal, which requires incorporating threats (or "vulnerability") and costs into priority setting. Generally, the more threatened an area is, the more it will cost to conserve. However, because economic opportunity costs vary dramatically, there do still exist areas of relatively low cost all over the globe.

We face a paradox in determining how to incorporate threats, costs, and opportunities into conservation priorities. Intuitively, we want to conserve the most threatened areas first, but we also want to get the greatest return for our investment. This paradox can best be resolved by identifying areas that hold species found nowhere else and that are guaranteed to lose species if the areas are not conserved. Among these, Conservation International ranks its actions with the most threatened biodiversity receiving the most urgent action. In effect, we need a dual conservation strategy that always prioritizes endemic-rich areas and ensures that we protect the most threatened places, while preemptively protecting equally unique places that are not yet under extreme threat. Based on this theory, Conservation International uses a two-pronged strategy for global conservation prioritization, simultaneously focusing on the irreplaceable and threatened Biodiversity Hotspots and on the High-Biodiversity Wilderness Areas, which are irreplaceable but still largely intact.

2 Biodiversity Hotspots

MYERS (1988) first identified ten tropical forest "hotspots" characterized both by exceptional levels of plant endemism and by serious levels of habitat loss. Later, MYERS (1990) added a further eight hotspots, including four Mediterranean-type ecosystems. Conservation

International adopted Myers' hotspots as its institutional blueprint in 1989 (CONSERVATION INTERNATIONAL 1990a), and in 1996, the organization made the decision to undertake a reassessment of the hotspots concept, including an examination of whether key areas had been overlooked (CONSERVATION INTERNATIONAL 1990b). In 1999 an extensive global review was undertaken, which introduced quantitative thresholds for the designation of biodiversity hotspots. To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 1,500 species of vascular plants (>0.5 percent of the world's total) as endemics, and it has to have lost at least 70 percent of its original habitat (MYERS *et al.* 2000). This analysis identified 25 Biodiversity Hotspots (MYERS *et al.* 2000).

A second major reanalysis has now been undertaken. In total, this updated analysis reveals the existence of 34 biodiversity hotspots (Figure 1), each holding at least 1,500 endemic plant species, and having lost at least 70 percent of its original habitat extent (MITTERMEIER *et al.* 2005). Overall, the 34 hotspots once covered 15.7 percent of the Earth's land surface. In all, 86 percent of the hotspots' habitat has already been destroyed, such that the intact remnants of the hotspots now cover only 2.3 percent of the Earth's land surface. Between them, the hotspots hold at least 150,000 plant species as endemics, 50 percent of the world's total. The total number of terrestrial vertebrates endemic to the hotspots is 11,980, representing 42 percent of all terrestrial vertebrate species. Reptiles and amphibians, are more prone to hotspot endemism than are the more wide-ranging mammals and birds, but the overall similarity between taxonomic groups is remarkable. Overall, 22,022 terrestrial vertebrate species call the hotpots home, 77 percent of the world's total. The current analysis also includes the first assessment of inland fishes across all hotspots. Although most current statistics are likely underestimates, because almost 200 freshwater fish species are discovered each year, the hotpots already hold 29 percent of the world's freshwater fish species as endemics, with 55 percent of species occurring (MITTERMEIER *et al.* 2005).

While the 34 hotspots clearly hold astounding levels of species endemism, this is not sufficient to describe the extent to which they represent the history of life. This is important because it could be argued that measures of biodiversity at higher taxonomic levels than the species better represent evolutionary potential, ecological diversity, and the range of options for future human use. In the current analysis, we therefore measure hotspot endemism at the higher taxonomic levels of genera and families, and find an extremely high concentration of biodiversity at these levels, even compared to what we would expect based on their levels of species endemism.

3 High-Biodiversity Wilderness Areas (HBWAs)

The Wilderness Area approach was developed simultaneously by MYERS (1988; 1990) and Mittermeier (CONSERVATION INTERNATIONAL 1990a). This approach emphasizes high-biodiversity ecosystems, but focuses on the opposite end of the threat spectrum. Whereas the Biodiversity Hotspots consist mainly of heavily exploited and often highly fragmented ecosystems greatly reduced in extent, the Wilderness Areas are still largely intact

(MITTERMEIER *et al.* 1998; 2002). Wilderness Areas represent important storehouses, major watersheds and play a vital role in climate stability. They are often the last places where indigenous peoples have any hope of maintaining their traditional lifestyles. To qualify as a Wilderness Area, the areas included must have 70 percent or more of their original vegetation, cover at least 10,000 square kilometers, and have fewer than five people per square kilometer (MITTERMEIER *et al.* 1998; 2002). There are 37 wilderness areas around the globe (MITTERMEIER *et al.* 2002).

A subset of the 37 Wilderness Areas, the five High-Biodiversity Wilderness Areas (North American Deserts, Amazonia, Congo Basin, Miombo-Mopane Woodlands, and New Guinea) (Figure 1), cover just 6.1% of land and hold more than 1,500 plant species each as endemics. Together, these five regions hold 17% of the planet's plants and 8% of terrestrial vertebrates as endemics. Compared with hotspots, these places therefore also have very high biodiversity value, but they are relatively more intact (though by no means not under threat), and therefore offer excellent opportunities for proactive conservation investment. High-Biodiversity Wilderness Areas are places where conservation should be done in tandem with, and complementary to, more reactive conservation in the hotspots (BROOKS *et al.* 2006). The HBWAs could be the hotspots of the future, if we do not invest wisely in them now.

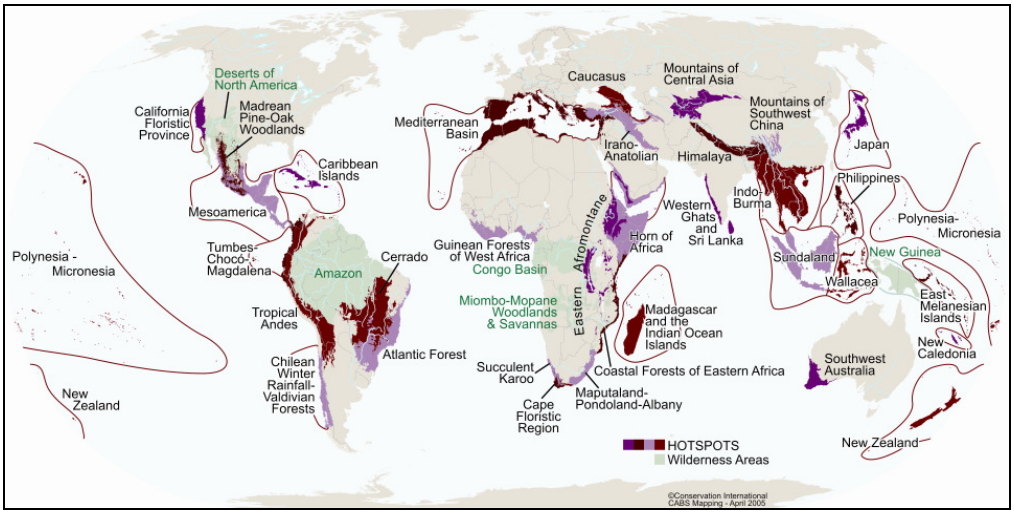

Figure 1: The World's 34 Biodiversity Hotspots and the World's 5 High-Biodiversity Wilderness Areas (CONSERVATION INTERNATIONAL 2005)

4 Key Biodiversity Areas (KBAs)

Efforts to identify global-scale priorities for conservation, such as Biodiversity Hotspots (MYERS *et al.* 2000; MITTERMEIER *et al.* 2005) and Wilderness Areas (MITTERMEIER *et al.* 2002), have been highly effective at directing conservation resources at a global scale. However, these broad scale approaches do not allow for the identification of site-scale conservation targets; furthermore, some sites that are globally important for biodiversity conservation will always fall outside of these broad priority regions.

Key Biodiversity Areas are sites of global significance for biodiversity conservation. They are identified using globally standard criteria and thresholds, based on the needs of biodiversity requiring safeguard at the site scale. These criteria are based on the framework of vulnerability and irreplaceability widely used in systematic conservation planning (EKEN *et al.* 2004). The assessment of KBAs is based on the same framework of irreplaceability and vulnerability as used globally for identifying hotspots. One criterion for KBAs concerns vulnerability: the presence of globally threatened species, of any taxon, at a given site. Three criteria for KBAs, meanwhile, concern irreplaceability, for sites holding: a) species with global ranges of <50,000 km^2; b) congregations of more than 1% of the global population of any individual species at a particular time; or c) species restricted to particular biomes (LANGHAMMER *et al.* in prep.)

Key Biodiversity Areas help to identify important sites not just within broad regions of global priority, but in all countries worldwide. The Key Biodiversity Areas framework can therefore help provide the fundamental basis of national and regional scale gap analyses.

Simultaneous to KBA assessment, an important international initiative is underway to identify and conserve the 'tip of the iceberg' of site-scale conservation targets, the Alliance for Zero Extinction (AZE, www.zeroextinction.org). The criteria for consideration of sites by AZE are extremely strict: they must hold effectively the entire global population of at least one species considered Critically Endangered or Endangered on the IUCN Red List (RICKETTS *et al.* 2005). Thus, for each AZE site, conservation is essential to avoid species extinction. AZE sites form a perfect subset of KBAs

5 Corridors

Although protected areas are considered to be the most effective tool to achieve biodiversity conservation, research has shown that in most cases, protected areas alone will be insufficient to conserve biodiversity over the long term. Not only is their integrity threatened by pressures exerted from the outside, but in several cases, the protected areas provide insufficient habitat and resources for targeted species, particularly those that are wide-ranging, or they do not sufficiently encompass and ensure the maintenance of key ecological processes, such as hydrological flows and pollination.

At Conservation International strategies, biodiversity conservation corridors are designed to address the issues of scale and connectivity requirements for species, ensure the ecological

resiliency of the landscape, ensure the proper functioning of ecological processes (e.g. pollination, hydrological flow, etc), and proactively tackle broad-scale threats.

6 Conclusions

The location of and threats to biodiversity are distributed unevenly, so prioritization is essential to minimize biodiversity loss. Global conservation planning is key for strategic allocation of flexible resources. Prioritization of highly irreplaceable regions must occur from both ends of the threat spectrum: some strategies need to be reactive (e.g. Biodiversity Hotspots, prioritizing high vulnerability), and others need to be proactive (e.g. High-Biodiversity Wilderness Areas, prioritizing low vulnerability).

However, it is through the conservation of actual sites (e.g. KBAs) that biodiversity will ultimately be preserved or lost, and thus drawing the lessons of global conservation prioritization down to a much finer scale is now the primary concern for conservation planning (BROOKS *et al.* 2006). In order to preserve biodiversity, conservation planning and action must be implemented at all scales, from local, to global.

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An intergovernmental process for identifying, conserving and monitoring forests of outstanding universal value: The World Heritage Convention

Marc Patry[1]

Abstract

The World Heritage (WH) Convention provides an internationally recognized legal framework under which countries propose their best protected areas (PA) for inscription onto the WH list. If these PAs meet rigorous criteria for global value and conservation integrity, they may be inscribed on the WH List. The WH Convention binds the international community to cooperate in the conservation of WH sites. Ninety two WH sites are considered WH Forest sites – these represent 13% of all IUCN category I-IV protected forests. The WH Committee launched the WH Forest programme in 2001 to better leverage the Convention in matters of in situ forest conservation. Rigorous monitoring of the state of conservation of WH Forests is carried out. WH Forests could represent a practical foundation for a global network of protected forests.

1 What is the World Heritage Convention?

Popularly regarded as little more than an international beauty contest for monuments, buildings and national parks, the full power of the World Heritage (WH) Convention (UNESCO 1972) is poorly understood not only amongst members of the public, but also amongst conservation professionals in general.

In reality, the WH Convention is the only international mechanism focusing on in-situ nature conservation and fully empowered to request governments to report on the state of conservation of their WH sites, and to request that appropriate conservation measures be taken to ensure that the natural values of these sites are maintained indefinitely.

183 countries representing over 99.4% of the world's terrestrial surface have ratified the WH Convention. These countries elect, on a rotating basis, 21 representatives to sit on the WH Committee, which carries out the business of the Convention – this is done with relative agility given the comparatively small number of Committee members. Typically, the Committee receives nominations for new WH sites, submitted by member countries and

[1] UNESCO-World Heritage Centre; e-mail: ma.patry@unesco.org

evaluated by the IUCN, which is the statutory advisory body to the Convention. Once inscribed[2], the Committee assures an on-going monitoring of the state of conservation (SOC) of the sites, to ensure that the high standards of conservation of WH sites are respected world wide. Should information reveal the existence of serious threats to a particular site, the Committee may request that specific remedial or conservation action be taken on the part of the country in question. The Committee may also place a site on the List of WH in Danger, should the situation warrant a focused and immediate attention on behalf of national and international stakeholders.

The Committee is served by the WH Centre, which is the Secretariat to the Convention. The WH Centre, located at UNESCO's headquarters in Paris, has a team of approximately 85 staff which help, along with IUCN, gather and process information on the SOC of WH sites and present this information to the WH Committee for its consideration.

2 World Heritage Forest Programme

On occasion, the WH Committee will launch a specific thematic programme in an effort to focus particular attention on a matter considered of major importance to heritage conservation worldwide. In 2001, the Committee launched the WH Forest Programme, with the objective of addressing forest conservation issues prevalent throughout the world through site specific activities. Though resources allocated to the WH Forest Programme have been modest, work under its auspices, both prior to its formal creation, and following it, has been substantial. A precursor meeting, held in Indonesia (1998) led to a spike in inscriptions of many new WH tropical forest sites in the following years. A follow-up meeting held in France (2005), brought together a wide range of forest conservation stakeholders to focus their attention on using the WH Convention to leverage action at the landscape level, outside of the formal WH site boundaries, in an effort to promote the implementation of the CBD Ecosystem Approach.

Generally, a WH site containing a "substantial" amount of forest cover, and inscribed on the WH list for values to which this forest cover contribute, is considered as a WH Forest. Though somewhat arbitrary, this definition provides a framework for the creation of a network of WH forest sites with the following characteristics:

- 92 WH forests in 49 countries
- Total area: 75,374,644 ha
- Average size: 819,290 ha
- 8 on the List of WH in Danger

[2] There are currently 186 natural heritage sites inscribed on the list of World Heritage, of which 24 include cultural heritage components (these are referred to as "mixed" sites).

The total surface area of WH forests represents approximately 13% of all IUCN category I-IV protected forests of the world, a very substantial proportion, giving the WH Committee an important opportunity and responsibility regarding the setting of international conservation standards for protected forests.

3 World Heritage Forests within the broader landscape – the Ecosystem Approach

The challenge of WH Forest conservation resides in part on ensuring that broader landscape level processes potentially affecting the integrity of a WH Forest are managed in such a way as to take into consideration the conservation needs of the site. To address this challenge, an international meeting under the framework of the WH Forest Programme was held in 2005 to focus attention on the mechanisms which could support such processes (UNESCO 2007). Some findings underlined the importance of applying the CBD Ecosystem Approach (and its 12 principles), and identified the Model Forest programme[3] as a tool with great potential. This programme considers protected forests as one of several landscape components which are integrated into a multi-stakeholder sustainable forestry approach. The UNESCO Biosphere Reserves also provide a conceptual framework under which the Ecosystem Approach could be applied, in the context of WH Forest conservation. The WH Programme is focused on integrating these processes and principles in its efforts to bolster conservation of WH Forests worldwide.

4 Monitoring the state of conservation of WH forest sites

In an effort to develop a clearer understanding of the changing State of Conservation of WH Forest sites, the WH Centre has developed a quantitative indicator of the threat intensity to which a WH Forest site is subjected, based on the history and frequency of the WH Committee's formal expressions of concern over the particular site. Ranging from "0" (lowest threat) to "100" (highest), the indicator provides a rapid assessment of the changing overall intensity of threat to the conservation of WH Forests (see figure 1).

