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A Global Network of Forest Protected Areas under the CBD

– Analysis and Recommendations –

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This paper is an independent study with the objective to contribute to the ongoing discussions on forest protected areas inside and outside the CBD. The opinions expressed in this paper are the views of the authors.

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List of Abbreviations

AAU	Assigned Amount Units
AZE	Alliance for Zero Extinction
BfN	German Federal Agency for Nature Conservation
BH	Biodiversity Hotspots
BR	Biosphere Reserves
BMELV	German Federal Ministry of Food, Agriculture and Consumer Protection
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CE	Crisis Ecoregions
CI	Conservation International
COP	Conference of the Parties
CPD	Centres of Plant Diversity
CPF	Collaborative Partnership on Forests
DfNS	Debt-for-Nature-Swaps
EA	Ecosystem Approach
EBA	Endemic Bird Areas
EBSA	Ecologically and Biologically Significant Areas
EEA	European Environment Agency
ES	Ecosystem Services
ETS	European Trading Scheme
EUA	Emission Allowances under the European Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility of the World Bank
FF	Frontier Forests
FINIP	Forest in Need of Immediate Protection
FLEGT	Forest Law Enforcement, Governance and Trade
FONAFIFO	Fondo Nacional de Financiamiento Forestal
FPA	Forest Protected Area
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GGA	Global Gap Analysis of Protected Areas
GHG	Greenhouse Gases
HBWA	High Biodiversity Wilderness Areas
IBA	Important Bird Areas
IMFN	International Model Forest Network
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Timber Trade Organization
IUCN	International Union for the Conservation of Nature

KBA	Key Biodiversity Areas
LIFL	Last Intact Forest Landscapes
LW	Last of the Wild
MAB	Man and the Biosphere Programme
MBI	Market-Based Instruments
MC	Megadiversity Countries
MDG	Millennium Development Goals
MEE	Management Effectiveness Evaluations
NGO	Non-Governmental Organization
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
PA	Protected Areas
PES	Payments for Environmental Services
PoW	Programme of Work
RAPPAM	Rapid Assessment and Prioritization of Protected Areas Management
REDD	Reducing Emissions from Deforestation and Degradation
SFM	Sustainable Forest Management
TNC	The Nature Conservancy
UNFF	United Nations Forum on Forests
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WA	Wilderness Areas
WCMC	World Conservation Monitoring Centre
WCPA	World Commission on Protected Areas
WDPA	World Data Base on Protected Areas
WH	World Heritage
WRI	World Resources Institute
WWF	World Wildlife Fund

Executive Summary

Deforestation and forest degradation are two of the main causes for the loss of terrestrial biodiversity and continue at an alarming rate, especially in tropical countries. Forest biodiversity is also threatened in boreal and temperate forests, e.g., due to increasingly industrialized forest management.

In-situ conservation is a corner stone of the CBD strategy to reduce the present loss of species and habitats in all types of ecosystems until 2010 (2010 biodiversity target). Recognizing the unsatisfactory spatial coverage and degree of effectiveness of existing forest protected areas (FPA), the CBD work programme (PoW) on Forest Biodiversity calls for the creation of adequate and effective FPA networks. Together they should form a global FPA network, which can be considered as a genuine part of the overall protected area (PA) network proposed by the PoWPA. If well established and functioning, such a global FPA network can stimulate similar conservation activities in other ecosystems. It can also facilitate the management and marketing of the various benefits FPA provide to local communities, and can thus contribute to global development goals like poverty alleviation. In the following, the character of the prospective network is discussed and proposals are made for its realization under the CBD, in particular concerning FPA selection, financing mechanisms and implementation.

Scope and character of a global FPA network

The global FPA network stipulated by the CBD is usually interpreted as an encouragement to establish tangible ecological networks as well as to enhance communication and scientific exchange between FPA and Parties. Both, ecological and communicative network functions are important, complementary and necessary. Combined with the aspired financial functions of the network, they can create incentives for participation, e.g., enhanced cooperation, exchange of expertise and international recognition. Ideally, the global network should consist of regional networks because ecological corridors and stepping stones can only be created at local and regional levels. Generally, the network has to pay heed to the following aspects: The CBD has to warrant national sovereignty, all member countries with forest areas should have the chance to participate, socio-economic issues need strong consideration because most forests are important for people's livelihoods, and the network should be open to existing as well as new FPA.

Setting global priorities for forest conservation

Principally, all existing FPA are important for forest conservation and should be considered for the global network if they are committed to elementary management standards (cf. Implementation). In addition, it is crucial to identify and close the global forest conservation gaps that still exist. This section discusses selection criteria, which can be used for this purpose.

According to the CBD, at least 10% of each of the world's forest types should be effectively conserved until 2010. Besides, the PoW on Forest Biodiversity and PoWPA point out that the selection of important (forest) areas for biodiversity conservation should take into account ecological criteria as well as socio-economic aspects related to participation and management. Several science-based NGO approaches and governmental agreements also deal with the selection of priority areas for conservation and mainly use vulnerability, irreplaceability and representativeness as ecological selection criteria. Three "conservation philosophies" can be differentiated: Proactive approaches

prioritize areas of low vulnerability in order to start conservation activities before an area is actually threatened; reactive approaches aim to protect areas that are highly irreplaceable and vulnerable; representative approaches highlight regions deemed crucial for conserving a representative part of global biodiversity without considering vulnerability. All three types of approaches are important and the respective criteria should be used in a complimentary way to select forests in need of immediate protection (FINIP) in the context of the CBD.

The existing approaches for the setting of conservation priorities should be combined with a global FPA gap analysis that evaluates, which ecological forest types still have less than 10% FPA cover. The forest classification used for this analysis could be based on the WWF forest ecoregions and only FPA with IUCN category I-IV should be considered as contribution to the 10% target. The FINIP highlighted by existing approaches and the gap analysis will be relatively large forest regions that cannot be completely designated as FPA. They rather constitute ecology based guidance where new FPA are required at global level. The concrete selection of new FPA is the responsibility of individual countries and should take into account socio-economic and political criteria to choose sites where the conservation objectives can be achieved and maintained in the long-term (Figure i).

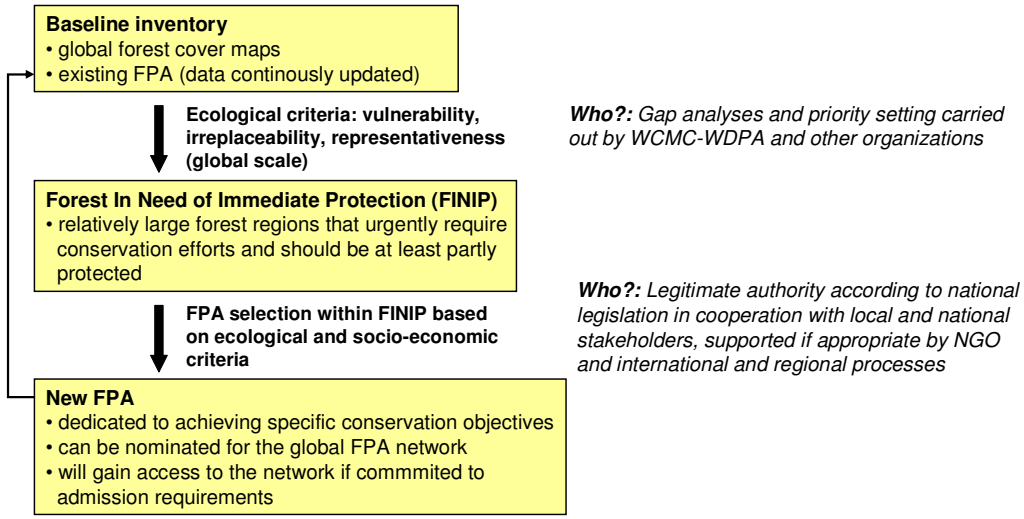

Figure i: Process of identifying and demarcating new forest protected areas

Options for Financing a Network of FPA

This section proposes a strategy for generating new and additional funding for existing and new FPA (Figure ii). The financing strategy is designed as a portfolio-approach, which allows for tapping into different sources from the private and the public sector in order to reduce the risk of underachievement. Applicable financing mechanisms should be additional to existing funds, generate synergies to other development goals and be technically feasible. Three mechanisms are proposed and it is recommended to implement them in a complimentary manner.

The first option is a virtual marketplace for ecosystem services (ES), which acts like an agent for bringing together "supply" and "demand" for ES provided by FPA. Buyers can either make direct payments or pay indirectly by transferring money to a fund, which pays for the maintenance of ES from eligible FPA. The initial focus should lie on the evolving and promising markets for carbon sequestration in forests, e.g., reducing emissions from deforestation and forest degradation (REDD) under the UNFCCC and voluntary markets, with the long-term objective to expand the spectrum to

other marketable ES provided by FPA. Buyers and suppliers can individually negotiate the terms of reference, e.g., countries could agree to pay a premium on the price of REDD-certificates if the selling country reduces its deforestation rate by increasing its FPA and improving their effectiveness.

The second option is to establish a virtual partnership platform where donors can individually or jointly "adopt" a park. It also has the objective of connecting donors and recipients but in contrast to the marketplace the partnership platform depends on the goodwill of donors. There is growing awareness that many products and their consumption contribute to today's global environmental problems. The partnership platform offers an opportunity for donors to directly commit themselves to their "responsibility" in a very visible fashion. As proposed for the marketplace, the partnership platform also offers the opportunity to pay in to a fund. This fund would allow for setting priorities on spending, e.g., according to ecological criteria (cf. Setting global priorities for forest conservation).

The third option is to put new financing instruments at work to generate additional funding, a share of which could be channelled to FPA via the marketplace and the partnership platform. There is a plethora of different instruments countries can choose, e.g., environmental taxes or auctioning different carbon credits or the introduction of a green lottery. Since legal barriers and political constraints in some countries will pose problems, such instruments could be introduced in those countries favouring this idea, with the option for others to participate at a later stage. This voluntary procedure reduces the hurdle of national sovereignty; however, it requires strong leadership of pioneer countries.

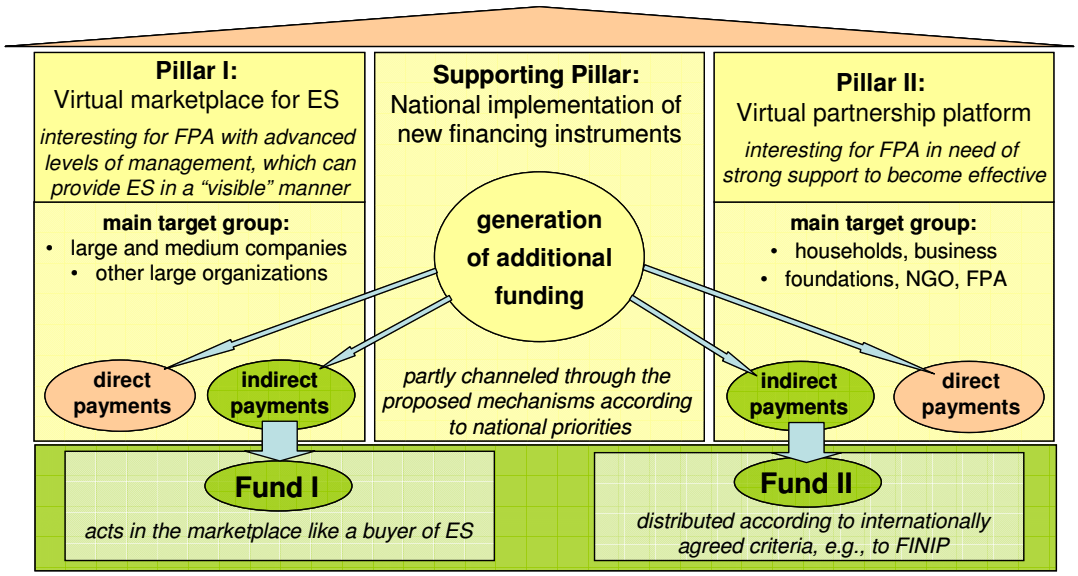

Figure ii: Proposed financing strategy for a global forest protected areas network

Implementation

Parties are invited to nominate existing and newly established FPA for the global network. Since the success of the aspired network relies on voluntary commitments, it is essential to create technical and financial incentives for Parties to nominate FPA. At the same time, the network also has to provide incentives to donors and investors for increasing their spending on forest conservation. They are likely to require a guarantee that their money is well-invested, which could be achieved by imposing respective admission requirements for existing and new FPA (Figure iii).

The global FPA network should, wherever possible, make use of the capacities of existing organizations such as the CBD, especially its Secretariat and the PoWPA, IUCN, UNEP-WCMC WDPA and GEF. To ensure that a large number of FPA will be able to join, it is considered as a "learning network" with elementary admission requirements and the objective of continuously improving FPA effectiveness in an iterative process. These requirements should include providing data on FPA location, size and IUCN categories and a statement of commitment to elementary management standards, e.g., long-term protection, sound management plans, and monitoring and reporting systems. The data provided by admitted FPA will be transferred to WCMC WDPA and will strongly support the maintenance and improvement of the FPA data sets already registered. Most importantly, these data will contribute to refining and updating the analyses for FINIP selection.

The learning character of the network offers the opportunity for PA and countries to receive advice on all aspects of network functioning (Figure iii). This is facilitated by the communicative functions of the network, i.e., by linking FPA and countries that demand for advice with appropriate organizations and experts. Regional linkages are important in this context to make the process more efficient and to account for particular regional issues.