A comprehensive database is also being constructed in the context of the WH Forest Programme, including forest size, forest cover, IUCN protected areas categorization, threat intensity coefficient, WH in Danger listing, for all of the 92 WH Forest sites. This information can be accessed on-line at: http://whc.unesco.org/en/forests/

[3] For more details, see: http://www.idrc.ca/en/ev-22891-201-1-DO_TOPIC.html

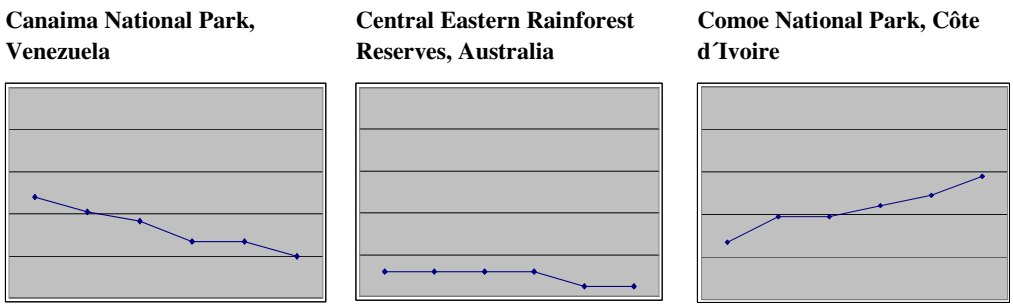

Figure 1: Sample threat intensity coefficients for 3 WH Forest sites. Horizontal scale represent year (2001-2006) and vertical scale represents increasing threat intensity (0-100) (UNESCO 2007)

In general, the state of conservation of WH forests is representative of other protected forests at national levels. On the one hand, they enjoy the same level of national legal status, and on the other, they may be subjected to the same conservation and management challenges. WH Forests in most developing countries and in some developed ones struggle with encroachment, poaching, effects of nearby infrastructure projects, side-effects of armed conflict, illegal logging and more. Budgets for management are often similarly constrained as those of other protected forests in the same country. The main difference conveyed on these protected forests by their WH status is the benefit of being more closely monitored by an international peer group – the WH Committee. Being in the international spotlight, these sites can be used to attract particular attention at resolving some of the most intractable conservation challenges they face. Lessons can thus be more readily learned here than in other protected forest areas, and once learned, can be more readily applied elsewhere.

5 Conclusion

Establishing a global network of protected forests need not demand the creation of a completely new system of admission, monitoring and assistance. This system exists already, within the framework of the WH Convention. Overseen by an intergovernmental panel of heritage experts, and benefiting from the technical, statutory support of the IUCN, the state of conservation of WH Forests can be regularly monitored, and through the existence of the existing WH Convention, countries can be made to implement necessary measures of conservation.

In charge of one of the five "Biodiversity Conventions", the WH Centre enjoys formal cooperative arrangements with the Secretariat of the Convention on Biological Diversity – and looking to the existing WH Forests as the foundation of a global network would require relatively little overhead, both financially and institutionally, while at the same time fulfil the oft-repeated requests of States Parties to both the WH Convention and the CBD for greater

cooperation with other conventions, and for the achievement of greater synergies between existing conservation mechanisms.

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Scaling up financing for forest protected areas: developing international payments for ecosystem services

David Huberman[1]

Abstract

With various payments for ecosystem services (PES) programs and pilot projects underway around the world, the need for institutional support for scaling-up PES to international and global levels is becoming increasingly significant. With a current lack of demand for ecosystem services beyond those related to carbon sequestration, the opportunity for 'bundling' is becoming increasingly attractive. We will argue that this bundle is best conceptualized within a landscape approach, and that the World Heritage Convention (WHC) represents the most appropriate model for matching this supply with an international demand for ecosystem services. The capacity that our international PES-WHC model has for linking the non-use values of more intangible benefits of ecosystem services (e.g. cultural, option, and existence values) with the use values (direct and indirect) will be offered as the basis for the argumentation. Further, taking the form of an international 'sponsorship auction', a WHC-inspired IPES scheme has the potential to stimulate the demand for ecosystem services by raising greater levels of awareness on the qualitative attributes of forest protected areas.

1 Introduction

Around the world, environmental managers are becoming increasingly familiar with the use of economic incentives in their conservation efforts. In a relatively short period of time, Payments for Ecosystem Services (PES) has established itself as one of the most popular new incentive-based policy instruments. Indeed, the notion that recipients of valuable ecosystem services pay directly for their provision and maintenance offers an innovative approach to the sustainable management of the environment. This focus on ecosystem benefits holds great promise in terms of raising environmental awareness among individuals and organizations that might overlook their many dependencies on the natural landscape.

As with any new concept, the notion of 'ecosystem services' – which refers to the many natural processes by which ecosystems, and the species that make them up, sustain and fulfill human life (DAILY 1997) – has yet to show its long-term potential. While PES schemes are

[1] IUCN – The World Conservation Union; e-mail: david.huberman@iucn.org

flourishing in many countries around the world – ranging from watershed management to 'bioprospecting' deals – it appears as though the model has a limited applicability at the global level. Although payments for the sequestration of carbon are spreading worldwide, other critical ecosystem services are having trouble keeping up. Yet there are many other possible international applications of PES. A forest protected area, for example, delivers valuable ecosystem services not only to the communities living in its direct vicinity (i.e. through crop pollination) or to downstream water users (i.e. through water flow regulation or sediment retention), but also to scientists, artists, tourists, and entrepreneurs coming from all four corners of the world.

While the PES model has already been applied to the pressing issue of climate change through the development of payments for carbon sequestration, the urgent international problem of biodiversity loss has yet to benefit from this innovative environmental policy tool. A guiding objective of this paper consists in determining to how an international application of the PES model (IPES) can help enhance conservation objectives by scaling up the financing of forest protected areas.

In this paper, we will present a model for IPES inspired from the World Heritage Convention (WHC). This model will be developed by conceptualizing the preservation of 'heritage' as a globally significant ecosystem service supported by and delivered through biodiversity conservation in protected areas.

As the debate on environmental valuation continues to struggle to attach economic values to the concept of biodiversity, we will take the intrinsic value of forest ecosystems as the starting point. Indeed, the notion that an ecosystem has global significance in terms of determining the cultural heritage of humanity cannot be easily quantified and priced. Yet, its value is easily recognizable. In this paper, the extent to which the PES model can serve as an effective means of redefining ecosystem values will be assessed through its capacity for generating greater levels of environmental awareness and stronger participation in conservation activities from previously un-engaged parties. Within this context, we will be looking for an entry point for new international actors to engage in the financing of conservation efforts through a WHC-inspired model for IPES.

2 Scaling up payments for ecosystem services

2.1 Voluntary demand

Within the Convention on Biological Diversity (CBD), there is growing interest in correcting incentives through innovative financial mechanisms and on improving the quantity and quality of existing biodiversity financing mechanisms. Article 11 of the Convention indeed requires Parties to "adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity" (CBD Article 11 COP 8 Decisions VIII/25 & VIII/26). Yet, these 'measures' have yet to achieve significant results in terms of reducing biodiversity loss.

Given the many political challenges to developing international regulations on the preservation of ecosystems, the prospect of private funding and support for conservation becomes increasingly attractive.

Consequently, voluntary actions have been identified as the starting point for the development of a biodiversity-centered IPES scheme (UNEP-IUCN 2006). It is believed that a further analysis and stronger understanding of the demand for ecosystem services could fuel the growth of the IPES model and improve its effectiveness (UNEP-IUCN 2006).

Despite the general consensus on the need to develop the demand side of IPES, there currently is no clear view on how such efforts should be carried out. However, the prospect of building on the carbon market stands out as the most popular option. This emergence has been fueled by the prominence of climate concerns on the environmental agenda and the prospects of including existing forests into the next Kyoto commitment period. Indeed, the idea of reducing emissions from deforestation and forest degradation (REDD) is gaining momentum.

2.2 'Bundled' landscape-based supply

Although the idea of combining climate and conservation concerns into a common IPES framework seems attractive, the approach is not without shortcomings. Whether they relate to the difficulties in establishing a meaningful baseline, the lack of permanence of payments, environmental leakage, or transaction costs, the many challenges which still need to be adequately addressed if REDD is to effectively fuel the development of IPES. While this discussion continues to evolve, the idea of using the PES model to 'bundle' various ecosystem services, such as carbon sequestration and habitat protection, could become an attractive alternative.

As highlighted previously, forest protected areas can easily be perceived as being the providers of 'bundles' of ecosystem services. A bundled approach to PES entails that the payments are destined to compensate for a package of socio-economic benefits provided by a variety of different ecosystem services. These benefits would need to be attributed to a given protected area that meets a set of criteria ensuring the sustainable management of the area. The focus of the payment scheme would thus be landscape-based, with investments going towards ecosystems, both intact and inhabited, as opposed to strictly on the elusive notion of biodiversity.

Such a landscape-based approach is precisely the one that has been recently favored by the World Heritage Forest Programme (WHFP), who defines it as: "an analytical and/or normative perspective that is based on the interaction between people and nature. It explores the relationships between past and present natural and social processes that contribute to shape a contiguous area of high social, biological, and/or aesthetic value. This approach is universally applicable yet emphasizes the identity of each landscape through the unique configuration of the processes involved." (SINGER 2007)

A distinct advantage of this landscape approach consists in bringing the focus down to the community level; thereby facilitating the long-term sustainability of environmental projects in a systemic approach that encourages participatory decision making processes (CAMPOS and CORRALES 2005). It has also been argued that a potential positive externality of a landscape-based PES scheme is the creation of social capital within the area concerned, as local stakeholders interact collectively to sustainably manage their resources (PAGIOLA *et al.* 2005). Thus, ongoing efforts at empowering community ownership over their natural resources could be encouraged through the process of identifying the ecosystem services offered within a given protected area.

3 A model for the financing of forest protected areas

3.1 Valuing ecosystem services

In terms of identifying the ecosystem services that might be present within a given forest protected area, the Ecosystem Benefits Indicator (EBI) offers a well-structured methodology (BOYD and WAIGNER 2003):

- characterization of an ecosystem in terms of its biophysical attributes
- assemblage of data on the ecosystem's social, economic, and bio-physical landscape
- identification of ecosystem services
- evaluation of service benefits through various indicators (population, land cover, property value, floodplain characteristics, sacred sites, etc…)

The mention of "evaluation" instead of "valuation" in the final point is quite telling. It points to the fact that the methodology is intended to come up with a qualitative as opposed to a quantitative overview of an ecosystem's values. This will not help us find a price for the bundle of services. Understandably so; as it has been argued that "for most of the values that humans attach to biodiversity and ecosystem services, the pricing approach is inadequate – if not misleading and obsolete – because it implies erroneously that complex decisions with important environmental impacts can be based on a single scale of values" (GATTO 2000).

Although the EBI method does not help us provide a quantifiable measure of ecosystem benefits, it serves as an effective bundling exercise. Within a landscape approach, this portfolio of ecosystem benefits offers an outreach tool for attracting conservation investments from various sources. Also, it could help identify who the potential beneficiaries of the ecosystem services are. Further, the EBI method could help target specific conservation actions that are most in need of funding. The existence of an incentive to make the landscape attractive for conservation investments will be a driving force of this bundling process. There is also a reason to hope that feelings of pride, either at community or regional levels, will reinforce the incentive to preserve the landscape.

3.2 The World Heritage Convention

Just as Parties to the World Heritage Convention (WHC) submit a site for consideration on the World Heritage list, landscape-based groups could use the EBI method to submit their site for consideration. Synergies between IPES and the WHC become increasingly apparent when we consider recent recommendations formulated by the WHFP, who "Encourage State Parties to the WHC to define the critical ecological support systems of a WH Forest Site", to "explore opportunities for payment for the environmental services of World Heritage forest sites" at the landscape scale and to "engage more of the potential donors in the wider landscape within which WHFS exist" (RIPLEY 2007).

What makes these recommendations particularly relevant to IPES is that they help support the notion that a bundle of easily identifiable ecosystem services will be considered a worthwhile investment. Indeed, the "critical ecological support systems" of a forest relates directly to the bundle of ecosystem services it provides. Implicitly, this means that a Natural World Heritage site is valued not only on the basis of its global significance, but also on the basis of the ecological processes which define the landscape.

Herein lies the IPES opportunity. It consists in using the less tangible benefits of ecosystem services (e.g. non-use values) as a means of highlighting the more utilitarian benefits (direct and indirect values). By recognizing that the values of a 'globally significant' site extend beyond cultural and other non-use values such as heritage, IPES could serve as an awareness raising tool for showcasing biodiversity's contribution to human well-being at various geographic scales.

3.3 Instituting payments through a 'sponsorship auction'

Within the above-stated IPES context, our model for a WHC-inspired scheme would be most suitably instituted through a partnership/sponsorship type of arrangement. After a panel of experts follows on EBI method to highlight the relative presence or absence of ecosystem services within a given landscape; individuals, organizations or companies would be able to place a bid to act as a sponsor for one or more of these landscapes. The most significant advantage of instituting an auction-based payments system is that it simplifies the valuation process by making it entirely dependent on willingness-to-pay.

In many cases, it is the image value of a sustainably managed landscape that will generate the demand. A tour operator, for example, will mainly be interested in financing a protected area in order to satisfy the maintenance of the 'image' of a sustainable landscape towards which to direct its clients. Adequate enforcement and monitoring of the conservation activities will be critical to ensure that any image-based sponsorship deal leads to on-site results.

An effective auction-based IPES scheme will need to ensure that currently unprotected, and preferably highly threatened, ecosystems are prioritized. Herein lies a considerable challenge for IPES. While a more 'image-based' demand for globally significant ecosystem services could become the driving force scaling up PES, it obviously cannot be considered as being the unique criteria determining an ecosystem's worth. Therefore, a measure of the

vulnerability of an ecosystem will need to be taken into account. Existing methodologies, such as the Conservation Status Index (OLSON and DINERSTEIN 2002), Biodiversity Hotspots (GIL *et al.* 2004), and Crisis Ecoregions (HOEKSTRA *et al.* 2005) provide some promising leads in terms of integrating these selection concerns into the IPES process.

At this stage, it is useful to remind ourselves that an IPES scheme should not be conceived of as an all-inclusive conservation tool. Its main attribute is its capacity for tapping into new sources of funding, and it should not be seen as a 'silver bullet' for achieving sustainable development objectives. Within our WHC-inspired model, IPES is seen as (i) an incentive for stimulating a demand for the financing of forest protected areas, and (ii) as a means for generating greater awareness on biodiversity and the role it plays in delivering ecosystem services in landscapes.

3.4 Looking ahead

As key stakeholders in the preservation of the planet's biological and cultural diversity, international tourism companies (e.g. hotel chains, airlines, tour operators, etc.) could potentially serve as first movers for a global scaling up of protected area financing. Their business interest is often directly related to the environmental quality of natural and cultural landscapes. While the operational concern would certainly be in preserving landscapes that attract many tourists, the added benefit of contributing to the delivery of a larger package of sustainability benefits could also hold some importance from a corporate social responsibility (CSR) and/or marketing perspective.

Following the lead of the tourism industry, other enterprises might become more interested in IPES. Building on the public relations benefits of an environmentally and socially effective CSR policy, large multi-national companies who are also directly linked to conservation concerns, such as those in the extractive and pharmaceutical industries, could be the next ones to follow.

Within the broader objective of using globally significant landscapes as a means of highlighting the benefits of ecosystem services, IPES should aim to expand its reach to include as many 'sustainable landscapes' as possible. Thus, the international demand for ecosystem services would serve as a spark to generate a stronger interest for the preservation of landscapes that have more of a regional or local significance. In such a perspective, the international model would be complemented by regional panels of experts, who would be better suited for valuing regionally significant ecosystems. By moving progressively towards more localized institutions, the WHC-IPES model could potentially become transformed into a global decentralized network of landscape-based PES schemes. Building on the 'heritage' concept, these efforts would strive towards handing natural resource management responsibilities down to those stakeholders who are most directly affected by them.

The end-goal of the IPES discussion should thus be to facilitate the transition from an economy of production to an economy of stewardship, where humans do not value natural capital as a substitute for human-made capital. (HAWKEN *et al.* 1999). In the longer term, the

objective of instituting sponsorship/partnership arrangements between the private sector and local community groups should be to facilitate this economic shift towards stewardship. For this to happen, the qualitative dimension of natural capital needs to be better communicated. This is precisely where a biodiversity-inspired IPES scheme could be useful. Building on the World Heritage Convention model, an international payment scheme which provides incentives for protecting our many unique and diverse ecosystems could potentially serve as a stepping stone for a greater appreciation of the inestimable qualitative values of the environment. Values we will no longer be able to quantify if we wait too long.