With the admission to the network FPA can gain access to the financing mechanisms. They will ideally benefit from a mixture of different financing instruments according to their particular financing strategy developed during the admission process. Participation in the financing mechanisms should be linked to an evaluation process, which assesses whether the FPA spends the payments in an effective way, and if the FPA actually makes progress in meeting the requirements of the commitment statement signed in context of the admission process.

A crucial issue concerning implementation is up-front financing. Sufficient funding is necessary for starting the admission process and the related task of providing financial and technical advice to FPA. Such start-up funding could either come from bilateral and multilateral ODA or by loans to be repaid once the financing mechanisms are working.

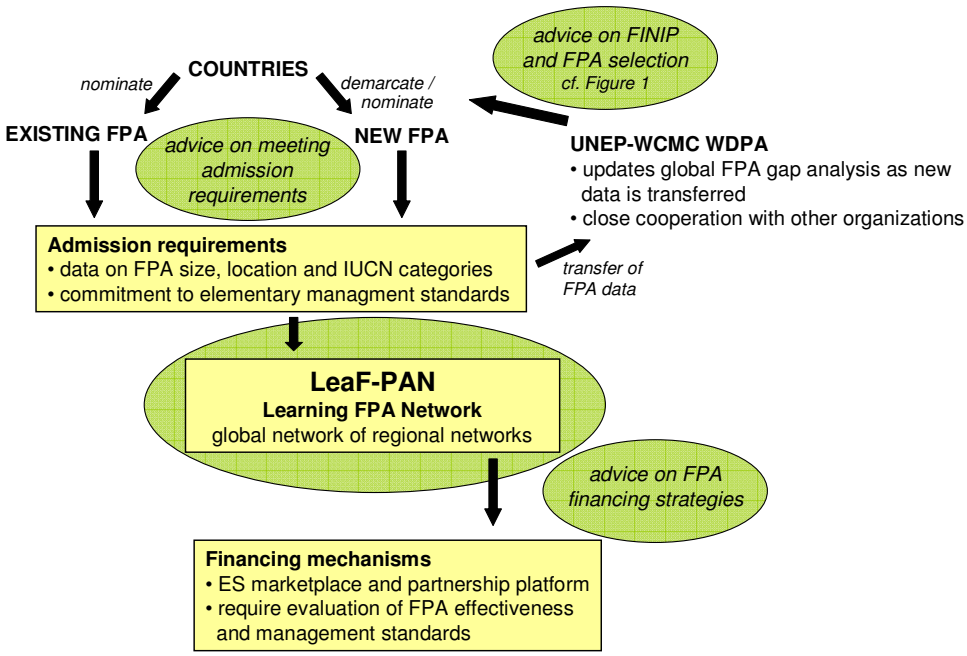

Figure iii: Functioning of the learning network for forest protected areas

Conclusion

There are many valuable concepts regarding the selection and financing of FPA but a strong political will is necessary to initialize implementation. The current international debates on forest related issues, e.g., on the value of forest biodiversity, on their role in global climate change and their inclusion in the carbon credit scheme under UNFCCC, contribute to stimulating public awareness on the global significance of forest ecosystems. This creates a "window of opportunity" for the issue of forest conservation.

The growing demand for food, biofuels and timber increases the land use pressure worldwide and will have a strong impact on the state of forests in the future. It is recognized that a global FPA network cannot compensate for the lack of responsible and sustainable use of the world's forests in general. Therefore FPA should be embedded in the wider landscape by consideration of the ecosystem approach, and well managed FPA buffer zones and corridors should be regarded as role models for the sustainable management of forests outside FPA. In addition to protecting 10% of each forest type under IUCN category I-IV until 2010, it is therefore proposed to aim at conserving a large share of the remaining forests under all IUCN categories in the long run.

COP9 offers the opportunity to strengthen forest biodiversity by using the existing awareness and knowledge to give a fresh thought to efforts to create a global FPA network. This will also be a valuable contribution to achieving the mutually recognized 2010 biodiversity target

1 Introduction

1.1 Background and objectives

The current rate of species extinction is one of the most challenging environmental problems of the 21st century. Above all, continuous forest destruction and forest degradation, particularly in tropical countries but also in boreal and temperate regions, have severe impact on biodiversity because forests harbor a great share of all terrestrial plant and animal species. Drivers and underlying causes for the loss of forest biodiversity vary from region to region, though the vast majority can be attributed directly or indirectly to human influence: Forests are destroyed by land-use changes or degraded by unsustainable resource extraction (Millennium Ecosystem Assessment 2005). They are also strongly affected by the altering environmental conditions, e.g., induced by climate change. Since forests play an important role in the global carbon cycle, their destruction leads to a significant emission of greenhouse gases (GHG), which further accelerates global warming (Gullison *et al.* 2007).

In view of the devastating global rate of species extinction, the Convention on Biological Diversity (CBD) sets the target to "*achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth*" (decision VI/26). Putting a halt to global deforestation and forest degradation plays a major role in attaining this target, but proves difficult because it is linked to complex global problems like poverty and population growth (Millennium Ecosystem Assessment 2005). Besides, most economic activities worldwide do not take into account that natural goods, e.g., forest biodiversity and the atmosphere, are available only in finite amounts. The external costs arising from the overexploitation of natural resources can be tremendous and in most cases they do not have to be internalized by the responsible actors (Costanza *et al.* 1997; Pimentel *et al.* 1997).

Protected areas (PA) are considered as a major pillar in the efforts to conserve global biodiversity. The CBD Programme of Work on Protected Areas (PoWPA) calls for the creation of "*comprehensive, effectively managed and ecologically representative national and regional systems of protected areas*" integrated into a global network, which "*provides for the connections between Parties* (…)*, for the exchange of ideas and experiences, scientific and technical cooperation, capacity building and cooperative action (…)*" (decision VII/28). The year 2010 represents the aspired milestone for the global terrestrial PA network and for achievement of the CBD biodiversity target; however, PA still face many obstacles like technical difficulties, financial constraints and lack of national and international commitment. Official development assistance (ODA) for conservation activities, presently the most important source of funding for PA, is on decline, while amount and area of terrestrial PA have increased significantly (OECD 2003). This leads to a further decrease in the already poorly equipped budgets of many PA, especially in developing countries that face extreme land use pressures. Insufficient funding and other constraints are likely to have negative impacts on the management effectiveness of PA. There is a large knowledge gap, however, because information on conservation objectives and protection status is not yet available for many PA, e.g., approx. 40% of all PA registered in the World Data Base of Protected Areas (WDPA) lack an assigned IUCN category (Herkenrath *et al.* 2007).

Forest ecosystems, which cover 30% of the global terrestrial land area (FAO 2006), require particular conservation efforts due to the wide range of ecosystem services (ES) they provide and because of the

permanent threat of deforestation and forest degradation. Currently, the great importance of forests in mitigating and adapting to climate change receives strong attention worldwide. Their function as large pools for carbon offers the opportunity to develop particular financing mechanisms for forest protected areas (FPA), which suffer from the same difficulties as PA in general. Officially, they cover more than 11% of the total global forest area (FAO 2006), but this figure is likely to include a large number of so-called paper parks, i.e., underfinanced parks failing to meet their conservation objectives.
The expanded PoW on Forest Biodiversity acknowledges the crucial role of FPA in forest biodiversity conservation and demands for the creation of *"adequate and effective protected forest area networks"* (decision VI/22). This PoW will be subject for in depth-consideration at COP9, which offers a major opportunity to review the progress made in establishing FPA worldwide and to work towards implementing the postulated FPA networks as genuine part of a general network of PA. This momentum could be used at COP9 to enhance international efforts regarding the establishment of a global FPA network and thus, to contribute significantly to the implementation of a general PA network.

Objective

The objective of the present paper is to give recommendations on the establishment of a global FPA network under the CBD. It aims to clarify fundamental issues, which have not yet been specified under the CBD, such as geographic scope and character of the global FPA network as well as expected network functions, e.g., in an ecological, communicative and financial context. The paper also makes suggestions for resolving pending questions like admission procedures for FPA and evaluation of effective management.
Chapter 2 discusses selection criteria for FPA, Chapter 3 concerns FPA financing, and Chapter 4 suggests how to initiate the network and facilitate its designated functions. Finally, conclusions are drawn concerning the role of a global FPA network as part of an overall conservation strategy. The paper draws on information from a broad range of scientific disciplines and its recommendations are based on the consideration of the current political processes. The authors hope that this paper will enrich the discussions at SBSTTA13 and COP9 and will contribute to making a step forward towards the implementation of the global FPA network.

1.2 General framework for a global forest protected area network

Recommendations regarding the global FPA network have to pay heed to some general principles and the character of the CBD:

National sovereignty: The CBD (Article 3) and the global FPA network have to respect national sovereignty and can only provide guidelines regarding the selection of forests and financing mechanisms.

Equity amongst Parties: All contracting Parties with forests should have the chance to participate in the prospective global FPA network under the CBD, so that responsibilities and benefits of the network are mutually shared by the global community. This is important to avoid an imbalance

between forest rich and forest poor countries regarding their commitments towards the FPA network. Countries with large forests, e.g., should not perceive participation in the global network as a burden with negative impacts on their economic development. In fact, the benefits of biodiversity flow to all countries of the world, while the majority of the costs for its maintenance falls on countries with very limited financial resources (McNeely and Weatherly 1996).

Benefit-sharing: Next to respecting equity amongst Parties at global level, it is important that the FPA network provides benefits to all stakeholders at local and national levels including, e.g., additional financing and technical support. The fair and equitable sharing of benefits, e.g., from the use of genetic resources, which is one of the main objectives of the CBD (Article 1), plays a key role in meeting the objective to link the goals of enhancing conservation and mutually alleviating poverty. Benefit sharing helps to mitigate burdens on local people such as restricted access to forest resources and thus creates incentives for compliance with and participation in the implementation of FPA.

Overlapping architecture of the CBD programmes: The CBD is organized in several thematic programmes and cross-cutting issues. Many CBD topics are covered by several programmes and attention has to be paid that decisions taken under these different PoW are compatible. Therefore, recommendations regarding the establishment of a global FPA network have to pay heed to the PoWPA and the PoW on forest biological diversity. Furthermore, forest ecosystems play an important role in the PoW on inland waters biodiversity, island biodiversity, marine and coastal biodiversity, and mountain biodiversity. A global FPA network should be considered as a "sub-process" under the aspired general PA network comparable to the process regarding a global marine PA network (e.g., UNEP/CBD/EWS.MPA/1/2).

2 Setting Global Priorities for Forest Conservation

The prospective global FPA network under the CBD should be comprehensive, representative and adequate (decision VI/22). This ambitious task can be facilitated by strategic conservation planning, which helps to allocate limited resources and time in the most effective way and to ensure that FPA adequately cover the earth's forest biodiversity.

All existing FPA are important for forest conservation and should be considered for the global network if they are committed to elementary management standards (cf. Section 4.2). Strategic conservation planning therefore requires a sound inventory of existing FPA. This inventory needs to be combined with the setting of global priorities to determine which forest areas still require protection and where international conservation efforts should kick off.

While Chapter 4 explains how existing FPA can join the global network, the present Chapter concentrates on the setting of global priorities to identify where new FPA are urgently needed. Priority setting does not imply that forests outside selected priority areas are negligible. It rather means that these forests are "forests in need of immediate protection" (FINIP) and that conservation efforts should be started there. This idea corresponds to the concept of ecologically and biologically significant areas (EBSA) under the CBD process on marine PA (Dearden and Topelko 2005; UNEP/CBD/SBSTTA/13/4). Ultimately all forests, located in and outside priority areas should be considered for protection or sustainable management due to their general importance for global biodiversity and due to other ES they provide, particularly their role in mitigating and adapting to global climate change.

The setting of global priorities for forest conservation is complementary to the ongoing process of conducting regional and national PA gap analyses (Dudley and Parish 2006; UNEP/CBD/WS-PA/AA/1/3). In fact, global conservation priorities can provide countries with crucial information on the importance of their forests at global level, in particular where political and ecological boundaries do not coincide and where, e.g., globally threatened species are nationally abundant or vice versa, globally abundant species are threatened at national level (Langhammer *et al.* 2007).

2.1 Guidelines developed by the CBD

Several CBD programmes provide guidelines on how to select important natural areas for conservation. While the PoWPA gives general criteria for all ecosystems, the expanded PoW on forest biological diversity and the outcome-oriented targets for forest biodiversity based on the 2010 biodiversity target (decision VIII/15) refer explicitly to forest ecosystems (Table 1).

The CBD guidelines that touch ecological aspects can be grouped under the general criteria vulnerability, irreplaceability and representativeness. Vulnerability (or threat) is the *likelihood that an area will be disturbed or destroyed in the future*. Irreplaceability (or uniqueness, rarity) is *the importance of an area for the conservation of particular species or ecosystem functions*. In contrast to vulnerability it refers to the spatial rather than the temporal dimension (Brooks *et al.* 2006; Langhammer *et al.* 2007). Representativeness measures *whether a given area contains habitat types, species assemblages, ecological processes or other natural features that are characteristic of the larger region*, a definition taken from the process on marine PA under the PoWPA

(UNEP/CBD/COP/8/INF/39). The CBD guidelines lack, however, precise definitions and threshold levels for these criteria.