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Increasing the efficiency of conservation spending: The case of payments for environmental services in Costa Rica

Stefanie Engel[1], Tobias Wünscher[2], Sven Wunder[3]

Abstract

Payments for environmental services (PES) are an increasingly used instrument both for financing and implementing conservation. The Costa Rican national PES scheme is often considered as a leading model in this regard. We find that improved targeting could substantially increase the efficiency of the program, in the sense that total environmental services achieved with a given budget were found to nearly double when environmental benefits, threat, and participation costs are considered in site selection. The results have implications for an upscaling of PES or the selection among potential conservation projects more generally. Nevertheless, targeting involves implementation costs and faces scientific, administrative and political challenges. Promising approaches for overcoming these challenges include: development of simple targeting tools; improved data availability; implementing targeting from the very start of a program; and using auctions to elicit participation costs.

1 Introduction

Increasing the efficiency of current conservation spending can be seen as an important complement to a strategy of raising additional funds for biodiversity conservation. First, by increasing the efficiency of an existing program, funds can be freed up for other programs or inclusion of additional sites in a given program ('achieving more for the buck'). Second, demonstrating efficiency can be important in attracting new funding sources, particularly from the private sector. Third, when thinking of transferring or upscaling existing financing mechanisms it is important to consider potential improvements first. Several elements of efficiency can be distinguished. One element is the choice of an appropriate instrument for the context under consideration. This includes, for example, the choice between direct (e.g., payments for environmental services) and indirect instruments (e.g., integrated conservation and development projects) (see, for example, FERRARO and SIMPSON 2002; FERRARO and KISS

[1] Institute for Environmental Decisions, ETH Zürich; e-mail: stefanie.engel@env.ethz.ch

[2] Center for Development Research, Bonn

[3] CIFOR, Brazil

2002; FERRARO 2001; SWART *et al.* 2003). In general, this choice should be based on a careful analysis of the sources of market failure for a specific situation. Second, issues of instrument design arise. This includes, among others, the way how land parcels are selected for program inclusion and how payments are implemented, for example, with respect to their amounts. These issues are discussed below for the specific instrument of payments for environmental services (PES), presenting some results from a study by WÜNSCHER *et al.* 2006 and forthcoming), in which a spatial targeting tool was developed for Nicoya Peninsula in Costa Rica. Other issues in PES design not considered here include poverty impacts (e.g., PAGIOLA *et al*. 2005, ZBINDEN and LEE 2005; ENGEL and PALMER forthcoming), leakage (e.g., MURRAY *et al.* 2002; SOHNGEN and BROWN 2004), dealing with weak property rights (ENGEL and PALMER forthcoming), and whether to pay local communities or individuals (ROJAHN and ENGEL 2005).

2 Definition and Relevance of PES

A wide range of definitions of PES exist in the literature. For the purposes of this paper, we use the one of WUNDER (2005), who defines PES as a voluntary transaction, where a well-defined environmental service (ES) (or a land-use likely to secure that service) is being 'bought' by a (minimum one) ES buyer from a (minimum one) ES provider if and only if the ES provider secures ES provision (conditionality). The Costa Rican national PES scheme ('Pagos por Servicios Ambientales' or PSA) is illustrative in this regard (figure 1). In this scheme, the implementing agency, FONAFIFO[4], bundles funding from various levels of society, including international donors, carbon buyers, local industry interested in water quality and flows, as well as the Costa Rican public through a national fuel tax and a planned water tariff. Payments are made by FONAFIFO to land owners in return for the latter adopting specific land use practices (with more than 90% of current payments made for forest conservation). The program recognizes four categories of environmental services (biodiversity conservation, carbon mitigation, hydrological services, and scenic beauty). Poverty alleviation is a further side objective on the program (see PAGIOLA forthcoming, for further details on the Costa Rican PSA program).

PES is increasingly used as a direct instrument in conservation. National programs also exist in Mexico and the United States. Its idea lies in translating external values of the environment into real financial incentives at the local level. PES is based on the 'beneficiary-pays' rather than the 'polluter-pays' principle, thus providing an alternative income source to local (often poor) land owners. Moreover, as various services may be provided with the adoption of a specific land use, payments for one specific service (e.g., hydrological services) can provide

[4] Fondo Nacional de Financiamiento Forestal

additional funding for the production of other services as 'by-products' (e.g., biodiversity conservation).

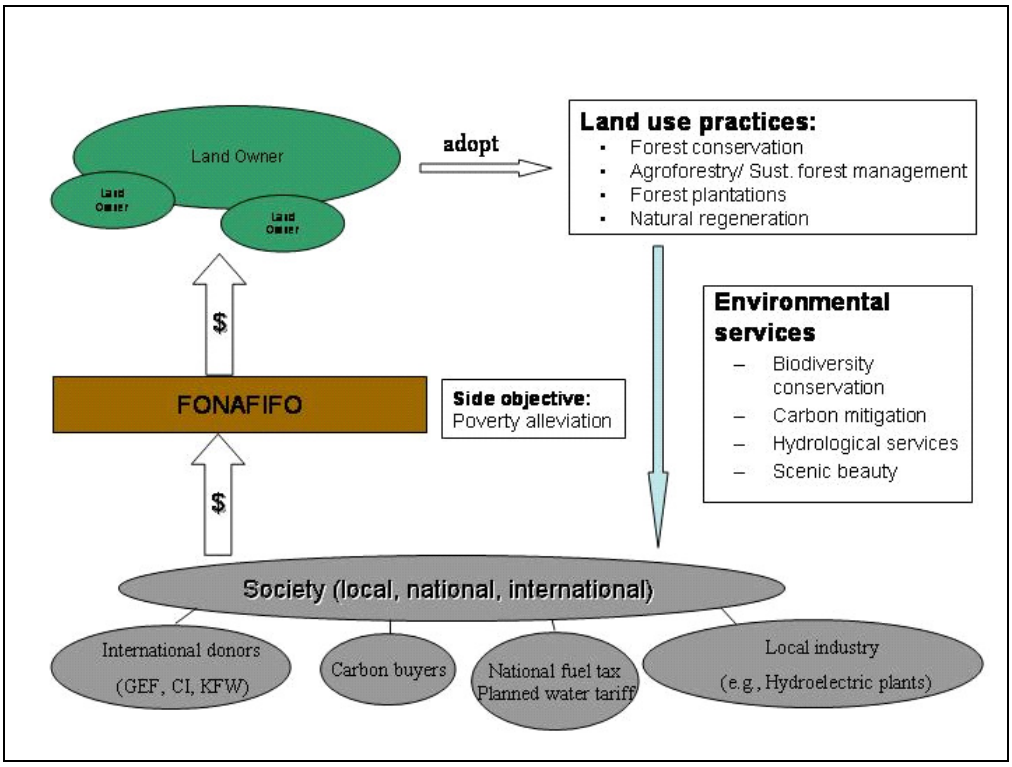

Figure 1: The Costa Rican PSA scheme

3 Targeting – Relevance and challenges

At the end of 2004, a total area of 230,000 ha were contracted under the Costa Rican PSA program. The number of applications far exceeded the available budget, with more than 800,000 ha of applications pending at the same time. The selection of sites in the program is made on a continuous basis, mostly on the basis of defined priority areas. Payments are fixed for each land use (for example, at ~40 US$/ha/year before 2006 and 64 US$/ha/year since 2006 for forest conservation), and no differentiation is made within priority areas according to delivered benefits. WÜNSCHER *et al.* (2006 and forthcoming) develop a spatial targeting tool to demonstrate that the amount of environmental services achieved with a given

conservation budget could be substantially enhanced through improved targeting. We consider three specific targeting criteria: benefits, threat, and participation costs.

First, targeting could be based on actual environmental services (and possibly achievements of side objectives) delivered by a given site. In practice, this poses the challenge of dealing with potential trade-offs between multiple objectives, choosing among or combining multiple indicators available even for single objectives, and considering spatial interactions. Approaches that have been used in the literature to deal with multiple objectives and/or indicators include using a weighted sum of standardized indices (PAGIOLA *et al.* 2004) and applying a distance function approach (FERRARO 2004). In our study we use the former approach, applying a z-value normalization and equal weights both within and across objectives to compute a total ES score. BARTON *et al.* (2003) use a dynamic selection approach for dealing with spatial interactions in providing biodiversity services. Alternatively, to keep the targeting tool as simple as possible, we include the distance of an applicant site to existing protected areas and forest patches as an indicator of biodiversity services (see WÜNSCHER *et al.* 2006 and FORTHCOMING, for further details on data and indicators used).

A second targeting criterion to be considered is threat. Sites may have high ES scores, but may be at low or no threat to be deforested. The additionality in Costa Rica‘s PSA program has been highly debated (e.g., PFAFF *et al.* 2007; SILLS *et al.* 2005). For example, PFAFF *et al.* (2007) find very low impact of the PSA scheme on deforestation. Considering threat in targeting poses the challenge of estimating baseline scenarios of deforestation. Brown *et al.* (undated) lists three approaches: analytical models (e.g., simple logistic curve based on population density), simulation (programming) models, and regression models. In our study, we used the results and data from a spatially explicit regression model of PFAFF and SANCHEZ-AZOFEITA (2004) in order to compute site-specific rates of expected deforestation in the absence of PES.

Finally, fixed payments give high production rents to land owners with low participation costs, while those with high participation costs are likely to not participate in the scheme. Participation costs include opportunity costs (the difference in income between the most profitable land use and the one contracted under the PES scheme), direct conservation cost (e.g., firebreaks, fencing), and transaction costs (e.g., obtaining legal title, information gathering). If a site has a high ES score and threat of deforestation, however, it may be worth paying more for its inclusion in the program, while sites with low participation costs would likely still participate at lower payment levels. This implies that the amount of total ES achieved with a given budget could be increased by differentiating payments on the basis of participation costs and considering these costs as a third targeting criterion. Estimating site-specific costs, particularly opportunity costs, can be challenging, however, as there may be a large variation in profitability across sites, land owners may act strategically in reporting costs, and a number of difficult-to-measure factors may influence individual opportunity costs or the minimum payment required to compensate for given costs (e.g., risk considerations,

cultural preferences, distrust towards state). Main approaches for estimating opportunity costs in practice include using land values, computing farm budgets or inferring values on the basis of farm and household data, and applying auctions to elicit land owners' minimum willingness to accept for including a site in the program (for example as applied in the U.S. Conservation Reserve Program and the Australian Bush Tender scheme; see Ferraro forthcoming, for issues of auction design and auctions vs. other methods). In our study, we used survey data from a random sample of 107 forest owners in Nicoya Peninsula to compute site-specific per-hectare estimates of returns from pasture.

4 Improving the efficiency of PES through improved targeting

In WÜNSCHER *et al.* (forthcoming), we use spatially explicit data for Nicoya Peninsula to illustrate the potential efficiency gains from improved targeting. Specifically, we develop a targeting tool that combines all three of the above listed targeting criteria to maximize ES additionality (defined as total ES score multiplied by the expected probability of deforestation) with a given budget, while allowing for flexible payments equaling site-specific participation costs. The results are compared to a baseline scenario, in which sites are selected purely on the basis of whether they lie within the pre-defined priority areas and payments are held fixed at a level of 40 US$/ha. This baseline also sets the budget limit for the improved targeting scenario. We find that the total ES score and ES additionality both nearly double through improved targeting (from 19,068 to 35,317 US$, and from 7,120 to 13,960 US$, respectively). Similar results were found by ALIX-GARCIA *et al.* (2005) for the Mexican PES scheme (finding a 4-times increase in efficiency through improved targeting) and by FERRARO (2003) for an easement program for Lake Skaneateles, US (showing that non-consideration of benefit/cost information reduced environmental benefits obtained by more than 50%). We also ran additional scenarios allowing for the consideration of only some of the targeting criteria and found that most of the potential for efficiency gain in the Costa Rican context comes from flexible payments considering participation costs.

5 Challenges in implementing improved targeting

Implementing improved targeting is not without challenges. Scientific challenges were already discussed above. In addition, administrative challenges include, e.g., the fact that an application of our improved targeting tool would induce a temporal concentration of administrative effort, as the decision on all applications would have to be taken after a deadline, rather than continuously as applications arrive. Perhaps most importantly, targeting is likely to face political challenges. On the one hand, land owners may not accept varying payment levels, particularly after homogenous payments were already introduced. Auctions, where land owners pose bids of their minimum willingness-to-accept for being included in the scheme may be able to overcome this problem. On the other hand, implementing bodies may have latent objectives (e.g., PSA may be seen as compensation for strict environmental legislation rather than for achieving additional environmental benefits). Finally, efficiency

gains need to be compared to implementation costs of targeting. In our study, we estimated implementation costs of improved targeting for Costa Rica to amount to approx. 0.27% of the total PSA budget, indicating that these costs appear to be justified by the order of potential efficiency gains.

6 Conclusions

PES is an increasingly used instrument both for financing and implementing conservation. The Costa Rican PSA scheme is often considered as a leading model in this regard. We find that improved targeting could substantially increase the efficiency of the program, in the sense that total environmental services achieved with a given budget were found to nearly double when environmental benefits, threat, and participation costs are considered in site selection. This finding confirms similar results of studies conducted on PES in Mexico and the US. We conclude that there are lessons to be learnt for PES design elsewhere. Moreover, efficiency considerations should be considered more generally when considering an upscaling of PES or the selection among potential conservation projects. Nevertheless, targeting involves implementation costs and faces scientific, administrative and political challenges. Approaches for overcoming these challenges include: (i) development of simple targeting tools, (ii) improved data availability, (iii) implementing targeting from the very start of a program, and (iv) using auctions to elicit participation costs.

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International financing mechanisms for the conservation of biodiversity – Report on a WWF work in progress

Pablo Gutman[1]

Abstract

This presentation describes an ongoing WWF initiative to review options, present findings and make recommendations regarding opportunities to increase international funding for the conservation of biodiversity inside and outside protected areas. Target audiences are the COP9 of the CBD, participants at other CBD related meetings, staff from WWF and other conservation stakeholders. The main technical documents and position papers resulting from this initiative will be available in late 2007.

1 The issue

The parties to the Convention on Biological Diversity (CBD) have agreed on very ambitious conservation goals; the so called 2010 targets. Unfortunately they have not committed the financial resources needed to achieve those goals, leaving them chronically under-funded. Repeated calls for new and innovative financing mechanisms for biodiversity conservation have gone no further than technical papers and conference rooms.

Financing issues will be tabled one more time at the forthcoming 9th Conference of the Parties to the CBD, the COP9, to convene in Germany in May 2008. In the run up to it WWF has undertaken a review of existing and proposed international financing mechanisms with the goal of tabling at the COP9 a short list of clear and doable proposals that can garner support to move from discussions to action.

We are developing this review in close consultation with key CBD stakeholders, and the technical report that will be the background for the policy proposals to bring to the COP9, will be circulated in late 2007. Below we describe the main sections of the said technical report.

[1] WWF-Macroeconomics for Sustainable Development Program Office; e-mail: Pablo.gutman@wwfus.org

2 Main sections in the technical report

2.1 Biodiversity's services and their value to society

Biodiversity's services and their value to society have been defined and listed (but not necessarily quantified) many times; including by the CBD itself (CBD 1992), the work of Pearce (PEARCE and TURNER 1990), Dixon (DIXON and SHERMAN 1990) and others in the 90's and more recently in the Millennium Ecosystem Assessment (MEA 2005). Still, the discussion lingers. The main message of this section will be that biodiversity conservation (BC) has values at different scales (local, national and international); and that sometimes BC is co-produced with other ecosystem services (ES), which opens opportunities for "joint delivery", but that BC can also sometimes be produced in competition with other ES, and other social goals, and this requires acknowledging the trade-offs, negotiating acceptable compromises, and agreeing on who will pay for what.

2.2 Funding biodiversity conservation inside and outside protected areas, current levels and funding gaps

This section will review what is known regarding financing needs for the conservation of the world's biodiversity, with a special focus on the financing needs of protected areas. The main message of this section will be (1) that world-wide biodiversity conservation faces a financial gap that is significant and probably growing, and there is widespread agreement that more national and international resources are needed to attain the CBD (and MDG) biodiversity goals and targets; (2) that more of the same (GEF + bilateral aid + international agencies) is surely needed but is not forthcoming; and (3) that there are many innovative ideas and initiatives, but they need a major boost if they are going to deliver.

2.3 A menu of international / global financing mechanisms for the conservation of biodiversity.

This section will list and briefly discuss existing and new international financing mechanisms that could support all or part of the cost of the world's BC. We will include here well known and currently at-work options as well as alternatives that thus far only have been discussed but not tried on-the-ground, plus completely new options that may appear appropriate in this context. The main message of this section will be that in the recent past many new and innovative international (and national) instruments to finance BC (or to finance BC-related ecosystem services) have been discussed and some are currently at work. But much more is needed if any of them are to become an important source of financing for BC in general and PA in particular.

2.4 Pros and cons of different international financing mechanisms: Identifying a subset of most promising options

In this section we will revisit in more detail some of the available financial mechanisms, listed in the previous section, so as to come up with a shorter list of most promising options. This section will be a main input to the final recommendations of section 6, and at the same time, it may be looked at as a final product on its own, in that the reader may want to use it to come up with her/his own list of recommended financing mechanisms to add or substitute to the ones we put forward in section 6. Some of the screening criteria we will use to select this short list include (1) how complicated would it be to have it up and running?; (b) how much money could it collect?; (c) synergy with other conservation and MD goals; (d) the convenience of building a mixed strategy that includes going simultaneously after governments, businesses and households' moneys; (e) how do different financial options stand regarding well known social and environmental principles?

2.5 Increasing financing through a better supply of conservation projects

No business can expect to get more money for the same product, and BC is no exception. Plus, in the case of BC more of the same is not very good, and conservation projects are routinely criticized for lack of targets, baselines, milestones monitoring and evaluation (FERRARO and PATTANAYAK 2006). We believe that, in order to boost international financing for BC, the conservation community will need to invest in significantly improving its offer, in terms of quantity, quality, efficiency, monitoring & evaluation, accountability, and "joint-delivery" opportunities. Probably a major sale effort would also be required. The main message of this section will be that in order to raise more money we need to offer the would-be payers a more attractive conservation portfolio, in terms of ready available, high quality initiatives.

2.6 Conclusions and recommendations

This final section will put forward conclusions and recommendations for the CBD on how to foster a suit of promising and viable new and innovative international financing mechanisms for the Conservation of Biodiversity. The aim is not to table a list of recipes, but rather to present the CBD with options that can be refined and re-defined by the parties interested in carrying them forward. At the same time several boxes will present more detailed examples so as to give a flavor of how one or other option could look like once implemented.

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Implementation of a global protected forest area network under the CBD[1]

Ryo Kohsaka, David Coates, Kieran Noonan-Mooney[2]

Abstract

This paper has been divided into three sections. The first describes how the Convention on Biological Diversity (CBD) addresses forest biological diversity by reviewing the history of the expanded programme of work on forest biological diversity. The second section focuses on Goal 3 of Programme Element 1 of the expanded programme of work on forest biological diversity as it is the most relevant to forest protected areas. In the third section, the interlinkages between the programme of work on forest biological diversity and the ecosystem approach are highlighted.

1 Brief review of the Forest Programme of Work

The Convention on Biological Diversity addresses forest issues through the expanded programme of work on forest biological diversity.

Prior to the development of the programme of work on forests the Conference of the Parties (COP) requested the Secretariat of the Convention on Biological Diversity to examine and report on the linkages between forests and biological diversity as well as the threats to forest ecosystems. Once such linkages were identified, the programme of work on forest biodiversity was formed in order to help Parties undertake actions to address the conservation and sustainable use of forest biological diversity in the context of their national setting.

The first programme of work on forest biological diversity was adopted at the fourth meeting of the Conference of the Parties (COP) in May 1998. However, currently the Secretariat of the Convention on Biological Diversity addresses forests through its expanded programme of work on forest biological diversity which was adopted at the sixth meeting of the COP in April 2002. The current programme is largely focused on practical actions which can be taken by Parties to improve the condition of forest biological diversity. During COP 6, it was also recognized that the expanded programme of work should be implemented by Parties in the context of their national priorities and needs.

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[1] The views expressed in this paper are personal and do not necessarily reflect that of the institution to which the author(s) is affiliated.

[2] Secretariat of the Convention on Biological Diversity (CBD); e-mail: ryo.kohsaka@cbd.int; david.coates@cbd.int

The expanded programme of work on forest biological diversity has 12 goals which are organized under three broad programme elements. The three programme elements are conservation, sustainable use and benefit-sharing, institutional and socio-economic enabling and knowledge, assessment and monitoring. Each goal is composed of individual objectives and activities. There are 27 objectives and 130 activities in total. The expanded programme of work on forest biological diversity therefore directly supports the three main objectives of the Convention, namely the conservation of biodiversity, the sustainable use of the components of biodiversity, and sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way.

2 Ensure adequate and effective protected forest area networks

The goal of the expanded programme of work which is most relevant to forest protected areas is Goal 3 of Programme Element 1 (To protect, recover and restore forest biological diversity). Goal 3 consists of three objectives. Objective 1 relates to the restoration of forests, Objective 2 pertains to the promoting of forest management practices and Objective 3 covers protected forest area networks. In total there are 11 activities associated with this goal. The three activities under restoration of forest biodiversity are multi-dimensional, the two activities under the conservation of endemic and threatened species are targeted, and the six activities under ensuring protected areas networks encourage multi-level cooperation.

Based on the information contained in the third national reports provided to the Secretariat of the Convention on Biological Diversity by the Parties, this goal is one of the most widely implemented of the expanded programme of work on forest biodiversity. Amongst the three objectives, restoration activities were the most prominent. With activities such as the incorporation of restoration measures into forest legislation and laws, the provision of protected forest areas networks, (in particular in western Europe) and the application of some components of the ecosystem approach being reported.

During the workshop there were discussions regarding the concept of “protected areas network”. These discussions centred on the meaning of the term “network” and it was concluded that further clarification was required. While the term is used to refer to a geographic area in the expanded forest programme of work, the global network mentioned in the protected areas programme of work refers to both a geographic and information network. The description used in the decision on protected areas includes the sharing of experiences and capacity building (footnote to VII/28 para.18[3]). These duality of the term “network” in

[3] The exact texts in the footnote is as follows:

“A global network provides for the connections between Parties, with the collaboration of others, for the exchange of ideas and experiences, scientific and technical cooperation, capacity building and cooperative action that mutually support national and regional systems of protected areas which collectively contribute to the achievement of the programme of work. This network has no authority or mandate over national or regional systems.”

the two programme of works need to be further taken into consideration in order to elaborate and discuss concepts for the establishment of a global network of protected forest areas under the CBD framework.

3 Forests and the Ecosystem Approach

In Decision II/8 it was recognized that the ecosystem approach should be the primary framework of action under the Convention. The ecosystem approach emphasizes the need to focus on different biotic levels in order to encompass the basic structure, processes, functions and interactions amongst organisms and the environment. In other words, it connects all the programme areas. The approach emphasizes the participatory approach and the involvement of different sectors. It is not enough to address the forestry industry alone but related sectors such as tourism, mining and agriculture must also be addressed. It should be noted, however, that there is no agreed upon definition of the ecosystem approach under the Convention on Biological Diversity.

The ecosystem approach requires forest managers to consider the effects, both actual and potential, of their activities on forest ecosystems in order to avoid unknown or unpredictable effects on forest ecosystem functioning. Forest ecosystems should also be understood and managed in an economic context. In particular, the costs and benefits of activities in forest ecosystems should be internalized to the greatest extent possible. Further market distortions that adversely affect forest biological diversity should be reduced and incentives that promote forest biodiversity and sustainable use should be aligned. Finally, the ecosystem approach stresses that forest ecosystems should be managed within the limits of their functioning. Therefore, the conservation of their structure and function should be a priority.

Historically forests have been managed for the purposes of timber production however increasingly this viewpoint is changing. As forests provide multiple goods and ecosystem services aside from timber production, it is necessary to consider the needs of a variety of stakeholders, not just those of foresters. The ecosystem approach, as it requires a broader approach to forest management and recognizes that humans are integral components of the ecosystem, is ideal for incorporating the views of other stakeholders into management practices.

The ecosystem approach, as a management strategy, does not preclude the use of other management methodologies such as sustainable forest management (SFM). Rather the ecosystem approach sets the overarching framework for forest management and allows for the integration of all other management approaches. In the third national reports some Parties pointed out that the ecosystem approach is compatible with SFM as exemplified in regional processes such as the Ministerial Conference on the Protection of Forests in Europe (MCPFE).

The relevance of the World Database on Protected Areas for a network of forest protected areas under the Convention on Biological Diversity

Peter Herkenrath[1], Igor Lysenko, Charles Besançon, Liesbeth Renders, Neil Burgess

Abstract

The World Database on Protected Areas (WDPA) is the key source for global and regional forest protected area information. It is in the process of a major redevelopment that will significantly enhance its usefulness for various users. The database already plays a significant role in reporting to major globally-agreed goals and targets, such as Millennium Development Goal 7 and the CBD programmes of work on forests and protected areas. For any global forest protected area network, the WDPA could provide information on officially designated protected areas, including sites that have not been assigned a particular IUCN management category but nevertheless qualify as sites contributing towards national, regional and global efforts and processes addressing forest conservation.

1 The World Database on Protected Areas

The World Database on Protected Areas (WDPA), the largest assembly of data on the world's terrestrial and marine protected areas, is a joint project of the IUCN World Commission on Protected Areas (WCPA), the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC) and the other members of the WDPA Consortium: American Museum of Natural History, BirdLife International, Conservation International, Fauna & Flora International, The Nature Conservancy, Wildlife Conservation Society, World Resources Institute, World Wildlife Fund (WWF US) and World Wildlife Fund for Nature (WWF International). The database is managed by UNEP-WCMC. The vision of the WDPA, which is currently being redeveloped, is as follows: To create a decentralised, user-friendly, up-to-date system for storing, managing and reporting on trends in coverage for all the world's protected areas – conforming to best practice techniques and providing a platform that allows for the easy integration of other conservation datasets and user opinion.

The WDPA contains a total of 118,000 sites, of which 71,000 (60%) have been allocated an IUCN protected area management category. For 58,000 (49%) of the 118,000 sites, the

[1] UNEP World Conservation Monitoring Centre; e-mail: peter.herkenrath@unep-wcmc.org

WDPA provides spatial attributes (GIS). Information in the WDPA comes from government as well as non-governmental sources and from the secretariats to the Convention on Wetlands of International Importance (Ramsar Convention) and the World Heritage Convention (BESANÇON *et al*. in prep, DUDLEY and PHILLIPS 2006, THE WDPA CONSORTIUM 2006).

2 The United Nations List of Protected Areas

The United Nations List of Protected Areas ('UN List') is mandated by the United Nations Economic and Social Council and is published jointly by IUCN and UNEP-WCMC. The last UN List came out in 2003 (CHAPE *et al.* 2003), and the next edition is planned for 2008. The WDPA is the official source for the UN List, which contains all government-submitted areas from the WDPA that meet the definition of protected areas. 11.5% of the world's forests are covered by protected areas recorded in the UN List.

3 Use of the World Database on Protected Areas

The World Database on Protected Areas is an important source for governments, government agencies and non-governmental organisations. It is being used for designing protected area systems, for conservation planning at regional, national and local levels, and for defining priorities for funding allocation in conservation. Also, the private sector increasingly uses the WDPA for risk assessments and other aspects of operations planning. A business consortium called Proteus, comprised of mining, oil and gas, and information technology companies, is providing support to the further development of the WDPA, in recognition of its global importance to conservation and for its direct benefit in operational planning.

Beyond its use in conservation priority-setting and private sector risk assessment, the WDPA is also regularly delivering information to report progress in implementing the Millennium Development Goals (MDGs) and the Convention on Biological Diversity (CBD) as well as to report to the UN Commission on Sustainable Development (CSD). One of the indicators for Millennium Development Goal 7 ('Ensure environmental sustainability') is the ratio of the area protected to maintain biological diversity to surface area. Information on the number and extent of protected areas at the global level is also relevant for a number of targets and goals of the CBD (SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY 2006). The coverage of protected areas has been recognised by the Convention as a headline indicator for the focal area of reducing the rate of loss of the components of biodiversity, in the framework of the 2010 biodiversity target. Ensure adequate and effective protected forest area networks is objective 3 for goal 3 (to protect, recover and restore forest biological diversity) of programme element 1 (conservation, sustainable use and benefit-sharing) of the Convention's expanded programme of work on forest biological diversity. Global data on protected areas are also relevant for reporting on the implementation of the CBD programme of work on protected areas. Examples are goal 1.1 (to establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally

agreed goals) and goal 1.3 (to establish and strengthen regional networks, transboundary protected areas and collaboration between neighbouring protected areas across national boundaries).

4 Future development of the WDPA

The current redevelopment of the WDPA focuses on the following issues:

- decentralising the management of information through delegating to regional nodes
- documenting data sources and separating records submitted officially by governments for direct incorporation into the UN List of those submitted by NGOs that may provide complementary or additional information
- involving the network of IUCN's World Commission on Protected Areas in validation of data submitted to the WDPA through a standardised system of verification and/or certification procedures
- linking the WDPA to associated databases, in particular on the governance of protected areas and on protected area management effectiveness, responding to calls for those data from, for example, the CBD and the World Parks Congress
- addressing an urgent need for building the capacity for compilation and delivering high-quality data to the WDPA, in particular in developing countries

5 The WDPA and forest protected areas

An overlay of protected areas as contained in the WDPA with the global area of forest shows that currently, protected areas cover only a relatively small percentage of forests. For major forest biomes, the percentage is as follows:

- tropical humid forests 18.9%,
- sub-tropical/temperate rain forests/woodlands 13.6%,
- temperate needle-leaf forests/woodlands 8.4%,
- tropical dry forests/woodlands 13.3%,
- temperate broad-leaf forests 10.3%,
- evergreen sclerophyllous forests 8.8% (CHAPE *et al.* 2005).

There are, however, large regional differences. A special case is provided by the African forest reserves (the following information is from BURGESS *et al.* 2007). The WDPA contains 3,804 forest reserves from 23 African countries. These sites have not been formally identified as protected areas and no IUCN protected area management category has been allocated. For many of those sites, very little information is available; in many cases, even the name or the size are not known outside of the country in question. However, these reserves cover between 1 and 6% of each of the African dry forests, lowland and montane moist forests, savannah woodlands, flooded grassland, and mangroves. They also cover between 3 and 6% of the Endemic Bird Areas, Hotspots and Global 200 Ecoregions of continental Africa. Such areas

of global importance include, for example, the Eastern Arc Mountains (Tanzania, Kenya), the eastern African lowland coastal forests, the Southern Rift Mountains (Tanzania, Malawi), the Upper Guinea forests (west Africa) and the lowland & mountain portions of Uganda.

Not all African forest reserves serve biodiversity conservation purposes, some might even have been established as future logging areas. However, if they were identified as protected areas, they would add no less than 25% to the list of officially protected areas in Africa. There is a need to work with national forest departments, in order to improve the information on forest reserves, to include forest reserves with a defined role for biodiversity conservation in the protected areas network, to improve their legal protection and international recognition and to develop measures for assessing their management effectiveness.

6 The World Database on Protected Areas and the UNFCCC agenda on reducing emissions from deforestation

Since the 11th Conference of the Parties in 2005, the United Nations Framework Convention on Climate Change (UNFCCC) has put the issue of reducing emissions from deforestation in developing countries (REDD) on its agenda. Deforestation is a major driver for land use and contributes an estimated 20-25% to the global CO_2-emissions. A future mechanism to address REDD provides a unique opportunity to provide multiple benefits not only in terms of carbon emission reduction, but also for biodiversity – and specifically forest – conservation (KAPOS *et al.* 2007). Information on protected areas could play a major role in the development and implementation of such a mechanism. Details will depend on the mechanism chosen, but could include information on which areas could be saved from deforestation through the mechanism, e.g. sites currently not protected, or which sites could serve as a baseline for measuring deforestation, of which protected areas would be a substantial part.

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8 Web resources

IUCN World Commission on Protected Areas: http://www.iucn.org/themes/wcpa/

UNEP World Conservation Monitoring Centre: http://www.unep-wcmc.org/

UN List of Protected Areas: http://www.unep-wcmc.org/protected_areas/UN_list/index.htm

WDPA: http://www.unep-wcmc.org/wdpa/

WDPA Consortium: http://www.unep-wcmc.org/wdpa/consortium.cfm

(all web resources were accessed June 2007)

Status of forest protected areas in Europe: Reflections on implementation, current problems and outlook

Tor-Bjorn Larsson[1]

Abstract

Forests cover 30% of the European land area. The forest area is slightly increasing due to afforestations and spontaneous regrowth of abandoned agricultural land. Only a small part of European forest can be classified as 'primary and modified natural'. Such areas are found mostly in the northern and to some extent also in the eastern part of Europe. The majority of forest is of the 'semi-natural' type, largely utilised by forestry. The Ministerial Conferences on the Protection of Forests in Europe (MCPFE) concert 44 countries and the EU to address common opportunities and threats related to forests and forestry. MCPFE has mainly focussed on the formerly highly feared threat to forests from long-range air pollution and also on developing principles of Sustainable Forest Management (SFM). Protected forest areas are a relatively marginal issue in this context but MCPFE has, e.g., made a major effort to create harmonised indicators and reporting on protected forests. Research cooperation supported by the European Union (EU) has greatly contributed to this. The EU and its 27 Member States have a close cooperation on biodiversity conservation, including protected forest areas, comprising both by financial and legal measures. The EU Birds and Habitats Directives is the legal basis for establishing a network of designated areas (the 'NATURA 2000' process) to maintain and, if necessary, restore 'a favourable conservation status' of a number of specified habitats and species. Presently forest covers almost half of the Natura 2000 network. Furthermore, the EU is co-funding establishment and management projects of Natura 2000 areas, most specifically by the LIFE program. In a future perspective protected forest areas must be part of a more general biodiversity strategy in Europe, covering the entire landscape. Socioeconomic aspects need increased attention.