Table 1: CBD guidelines for the selection of important areas for biodiversity conservation (PoW: Programme of work, PE: Programme element, FA: Focal area)

	PoW Forest Biodiversity (PE 1, Goal 3)	**PoW Protected Areas (PE 1, Goal 1.1)**	**Outcome-oriented targets (FA 1, Goal 1)**
Ecological criteria			
Low vulnerability		*large, intact or relatively unfragmented, e.g., large remaining forest areas*	
High vulnerability	*endemic and threatened species*	*areas under high threat, most threatened species*	*most threatened and vulnerable forest ecosystems*
Irreplaceability		*highly irreplaceable*	*areas of particular importance to forest biodiversity*
Representativeness	*comprehensiveness, representativeness and adequacy … relative to forest types, biologically and geographically representative*	*comprehensive and ecologically representative*	*at least 10% of each of the world's forest types, comprehensive, … and ecologically representative*
Other criteria			
Participation	*full participation and … respect for the rights of indigenous and local communities, and other relevant stakeholders*	*full and effective participation of indigenous and local communities and relevant stakeholders*	
Management	*adequate and effective*	*effectively managed, benefit indigenous and local communities*	*effectively managed*

2.2 Approaches developed by NGO and intergovernmental agreements

Several NGO and intergovernmental initiatives developed science-based guidelines for identifying the natural environments with highest conservation priority from a global perspective. Although most of them consider not only forests but the earth's biodiversity as a whole, all highlight forest ecosystems as important conservation priorities.

Approaches initially developed by NGO in cooperation with scientists and research institutes are mainly based on ecological selection criteria and can be grouped into three main categories, i.e., proactive, reactive and representative (Table 2). Proactive approaches prioritize areas of low vulnerability that still harbor large and undisturbed ecosystems. They recommend starting conservation activities before a region is actually threatened. In contrast, reactive approaches prioritize areas of high vulnerability and, mostly, high irreplaceability. The notion is that conservation measures are most crucial in the biodiverse regions on earth, which are under immediate threat of destruction. Representative approaches have the objective to highlight all regions considered as important for conserving a representative part of global biodiversity. Sites are primarily selected according to their high degree of irreplaceability, without consideration of site vulnerability (Brooks *et al.* 2006).

Most NGO approaches screen the planet for ecological conservation priorities and intend to draw attention to regions that urgently require more detailed assessments and conservation planning at local level. These priority areas can be of vast size and are usually highlighted without considering their, often socio-economically constrained conservation potential. Key Biodiversity Areas, AZE, and IBA are the only NGO concepts that prioritize concrete sites at local level with the aim to achieve legal protection for these areas[1]. Site identification under these three approaches is still ongoing and relies on cooperation with national governments and many other organizations.

Table 2: NGO approaches for the selection of priority areas for conservation (modified Brooks et al. 2006)

	proactive (vulnerability low)	**reactive (vulnerability high)**	**representative (vulnerability not considered)**
irreplaceability high	High Biodiversity Wilderness Areas (HBWA) (Mittermeier *et al.* 2003)	Biodiversity Hotspots (BH) (Mittermeier *et al.* 2004) Global Gap Analysis of Protected Areas (GGA) (Rodrigues *et al.* 2003) Alliance for Zero Extinction (AZE) (Ricketts *et al.* 2005) Key Biodiversity Areas (KBA) (Eken *et al.* 2004; Langhammer *et al.* 2007) Important Bird Areas (IBA) (Birdlife International 2006)	Global 200 (Olson and Dinerstein 2002) Megadiversity Countries (MC) (Mittermeier *et al.* 1997) Centres of Plant Diversity (CPD) (Davis and Heywood 1994-1997) Endemic Bird Areas (EBA) (Stattersfield *et al.* 1998)
irreplaceability not considered	Wilderness Areas (WA) (Mittermeier *et al.* 2003)[2] Last of the Wild (LW) (Sanderson *et al.* 2002) Frontier Forests (FF) (Bryant *et al.* 1997) Last Intact Forest Landscapes (LIFL) (Greenpeace no year)	Crisis Ecoregions (CE) (Hoekstra *et al.* 2005)	

The intergovernmental agreements (Table 3) consider not only ecological criteria during the selection process but also criteria on site manageability, i.e. measures of the likelihood whether conservation objectives can be achieved and maintained in a given site. Sites are admitted 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 mechanism although they have in common that the responsibility for selecting, proposing and managing the sites lies primarily with the contracting Parties.

[1] AZE sites and IBA constitute particular subsets of KBA (Schmitt 2007).

[2] The LW approach is classified as proactive because it puts an emphasis on low vulnerability. At the same time it also has a representative aspect, because the least vulnerable areas are selected for each biome and realm on the land surface.

Table 3: Examples for global intergovernmental agreements concerning protected areas

Global agreements	
Biosphere Reserves (UNESCO Man and the Biosphere Program)	www.unesco.org/mab/BRs.shtml
UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage	http://whc.unesco.org/ http://whc.unesco.org/en/forests/ www.unep-wcmc.org/wh/reviews/forests/
Wetlands of International Importance (Ramsar Convention)	www.ramsar.org

2.3 Suitability of existing approaches for selecting forests in need of immediate protection (FINIP) under the CBD

The presented NGO approaches use the same criteria for setting global conservation priorities as does the CBD, namely vulnerability, irreplaceability and representativeness. The particular definition and the weighting of these criteria can differ considerably, however, and as a consequence the highlighted conservation priorities can be rather similar or divergent[3]. Yet, the approaches should not be regarded as contradictory but as complementary methodologies for setting comprehensive conservation targets at global scale. Adequately combined, they constitute a valuable basis for specifying the general selection guidelines given by the CBD (Table 1).

Selection criteria should not necessarily require excessive data input on particular species because scientific data are very scarce for many forest ecosystems especially in the tropics, e.g., accurate species lists, information on threatened species (IUCN Red Lists) and knowledge on species' life-cycles. Habitat-related data such as canopy cover and size of unfragmented forest are often easier to collect and can constitute a valuable substitute for missing species data. In the following it is discussed, which of the existing approaches seem appropriate to highlight FINIP with reference to CBD criteria:

Low vulnerability (proactive approaches)

The location of the *large remaining forest areas* on earth (Table 1) is already well-known as pointed out by proactive approaches that highlight natural areas with low vulnerability (Table 2). These approaches employ a habitat-related definition of vulnerability and measure it in terms of human influence on the area, e.g., by taking into account the amount of original habitat remaining (LIFL, WA) and / or human population density (WA, LW). The forest areas highlighted by different proactive approaches show substantial overlaps and are usually very large.

Last Intact Forest Landscapes is considered as the most relevant approach because it is a forest-specific analysis based on recent satellite data from 2001 and 2002. It shows that large and intact forest landscapes are mainly located in the tropics and the boreal zone. The LW can be used to complement the LIFL. The LW treat "wilderness" in a relative way pointing out the relatively wildest areas by biome and realm on the land surface. This bears the advantage that all forest ecosystems are taken into account, and that relatively natural forest areas considered as too fragmented for inclusion under LIFL also receive attention.

[3] for a detailed description of the approaches see (Spergel 2001)

High vulnerability and high irreplaceability (reactive approaches)

The CBD considers high vulnerability in terms of *endemic and threatened species* as well as in terms of *areas under high threat*. Regarding irreplaceability, a particular species- or habitat-related definition is not mentioned (Table 1). The two criteria are considered jointly by most of the reactive approaches due to the notion that conservation measures are most urgent in natural areas that are both, highly irreplaceable and highly vulnerable (Table 2).

Reactive approaches measure vulnerability of a natural area directly in terms of original habitat lost (BH) or in a more indirect way by considering the occurrence of globally threatened species in that area according to IUCN Red Lists (e.g., KBA, AZE, IBA) (Table 4). Irreplaceability can be measured with reference to general species richness and endemism, e.g., area contains at least 1,500 endemic plant species (BH). It can also be defined according to the importance of an area for particular species, e.g., site holds, on a regular basis, a significant proportion of the global population of one or more restricted-range species (KBA) or has exceptionally large numbers of migratory and congregatory species (IBA).

Table 4: Biological targets used by the approaches listed in Table 2

	Biological target									
	Habitat / ecosys-tem	Species								
		Plants	Conifers	Mam-mals	Birds	Amphi-bians	Reptiles	Freshw. fish	Arthro-pods	Gastro-pods
Proactive approaches										
FF	x									
LIFL	x									
LW	x									
WA	x									
HBWA	x	x								
Reactive approaches										
CE	x									
BH	x	x								
KBA		x		x	x	x	x	x	x	x
AZE			x	x	x	x	x			
GGA				x	x	x				
IBA					x					
Representative approaches										
Global 200	x	x								
CPD	(x)	x								
MC		x		x	x	x	x			
EBA					x					

Species-related approaches are constrained by the fact that they require large data input, which may be available only for certain taxa and regions (Table 4). Besides, they often put an emphasis on species rich tropical forests, leaving other forest ecosystems unconsidered. Biodiversity Hotspots, which use a habitat-related definition of vulnerability, call attention to relatively large areas. Where species data are available, this approach could be complemented by KBA, AZE and IBA to select concrete sites for

PA within the large BH. Although the reactive approaches were not developed for forest ecosystems in particular, the majority of, e.g., BH and AZE sites, is located in forested regions.
The GGA is considered as important background information on global gaps in PA but puts strong emphasis on the tropics and uses rather complicated algorithms to calculate site irreplaceability based on particular species and conservation targets. Crisis Ecoregions assume that the greater the disparities between habitat loss and protection the greater the threat to biodiversity and ecosystem functioning. Although the habitat-related analysis is appropriate for forests, it is questionable whether figures for percent area converted and percent area protected are ecologically meaningful and comparable regarding different forest types.

Representativeness (representative approaches)

Representativeness is an ambiguous criterion because its nature strongly depends on the examined geographic units and ecological targets. A crucial question is when representativeness is achieved, e.g., which ecosystems adequately represent all global ecosystems, or which number of species is representative for the global species pool. Further issues concern the size PA need to have in order to contain a viable proportion of the ecosystem or the species' population they should represent, and the number of replicate areas required.
The CBD clearly states that a global FPA network should *cover at least 10% of each of the forest types* (Table 1). None of the existing approaches, however, uses the term representativeness in this respect, which may be related to the fact that a universally accepted and ecologically meaningful global forest classification system does not yet exist. Some approaches highlight irreplaceable natural areas in relation to broad fairly homogeneous biogeographic regions (LW), in relation to characteristic habitat and ecosystem features within each biogeographic region (Global 200), or in relation to national boundaries (MC). Others do not use predefined geographic units but select regions considered as important for conserving a representative part of global biodiversity of plants, i.e., area contains at least 1,000 plant species or 100 endemic plant species (CPD) or birds, i.e., area encompasses the overlapping breeding ranges of two or more restricted-range land birds (EBA). 83% of all EBA are located in forests mostly in the tropics and subtropics, which often have not only high bird diversity but also high numbers of species from other plant and animal groups.

Other criteria

The PoW of the CBD emphasizes the need for *adequate and effective management* of PA (Table 1). In fact, "s*cientific criteria by themselves contribute little to conservation and sustainable use of biodiversity, and have to be supported and enacted by effective administrative, management, and governance systems"* (UNEP/CBD/COP/8/INF/39). This implies the importance of socio-economic and political criteria for selecting sites as PA where the likelihood of achieving and maintaining the respective conservation objectives is high. All of the intergovernmental agreements and some of the NGO approaches provide background information and examples on how to incorporate these criteria in the selection and delineation process for PA (Table 5). They also developed guidelines for PA management.

Table 5: Management and legal requirements for protected areas stipulated by approaches listed in Tables 2 and 3

Approach	Management requirements	Protection requirements	Management guidelines
NGO initiated			
Centres of Plant Diversity	discrete area with common management issues	-	-
Important Bird Areas	site where conservation objectives can be reasonably achieved	internationally agreed priority for conservation action; aim to get all sites under (inter-)national legal protection	Strategies for the conservation and management of IBA in Africa 2005-2015
Key Biodiversity Areas	site that can be, potentially, managed to safeguard the biodiversity they shelter	types of conservation tactics that are appropriate may vary with socio-economic context	CI regional programs
Intergovernmental agreements			
Ramsar	wise use of site	Parties have to establish nature reserves in wetlands, whether or not they are included on the Ramsar List	Wise Use Resource Centre; Ramsar Handbook Series for the Wise Use of Wetlands
World Heritage	sites should have a management plan	adequate long-term legislative, regulatory, institutional or traditional protection	WH Centre Project: "Using WH to build support for protected areas"
Biosphere Reserves	appropriate zonation and management policy	nominated by national governments, core zones require legal protection	according to BR nomination form; advice from MAB National Committees

2.4 Proposal for action

This proposal for action suggests a strategy for deciding where new FPA are needed most urgently in the context of a global FPA network under the CBD (for the role of existing FPA, cf. Chapter 4). It incorporates existing approaches considered suitable for FINIP selection (cf. Section 2.3) and points out issues for further research.

"*Priorities reflect value judgments, so it follows that they flow from prior decisions about what matters most*" (Johnson 1995). Since the overall objective of the global FPA network is the conservation of forest biodiversity, the application of ecological criteria should be the first step in identifying and closing forest conservation gaps (Figure 1). A two-fold selection process is recommended: In a first step, ecological selection criteria such as vulnerability, irreplaceability (cf. Points (i) below) and representativeness (cf. Point (ii) below) should be used at global level to identify relatively large FINIP. In a second step, new FPA should be demarcated within these large FINIP taking into account the socio-economic situation in the area (cf. Point (iii) below).