1 The European forest

In a natural state most of the European land area would be forest. Consequently, forest ecosystems are the main repositories of terrestrial species naturally occurring in Europe. Today, forest covers ca 30% of the land area. The forest cover is fragmented in western and southern parts of Europe – as a consequence of a long history of relatively dense human

[1] European Environment Agency; e-mail: tor-bjorn.larsson@eea.europa.eu

settlements and intense farming and grazing – while the northern and largely also eastern part is characterised by a more or less contiguous forest cover (EFI 2003). During recent decades forest area has been recovering in Europe; presently the ca. 190 mill ha of forest increase by ca. 0.5% yearly (FAO 2005).

Primary and modified natural forest is found mostly in the northern and to some extent also in the eastern part of Europe. In the 27 Member States of the European Union (EU-27) this is not a dominating type, in total some 9 million ha have been reported, mainly in Sweden, Finland and Romania (FAO 2005). Semi-natural forests, i.e. forest of native tree species which is more or less intensively utilized and thus modified by man, dominate; in Europe (excluding Russian Federation) some 86% of the forests are reported to be of this category (MCPFE 2003). Plantations, mainly of non-native tree species, comprise only some 9% of European forest and are of importance only in a few countries, e.g. making up 86% of Irish forest and 33% of the forest of Portugal (MCPFE 2003; FAO 2005).

2 European cooperation on protection of forests

The Ministerial Conferences on the Protection of Forests in Europe (MCPFE) address common opportunities and threats related to forests and forestry of presently 44 European countries (and the EU). This process started in Strasbourg in 1990 where the forest ministers, e.g., expressed their concern about the damages to forest by long-range air pollution ('forest death'). There was also political support from the forest sector to establish the ICP[2] Forest monitoring network comprising some 8,000 plots for extensive measurements and ca. 800 plots on which more intense monitoring has taken place. The major achievements of the following MCPFE (Helsinki 1993, Lisbon 1998, Vienna 2003) largely relate to developing the concept of Sustainable Forest Management and a quite elaborate set of indicators according to which the countries are requested to report to each MCPFE.

Of specific relevance to protected forest areas (PFAs) is, e.g., the resolution on biodiversity of the most recent MCPFE in Vienna 2003. It states the need to 'analyse and further develop protected forest networks, taking into account existing networks, in terms of their comprehensiveness, representativeness and adequacy relative to forest types and the effectiveness of their management with regard to the conservation goal´. This has taken place in an action of European experts (COST E27, see further below) resulting in 'improved guidelines on data collection and presentation' which hopefully will enable the countries to report more reliable and consistent figures on protected forest area in Europe in 2007. Consequently the information to be presented about the MCPFE indicator 4.9 Protected forests, cf. Table 1 (MCPFE 2003), is expected to be more consistent in the report 'State of Europe´s forest 2007 (MCPFE in prep.) than in earlier reporting.

[2] International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests

Table 1: Categories according to which the European countries are obliged to report their protected forest areas (MCPFE indicator 4.9 Protected forests) (MCPFE 2003)

MCPFE Classes	
1. Main Management Objective 'Biodiversity'	1.1 'No Active Intervention'
	1.2 'Minimum Intervention'
	1.3 'Conservation through Active Management'
2. Main Management Objective 'Protection of landscapes and Specific Natural Elements'	
3. Main Management Objective 'Protective Functions'	

Apart from being a party to MCPFE, the European Union (EU) and its 27 Member States cooperate on protected forest areas (PFAs) both by financial and legal measures. The legal basis for establishing and supporting management of PFAs in the EU are the Birds and Habitats Directives, the 'NATURA 2000' process, cf. EC (2007a). Natura 2000 is quite a complex process, currently being implemented in a harmonised way by the EU Member States, under the responsibility of the European Commission, which does not hesitate much to bring countries to the European court when deviating from the Directives.

From a forest perspective, the main obligations for a country according to the EU Habitats Directive are to identify its 'habitat types of community interest' and to maintain these habitats 'at a favourable conservation status'. This also includes a number of forest dependent species listed in the Annex II of the Directive.

A key activity to meet the objectives of the Bird and Habitats Directives is identification ('designation') of areas to be part of 'A European ecological network of special areas of conservation (Natura 2000)'. The Natura 2000 network is expected to cover 10-15% of the EU territory. In 2005, about 47% of the area designated according to the Habitats Directive were covered by forest (EEA 2006), cf. also figure 3.

Presently the Habitats Directive lists 84 forest habitats, of which 25 'priority habitats' are identified (EC 2003). Some of the habitats listed are quite specific while others are more broadly defined. There is also a clearly visible variation in the approach to implement the Habitats Directive in different regions of Europe. This is shown in figure 1 presenting total forest area designated in six biogeographic regions of Europe (see EEA 2007 for a map of all European biogeographic regions). The countries of the boreal region, having most forest, have designated a much smaller area compared to, e.g., the Mediterranean countries. There

may be several explanations but one is most likely attitudes and expectations of other EU support – i.e. funding – to designated areas.

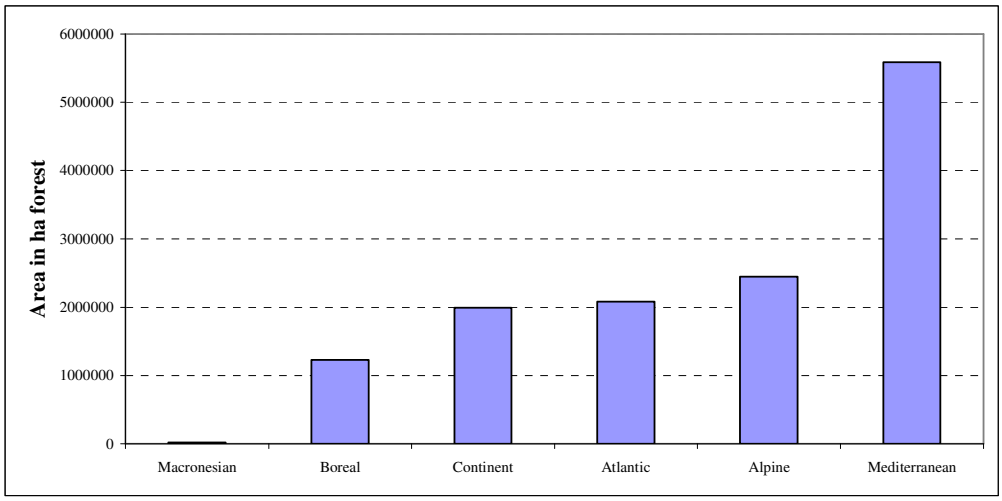

Figure 1: Forest areas 2004 proposed as Special Areas of Conservation according to the EU Habitats Directive by biogeographic region (EEA 2006)

What does it mean in practise to designate an area, e.g. a forest, as a Special Area of Conservation (the term used by the Habitats directive) and/or identify a specific forest habitat to be included in the Annex 1 of the EU Habitats Directive? In brief the directive provides the following measures:

- Habitats and species are to be maintained in 'a favourable conservation status' and the Member States are obliged to report on this to the European Commission. The requirements on the reporting and on the quality underlying data are successively being increased, e.g. in the second round of reporting (2007) a quite detailed report is requested comprising e.g. maps of distribution of the habitats while still 'expert opinion' suffices as regards underpinning information on development of habitat quality.
- If areas are exploited compensatory measures must take place (Article 6.4). Experience has shown - at least as regards Natura 2000 areas of limited size and of more specific habitats, like e.g. some wetland areas - that exploiting for building (expanding ports, new railways) is very difficult and one prerequisite, once it has been shown there is no other option, is that a compensatory measure, such as designating another equally valuable area, can take place. It is likely that this is less of a problem in very large 'landscape-type' habitats.

- Areas designated according to the Birds and Habitats Directives get a certain priority in achieving structural and agricultural funding by the European Union. There is also a specific funding, the EU LIFE-Nature program, ear-marked to facilitate the implementation of these Directives, see below.

Experience of implementing the Natura 2000 in forest areas is that there have been many misunderstandings and different attitudes in the countries. As a consequence the Commission stresses the need of stakeholder involvement. In most forested Natura 2000 areas commercial forestry is expected to continue, given the forestry practices do not conflict with the objective of 'favourable conservation status'. The guidelines from the Commission (EC 2003) state that in most cases 'normal forestry' according to the Sustainable Forest Management principles (MCPFE 2007) is expected to be acceptable. The Commission also stresses the opportunity for co-financing and compensation for restrictions in ownership.

Apart from a legislative power, the cooperation within the European Union includes substantial co-funding mechanisms. We will here focus on the 'The Financial Instrument for the Environment (LIFE)' (EC 2007b), as this is the most specific support to implementing nature and biodiversity measures. The current Life+ program will cover 2007-2013 with a budget of 2.143 billion euros, of which at least 50% will be used co-financing nature and biodiversity projects.

The specific area 'LIFE+ Nature and Biodiversity' will thus support the further development and implementation of the Natura 2000 network by co-financing 'Best practice or demonstration projects'. Funding of land purchase is possible while it is clearly stated that 'recurring conservation management actions' are ineligible. During earlier periods of the LIFE programme (since 1992) significant support has been allocated to nature conservation projects, including projects on forests. The upcoming budget will allow for an increase in this support.

Apart from area, Life+ also comprises support to 'Forest monitoring', which potentially also could cover protected forest areas. The basis for a future European forest monitoring will be the ICP Forest/Forest Focus network of monitoring plots originally set up to monitor the effects of long-range air pollution, cf. above. Recently a number of promising pilot studies to investigate options to include biodiversity aspects have been carried out.

3 Future perspectives

The prerequisites to establish and manage forest biodiversity and protected forest areas are quite varying in Europe. Large forest areas in a near natural state are mainly found in the boreal region (parts of Norway, Sweden, Finland and Russian Federation). In a European perspective such areas are quite unique and deserve protection, in principle 'the better the more' is protected. Actually there is an ecological justification to conserve such large areas given the natural disturbance processes can be maintained. The main disturbance in the boreal forest is fire, operating at different scales to create succession dynamics. Generally quite big

areas are needed to offer enough succession habitats for many of the boreal forest species. The boreal forest species are more or less closely dependent on these natural dynamics; some do indeed need burned wood and forage in early succession stages while others are more favoured by structures of the later succession stages, like dead wood and big trees. Although several large forest reserves have been established in the boreal zone there is great resistance from some interest groups to protect more. Furthermore it has shown very difficult to allow forest fires and other disturbance factors operate freely, for security reasons.

In most of Europe strictly protected forests are only patches in a more or less heavily utilised landscape. Conserving forest biodiversity must thus require an integrated strategy, combining biodiversity considerations in normal forestry. There are many examples where forestry has been successful in adapting to the biodiversity needs. This also explains why this is stated to be a main approach within the EU Natura 2000 process (EC 2003).

Finally, the European Forest Map shows that in large areas of Europe the main threat to forest species is the fragmentation of forest. This process has been ongoing for centuries, mainly driven by the need to feed the population through agriculture. Today this process is reversed, forest area is slightly increasing by afforestation and spontaneous regrowth. The main uncertainty is the urban sprawl, which is quite extensive in Europe (EEA 2006). However, the most probable outlook is that in particular afforestation will increase, due to interest to create carbon sinks and wood for energy. Afforestations with exotic and/or biotechnologically 'improved' species are almost by definition negative from a biodiversity point of view. However, there are a number of potential biodiversity considerations when establishing and managing forest plantations, as investigated in countries with a large share of plantations (France, Ireland, UK). There is definitively a positive potential also as regards afforestations from a forest biodiversity point of view.

To conclude, from an ecological point of view protected forest areas in Europe must be established and managed in the perspective of the entire forest landscape, comprising also areas with ongoing forestry ('the semi-natural forest') and even forest plantations.

As a final reflection the issue of protected forest areas and protection of forest biodiversity has a socioeconomic perspective. A large part of the European forest is privately owned. Apart from enterprises it is estimated there are some 16 million private forest owners in Europe. This is a very heterogeneous category but many of them manage their forest as a family enterprise. Forestry is still a main economic activity in a number of the European countries, and presently the trend is that the profitability is increasing. The forest provides a number of services to society in addition to the wood. Protection of forests is sometimes a very conflicting activity but there are also signs that protected forest areas may bring benefits to the local community (COST E27 2007). More cooperation on research on the socioeconomic aspects of protected forest areas is needed to support the European policy makers involved in establishing and managing such areas.

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Status of forest protected areas in Indonesia: Implementation, current problems and outlook

Adam Malik[1] and R.I. Pujaningsih[2]

Abstract

With a total forest area of about 109.96 million ha, Indonesia has an important role to play in conserving biodiversity. According to the Indonesian Forest Declaration no. 41 (1999), forest is divided into three categories: forest for production (57.62 million ha), forest for conservation (23.24 million ha) and forest for protection (29.1 million ha). Forest conservation refers to biodiversity and landscape conservation; forest protection refers to protection of the hydrological zone. Conservation area as well as the protected area is categorized into six models; the National Park model is the largest model area to conserve. The destructive practices of the forestry corporations in Indonesia have left the forest industry in crisis. The causes for forest destruction Indonesia can generally be divided into five categories: (1) Conversion of forest land; (2) Illegal logging; (3) Encroachment of forest land; (4) Earthquake and tsunami, and (5) Forest fire. There is an ongoing struggle for forest resource control in Indonesia by the Ministry of Forestry: (1) Stop illegal logging and forest product smuggling; (2) Revitalization of forestry industry; (3) Rehabilitation and conservation of forest resources; (4) Economic empowerment of community live in and around forest area, and (5) Stabilization of forest area.

1 Introduction

In South-East Asia, especially in Indonesia, conflict concerning forest resources occurs very often on a big scale at local level. Forests in the ASEAN[3] region are of global significance in terms of biological diversity conservation. Indonesia is one of the countries which still harbors tropical rain forest besides Brazil and Africa. E.g., the biosphere reserves designated in Indonesia show that the country has an important role for conserving biodiversity. Protected areas have long been the cornerstone of international biodiversity conservation strategies. The strategy for managing forest protected areas in Indonesia focuses on

[1] Jurusan Manajemen Kehutanan, Fakultas Pertanian, Universitas Tadulako; e-mail: adam_untad@yahoo.co.id

[2] Faculty of Animal Agriculture, Diponegoro University; e-mail: retnoip@telkom.net

[3] Association of Southeast Asian Nations

conservation areas, because these areas are convention zones for biodiversity accessing, exploiting and controlling.

Protected areas have a critical role to play in conserving biodiversity and in contributing to developing countries' priorities of local economic development and poverty reduction. However, conservation agencies cannot afford to blindly strive to create more protected areas without addressing the issues evolving around those that already exist – both in terms of their efficiency in conserving biodiversity and their negative consequences for resident and neighbouring communities. Protected areas alone will not be sufficient to tackle biodiversity loss. Strict protection must be seen as a last resort rather than the ideal solution and is just one strand of a bundle of strategies that refer to biodiversity conservation within the broader context of sustainable development.

Total forest area in Indonesia is about 109.96 million ha. There are several types of forest in Indonesia depending on the geographical situation such as Coastal forest, Mangrove forest, Swamp forest, Peat swamp forest, Tropical rain forest, Heath forest, and Monsoon forest. According to the Indonesian Declaration of Forest no. 41, the year 1999 (Indonesian Ministry of Forestry 2005), forest is divided into three catagories according to its function: forest for production (57.62 million ha), forest for conservation (23.24 million ha) and forest for protection (29.1 million ha). Conservation forest deals with diversity and landscape conservation. In a specific way, protected forest supports the hydrological zone.

Conservation area as well as the protected area is categorized into six models, and the National Park model is the largest area to conserve (Table 1). However, establishment of a protected area does not necessarily guarantee protection of the biodiversity, environmental or cultural features it contains. Protected area designation must come along with a conservation strategy, because the quality of protected area management is even more important than the amount of area under protection.

The National Park model has a protected zone that encompasses the variety of existing life forms with their genetic diversity and ecological functions. In forests, biological diversity allows species to adapt continuously to dynamically evolving environmental conditions, which maintains the potential for tree breeding and improvement (to meet human needs for goods and services and changing end-use requirements), and supports ecosystem functions. People have considered National Parks as an economic resource for their own welfare, which has some demand consequences regarding National Park utilization. If the regional government treats a National Park as the resource of regional income in accordance with economic regional development, this makes the existence of the National Park as the last chance to save the remaining the natural resources.

Table 1: Conservation Area in Indonesia (after: FOREST DEPARTMENT OF INDONESIA 2006)

Type	(HA)	Unit
Strict nature reserve	5,342,379.74	249
Game reserve	5,422,922.79	77
National Park	10,861,259.42	50
Nature recreation park	1,041,345.21	124
Grand provincial park	347,427.34	21
Hunting park	224,816.04	14
Total	23,240,150.54	535

Interest in forest conservation, particularly for biological diversity, has increased considerably during the past decade. Indonesia's forests are among the world's most diverse and biologically rich. Although the country comprises only 1.3 percent of the Earth's land surface, it holds a disproportionately high share of its biodiversity, including an estimated 38,000 of the world's plant species, 12 percent of mammal species (38 percent are endemics) and 1,531 of bird species (28 percent are endemic). Moreover, there are also found 511 reptilian species and 121 species of butterflies with 44 percent of them being endemic (FOREST DEPARTMENT OF INDONESIA 2006). This makes Indonesia one of the Megadiversity Countries.

Among the other big islands of the Indonesian archipelago, Sulawesi is the big island situated in Wallacea area, a unique region of the world with plant and animal species that represent a cross between Asian and Australian species. Biogeographically this is the switchover area between the Asian Zone and the Australian Zone or, as we recognize it, the Line Wallace (Wallace Lino). According to the results of an expedition of Alfred Russel Wallace in the year 1850, the flora and fauna that is found in this region is specific and unique (KINNAIRD 1997). Some of the endemic flora species are *Manglietia* sp., *Eucaliptus deglupta*, *Calamus* sp. and *Agathis* sp., while some of the endemic fauna species are Anoa (*Bubalus quarlesi* and *Bubalus deppressicornis*), *Cervus timorensis*, *Babyrousa baburussa*, *Macaca tonkeana*, *Tarsius spectrum* and *Macrocephalon maleo*.

2 Forest degradation in Indonesia

Forest degradation can have different causes and may eventually lead to different degrees of structural and functional alteration. Many regions of the world continue to experience high rates of deforestation and forest degradation despite efforts to ensure forest protection and conservation. Excessive commercial logging is commonly (although sometimes erroneously) blamed for the rapid decline of natural forest resources and for floods and landslides. This has

led to political decisions in some countries to ban logging in natural forests, either totally or partially.

Major direct causes of forest degradation have been identified as part of the current assessment (ACHARD *et al.* 2002):

- Individual elements of the protected area are removed without alteration of the overall vegetation structure (e.g., animal species used as bushmeat, valuable timber trees, exotic plants)
- Overall impoverishment of the ecology of the protected area through, e.g., encroachment, long-term air pollution damage or persistent poaching pressure
- Major conversion and degradation through, e.g., removal of forest cover, building roads through the protected area, major settlements or mining

Underlying causes include poverty, population growth, markets and trade in forest products and macroeconomic policies.

In Indonesia, the main causes for forest degradation were categorized into five factors: (1) Conversion of forest land, (2) Illegal logging, (3) Encroachment of forest land, (4) Earthquake and tsunami, and (5) Forest fire. Conversion refers to the clear felling of the original forest and preparing the land for other uses, e.g., for oil palm plantations, rubber plantations and cacao plantations (TSCHARNTKE 2007).

The destructive practices of forestry corporations in Indonesia have left the forest industry in crisis. Legal timber supplies 88 million cubic metres although, actually, the production of legal logging produces only about 10 million cubic metres. This makes Indonesia loose almost 54.7 billion US dollars per year (FOREST DEPARTMENT OF INDONESIA 2006). The rate of forest degradation reaches 2.8 million ha per year. Among all tropical regions, South East Asia reaches the highest deforestation rates (FAO 2001). Rehabilitation efforts were not in balance with forest degradation. Many cases showed that legal / illegal logging activities will be followed by encroachment activities. Once gigantic trees have been removed by legal / illegal logging activities, it is easier for the community to clear the land from smaller trees and to develop those areas into farms or to occupy them. Large scale corporations have used fire as a cheap and easy means of clearing forest for further planting. Deliberate fire setting combined with the dry conditions caused by El Nino events has led to uncontrolled wildfire causing damage of an unprecedented extent and intensity.

3 Five priorities of forest policy

To enhance the conservation value of protected areas efforts have been made both to increase the area of land in protected area systems and to make more strategic choices concerning the protection of additional areas. There is an ongoing struggle for forest resource control in Indonesia by the Ministry of Forestry:

1. Stop illegal logging and forest product smuggling
2. Revitalization of forestry industry
3. Rehabilitation and conservation of forest resources
4. Economics empowerment of community live in and around forest area
5. Stabilization of forest area

Until the year 2009, some important strategic point should be enforced by the Directorate General of Protection and Conservation of Nature (PHKA) with priority on:

6. Area stabilization
7. Identification and study of the public concern and eminent potency of the area, which will be the trade mark of the National Park Model itself
8. Create different management areas by participatory zoning
9. Compilation / review of planning management
10. Empowering natural resources use regarding cultivation, conservation, alternative energy and applied research activities
11. Habitat rehabilitation, ecosystem restoration and managing dynamic populations
12. Empowering of professional human resource
13. Developing of facilities management
14. Empowering the chances of investment regarding natural ecotourism as well as environment utilization
15. Promoting National Park conservation in order to obtain the appreciation and motivation of others
16. Attaining opportunities of management collaboration for National Parks

The implementation of the strategy is explained in the following diagram (Fig. 1).

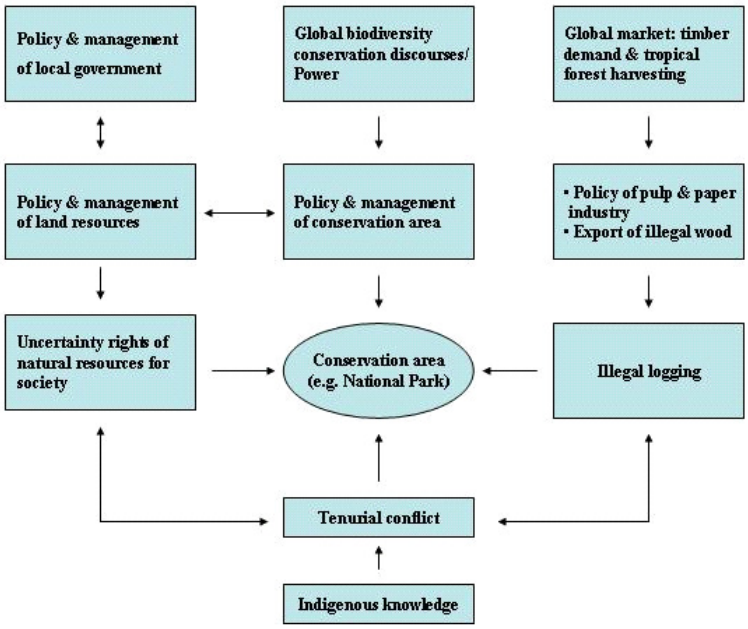

Figure 1: Conservation area – the convention zone for biodiversity accessing, exploiting and controlling (ADIWIBOWO 2005)

4 Remarks

- Keep the biodiversity within and between agroforestry systems (diversity of shade trees and land-use systems adjacent to rainforest sites).
- Focus on long-term resilience and sustainability of both efficient land-use and conservation
- Find win-win or small loss-big gain solutions (trade-offs, balancing human and ecological needs)

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Part III

Working Group Results

On the second and third workshop day, intensified thematic discussions took place in four working groups (Annex 1). Group work and plenum sessions alternated in order to raise critical issues within a bigger audience and to reconsider new inputs during the group work. The following chapters summarize the discussion processes and the conclusions reached in the individual Working Groups. Each Group was asked to develop an ideal and a political feasible scenario for realization of a forest protected area network under the CBD. The ideal scenario should assume unreserved international support of such a network, while the politically feasible scenario should take into account current political constraints. The views presented in the Working Group summaries do not necessarily reflect the views of the respective authors.

Working Group 1: Criteria for the selection of priority forests

Christine B. Schmitt

1 Nature and value of a forest protected area (FPA) network

Prior to defining the criteria for the selection of priority forests, Working Group 1 tried to specify the term protected area network, as used in different CBD work programs. It was concluded that network can either refer to an ecological network, i.e., the connection of forest habitats through corridors and stepping stones, or to a communication network, i.e., the conceptual connectivity of all stakeholders involved in FPA establishment and management. Ecological networks can only be established at local or regional levels because the FPA to be linked have to share certain ecological similarities. As a consequence, at global level the network should be understood as a conceptual one, while at regional scale it should incorporate both, ecological and conceptual functions.

The added value of a communication network is increased cooperation, exchange of information and expertise. The establishment of an internationally recognized FPA network is also anticipated to stimulate financing because it creates a positive incentive for donors who are willing to pay for globally agreed priorities. Adequately managed, FPA can provide various benefits to local communities in and around the PA. A network could help to better manage these benefits and to promote public participation at local and global scales.

Working Group 1 identified a good "window of opportunity" for forest protection due to raised awareness for forest issues amongst governments worldwide, e.g., year 2011 will be the year of forest. Forest conservation helps achieving the 2010 biodiversity target, plays an important role in mitigating climate change and can contribute to poverty alleviation. Forests are particularly important because they provide many ecosystem services although it was questioned whether costs and benefits of conservation are balanced for all forest types.

A well established and functioning FPA network could be a role model for implementation of a general network of PA. The crucial question is which FPA should be included. One possibility would be to create a new label, e.g., CBD Forests, as examples of "best practices" in FPA management. Although these prestigious CBD Forests would certainly attract international attention and support, a cap does not seem useful if the FPA network is regarded as major contribution to the 2010 target and as positive push for all PA. Besides, it is a political necessity to open the network and its financing options to all parties of the CBD. Working Group 1 consented that any network has to respect the sovereignty of national states and its establishment should therefore follow a "bottom up" rather than "top down" approach.

2 Consideration of existing FPA

Working Group 1 recommended that a FPA network under the CBD should build on existing FPA. A gap analysis of FPA, which has already been completed in several countries, should be carried out at global level to evaluate which forest types are still not sufficiently protected. Such a global gap analysis can also help to solve the question whether consolidation of existing FPA or designation of new ones is of prime importance.

Regional activities should be regarded as the basis of a global network, e.g., NATURA 2000, Emerald Network, Mesoamerican Corridor, Central African Regional Program for the Environment (CARPE), Central African Forests Commission (COMIFAC), and International Model Forest Network (IMFN). It is also important not to replicate efforts of other organizations, e.g., World Heritage Forest Program.

3 Selection criteria and process

Considering the above discussions, Working Group 1 underlined that global criteria for FPA selection should be regarded as decision-making support to governments and should complement not replace regional criteria. In this respect, global maps highlighting important forest regions for conservation are scientific advice and do not violate national sovereignty. The scale of those maps is too large for determining the exact extent of particular FPA and thus leaves room for interpretation at national level. To make clear that ultimately all forests are valuable, the term "priority area" should be replaced by "areas in need of immediate action". The selection process can be separated into three steps:

i) Identification of forest regions in need of immediate action based on ecological criteria

Irreplaceability, vulnerability and representativeness are the most important ecological criteria for FPA selection. Irreplaceability is measured mainly in terms of species numbers while vulnerability includes information on intactness and threat. Representativeness is an ambiguous criterion because it strongly depends on scale and ecological reference, e.g., species or ecosystems, and involves the question whether replication is required.

In addition to these three criteria, Working Group 1 recommended the integration of carbon and climate related aspects into the FPA selection process. Climate change creates a need for more, bigger and strongly connected FPA to allow for species migration under changing environmental conditions. Particular conservation attention should be given to carbon rich forests such as forested peatlands.

Irreplaceability can be used to pinpoint outstanding forests at global scale. In addition, the globally most threatened forests (reactive approach) and the least threatened ones (proactive approach) should be selected according to the vulnerability criterion[1]. Representativeness can

[1] Compare BROOKS *et al.* (2006): Global Biodiversity Conservation Priorities. Science 313: pp. 58-61.

then be used to make sure that all forest types and countries are considered. Highlighted areas will consequently range from virgin forests to forests with considerable human impact.

Working Group 1 concluded that existing approaches, which point out forest areas in need of immediate action, show considerable overlaps and should be evaluated further, e.g., by overlaying the respective global maps. Generally, habitat approaches may be better suited for area selection than species approaches although the latter are often more charismatic.

ii) Particular site selection based on socio-economic and political criteria

While ecological criteria can be used to highlight larger forest regions ("FPA candidates"), socio-economic and political criteria are important for selecting the actual PA location on the ground, i.e., sites with good conditions for effective protection from local as well as national perspective. Depending on the particular socio-economic situation within and outside the PA, the whole range of IUCN management categories should be applied.

iii) Site denomination / establishment

Sites are officially delineated and protected.

4 Ideal scenario

In the ideal scenario forest benefits to society, including climate issues, would be well recognized at local, national and international levels. Pertinent reports, e.g., a Stern Report on Biodiversity, and extensive marketing of forest ecosystem services would have created a global environment where people and governments, in particular of developed countries, are willing to pay for forest conservation. The selection and monitoring of FPA would be supported by an agreed map of global forest types.

The FPA implementation process would be hosted by a secretariat, e.g., as a division of an Intergovernmental Panel on Biodiversity. The secretariat could give global guidance on forest regions in need of immediate action based on existing recommendations by NGO. This information could be fed into regional processes and could finally facilitate the FPA selection process at national levels. At the same time, governments would strive to translate FPA gap analyses into political action.

Working Group 1 imagined the ideal FPA network to include outstanding forests in terms of irreplaceability and intactness as well as forests that may be less spectacular but representative of certain forest types. The precautionary principle should be used in FPA selection where species and ecosystem functions are not yet fully known. Different protection categories should be applied and the FPA should be linked with the surrounding landscape.

Even in the ideal, scenario expectations regarding the quantity of protected forest should not be too unrealistic as this could create opposition. Working Group 1 considered

recommendations made by the Global Vision for Forest 2050 project[2] and suggested to aim at protecting ca. 50 to 60% of the world's forests.

5 Politically feasible scenario

In reality, the establishment of a FPA network is constraint by political factors. The term network by itself creates problems and global guidance regarding the location of forest regions in need of immediate action can be considered as contradictory to national sovereignty. The network also has the difficult task of dealing with the imbalance between forest rich and forest poor countries. A further problem is that the CBD secretariat does not have the capacity to supervise a global FPA network.

Working Group 1 agreed that the selection criteria for FPA should be similar in both, ideal and politically feasible scenario, but that threshold levels should be higher in the latter and therefore fewer FPA would be selected. The selection process should be dynamical, i.e., start small and arrive at the ideal world step by step. Regional processes should be strengthened.

A global forest type classification is urgently needed to realize a globally representative FPA network. The WWF ecoregions are widely accepted and could be used as global baseline information after some further refinement for forest types. However, where fine-scale forest classifications exist at regional level these should be used.

The 2010 target aims at conservation of "10 % of each forest type" globally. This target was considered as minimum solution or as good progress depending on the scale used for defining forest types.

6 Research needs

Working Group 1 identified the following research needs:

- overlaying existing global maps of forest regions in need of immediate action
- global forest type definitions
- global map showing carbon and biodiversity richness of forest ecosystems
- impact of climate change on forest biodiversity and vice versa

[2] UNASYLVA No 204, Vol 52: 40 % of the world's forest should be protected (IUCN categories I-IV).