In line with the CBD principle of national sovereignty, the responsibility for demarcating FPA remains with the individual countries. Any selection criteria for FPA can be merely understood as decision-making guidance and support to governments and should complement, not replace appropriate national and regional concepts. In this respect, global maps that highlight FINIP are scientific advice and are not intended to interfere with decisions concerning forests on national territory. Besides, the resolution of those maps is not sufficient for determining the exact boundaries of particular FPA and

thus leaves room for interpretation at national level. Countries are invited to nominate newly demarcated FPA for the global network but they will only gain access if committed to elementary admission requirements (cf. Chapter 4.2).

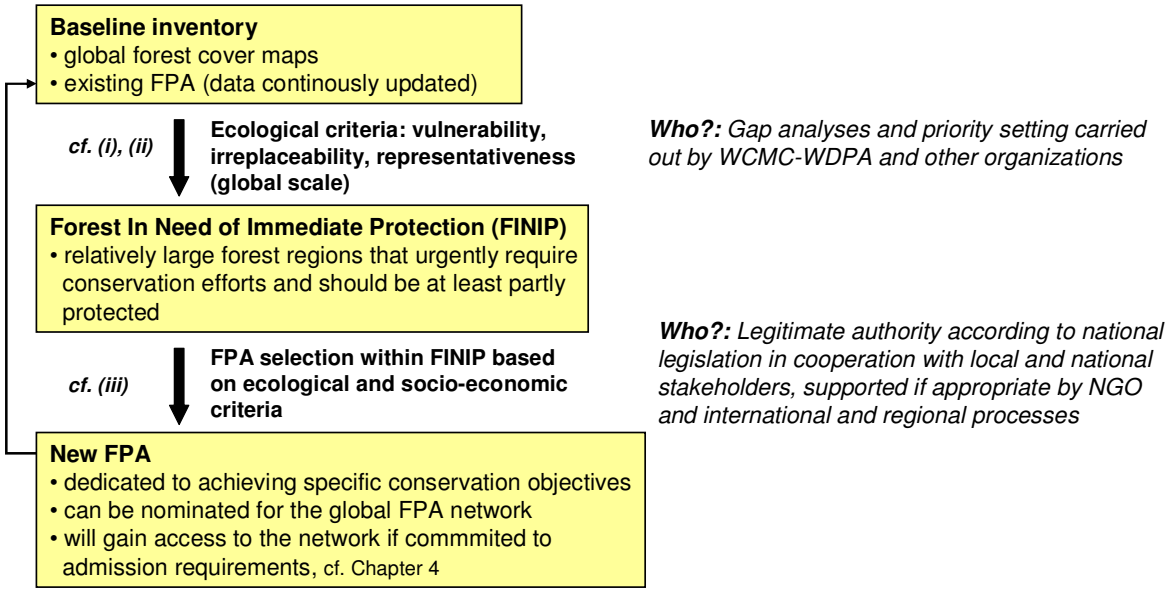

Figure 1: Process of identifying and demarcating new forest protected areas (FPA); for further explanation cf. Points (i) to (iii) in the main text

(i) FINIP identification based on vulnerability and irreplaceability

The CBD clearly states that *large intact*, *highly threatened* as well as *highly irreplaceable* forest areas should receive special conservation attention (Table 1). Thus, FINIP selection should not solely concentrate on, e.g., either intact or threatened forests, but should use different selection approaches in a complimentary way. As discussed in Section 1.3, some of the existing approaches are highly useful for determining FINIP in line with these CBD requirements. Biodiversity Hotspots can provide information on highly vulnerable and highly irreplaceable forest regions at global level, while the LIFL highlight vast and relatively untouched forest areas. Centres of Plant Diversity and EBA can point out irreplaceable forest areas with exceptionally high plant and endemic bird diversity. In addition, these approaches can be combined with a global FPA gap analysis for forest types by overlaying the respective maps as explained in Point (ii).

The FINIP highlighted by BH, LIFL, CPD and EBA vary considerably in size and can cover several 100,000 km^2. In some cases, it might be feasible to turn them into very large FPA, e.g., by creating extended buffer zones where sustainable forest uses are allowed. However, socio-economic and political constraints will mostly not allow for the creation of such large FPA. The FINIP are therefore considered as potential areas for FPA only; Point (iii) proposes out how to select concrete sites for FPA within FINIP.

In a nutshell:
Suitable approaches for selecting FINIP based on vulnerability and irreplaceability

- Biodiversity Hotspots (high vulnerability and high irreplaceability)
- Last Intact Forest Landscapes (low vulnerability)
- Centres of Plant Diversity and Endemic Bird Areas (high irreplaceability)

(ii) FINIP identification based on representativeness: Global FPA gap analysis for ecological forest types

The latest decision of the CBD calls for the protection of *at least 10% of each of the world's forest types* until 2010 (Table 1). This objective could be seen as a starting point for action regarding a global FPA network. The representation of all ecological forest types in the global FPA network has the advantage to give a chance to all forested countries to participate in the prospective network. This is important to avoid that only countries harboring extremely species-rich and / or large intact forests are challenged with forest conservation.

Officially, 11% of the global forest area is already protected (FAO 2006), but this analysis does not differentiate between ecological forest types and includes all FPA with and without IUCN management categories assigned. A thorough assessment of the progress made towards achieving the CBD 10% target requires a globally accepted ecological forest classification system. The WWF forest ecoregions could serve as basis for the development of such a system because they are currently the most detailed ecological forest types at global scale and are widely accepted (Olson *et al.* 2001). In addition, the assessment should take into account the IUCN category system that assigns management categories to PA according to their management objective (Appendix 1).

Protected areas with IUCN categories I-IV have relatively strict guidelines regarding human settlements and resource use, while PA with IUCN categories V and VI allow for a wider spectrum of forest uses, which can modify species composition and structure of the original forest vegetation. It is therefore common practice to consider only FPA with IUCN categories I-IV as contribution to the conservation of natural forests (e.g., Mittermeier *et al.* 2004; Patry and Ripley 2007). Currently, there is still a large number of PA without IUCN categories because translation of national protection categories into the IUCN system often proves a difficult task. This situation is expected to improve, however, due to many ongoing international efforts for amelioration and simplification of the IUCN system (cf. Chapter 4).

We suggest that the assessment of the CBD 10% target should only take into account FPA with IUCN category I-IV, while recognizing that FPA of all IUCN categories are generally important for the global network. Additional conservation activities, however, are needed most urgently in forest types where FPA with IUCN category I-IV cover less than 10% (representation gaps, Dudley and Parish 2006). Similar to the FINIP under Point (i), the highlighted forest types will be very large regions. They cannot be completely designated as FPA but should be considered as potential areas for the upgrading and enlargement of existing FPA or the demarcation of new FPA.

Since quite a large number of forest types is probably not adequately covered by FPA, the question arises in which of these additional conservation activities should be started first. To answer this question, the global gap analysis can be combined with FINIP identification based on vulnerability

and irreplaceability by overlaying maps of forest types and the approaches presented under Point (i). Special attention could be given to forest types that are inadequately covered by PA and overlap with BH, LIFL, CPD or EBA. A consortium of UNEP-WCMC, WWF and WRI is currently working on the suggested global gap analysis for FPA and the overlaying of maps with conservation priority areas (Appendix 3).

In the long-run, it will be important to carry out an ecological gap analysis to evaluate whether the 10% target is an adequate objective for all forest types. Since biodiversity is not evenly distributed across all ecosystems, some forest types may require more ambitious conservation targets than others to secure long-term species survival and ecosystem functioning. Another problem could be that, although 10% of a forest type is protected, the FPA do not adequately represent its ecological character, e.g., because they are too small, have the wrong shape or lack key species (Dudley and Parish 2006; Langhammer *et al.* 2007; Rodrigues *et al.* 2004).

In a nutshell: Recommended criteria for selecting FINIP based on representativeness

- forest types where existing FPA (IUCN category I-IV) cover less than 10%, especially globally rare forest types, those with globally outstanding phenomena, and forest types that overlap with CPD, EBA, BH and LIFL; and
- in the long-run, forest types where the 10% target is achieved but not sufficient from an ecological point of view.

(iii) FPA selection within FINIP

As stated under Points (i) and (ii), FINIP are unlikely to be designated as FPA as a whole due to their vast size. They can range from virgin forests to forests with high human impact in accordance with the employed selection criteria, e.g., low or high vulnerability. Depending on the particular environmental and socio-economic condition in the FINIP area, newly designated FPA will have different management objectives.

Ecology based decisions on the exact location of FPA within FINIP could be supported by existing approaches such as LW, KBA, AZE and IBA. The LW is a very flexible approach, which can be modified to pinpoint the most vulnerable and the most intact forest areas within a given biogeographic unit. In addition, it is possible to adapt the LW threshold levels for vulnerability to the particular environmental situation within a forest type and to the aspired size of the potential FPA. Key Biodiversity Areas, including AZE and IBA, pinpoint highly vulnerable areas of particular species richness that are of manageable size. In contrast to LW, the required data for these species-related selection processes are not yet available worldwide, although substantial progress in KBA data collation has been made (Langhammer *et al.* 2007). The global approaches should not replace but complement existing ecological selection criteria at regional level, e.g., NATURA 2000 in Europe (Appendix 2).

Many forest areas provide the livelihood for indigenous and traditional people, and forest exploitation can make an important contribution to national economies. The effectiveness of FPA will therefore strongly depend on the degree of support they gain at local, regional and national level. As a consequence, the selection process for FPA within FINIP must also consider socio-economic issues in

order to designate sites where the conservation objectives have a chance to be achieved and maintained in the long-term.

The CBD points out that this can be realized, e.g., by incorporating *all relevant stakeholders* in the selection process and by making sure that the prospective FPA will *benefit indigenous and local communities* (Table 1). The combination of different degrees of protection, i.e. core and buffer zones with different IUCN categories, within one PA can contribute to mitigating conflicts regarding conservation objectives, on the one hand, and socio-economic interests, on the other. Yet, disputes often cannot be fully settled through a negotiation process and thus financial compensations for FPA designation are important.

National and regional initiatives for forests and PA (Appendix 2) can play a strong role in selecting and advocating FPA locally, because they are well acquainted with the particular environmental and socio-economic settings. In addition, global programs like UNESCO BR and the NGO-initiated KBA and IBA constitute valuable examples for initiating concrete conservation activities in a bottom-up process because they rely strongly on support and expertise at local, regional and national levels. The FPA selection process should take into account existing guidelines on participative management and PA effectiveness, aspects to be considered already before not only after FPA delineation (e.g., Beltrán 2000; Borrini-Feyerabend *et al.* 2004; Chape *et al.* 2005; Dudley *et al.* 2005; Hockings *et al.* 2006; WWF 2004). Although NGO and other international programs and initiatives can support FPA demarcation technically and scientifically, the official FPA demarcation has to be done by legitimate authorities according to the country's legislation (Figure 1).

In a nutshell: FPA selection within FINIP should rely on

ecological criteria

- LW → relatively vulnerable or relatively intact sites
- KBA, IBA, AZE → sites with high vulnerability and high irreplaceability
- ecological criteria developed at national and regional levels

further aspects to be considered

- socio-economic situation in the area
- participative planning approach
- existing IUCN and CBD guidelines on PA effectiveness
- expertise of international and regional initiatives, e.g., UNESCO BR, KBA, IBA and those in Appendix 2

(iv) Consideration of global climate change

Although global climate change will have a significant impact on biodiversity and distribution of forests worldwide, neither the CBD nor the presented approaches mention the consideration of climate issues as a selection criterion for FPA. One problem certainly is that the effects of climate change on particular forest types cannot yet be predicted exactly. Following the precautionary principle, international efforts should focus on creating more, bigger and better connected FPA to allow for species migration under altering environmental conditions. Further studies are needed to locate

climatically stable forests, i.e. forest refugia during the ice ages or arid periods, which could be used to create FPA in areas where forests are likely to remain even under a changing global climate (Eeley *et al.* 1999; Kirkpatrick and Fowler 1998; Meave *et al.* 1991; Watson *et al.* 1998). Concerning mitigation of climate change, particular conservation attention should also be given to carbon rich forests such as forested peatlands (Zoltai and Martikainen 1996).

In a nutshell: Consideration of climate change under a global FPA network

- apply precautionary principle: Creation of more, larger and better connected FPA
- FPA should cover climatically stable forests and forested peatlands

3 Options for Financing a Network of FPA

3.1 Trends and needs in FPA financing

Presently, public expenditures are by far the most important source for conservation in general and PA in specific. Tighter public spending aggravates the existing budget shortfalls of FPA and is due to global economic liberalization and deregulation, as well as the shift of official development assistance (ODA) towards social goals and poverty alleviation; these goals should be addressed jointly with environmental and sustainable development issues (Verweij and de Man 2005). As a consequence to the existing deficits, the mobilization of sufficient finances is probably the most urgent challenge concerning the international efforts in reducing the current loss of biodiversity. The necessity for increased funding to foster conservation, especially in developing countries[4], is pointed out by many decisions and meetings of the CBD, as well as other international processes.[5] The CBD repeatedly asked donors and the international community to support the implementation of its PoW by enhanced financing and technology transfer, and therefore called for the generation of new and additional funding from public and private, domestic and international sources.

Studies on the overall costs for the creation and effective management of a representative global network of PA estimate an annual need of several billion US $ (Costanza *et al.* 1997; Emerton *et al.* 2006; James *et al.* 2001). Although such figures should be used carefully due to their estimation character, they are valuable for getting an impression of what dimensions of input (in terms of funding) are necessary if the agreed goals of the CBD and its PoW are to be met. Recognizing the need for raising additional funds and tapping into new sources, a sound and comprehensive financing strategy for a global FPA network must be developed in order to improve conservation effectiveness of FPA and to make progress in reaching the 2010 biodiversity target.

The scope and the character of the aspired network determine the necessary funding for successful and effective implementation. In any case, proposals for a financing strategy have to be flexible concerning potential new sources and should hence rely on several sources. It should aim at both, increasing the available funding and improving the effectiveness of conservation activities in FPA. These aspects are related, because donors and investors can be convinced more easily to get engaged if a certain degree of quality for their donations, respectively investments, can be assured. Funding for conservation in general and FPA in specific is needed for different purposes:

- Active costs include those for the acquisition of land, management, enforcing laws and restrictions; further costs will arise for putting the planed network at work, e.g., for endowing institutions and building capacities.
- Passive costs are mainly compensation payments for opportunity costs that arise for local stakeholders if restrictions are imposed on their access to natural resources in core and buffer zones of FPA.

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

[5] This part of the paper focuses on the question how to tap into new financing sources; related questions on the fair and equitable distribution of funds are given thought in Chapter 4 (Implementation).

The applicable financing mechanisms should meet certain criteria. They should

- be additional to existing funds and not replace them,
- include private capital,
- produce synergies to other development goals, especially with respect to poverty alleviation, mitigation and adaption to climate change, and avoid perverse incentives,
- be transparent and technically feasible and
- follow the user-pays principle (polluter or beneficiary). Those actively using resources should be involved in bearing the costs of their maintenance.

Last but not least, it is important for any suggested mechanism to have a political quorum in order to have a chance of being put into practice. The lack thereof is the main reason why many of the innovative and sometimes very promising mechanisms have not been implemented until today.

In a nutshell:

- A significant increase of funding is needed to cover the active and passive costs for effective conservation in FPA and for establishing a global network.
- Since public sources are on decline, private sources should be tapped into as well.
- The demand for ES and conservation projects by private investors and donors is likely to increase if the quality of conservation in FPA and thus the "attractiveness of the product" can be improved.

3.2 Overview of financing mechanisms

There is a plethora of publications which review and evaluate different traditional options and innovative instruments to raise new and additional financial resources for FPA (Emerton *et al.* 2006; Gutman 2003; 2007; UNEP/CBD/WG-RI/2/4; Verweij and de Man 2005); however, financing through these mechanisms "does not simply happen – in order to deliver, they need a major boost" (Gutman 2007). Some of the mechanisms relate directly to the great variety of goods and ecosystem services (ES) provided by forests or to the costs of their depletion, e.g., payments for ES or specific carbon credits. Other innovative financing instruments like international taxes are applicable for conservation activities in general, in and outside all types of PA. Differences mainly exist with respect to who will actually be paying for conservation (governments, private households or businesses) and to the motivation for these payments (voluntary, charging for ecosystem goods and services or regulatory mechanisms). The mechanisms can be categorized in three groups: External financing, market-based instruments and generation of other funding for conservation (Emerton *et al.* 2006). This chapter presents the most prominent examples for each of these groups.

External financing sources

Traditionally and until today external financing sources, mainly ODA and domestic government budgets, contribute the major share of the total financing spent for conservation in general and FPA in specific. Bilateral ODA often focuses on specific countries and regions with respect to economic and

political interests as well as to historical ties. It is less bureaucratic and has fewer restrictions than multilateral assistance, e.g., through GEF or the World Bank. Multilateral funding engages predominantly in larger geographic contexts and tends to be inflexible, timely and complicated. So-called "debt-for-nature-swaps" are special type of bilateral development assistance (DfNS); they combine the objectives of poverty alleviation and conservation through debt relief. [6]

Other external financing mechanisms are multilateral and private environmental or conservation trust funds which denote rising significance and can also be administrated by NGO. These independent funds are often financed through national government grants and international donor agencies with the objective to ensure stable financial flows for PA (park funds) or to support suitable projects of local actors (grant funds). Further important external sources are donations from philanthropic foundations, corporate entities or private people. They are esteemed to have a large potential for additional conservation funding due to increasing awareness which eventually leads to more corporate responsibility and corresponding spending.

Market-based instruments

Market-based instruments (MBI) which generate cash flows by charging for goods and ecosystem services (Bräuer et al. 2006). They have in common a decentralized character through their impact on market signals by which market distortions resulting from the public good character of PA products and services are to be reduced (EEA 2006). Shifting the costs and responsibilities associated with use of natural resources to the polluter, respectively the user, is believed to be more efficient than "command and control mechanisms" (UNEP 2004b). Examples for MBI can be payments for environmental services (PES) like carbon sequestration or watershed protection (Spergel 2001; UNEP 2004a). PES can refer to a variety of mechanisms with different degrees of commercialization; (Wunder 2005) defines them as a voluntary transaction, in which a well-defined ES or a land use likely to secure that service is 'bought' from a supplier, provided he secures its further provision. PES collect voluntary payments from the beneficiaries and channel them to those maintaining ecosystems. Although PES are a wise and promising instrument to correct the market distortions associated with using natural resources, there are several challenges and concerns:

- There is a need for clearly defined property rights and political support.
- There might not be a large market for some ES, because the direct benefits are primarily provided at regional or local level.
- Appropriate measuring, valuing and targeting of the ES provided is necessary in order to determine fair and reasonable prices.
- PES must be well designed to avoid perverse incentives and ensure equitable benefit sharing.
- It is not possible to guarantee the permanence and stable delivery of ES, especially under changing climatic conditions.

[6] DfNS: An investor buys the public debt of a country at a discount and swaps it with the government for a commitment to fund, e.g., PA . These swaps can target bilateral or commercial debts; payments are used to finance local conservation trust funds which then distribute grants to the respective PA.

Besides carbon sequestration and watershed protection, there are other forest-related MBI such as entrance fees for parks and concessions for sustainable resource extraction, e.g., activities in accordance with the ecosystem approach like sustainable harvesting of wood, hunting, or the collection of medicinal plants (i.e., bio-prospecting); although often limited to specific local areas, they are mechanisms which can attribute a price on these goods with an immediate value for the beneficiaries.[7] Concluding, the creation of new markets and pricing for ecosystem goods and services is believed to be a very powerful instrument for future financing of FPA, because it contributes to the internationally agreed objectives of the CBD.

Generating other funding for conservation

The third category aims at generating funding for conservation by creating stronger incentives for sustainable land use, e.g., through fiscal instruments. While MBI focus on attributing a price to ecosystem goods and services, this group of mechanisms does not clearly relate to the value generated by the ecosystem but uses other means to raise money and distribute it for the designated purpose. The difference to external sources is the intention to generate revenues and to simultaneously steer the behaviour of both, consumers and producers in the sense of sustainable development, e.g., through fiscal instruments which influence the price of goods and services. Thus costs of unsustainable activities are increased while environmentally sound practices are rewarded by incentives and higher income. Means are imposing special taxes or subsidies, respectively removing them if they foster activities competing with conservation (EEA 2006). Fiscal reforms with a focus on removing environmentally harming subsidies are considered to have an enormous potential to decrease negative impacts of human-induced depletion and pollution of natural goods. In fact, the total amount of funding necessary for significantly enhanced biodiversity conservation in FPA amounts to a small fraction of what is spent worldwide on such subsidies in the land use sector (OECD 2003). Another approach is that countries charge companies for the extraction of non-renewable natural resources from forests because it affects FPA directly and indirectly and may cause tremendous collateral damages for the environment; it is often non-domestic multinational companies exploit fossil fuels and minerals without bearing the costs for the recovery of the environment. Given the market value of these resources, a tremendous amount could be generated and channeled directly into FPA.

In a nutshell:

- There is a plethora of traditional and innovative mechanisms that can be implemented or need significant up-scaling for raising additional funds.
- Mechanisms differ concerning their technical and political feasibility; national concerns often prevent simple and effective solutions, e.g., international taxes or subsidy reforms.
- Attributing a price to ES is an effort to correct the market distortions which are one of the main underlying causes for unsustainable land use.

[7] However, regulations on the extraction of resources from FPA are appropriate only in buffer zones of PA; they bear a potential for leakage effects and should be considered carefully.

3.3 Alternatives for action

Given the decline of public spending, it is recognized that new financing mechanisms should have a stronger focus on the private sector. In fact, public awareness and the willingness to support conservation are currently increasing due to the continuing depletion of natural resources and the resulting environmental problems. For instance, there are many companies that commit themselves to their 'corporate responsibility', e.g., through the UN Global Compact initiative, in acknowledgement that their behavior and products contribute significantly to today's global environmental problems. However, public sources like ODA and national budgets are likely to remain the most significant source for financing FPA and should therefore be an important part of a financing strategy as well. Although in most cases they will not meet the demanded criterion of being additional to existing resources, they can help to increase the overall volume of the proposed mechanisms.

In the following, three options for a financing strategy are proposed that take these considerations into account. The mechanisms tap into different sources and differ concerning the motivations for payments and donations. They vary with respect to their advantages, challenges, volume and likelihood of implementation. The proposed mechanisms have in common that up-front financing will be necessary for covering overhead costs and putting them at work. These costs could be covered either by ODA or government loans, which could be repaid by a share of the future proceeds.

(i) Virtual marketplace for ES provided by FPA

The first option is a virtual marketplace for ES provided by FPA, e.g., carbon storage, watershed protection, conservation of biodiversity or avoidance of erosion. While the benefits of many of these ES are local and global, the burden (in terms of costs) for their maintenance falls on relatively poor countries and the people living in the respective areas. Many less developed countries do not have the means to adequately cover these costs; others exploit their ecosystems to foster a rapid economic development. In some places regional or national PES-schemes have been installed to cope with this problem, but most of them remained at pilot stages and did not yet succeed in scaling up. In the light of increasing global environmental problems and in recognition of the finiteness of natural resources, however, there is a growing demand for such ES; at the same time it is difficult to find reputable suppliers for businesses and other actors willing to pay for ES.

The aim of the virtual marketplace is to act like an agent which brings together supply and demand of different forest-related ES provided by FPA and thus to correct these deficiencies.(Figure 2). The marketplace primarily targets at companies and countries which, in awareness of the value of ES and the spirit of corporate responsibility, want to compensate for their consumption of natural resources. It helps to connect specific FPA as "suppliers" which offer well-defined ES to actors in search for conservation projects; it provides visibility of the actors' engagement and allows for voluntary payments for the provided ES on basis of the individually agreed terms. Part of this mechanism should be a fund to be fed by payments of actors not willing or not in the position to engage in direct negotiations with the suppliers. This fund buys and sells ES from eligible FPA and can offer access to additional financial sources for FPA which do not succeed in attracting investors. Furthermore, the fund allows setting priorities and to create incentives for beneficiary FPA to fulfill requirements concerning their management.

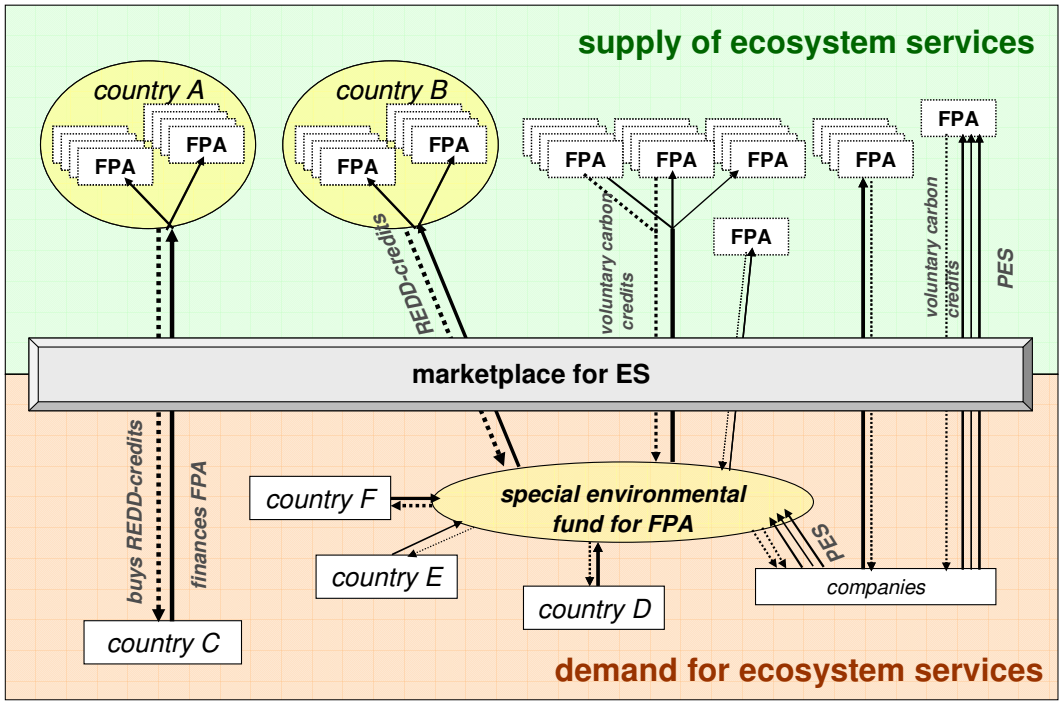

Figure 2: Virtual marketplace for ecosystem services (ES) provided by forest protected areas (FPA)

Specific land uses may provide several ES which can be considered as 'by-products' if payments for one specific service are sufficient to provide additional funding for the production of other services like conservation of biodiversity (Engel *et al.* 2007). Thus it is proposed to use the emerging forest-related carbon markets as a "vehicle" for the initiation of the marketplace (box). Carbon sequestration is an ES which provides global benefits, and rapidly evolving markets have been installed successfully. On the international level a mechanism is proposed under the UNFCCC which aims at conserving forests and reducing greenhouse gas emissions from deforestation (REDD) in developing countries. Although it is left up to the countries on how they achieve progress in this matter, improving the effectiveness and enlarging FPA can be a suitable tool to generate credits which are to be bought by industrialized countries. Since the proposed marketplace enables individual terms of reference, a premium on the price of REDD-certificates could be paid if the selling country chooses a national REDD-strategy in which FPA play a major role. The long-term objective of the marketplace should be to expand the spectrum to other services like watershed protection, biodiversity (bio-prospecting) or scenic beauty (ecotourism) in view of developing and future emerging markets. The flexibility of the marketplace concerning individual agreements allows for innovative approaches with respect to the most visible and marketable ES.