Working Group 2: Protection and management requirements for forest protected areas

Georg Winkel

1 Basic considerations/idea of network

The idea of developing concrete management requirements for forest protected areas (FPA) at local or regional level needs basic considerations about the demands that FPA should fulfill in order to participate in a global network under the CBD. The most important requirement appears to be that their management will be developed in accordance with the principles of the ecosystem approach. Generally, this could be achieved in two different ways:

- by creating a network of FPA as a prestigious club, in which its members comply with the ecosystem approach in an ideal way,.
- by building a learning network under the CBD to find appropriate ways of applying the ecosystem approach ("network of improvement"). This appears to be less ambitious but more realistic

Both options have advantages and disadvantages. The "prestigious club" might, on the one hand, motivate a lot of PA managers to join the network to yield appreciation/prestige in its wake. On the other hand, this might lead to frustration among those PA managers who do not have the capacities to follow this sophisticated ecosystem approach. The learning network, however, could be motivating for the latter, whereas it might not be considered as very ambitious by the others.

Anyway, the implementation of the ecosystem approach is vital and seems to be realistic for FPA under the CBD. It is therefore worthwhile to venture a more precise discussion about further management requirements with regard to the 12 principles of the ecosystem approach.

2 Managing Forest Protected Areas with the Ecosystem Approach

1. *The objectives of management of land, water and living resources are a matter of societal choices* ***and***
2. *Management should be decentralized to the lowest appropriate level* ***and***
3. *The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices* ***and***
4. *The ecosystem approach should involve all relevant sectors of society and scientific disciplines.*

These aspects are of high importance, because they underline the embedding of all management questions in a culturally and by human minted environment. Conservation objectives do not come up by themselves, they rather evolve as a result of societal choice. Therefore, from a nature conservationist point of view, it is essential to communicate the benefits and values of PA to the society in a proper way. This holds true especially for FPA, because forests provide many different and important values and ecosystem services for societies. The most detailed management decisions have to be made at local or regional level and acceptance by the local population is considered essential for a successful management. Moreover, local and regional stakeholders should be involved in developing the management plans (multistakeholder as well as multisectoral planning and management approach). However, it must be accepted that diverse cultural beliefs, governance traditions and institutional realties, especially with regard to the global level of this discussion, might lead to more culturally "framed" FPA – in the sense that compromises between conservationist's demands and local cultural interests have to be made, e.g., traditional customary rights might be respected even if they slightly contradict ecological goals.

5. *Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.*

With regard to this principle, it seems necessary to develop and establish mechanisms through which FPA managers can communicate, negotiate and solve issues of concern which might arise in PA (e.g., hazards in adjacent economically managed forests due to natural disturbances in the PA, like fires) as well as bad effects caused by adjacent ecosystems to a FPA (e.g., immission of pesticides). Special attention should be paid to leakage effects, which might accompany the management improvement of PA (e.g., increasing resource extractions from non-protected adjacent forests).

6. *Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management program should:*
   a) *Reduce those market distortions that adversely affect biological diversity;*
   b) *Align incentives to promote biodiversity conservation and sustainable use;*
   c) *Internalize costs and benefits in the given ecosystem to the extent feasible.*

This principle should be implemented as formulated under the ecosystem approach. With regard to FPA, some aspects should be stressed:

- Forests provide a comprehensive amount of ecosystem services. During the last years, the storage of carbon aroused highest political attention. This fact should be considered regarding its benefit for future nature protection issues.

- Property right questions are an essential basis for economic decisions and market bound governance instruments. It therefore seems important to respect customary tenure systems when developing FPA management plans.
- Especially for forests of high economic or social value, studies on the economic situation that take into account ecosystem services and opportunity costs of FPA are a helpful tool to develop fair governance mechanisms.
- Summarizing all aspects mentioned, transparency and accountability are important to foster – as mentioned under principle 1 – societal decisions for protection that counteract short-term profitability interests.

7. *Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.*

Obviously, this principle is most important with regard to FPA.

8. *Ecosystems must be managed within the limits of their functioning* ***and***
9. *The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.*

As to these principles, it has to be stated again that the majority of management decisions in FPA should be made at regional or local level with participation of local and regional stakeholders. Most probably, violations of principles 6 and 7 might occur if demands of local stakeholder are not consistent with ecological prerequisites or conservational demands. Concerning FPA establishment and important management decisions in these or adjacent areas, environmental impact assessments might be helpful to trigger supportive decision processes.

The spatial scale of a PA should thereby be defined according to the goals of protection.

10. *Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term* ***and***
11. *Management must recognize that change is inevitable.*

From these principles, ideas for FPA management can be derived. First, FPA planning should, if possible, consider long term trends. The PA should – depending on the management of adjacent areas – be large enough to allow for evolutionary processes (e.g., to provide a gene pool big enough for selection and to give species the chance to migrate). As landscapes are no closed systems, it often does not make sense to draw strict borders – more flexible and open approaches are needed for FPA. However, this flexibility is limited by long-term processes concerning forests. E.g., to regenerate an old growth forest needs centuries or might be impossible at all. Therefore, the location of a FPA cannot be changed from time to time.

Ideally, regional level land-use planning comprises the whole surrounding of a PA to minimize impacts from outside and to promote conservation and sustainable land use in the adjacent regions.

Last but not least the financial strategies should aim at integrating the area beyond the PA to ensure sustainability.

12. *The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.*

It is essential to find the balance between the diverse demands to make trade-offs between conservation and utilization within and outside of FPA acceptable for all parties involved. Obviously, since the ecosystem approach was developed to be considered on whole land management on earth, the balance between use and conservation must be shifted towards the latter in a PA; as these areas are particularly dedicated to nature protection.

3 Conclusion

Summarizing, it can be stated that proper management of FPA is only possible if the following (pre-) conditions are fulfilled:

- there must be a certain political willingness to protect forests. The protection of forests will not be successful in the long-term if local and regional stakeholders cannot gain benefits from the protection status
- there must be adequate resources to protect a forest. This holds true especially for technical capacities, institutional frameworks / capacities in place and, of course, availability of long-term funding.

An important question concerning the idea of a FPA network remains to be discussed: Should the local management authorities or national governments join the network? This question finally leads to the discussions on financing and implementing a FPA network, which is dealt with in the following chapters.

Working Group 3: Financing mechanisms

Till Pistorius

1 Defining the character and the functions of the network

The working group realized that questions concerning the character and the intended functions of the FPA network are crucial for the development of a sound and effective financing strategy. Two groups of network functions were identified: A global network (of regional networks) can focus on ecological functions and consist of physical sites on the ground. This type of understanding concerning the network character relates to goal 3 objective 3 of the expanded program of work on forest biodiversity (CBD/VI/22): *"to ensure adequate and effective protected forest area networks"*. The program is strongly linked to the program of work on protected areas (CBD/VII/28), which calls in §18 for the *"establishment of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas that contribute to achieving the three objectives of the Convention and the 2010 target, i.a. through a global network."* It is amended by a footnote which serves as a legal escape clause: *"A global network provides for the connections between Parties (…), for the exchange of ideas and experiences, scientific and technical cooperation, capacity building and cooperative action (…). This network has no authority or mandate over national or regional systems."* This understanding refers to the other group of possible functions in which the network has more political and scientific character, e.g. by the transfer of knowledge.

These two understandings imply varying necessities for funding and also different options for raising new and additional money. It was generally agreed that a primary function of any network type should be to establish and coordinate a "marketing strategy" for conservation in order to make conservation more visible and thus enhance the attractiveness for donors to take on commitments. This was seen as a precondition to tap into new and additional sources and could serve as an incentive for countries, existing networks of FPA or single PA to join such a network. Furthermore there was consensus that financing through newly established mechanisms should avoid adverse effects and perverse incentives. Certification of timber and non-timber forest products could be a means for this goal and refers especially to the issue of carbon credits. Other relevant activities for a network could be a communication campaign which helps formulating the added value of enhanced conservation, accompanied with a search for sponsors and supporting efforts to bundle different sources and levels of ecosystem services. Since no consensus could be obtained regarding an understanding of what is meant by the term 'a global network of FPA', the group tried to identify suitable requirements and criteria for financing mechanisms, distinguishing between the objective to finance the network structure and financing of FPA (see table).

Table: Requirements for financing the network structure and financing FPA

Financing the structure of the network	**Financing FPA in general**
new and additional	
bilateral / multilateral	
quickly available	reliable, long-term financing
one governing body	individual portfolio
private sector participation	contribute to poverty alleviation
avoid duplication of work, use existing structures (CIFOR, ITTO, NGO)	goal: better conservation projects (supply side)
subsidies (bi- & multilateral ODA)	

With these criteria and requirements efforts were made to identify suitable financing mechanisms according to the potential network functions for FPA in specific and for all types of PA in general. As a result many potential new sources were identified for an ecological network which consists of real FPA on the ground, because here a variety of mechanisms can be used that attribute a price to the goods and services generated by these FPA. There was a focus in the discussion on the promising issue of carbon credits in a future climate regime, site-based payments for ecosystem services and the concept of partnerships between PA. Another promising idea was the concept of an ecosystem marketplace which brings together the producers and consumers of ecosystem services (i.e. companies). Such a mechanism has several advantages: it makes conservation visible and thus more attractive for private capital and it can be expanded to other types of PA (mountains, wetlands, inland waters etc).

The other possible character of the network is more abstract (political, scientific) and has functions that are difficult to relate to the generated values of FPA (i.e. transfer of scientific and management knowledge, capacity building). As a result only few ideas were brought up on how such a network could be financed. One was to collect membership fees in order to give participating FPA a certain status (“world site”), another was to collect a small percentage fee on the value of their consumption of forest-based products. For all types of PA only the idea of royalties was brought up.

2 Politically feasible scenario

There was no agreement on the functions of the network in the “politically feasible scenario”. Participants suggested that the network should provide the framework for a geographical network of FPA, enhancing the corridor function for migrating species. Others emphasized functions as scientific support for regional processes concerning the selection of PA and their financing, the promotion of conservation and associated values in order to make conservation

more visible. Furthermore, it could provide input concerning cross-cutting issues to other processes such as the UNFCCC (i.e. climate and biodiversity) in order to avoid adverse effects. Another service could be capacity building on the establishment of innovative financing and fund raising. Incentives for joining the network were mainly seen in the services provided by the network, the institutions and its governance as well as the initial financing. Concerning the institutions, there was consensus that existing structures should be used and organizations like CIFOR and ITTO integrated. However GEF as the existing financing mechanism of the CBD needs new structures and be improved significantly if to be used for additional tasks.

3 Ideal scenario

In the "ideal scenario" the main function of the network should be an improved coordination of conservation activities, i.e., through a connection of core conservation zones, buffer zones and conservation outside of FPA. It was suggested that instead of countries becoming members of the network, membership should be made eligible for single FPA or existing networks. One main function could be that of creating a helpdesk which serves as a catalyst for local action. A remaining key question is whether it should be a network of knowledge vs. a network of knowledge and money. Incentives for stepping-in and staying in the network evolve again through the positive incentives provided by the network (functions, financing and institutional support). Further incentives could be a 'blue flag type label' and the guidance on questions concerning management and other challenges. It was suggested to create a world forest secretariat which could be maintained for example by IUCN. For the issue of financing it was suggested to establish a global trust fund which could also be used to administer carbon credits. Initial funding for such a fund should come from OECD countries. Other mechanisms to achieve long-term financing could be international taxes on wood products or bunker fuels. The idea is to increase the voluntary commitments of businesses and other private sources.

As main challenge and issue for further research the bundling of different ecosystem services (i.e., carbon, watershed management and biodiversity) was identified. Another interesting aspect which deserves attention is how GEF needs to be restructured in order to become suitable for serving as central institution in the context of a global network of PA.

Working Group 4: Options for implementation

Carol Grossmann

1 Ideal scenario

Working Group 4 consented that an ideal global forest protected area (FPA) network should rely on increased communication amongst organizations concerned with sustainable forest management in general and with establishing FPA networks in particular. The aim would be to create regional FPA networks, which fulfil ecological as well as communication functions and form part of an overall network that facilitates global communication on FPA matters. Such a global FPA communication network should be established and supported under the umbrella of the CBD in an institutionalized manner, but should not form a new formal organization by itself.

In an ideal scenario, the 9th Conference of Parties (COP9) of the CBD would request the establishment of a working group that facilitates regional FPA processes and the formation of a global FPA network. It should closely cooperate with the existing ad hoc open-ended working group concerned with general protected areas issues. The CDB secretariat would delegate administration and funding of such a working group to non-governmental organizations (NGO), intergovernmental organizations (IGO) or individual governments.

2 Politically feasible scenario

Considering that

- there are already strong regional processes dealing with
  - the sustainable management of trans-boundary forest areas, which usually includes designation of FPA as well as long-term maintenance of managed forest cover,
  - the establishment of long-distance wildlife corridors between forests, which includes maintenance and establishment of agroforestry systems, and
  - the management of buffer zones inside FPA,
- the respective regional institutions and secretariats exist, and
- global governmental and non-governmental organizations, e.g. Collaborative Partnership on Forests (CPF), FAO, Forest Stewardship Council (FSC), GTZ, Tropenbos and WWF, are involved in these regional proesses,

Working Group 4 recommended that

- existing processes should be better coordinated in order to initiate and manage regional FPA networks effectively and to form one global communication network for FPA.

This intention requires

- to compile relevant information about the above-mentioned regional and global processes and their organizations,
- to contact the respective organizations in order to evaluate the consideration of the CBD FPA process and targets within their range of activities, and
- to inform them, if necessary, about the need for broad support of the CBD targets and possibilities and ways to contribute to these targets.

Working Group 4 recommended to disseminate information and to enhance communication by

- inviting representatives of relevant organizations to regional and/or global round tables on issues regarding FPA networks under the CBD, and by
- bringing together experts of the CBD Ad Hoc Technical Expert Group (AHTEG) on the Review of Implementation of the Programme of Work on Forest Biological Diversity and the CBD Ad Hoc Open-ended Working Group on Protected Areas

By 2014, a first report on the progress of the global FPA network should be published by the CBD secretariat. Realization and funding of the report should be supported by governmental as well as non-governmental organizations. Working Group 4 suggested the time span of seven years because several time-consuming preparatory steps are necessary and recommended:

17. By 2009, the relevant regional and global organizations should be supported in integrating information on their CBD related activities and achievements in their regular annual reporting systems. They could be given, e.g., a list of questions that can serve as guideline for important aspects to be considered. This procedure is recommended to avoid undesirable augmentation of reporting systems. Ideally, the examples of CBD related questions will prompt the addressed organizations to enhance or even initiate CBD relevant activities.
18. By 2010, the addressed organizations should actually start to integrate CBD relevant activities and achievements into their annual reports.
19. By 2013, a consultant assigned by the CBD secretariat should evaluate the annual reports of the addressed organizations in terms of information and achievements regarding the establishment of regional FPA networks. The evaluation should also consider the progress in linking regional activities within a global communication network. The results will be published in form of the above-mentioned report in 2014.

Conclusions

Christine B. Schmitt, Till Pistorius, Georg Winkel

The Freiburg workshop was a platform for scientists, politicians and representatives of civil society to discuss issues related to the establishment of a global forest protected area (FPA) network under the CBD. Owing to the diverse national and thematic backgrounds of the participants, the workshop was able to give a comprehensive overview of challenges and opportunities regarding such a network. In the following, we will resume the main results of the workshop and highlight some important aspects.

1 Network character and functions

One central point of the discussions was the meaning of the term "network" itself. Although functional aspects of the FPA network are already stated by the CBD, fervent debates at the workshop underlined the remaining uncertainty regarding the exact nature and qualities of the prospective network. These questions have to be resolved because they provide the overall framework for all other thematic issues related to a global FPA network.

According to the CBD, the network should fulfill two main functions, namely ecological ones on the one hand (Work Programme on Forest Biodiversity), and communicative ones on the other (Work Programme on Protected Areas). During the workshop, it became apparent that these two functions must refer to different geographical scales: Ecological functions, i.e. the establishment of corridors and stepping stones between FPA, can only be met at regional levels where ecologically related forest ecosystems exist. In contrast, communicative functions need to be maintained at all levels from local to global. Ultimately, the FPA network has to be a "network of networks" as anticipated under the Work Programme on Forest Biodiversity. It should consist of regional networks fulfilling ecological as well as communicative functions and an overall global network that facilitates communication and a common agenda between the regional networks.

The more visible parts of the network will be the actual FPA on the ground that can be illustrated by maps. This tangible network needs support from a virtual communication network, including not only FPA managers and the appropriate authorities but also organizations involved in sustainable forest management and forest conservation regardless whether they actually manage FPA on the ground. The establishment of ecological and virtual links can be seen as two parallel but strongly interrelated processes.

2 Selection process

Particular thresholds for joining the communicative network were not discussed because the notion was the more organizations participate, the more information can be shared. The requirements for FPA to become part of the ecological networks were, however, subject of controversial discussions. On the one hand, participants were in favor of a prestigious network of FPA with strict criteria regarding forest biodiversity, protection status and management issues, because the likelihood of attracting public attention and funding would be rather high. On the other hand, it was argued that an ecological network with broad participation should strive to contribute to the general objectives of the CBD in terms of biodiversity conservation. In this case, the initial expectations towards the standards of the participating protected areas cannot be too ambitious, because it would limit the amount of potential network participants. Thus, the character of the network should be more of a learning network.

Existing ecological criteria for the identification of forest areas in need of immediate conservation action ("priority forests") consider mainly irreplaceability, vulnerability and representativeness although the definition and the weighting of these criteria may vary between different approaches. The existing criteria constitute a comprehensive basis for the selection of FPA for the global network but need to be adequately combined and made more coherent. As a first step in the selection process under the CBD, the ecological criteria should be used to highlight larger forest regions in need of immediate conservation action ("FPA candidates"). In a second step, socio-economic criteria are required to select sites with good conditions for effective forest protection.

It was a common understanding that participatory approaches are a prerequisite for successful FPA implementation and that interests of local communities are more likely to be met if a zoning with different IUCN protection categories is applied within each FPA. Ideally, the FPA should be ecologically and conceptually embedded in its surrounding landscape as stipulated by the ecosystem approach. The workshop also underlined that under the CBD, any selection criteria can be merely understood as decision-making guidance and support to governments and should complement, not replace, appropriate regional concepts.

3 Financing

Both, implementation and effectiveness of the prospective FPA network stand and fall with the availability to generate adequate financial resources. While funds also have to be sought for supporting the administrative structure of the virtual communication network, it is obvious that the largest need for new and additional finances exists for establishing and maintaining actual FPA on the ground. The latter requires much more financial resources but there are also many more options to generate new sources. Examples are payments for environmental services (PES), charging for resource extraction or tourism or tapping into carbon credits.

Though rather unlikely, an increase of official development assistance (ODA) could also be considered.

Concerning financing, one function of the network should be to improve the supply side of conservation by setting standards (including certification and labelling), making conservation more visible and better promote the value of ecosystem services generated by FPA. Another closely related function should be to assist single FPA or regional networks in raising funds, i.e. by bringing together supply and demand of conservation activities. Financial backing and improved visibility of conservation provided by the network could serve as incentives to join the network and to submit to certain management guidelines (i.e. ecosystem approach, sustainable forest management).

The mechanisms applied for raising new funds should be flexible, because options arise at different levels (local, regional, global) and should fit the specific circumstances of the individual site. At local level, FPA managers can be assisted in generating their own financial resources, e.g., through tourism, marketing of local products, providing ecosystem services to adjacent urban areas and initiating public-private-partnerships. Likelihood of attracting adequate funds could be included as socio-economic criteria in FPA selection.

At regional and national levels, PES-systems can be installed if this is in accordance with national conservation strategies and legislation. At the global level, especially carbon credits for reducing emissions from deforestation (RED) as presently discussed under the international climate regime (UNFCCC) or voluntary certificates seem to have a large potential for synergies and represent a promising future source for funding conservation in PA. However, implementation of such a carbon credit scheme is likely to be years ahead. Thus a portfolio approach of different financing options should be considered within the CBD process. The Global Environment Facility (GEF) with its current structure and mandate seems not apt to take on additional functions. It could play a main role in coordinating international financial flows but needs to be reorganized according to these new tasks.

4 Implementation

Precondition for any FPA network under the CBD is back-up from the CBD Parties. It is therefore of paramount importance that the prospective network respects national sovereignty of the member states and that participation is voluntary. The global network should be established by an iterative and dynamic bottom-up process. The workshop participants strongly recommended considering the large number of regional processes in the field of FPA as vantage points for the network of networks.

The CBD Secretariat does not have the capacity to facilitate the establishment of a global FPA network. Thus, a coordinating body is urgently needed. The workshop concluded that, ideally, the FPA network could be hosted by a secretariat as division of a prospective Intergovernmental Panel on Biodiversity or by a world forest secretariat maintained by the IUCN. Another suggestion was the establishment of an ad hoc open-ended working group on

FPA at the next Conference of the Parties of the CBD in 2008. Administration and funding of this working group should be outsourced to non-governmental organizations (NGOs), inter-governmental organizations (IGOs) or individual governments.

A first step in the implementation process of the FPA network certainly is to take stock of all existing regional processes and the global organization (NGOs and IGOs) involved in sustainable forest management and forest conservation. All relevant organisations should be encouraged to get (more) actively involved in the CBD process and to include information on issues related to FPA networks in their annual report systems. Based on the information provided by these organizations, a report on the progress of the global FPA network should be published.

5 Outlook

At the moment, there is a window of opportunity to make some large steps forward in the establishment of a global protected are network because the significance and the necessity for conservation of forests as providers for numerous ecosystem services is increasingly recognized worldwide. Forest conservation, *i.a.*, helps achieving the CBD 2010 biodiversity target, mitigating and adapting to climate change, preventing erosion, halting desertification and can also contribute to poverty alleviation. To organize forest conservation in a global FPA network provides the opportunity for increased international cooperation, exchange of information and expertise, financial assistance and institutional support.

This workshop showed the major importance of communicating the benefits of forest conservation in order to raise public awareness and motivation for FPA at local and national levels worldwide. Appropriate marketing strategies for FPA can make conservation more attractive to donors. They will also show that FPA create opportunities rather than detriments for the region concerned. Ultimately, a successful global FPA network could act as a role model for the implementation of the general global protected area network anticipated by the CBD.

The count down to the ninth Conference of the Parties of the CBD (COP9) has already started. We consider the results of the Freiburg workshop as a comprehensive basis for the negotiations in the run-up to COP9 and hope they will contribute to finding workable solutions for achieving a global PFA network under the CBD.

Annex 1

Workshop programme

Tuesday, May 8

Arrival

19:00 *Dinner at "La Piazza" (optional)*

Wednesday, May 9

9:00 **Welcoming address**

Kilian Delbrück, Federal Ministry for the Environment (BMU), Germany

9:15 **Introduction to the workshop**

Georg Winkel, IFP, Germany

First thematic session: Selection and management of forest protected areas

Chair: Georg Winkel

9:30 Tough choice – how to select priority forests for a global network of forest protected areas?
Christine B. Schmitt, IFP, Germany

9:55 The WWF Global 200 and WWF's work in particular ecoregions
Jörg Roos, WWF Germany

10:20 *Coffee break*

10:45 Biodiversity Hotspots, Wilderness Areas and CI's conservation approach in selected regions
Daniel Brito, Conservation International (CI), USA

11:10 The Mesoamerican Biological Corridor and PERTAP (Mesoamerican Protected Area System) (CANCELLED)
Lorena San Román, Universidad para la Cooperación Internacional (UCI), Costa Rica

11:35 Protecting globally important forests under the World Heritage Convention
Marc Patry, UNESCO World Heritage Forest Programme, France

12:00 **Final discussion**

12:15 *Lunch*

Wednesday, May 9 (continued)

Second thematic session: Financing mechanisms

Chair: Rainer Hummel

13.15 Financing conservation of forest protected areas – sources, potential and challenges
Till Pistorius, IFP, Germany

13:40 Scaling up financing for protected areas
Fulai Sheng, UNEP, Switzerland

14:05 Targeting payments for environmental services
Stefanie Engel, Swiss Federal Institute of Technology (ETH Zuerich), Switzerland

14:30 Innovative international financing mechanisms for the conservation of biodiversity. Report on a work in progress
Pablo Gutman, WWF International, USA

14:55 **Final discussion**

15:10 *Coffee break*

Third thematic session: Implementation mechanisms and the political reality

Chair: Roderich von Detten

15:35 Introduction
Georg Winkel, IFP, Germany

15:45 Implementation of a global forest protected area network under the CBD and the political reality
Ryo Kohsaka, Secretariat of the CBD, Canada

16:10 Relevance of the World Data Base on Protected Areas for a network of forest protected areas under the CBD
Peter Herkenrath, UNEP-WCMC, UK

Catalizing civil activities and local socio-economic initiatives using the potential of protected areas
Natalia Danilina, World Comission on Protected Areas for North Eurasia (IUCN)

16:35 Status of forest protected areas in Europe: some reflexions on implementation, current problems
and outlook
Tor-Björn Larsson, European Environmental Agency (EEA), Denmark

17:00 Status of forest protected areas in Indonesia: implementation, current problems and outlook
Adam Malik, Tadulako University, Indonesia

17:25 **Final discussion**

18:00 **Welcoming address**
Karl-Reinhard Volz, Vice Chancellor of the University of Freiburg
Hors d'Oeuvres Reception

21:00 Traditional Beer Garden

Thursday, May 10

9:00 **Introduction to the second workshop day**
Chair: Georg Winkel

9:30 Open Space discussion on a global network of forest protected areas under the CBD
Participants are asked to give comments, opinions and questions regarding the four thematic issues relevant for the parallel working groups (see below)

10:30 *Coffee break*

11:00 **Plenum session: Presentation of open Space results and formation of working groups**
Chair: Georg Winkel

12:00 **Four parallel working groups**
(1) Criteria for the selection of priority forests
Chair: Christine B. Schmitt
(2) Protection and management requirements for forest protected areas
Chair: Georg Winkel
(3) Financing mechanisms
Chair: Till Pistorius
(4) Options for implementation
Chair: Carol Grossmann

13:00 *Lunch*

14:00 **Parallel working groups continued**

15:30 *Coffee break*

16:00- **Plenum session: Presentation and discussion of working group results**
18:00 ***Chair: Carol Grossmann***

18:30 *Guided tour of Freiburg (Uwe Schmidt)*

20:00 *Dinner at "Zum Roten Bären"*

Friday, May 11

8:45 **Introduction to the third workshop day**
Chair: Georg Winkel

9:00 **Parallel working groups continued**

10:30 *Coffee break*

11:00 **Plenum session: Presentation of working group results, final discussion and conclusions**
Chair: Georg Winkel

12.45 **Closing words**
Kilian Delbrück, Federal Ministry for the Environment (BMU), Germany

13:00 *Lunch (optional)*

14:00 **Departure**

Annex 2

Workshop participants

Belgium

Mr Tim Christophersen

Secretariat of the Convention on Biological Diversity (CBD)

tim.christophersen@biodiv.org

Brazil

Prof Paulo de Tarso de Lara Pires

Atlantic Forest Protection Program

Federal University of Paraná (UFPR)

ptlpires@sema.pr.gov.br

Cameroon

Dr Bernhard Foahom

Institute of Agricultural Research for Development (IRAD)

foasipowa@yahoo.fr

Ms Njanzou Ramatou

Commission des Forêts d'Afrique Centrale (COMIFAC)

ramatoun@yahoo.fr

Canada

Dr Ryo Kohsaka

Secretariat of the Convention on Biological Diversity (CBD)

ryo.kohsaka@biodiv.org

Mr David Coates

Secretariat of the Convention on Biological Diversity (CBD)

david.coates@biodiv.org

Denmark

Mr Tor-Bjorn Larsson

European Environment Agency (EEA)

Tor-Bjorn.Larsson@eea.europa.eu

France

Mr Marc Patry

Natural Heritage

World Heritage Centre (UNESCO)

ma.patry@unesco.org

Germany

Mr Axel Benemann

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

axel.benemann@bmu.bund.de

Dr Oliver Deke

German Advisory Council on Global Change (WBGU)

odeke@wbgu.de

Dr Kilian Delbrück
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Kilian.Delbrueck@bmu.bund.de

Mr Michael Dutschke
Biocarbon
michael@biocarbon.net

Mr Jürgen Geldbach
Federal Ministry for Food, Agriculture and Consumer Protection (BMELV)
juergen.geldbach@bmelv.bund.de

Dr Anke Höltermann
Federal Nature Conservation Agency (BfN)
Anke.Hoeltermann@bfn.de

Dr Susanne Lehmann
Federal Nature Conservation Agency (BfN)
Susanne.Lehmann@bfn.de

Mr Carsten Loose
German Advisory Council on Global Change (WBGU)
close@wbgu.de

Dr Elke Mannigel
Oro Verde
emannigel@oroverde.de

Mr Matthias Reiche
Federal Ministry for Economic Cooperation and Development (BMZ)
Matthias.Reiche@bmz.bund.de

Ms Carmen Richerzhagen
German Development Institute (DIE)
carmen.richerzhagen@die-gdi.de

Mr Jörg Roos
WWF Germany
roos@wwf.de

Ms Jutta Stadler
Federal Nature Conservation Agency (BfN)
jutta.stadler@bfn-vilm.de

Mr Christoph Thies
Greenpeace International
cthies@greenpeace.de

Ms Astrid Thyssen
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Astrid.Thyssen@bmu.bund.de

Dr Manfred Treber
Germanwatch e.V.
treber@germanwatch.org

Dr Konrad Uebelhör
German Development Cooperation (GTZ)
konrad.uebelhoer@gtz.de

Indonesia

Dr Adam Malik
Jurusan Manajemen Kehutanan, Fakultas Pertanian, Universitas Tadulako
storma-palu@gwdg.de

Ms Retno I. Pujaningsih
Faculty of Animal Agriculture
Diponegoro University
retnoip@telkom.net

Dr Terry Sunderland
Centre for International Forestry Research (CIFOR)
t.sunderland@cgiar.org

Russia

Ms Natalia Danilina
Environmental Education Center Zapovedniks/
World Commission on Protected Areas for North Eurasia (IUCN)
chipmunk@inst-econ.org.ru

Switzerland

Prof Stefanie Engel
Swiss Federal Institute of Technology, ETH Zürich
stefanie.engel@env.ethz.ch

Mr David Huberman
The World Conservation Union (IUCN)
David.huberman@iucn.org

United Kingdom

Mr Peter Herkenrath
World Conservation Monitoring Centre (UNEP - WCMC)
Peter.Herkenrath@unep-wcmc.org

Dr Jon Lovett
Environment Department
University of York
jl15@york.ac.uk

Dr Muhtari Aminu-Kano
BirldLife International
muhtari.aminu-kano@birdlife.org

United States of America

Dr Daniel Brito
Center for Applied Biodiversity Science (CABS)
Conservation International (CI)
dbrito@CI.conservation.org

Mr Pablo Gutman
WWF Macroeconomic Policy Office
Pablo.Gutman@wwfus.org

Workshop Organizers

Mr Till Pistorius
Institute of Forest and Environmental Policy
Till.Pistorius@ifp.uni-freiburg.de

Dr Christine B. Schmitt
Institute of Forest and Environmental Policy
Christine.Schmitt@ifp.uni-freiburg.de

Dr Georg Winkel
Institute of Forest and Environmental Policy
Georg.Winkel@ifp.uni-freiburg.de

Workshop Assistants

Ms Anne Bogdanski
University of Kaiserslautern
annebogdanski@hotmail.com

Ms Lisa Cappelmann
Institute of Forest and Environmental Policy
Lisa.Cappelmann@ifp.uni-freiburg.de

Dr Carol Grossmann
Institute of Forest and Environmental Policy
Carol.Grossmann@ifp.uni-freiburg.de

Mr Rainer Hummel
Institute of Forest and Environmental Policy
Rainer.Hummel@ifp.uni-freiburg.de

Ms Sabine Reinecke
Institute of Forest and Environmental Policy
Sabine.Reinecke@ifp.uni-freiburg.de

Mr Walters A. Tubua
Institute of Forest and Environmental Policy
tubwalt@yahoo.fr

Ms Dinah Tyczewski
Institute of Forest and Environmental Policy
DTyczewski@compuserve.de

Dr Roderich von Detten
Institute of Forest and Environmental Policy
r.v.detten@ife.uni-freiburg.de

Annex 3

Climate certificate

Most workshop participants had to travel long distances to reach Freiburg and thus contributed to global warming by travel-related emission of CO_2. In total, airplane and train journeys of the workshop participants produced approximately 55,000 kg of CO_2.

The non-governmental organization *atmosfair* invests money in, e.g., solar, hydropower, biomass, or energy-efficiency projects with the objective to compensate such greenhouse gas emissions. Travelers can donate the amount of money necessary to neutralize the amount of greenhouse gases comparable to the emissions caused by their voyage.

To compensate for the CO_2-emissions caused by the workshop participants, the German Federal Ministry for the Environment (BMU) together with the German Federal Agency for Nature Protection (BfN) donated 1,100 € to *atmosfair*. The certificate guarantees the funding of recognized climate protection projects and the retirement of the respective emission allowances in the German official registry.