Similar marketplaces already in place are, e.g., the Katoomba Group's ecosystem marketplace[8] or the recently installed "CDM bazaar" of the UNFCCC. Successful implementation of national PES-schemes can be found in Costa Rica (Pagos por Servicios Ambientales), the USA and in Mexico. The proposed fund of the marketplace should follow the portfolio-approach of FONAFIFO which is the Costa Rican implementing agency of the national PES-scheme: It relies on bundling various sources like international donors, carbon buyers, local industry interested in water quality and flows, and is

[8] http://www.ecosystemmarketplace.com/

additionally fed through a national fuel tax and a planned water tariff. Payments are directed to land owners in return for adopting specific land use practices, with more than 90% of current payments allocated to conserving forests (Engel *et al.* 2007).

Box: International and voluntary carbon markets

1. Reducing Emissions from Deforestation and Degradation (REDD) under the UNFCCC

In contrast to afforestation and reforestation projects under the clean development board CDM, there are few opponents to including REDD in a future climate regime; the idea of is to leave it up to the individual country to develop strategies on how to reach a reduction of their deforestation rates. This national approach aims at reducing leakage effects. Measures could be, e.g., to improve forest legislation and law enforcement, to install fire monitoring systems or to enlarge FPA, respectively secure their effectiveness. Although the international climate regime has not yet decided upon how this mechanism for enhanced forest conservation should be designed, it is likely to be installed within the next years. While any reduction of deforestation is generally beneficial for biodiversity, certain forests types need immediate attention with respect to their climate and habitat functions, e.g., forested peatlands. However, depending on the adopted forest definition and the scope of such a mechanism there are risks of creating perverse incentives for biodiversity. Despite these risks, currently there is a broad consensus amongst the experts of this UNFCCC process that a future REDD-mechanism should not make reference to other objectives of related processes such as those of the CBD or UNFF, in order not to further complicate this process. In order to avoid such perverse incentives, it is necessary on the one hand to carefully design the mechanism; on the other hand, the opportunities the market offers to ensure synergies between the forest-related processes should be used. The marketplace would facilitate this by making use of the possibility for buyer and seller countries to act as strong players and constitute the conditions on how a reduction of deforestation is to be achieved, e.g., industrialized "demand"-countries buy REDD-credits only if a share of the revenues is used for financing FPA activities. Pilot activities as planned by the World Bank might be recognized as early action, although the technical and political modalities are not in place yet and credits will not be traded before 2013, the beginning of the 2nd commitment period – provided the parties of the UNFCCC can agree on a post-Kyoto agreement.

2. Voluntary markets for carbon certificates

In 2006, voluntary carbon markets already had a volume of more than US $ 100 Mio. (Hamilton *et al.* 2006). Their rapid growth is believed to continue due to the overwhelming demand of companies and private people who whish to offset their 'carbon footprint'. Motivations of companies to measure and compensate their carbon emissions are voluntary emission reduction targets in the context of their corporate responsibility, gaining experience in carbon markets, learning about the associated regulatory requirements, marketing reasons ('carbon neutral products and services') as well as attracting potential investors. Although from the methodological point of view it is more complicated to develop and manage land use projects than energy or technical projects, there are many investors seeking for such projects. The explosive increase of demand results in shortcomings on the supply side and has led to significant malpractice due to the lack of standardized certification and verification procedures. Those are necessary to avoid dubious projects or multiple sales of the same credits. Tapping into voluntary carbon markets will thus require reliable partners, a well-accepted certification scheme and corresponding verification procedures.

It is important to point out the fact that, next to the advantages, concerning this mechanism there are still many challenges to be overcome (Table 6). Though promising, it is important to secure quality standards to ensure the credibility of such certificates and avoid a flooding of the market with carbon certificates. REDD-certificates will furthermore compete with all other forms of emission reduction. This creates a need for ambitious emission reduction targets of the relevant greenhouse gas emitting countries.

In contrast to the voluntary markets, credits for REDD activities are a prospect future market with a large potential for conservation activities; the success of this mechanism depends on the outcome of the complicated negotiation process on a post Kyoto-agreement. In order initiate early action the World Bank supports capacity building and pilot activities with its new FCPF; in this context involved donor and recipient countries could make use of the proposed marketplace.

Table 6: Advantages and challenges of the proposed marketplace for ecosystem services (ES)

Advantages	Challenges
• Making use of the rapid growth of existing voluntary carbon markets, and the demand for other ES like watershed management is expected to develop.	• Quality of the ES requires certain standards, monitoring, verification and certification → the more accurate, the higher the transaction costs and the less flexible is the mechanism.
• The user (polluter / beneficiary) pays.	• Will take time to establish and evolve, "learning-by-doing".
• New and additional capital includes different private sources.	• Need to avoid malpractice, e.g., simple rent-seeking strategies.
• Individual terms of reference and standards can be agreed, e.g., regarding management, monitoring, reporting, certification etc.	• Need to ensure participation of and benefit for all local and indigenous people living in and around protected areas.
• Flexibility: Direct negotiations between suppliers and buyers enable individual agreements, e.g., premiums on carbon credits, additional payments, long-term contracts etc.	• Need to solve methodological questions, e.g. concerning carbon credits the definition of baselines, handling the permanence problem etc.
• Direct connection of actors enables investors to show where and how they take on responsibility and commitments.	• Focus on one specific ES as a "carrier" bears the risk of creating perverse incentives for other ES, risk of market fluctuations.
• Indirect interaction via the fund enables to channel funds according to priorities, e.g., to extremely threatened / underfinanced areas.	• Need for institutional structures are capable of managing the marketplace efficiently, need to avoid (more) bureaucratic structures.

In a nutshell: The virtual marketplace for ecosystem services (ES)

- aims at bringing together supply and demand for ES generated by FPA (main focus on governments and businesses).
- is flexible because direct payments and terms are agreed individually between the FPA and investors.
- increases the visibility of engagement, which is important for investors who want to take commitment in the context of their corporate responsibility.
- offers actors who do not want to engage in direct interaction with suppliers of ES to pay into a fund that allows for channeling financial resources according to defined priorities.
- should initially focus on different carbon markets; according to the demand, payments for other ES can be included.

(ii) Virtual partnership platform for FPA

A virtual partnership platform intends to bring together donors and recipients in a visible manner. Donors can individually or jointly 'adopt' a park and support it financially, as well as by providing technical assistance (Figure 3). Donors can be countries through traditional bilateral ODA or DfNS, but also philanthropic foundations, businesses, NGO, or private people. Therefore regarding its structure, the partnership platform is similar to the proposed marketplace for ES. The main difference is the motivation for the payments and the sources to be tapped into, because the platform does not aim at correcting market distortions or attributing a price to ES: The partnership platform depends on good-will donations and intends to channel them efficiently to the recipients.

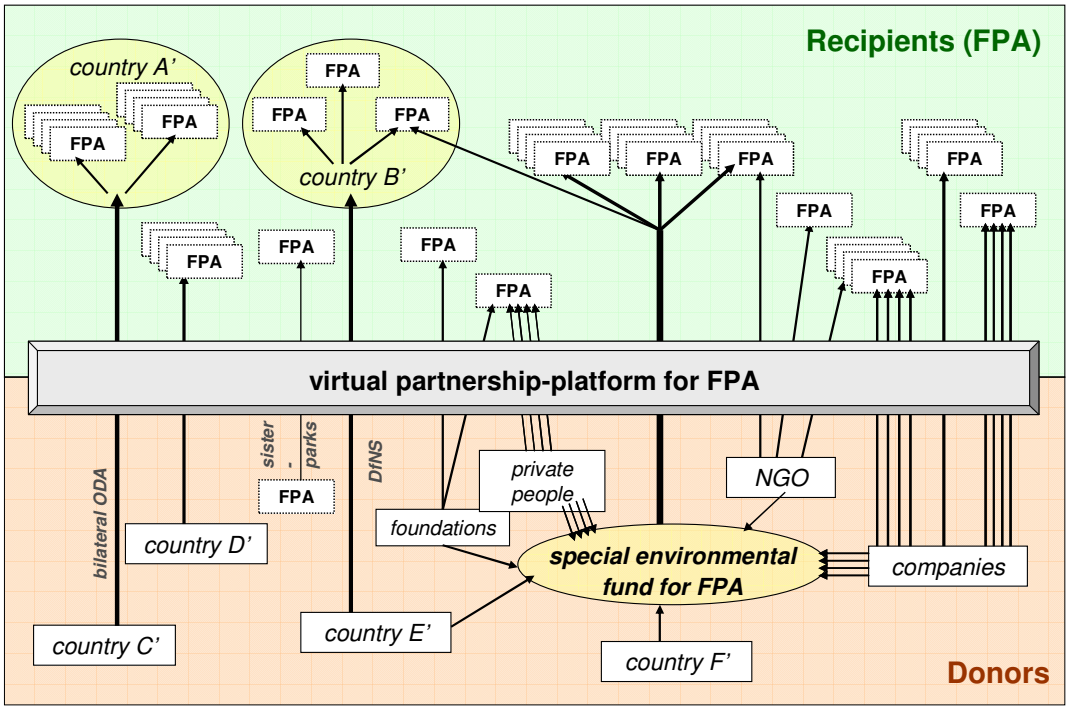

Figure 3: Virtual partnership platform for forest protected areas (FPA)

As in the marketplace the donors can choose either to support FPA directly or to feed a fund, which supports eligible FPA that lack funding and finances new FPA. Furthermore the concept of sister-parks could be integrated into this platform, by which a well-funded park can 'adopt' and support an underfinanced FPA, e.g., via technical assistance.

The added value of this platform is the same as in the suggested marketplace: By joining the platform and receiving additional funds FPA commit themselves to a set of management standards, which helps improving the quality of the financed activities. Such a proof of quality and the visibility of engagement should stimulate the willingness of donors to support FPA through this mechanism. However, next to the advantages there are some important challenges to be taken into consideration (Table 7). One important aspect is that this mechanism will not only attract additional funding but will also distract resources from other projects depending on international aid and donations.

Table 7: Advantages and challenges of the partnership platform for forest protected areas (FPA)

Advantages	Challenges
• Flexibility: The mechanism addresses many different sources in the private sector; in-kind contributions (e.g., ODA, DfNS) are possible.	• Need to ensure participation and benefit of local and indigenous people living in and around FPA.
• Geographic reference enables to show where and how responsibility is taken; visibility increases the attractiveness for donors.	• Need to establish institutional structures capable of managing such a partnership platform efficiently.
• Governments can decide on individual mechanisms, e.g., taxes, and channel the generated funds to FPA directly via the platform or indirectly through the fund.	• Good-will character of payments; dependence on fluctuating public awareness for environmental and biodiversity issues.
• The fund allows tapping into private sources like households, businesses and others; funds can be channeled according to well-defined priorities.	• Open also for traditional sources like ODA; need to avoid replacement of traditional sources and to ensure additionality for conservation in FPA.
• Voluntary, no obvious political obstacles.	• Competition with other demands on ODA.

In a nutshell: The virtual **partnership platform**

- links recipient FPA to different kinds of donors like governments, private households, businesses, FPA ("sister parks") philanthropic foundations etc.
- is based on good-will payments of the donors.
- provides visibility of engagement.
- is very flexible because it allows governments to implement instruments at national level that will not have a chance for international implementation.
- should incorporate a fund which collects money from those actors who do not want to engage in direct partnerships.

(iii) Implementation of new financing instruments

There are many proposals by experts and scientists for innovative national and international financing instruments for conservation in general and specifically PA (Gutman 2007). These instruments face tremendous political hurdles regarding their implementation or require strong up-scaling if they shall become a significant source for funding FPA. In the following, three promising instruments are introduced. Section 3.4 proposes an approach on how these instruments can be implemented and used to generate additional funding for FPA.

Environmental taxes could raise large amounts of additional finances. Many suggestions have been made for taxing certain products or services and using the revenues to feed a fund for FPA, in recognition of the enormous potential such taxes could have. Depending on the design and what is taxed, such an instrument could meet all the mentioned requirements like application of the polluter-pays-principle, equity considerations as well as contributing to other development goals. Thus, a global agreement on taxes related to international environmental topics would create a sound mechanism for FPA funding. For instance, with respect to deforestation, an agreement on taxing beef and biofuels produced from palm oil, corn and soy on former forest areas could be negotiated. If the price for these goods increases, unsustainable production will become less attractive; at the same time the tax generates funds to protect natural resources. Proposals on global taxes (e.g., the so-called Tobin tax) have failed so far due to the monopoly of sovereign countries to impose taxes. However, an international framework agreement, which leaves room for the individual design of the nationally imposed taxes might overcome some of these hurdles (cf. section 3.4). Further efforts should be undertaken to impose such instruments, preferably on products that have a significant negative impact on the environment.

Another innovative proposal is to *auction a share of the carbon certificates* issued under the UNFCCC (Assigned Amount Units, AAU). The advantages are that funding is generated indirectly in accordance with the polluter-pays-principle and that the international market for carbon credits will be stimulated. At the same time, funds are generated which can be used for environmental purposes. Another option for European countries would be to auction a share of the EU allowances (EUA) issued under the European Trading System (ETS). For instance, Germany intends to do so under it's recently launched Life Web Initiative; approx. 10% of the 482 Mio. EUA will be auctioned. Despite the advantages, there are also some challenges to be considered:

- According to the price, which is influenced by many factors, this auctioning has the potential to raise a high double digit million figure; however, the more money such a mechanism will deliver the more it will whet the appetite of different stakeholders for using the funds for their objective, e.g., on expanding renewable energies. A clear commitment on the spending is necessary, if a share of this source is to be used for forest conservation
- Auctioning will only lead to substantial flows of money if the market is not over-allocated and if reduction targets are set ambitiously enough to create a real demand. Allocation at no charge and in excessive amounts has lead to a price decline in the 1st trading period of the European Trading Scheme (ETS) from € 30 to less than € 0.10 per t CO_2 within one year.

Given the technical and political constraints of a global tax agreement and the auctioning of carbon certificates, a more promising idea appears to be the introduction of a *global green lottery*. Facing a

global market of $ 126 billion for more than 170 public lotteries in 2001, (Addison and Chowdhury 2003) suggest to either introduce versions of a global green lottery under national lottery systems or to establish a single global lottery which is sold worldwide and administrated by one organization. A green lottery has the advantage that government funds are not needed and it offers tremendous potential due to the large and growing market for lotteries. Using a share of the proceeds for environmental purposes will attract many private people, because they act beneficently and have the chance of winning at the same time. A success story in practice is the Dutch charity lottery which has outstanding visibility and gained reputation over the almost 20 years of its existence. Half of the revenues (€ 300 million in 2006), were channeled to charity institutions (Koch-Weser and Jacobs 2007). Problems associated are legal barriers and moral concerns in some countries.

The three proposed innovative international financing instruments have different advantages, respectively face certain challenges (Table 8).

Table 8: Advantages and challenges of different innovative international financing instruments for forest protected areas (FPA)

Mechanism	Advantages	Challenges
Environmental taxes	• Polluter-pays principle. • Tremendous potential for new funds and simultaneous correction of market distortions.	• No political quorum. • Technically difficult to implement (institutions, legal basis), possible only on a national basis.
Auctioning a share of the UNFCCC carbon certificates (AAU)	• Indirectly in accordance with the polluter-pays principle. • Linking of related global environmental problems (climate change and loss of biodiversity). • Pragmatic approach, technically feasible.	• No political quorum, possible only on a national basis. • Uneven sharing of the burden (only Annex-I countries that have ratified the Kyoto Protocol). • Uncertain future development of the international climate regime.
Global green lottery	• Large potential. • Appears politically feasible because no government funds are needed. • Similar mechanisms successfully implemented at national level.	• Up-front financing needed. • Legal constraints and moral concerns in some countries. • Need for transparency and well planned marketing.

In a nutshell: Implementation of new financing instruments, e.g.

- A global agreement on an environmental tax, which uses a share of the proceeds for FPA.
- Auctioning a share of carbon credits – either AAU issued under the UNFCCC, or carbon credits of other markets like, e.g., EU allowances of the ETS.
- A global green lottery, which follows the example of national charity lotteries.

3.4 Proposal for action

This section proposes a strategy on how to raise new and additional financing for a global network of FPA. If implemented, it offers considerable potential for added value by enhancing quality and effectiveness of forest conservation. Sufficient additional funding connected with technical advice to meet the management requirements will be the major incentive for FPA participation and is likely to reduce the political hurdles of implementation. This proposed financing strategy has the character of a flexible portfolio-approach which, similar to that suggested at UNFF7 for SFM (Lakany *et al.* 2007), allows for in-kind contributions as well as for putting new mechanisms at work. Ideally all three mechanisms presented in Section 3.3 will be installed as "pillars" of the financing strategy, because they address different sources and thus reduce the risk of underachievement (Figure 4).

The first pillar of the strategy is a marketplace which serves as a frame for PES. Efforts to establish international PES-schemes face many difficulties and raise concerns with respect to political aspects (e.g., ecosystems that expand over national borders), property rights and poverty alleviation. These points may vary depending on the concerned region or country and should be taken into account in the design. The proposed marketplace mechanism does not determine the rules for the trade – its purpose is to bring together supply and demand of ES generated by FPA. The suppliers (countries, respectively FPA) and buyers who demand ES generated and maintained by FPA can negotiate the terms for funding and the price for the respective ES. The second pillar, a partnership platform aims at linking donors and recipients in a visible fashion which enables to show where and how actors assume responsibility. The difference to the marketplace is the good-will motivation of donors for payments. Thus it addresses a greater variety of different actors. The third pillar addresses governments which should strengthen the mechanisms by implementing new instruments to generate additional funding for FPA; a share of these funds and other existing sources for conservation should be channeled through the proposed marketplace and the partnership platform

It will certainly take some time to install and promote marketplace and partnership platform, especially if these mechanisms should rely mainly on international demand - supply mechanisms and private donations, respectively. At least in the beginning, these mechanisms will strongly depend on the integration of public sources, e.g., in the form of in-kind-contributions. The implementation of new financing mechanisms at national level can contribute to raise additional national funding, a share of which could be channeled through marketplace and partnership platform. This would also help to deal with the challenge that most new international financing instruments, which address public sources, failed to be put in practice so far because concerned countries denied their approval. It is therefore recommended to aim at implementing new financial instruments at national level first and consider implementation at global level as a long-term objective.

This strategy offers a maximum of flexibility because countries can implement such mechanisms domestically to generate funding to directly finance FPA or feed the proposed funds. Alternatively, countries could try to reach an agreement on imposing one of the proposed instruments and implement it on a voluntary basis. Both options, however, require strong leadership of pioneer countries which pave the way for others to join at a later stage. Especially environmental taxes would be a most desirable tool for furthering conservation because they can directly target at correcting market distortions which lead to unsustainable land uses. Such a tax could be raised at national level, and

while the majority of the raised money would remain in the national budget, a share should be directed to FPA. Auctioning of a share of the AAU-carbon certificates issued under the UNFCCC or pursuing the introduction of an international green lottery seems politically more feasible and has thus better chances to be implemented.

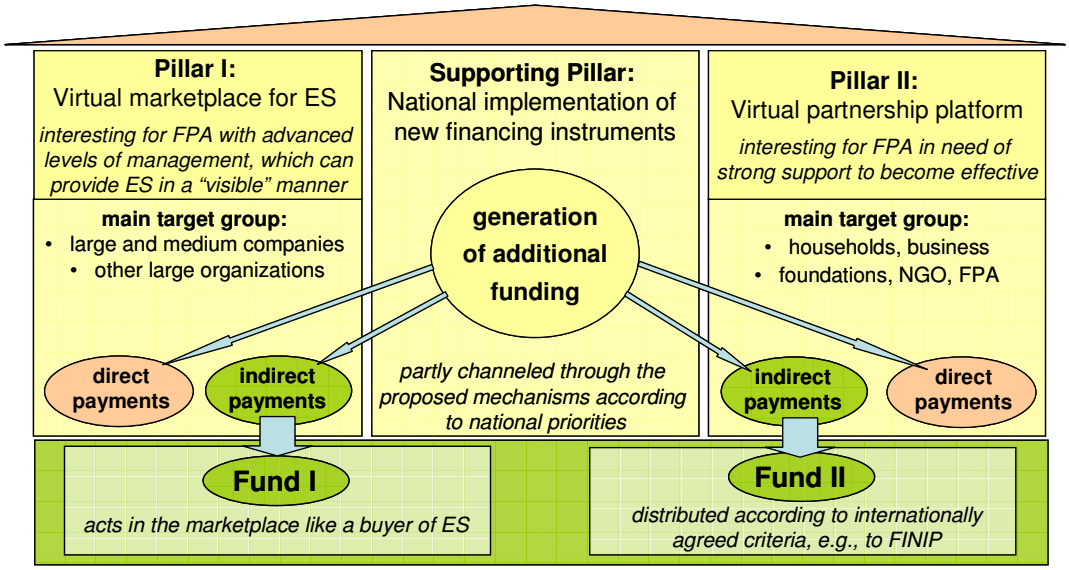

Figure 4: Proposed financing strategy for a global forest protected areas network (FPA)

In a nutshell: A financing strategy

- should be flexible and allow different actors, including governments, to choose and apply those instruments which are most suitable to them.
- It is recommended to implement all of the proposed mechanisms as a portfolio-approach to avoid under-achievement and consider them as pillars of a comprehensive financing strategy.
- Implementation of the new financing instruments should be implemented at national level and the funds be channelled through the proposed marketplace or the partnership platform. Alternatively, countries could try to reach an agreement on imposing one of the proposed instruments and implement it on a voluntary basis. Both options require

4 Implementation

4.1 Character and scope of a global FPA network

The aspired global FPA network should be established as a genuine part of the general PA network under the CBD (cf. Chapter 1). Its criteria and mechanisms therefore need to be designed in a way that they can be adopted for other ecosystems if they prove to be successful in practice. As pointed out before, forest ecosystems are a good starting point for taking the lead in the formation of an overall PA network due to their exceptional biodiversity, their large area cover and the strong attention they currently receive in the context of global climate change.

The establishment of the global FPA network should, as much as possible, rely on the capacity of existing global organizations and structures in the field of forest conservation and PA, i.e., the CBD, especially its Secretariat and PoWPA, IUCN, UNEP-WCMC WDPA and GEF. With respect to the sovereignty of national states, its establishment should follow a bottom-up approach as commonly applied by other intergovernmental agreements on PA, e.g., UNESCO WH, Ramsar and UNESCO BR. This implies that participation is voluntary and that the realization of the network is an iterative process. The responsibility for designating and managing FPA remains with the national states, which will be invited to nominate existing as well as new FPA for the network[9].

The prospective network will facilitate three crucial functions: Communication, ecological connectivity and financial support. The enhancement of communication between FPA, countries and relevant organizations is important because it can help to increase financial and technical cooperation as well as exchange of information and expertise at national, regional and global levels. Making use of synergies at all levels is necessary to avoid double work and to use limited financial resources in the most efficient way. The network should therefore draw on the expertise of relevant NGO and cooperate with international organizations working in the field of forest conservation and sustainable forest management, e.g., CPF, FAO, FSC, IMFN and ITTO. It is also important to make reference to related international policy processes, conventions and agreements, e.g., REDD under UNFCCC, UNCCD, UNFF, and FLEGT.

Since the network has the objective to facilitate ecological connectivity between FPA, it will ideally consist of more closely knit regional FPA networks (cf. Section 4.2). Such a nested composition of the global network underlines the necessity to integrate and to cooperate with, e.g., existing regional network initiatives (Appendix 2), the regional branches of the IUCN-WCPA and the different coordination and support activities at (sub-) regional levels proposed by the PoWPA.

The amount of FPA joining the global network is linked to the available financial resources, because additional funding will be a major incentive for Parties to nominate FPA. At the same time, potential donors and investors, who can provide this additional funding, are interested in well-reputed projects and conservation activities as well as in standards and evaluation procedures, which ensure the success of their investments (cf. Chapter 3). If a growing FPA network is successful in enhancing the supply side of forest conservation by improvement of FPA effectiveness and visibility, it is also likely to stimulate the demand for forest conservation and the willingness to pay for it. This leads to the

[9] In the special case of FPA located on private land, the respective landowner or the coordinating organization, e.g., Conservation Land Trusts, should be responsible for FPA nomination.

question whether the global network should adopt certain requirements concerning FPA protection status, management and monitoring that can help to guarantee a high degree of effectiveness and quality of forest conservation. Basically, there are three different options for networks with different levels of admission requirements: A basic network that can be joined by any FPA, a prestigious network for FPA that meet advanced standards of forest conservation, and a learning network, which has elementary admission standards and the objective of continuous improvement of FPA effectiveness in an iterative process (Table 9).

Table 9: Admission requirements and potential attractiveness of three different network options: Basic, prestigious and learning network

	Admission requirements for FPA	**Potential number of eligible FPA**	**Potential for attracting additional funding**	**Incentive for improving FPA effectiveness**
Basic network	None	High	Limited	Limited
Prestigious network	Advanced	Low	Relatively high	High for already advanced FPA but low for others
Learning network	Elementary; aims at gradually improving FPA effectiveness	Growing over time depending on admission requirements	Expected to grow over time	High due to additional financing options

A prestigious network would certainly attract considerable international attention and funding, but would enable only a limited number of outstanding FPA to join. This concept does not appear to be appropriate because the FPA network aims to include FPA of all Parties with forests, should be a positive push for the overall PA network and a major contribution to the 2010 target. In contrast, the basic network would include a large number of FPA but funding options are limited and there would be little incentive for improving FPA effectiveness.

It is therefore recommended to establish a learning network with elementary admission requirements for FPA (cf. Section 4.2) and the objective of continuous improvement of FPA effectiveness in an iterative process. The learning character of the network is emphasized by the possibility for FPA and countries to receive advice on all aspects of network functioning, i.e., from FPA selection, throughout the admission process until participation in the financing mechanisms (Figure 5). Advice is facilitated by the strong communicative function of the network drawing on the expertise of relevant organizations and processes at national, regional and global level as mentioned above.

Visibility of the network could be improved by awarding a label to FPA that are admitted to the network. The proposed label could also help to promote sustainably produced goods and services generated by these FPA. Such marketing efforts can help to provide additional income for people depending on the natural resources of FPA core and buffer zones and can thus be considered as a contribution to poverty alleviation. If the learning network is successful in maintaining its standards and improving FPA effectiveness over time, its members will increasingly benefit from additional financial resources as well as international recognition and cooperation.

In a nutshell: The FPA network should be a "Learning Network", which

- is a genuine part of the overall PA network stipulated by the PoWPA,
- constitutes a role model for the protection of other ecosystems,
- serves financial, communicative and ecological functions,
- has a nested network structure (global network of regional networks),
- cooperates with and integrates relevant organizations and processes,
- invites governments to nominate existing and new FPA on a voluntary basis, and
- has elementary admission requirements with the objective of continuously improving FPA effectiveness.

4.2 How to join the network

The formation of the global FPA network is considered as an iterative process of increasing FPA membership, identifying remaining global forest conservation gaps and diversifying financing mechanisms over time. As access to additional funding should be a major incentive for FPA and countries for participation in the network, it is important to implement the financial mechanisms of the network in a process parallel to FPA admission. The following aspects are important:

(i) Nomination of existing and new FPA

Countries are invited to nominate existing and newly designated FPA for the network, which will gain access if they fulfill certain, elementary admission requirements (Figure 5). Existing FPA of all IUCN categories are crucial starting points for the network and are important for global forest conservation whether located within FINIP or not. Similarly, all newly designated FPA are important for the network irrespective of their IUCN category and their particular location.

FPA nomination is a voluntary process and it is up to the individual countries, which and how many FPA they propose for the global network. However, as the financing mechanisms of the network are evolving, there will be the possibility to allocate special financial support for the improvement or designation of FPA in selected FINIP areas (cf. Chapter 2).

(ii) Advice to FPA and countries during the admission process

The learning character of the network offers the opportunity for PA and countries to receive advice on all aspects of network functioning (Figure 5). This is facilitated by the communicative functions of the network, i.e., by linking FPA and countries that demand for advice with appropriate organizations and experts. Regional linkages are important in this context to make the process more efficient and to account for particular regional issues (cf. Section 4.1).

FPA that are admitted to the global network should also receive assistance in developing individual financing strategies depending on their budgets, the additional financing needed and the particular environmental and socio-economic settings in the area. In addition, WCMC WDPA and other appropriate organizations can help in selecting new FPA in FINIP areas, which will be eligible for special financial support provided by the financing mechanisms of the network.

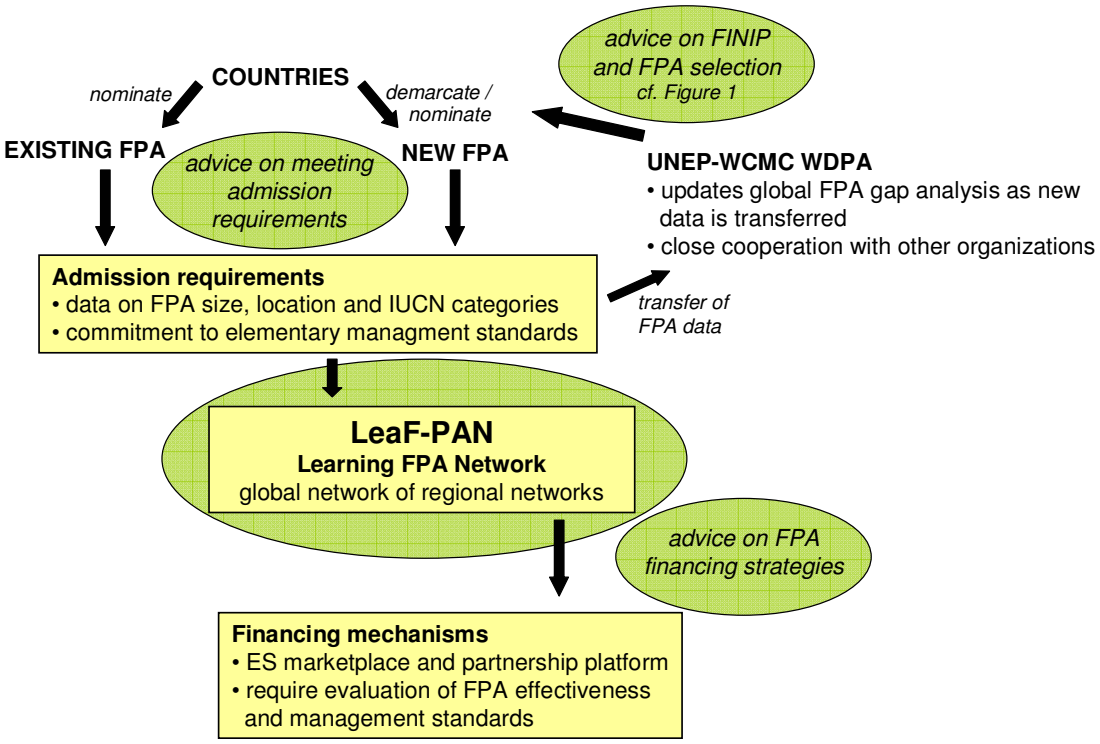

Figure 5: Functioning of the learning network for forest protected areas (FPA)

(iii) Admission requirements

Both, existing and new FPA, need to fulfill elementary admission requirements in order to join the global network (Table 10). These requirements should be developed in more detail in close cooperation with relevant international organizations, e.g., IUCN-WCPA and UNEP-WCMC, and under consideration of existing CBD guidelines (e.g., Dudley *et al.* 2005).

One precondition for FPA for joining the network should be the provision of data on location, size and IUCN categories. The data provided by admitted FPA will be transferred to WCMC WDPA[10] and will strongly support the maintenance and improvement of the PA data sets already registered. Most importantly, these data will contribute to refining and updating the global FPA gap analysis for forest types (cf. Chapter2) on a regular basis. The results of this gap analysis help to identify FINIP that can be used in setting priorities for the distribution of available financial resources.

The reporting of adequate IUCN categories for FPA is not an easy task, because they often do not correspond with national PA categories and countries usually do not have separate data files for FPA. The IUCN categories are currently under revision, however, and a renewed system will probably be presented at the World Parks Congress in fall 2008. Based on this revised system, countries could be asked to develop aggregation rules for the translation of national PA management categories into IUCN categories. The reporting is also facilitated, e.g., by guidelines on forest and FPA definition

[10] UNEP-WCMC supports CBD implementation under an agreed framework with the CBD Secretariat; in its PoWPA, the CBD invites Parties to "*participate in the World Database on Protected Areas maintained by UNEP-WCMC*" (decision VII/28).

(Appendix 1). In addition, WCMC WDPA is currently developing a peer review process for IUCN category verification and a reporting mechanism for PA on private land.

In line with the assigned IUCN categories, FPA will have different conservation objectives and will thus require different management approaches. Irrespective of their particular conservation objectives, they should be committed to certain management standards that increase the likelihood of high management effectiveness i.e., "*the extent to which it* [a PA] *is protecting values and achieving goals and objectives*" (Hockings *et al.* 2006). These standards should include requirements regarding, e.g., legal protection status, management plans and monitoring systems, issues also considered by other intergovernmental initiatives such as UNESCO WH, UNESCO BR and Ramsar (Table 5). In accordance with the idea of the learning network, FPA are admitted to the network if they already meet elementary management standards, or if they submit a statement of commitment towards meeting these standards in the future.

FPA that are part of the network will benefit from the communicative functions of the network and from enhanced international visibility and recognition. They will also have access to the marketplace and partnership platform and can receive financial support from the proposed funds, especially if they are located in FINIP areas. Participation in the financing mechanisms should be linked to an external evaluation process to ensure that the money is invested in an efficient and effective way (cf. Section 4.3). This includes, e.g., that FPA meet the elementary management standards or make substantial and comprehensible efforts to do so,

Table 10: Requirements for FPA admission to the global FPA network

Step 1: GENERAL PARTICIPATION IN THE NETWORK
FPA should provide
• data on location, size and IUCN protection category, respectively location and size of zones with different IUCN protection categories
FPA should submit statement of commitment towards meeting elementary management standards, e.g.:
• participatory management approach
• long-term management plan, including core and buffer zones where appropriate
• long-term conservation through adequate legislative, regulatory, institutional or traditional protection
• willingness to participate in training programs and knowledge exchange with other FPA
• internal monitoring and reporting system
Step 2: PARTICIPATION IN THE FINANCING MECHANISMS
FPA should go through
• external evaluation process regarding FPA effectiveness and management standards

NB: These requirements should be developed in more detail in close cooperation with relevant organizations, e.g., IUCN-WCPA and UNEP-WCMC, and under consideration of existing CBD guidelines.

(iv) Creation of regional ecological networks

Ideally, the global FPA network will consist of regional ecological networks connecting FPA through ecological corridors and stepping stones. The linking landscapes elements could be protected as well as sustainable managed forest areas as, e.g., in the Mesoamerican Corridor. The highest level of ecological network to be achieved in the future would apply the ecosystem approach in all aspects of

land-use planning such that FPA are linked by protected corridors and are nested within a sustainably managed landscape.

The creation of such ecological networks is an ambitious process, which underlines the importance of regional initiatives, e.g., those in Appendix 2, IUCN-WCPA branches and PoWPA activities, and the necessity of joint conservation approaches for forest ecosystems that occur in several neighboring countries. The global FPA network can facilitate this process by enhancing cooperation and exchange of expertise at the regional level and by granting financial support to FPA that are components of these networks. In many parts of world, however, the creation of ecological networks will still take some time, because the establishment of adequate corridors and stepping stones requires a high level of land-use planning and often causes conflicts concerning different land use interests.

In a nutshell: The creation of regional ecological FPA networks

- is an iterative process and a long-term objective,
- requires integration of and cooperation with existing regional initiatives, and
- can best be achieved if the ecosystem approach is applied in the management of FPA and the wider landscape.

4.3 Participation in the financing mechanisms

This paper proposes a flexible portfolio-approach with three different mechanisms (Figure 4). Although they can be considered as optional, it is recommended to implement all of them in order to reduce the risk of underachievement and to raise significant amounts of additional funding. Individual FPA will ideally benefit from a mixture of different financing instruments according to their particular financing strategy developed during the admission process (cf. Section 4.2). With the admission to the network FPA will in principle gain access to the financing mechanisms.

Direct payments to FPA

FPA have two options to enter into direct negotiations with potential donors and investors: The marketplace and the partnership platform. These two financing mechanisms create direct links between the supply and the demand side on a voluntary basis. They enable the actors to agree individually on the flows of funding, although evaluation of spending effectiveness should follow some fundamental principles as outlined below.

Entering the marketplace requires a relatively high level of FPA management. Besides, FPA with outstanding features, e.g., large size, scenic beauty or special species, are likely to gain the attention of potential donors and investors more easily than less attractive FPA. For the latter, indirect payments as described in the following will be more important.

Indirect payments to FPA (Funds)

The proposed financing strategy suggests to install two separate funds for both, marketplace and partnership platform, as a service for those actors who do not wish to directly negotiate with FPA or to donate for a specific FPA. In contrast to the direct payments, which are spent according to

individual agreements, the funds allow for setting general priorities regarding their distribution. One priority for funding should certainly be underfinanced existing and new FPA that are located within FINIP (cf. Chapter 2). The funds offer the opportunity to support the early stages of FPA establishment until FPA are apt for joining marketplace and partnership platform. In addition, they are important for FPA, which require immediate conservation attention but receive little direct attention from donors.

Since this paper focuses on the question how to raise new and additional sources, issues regarding the fair distribution and prioritization of payments at site level are beyond its scope. Generally it needs to be considered that FPA will only be successful if people living in these forests and depending on their resources are compensated for restricted access and benefit from enhanced conservation. The principles of the international community can provide valuable guidance (e.g., Agenda21 1992; CBD 1993):

- Development and implementation of financing instruments should be as participatory as possible and include all relevant stakeholders in order to improve their acceptance, to promote benefits and responsibilities for the involved and to gain access to local expertise and other meaningful contributions.
- Fair and equitable sharing of benefits is the key for contributing to the goal of mutually addressing conservation and poverty alleviation.

Evaluation of payments

Potential donors and investors will require that their spending is invested in effectively managed FPA. In the framework of direct payments, the monitoring and evaluation of payments should be part of the individual agreements between FPA and donor organizations or buyers of ES. Regarding the indirect payments, there is a need for general guidelines for the evaluation of FPA that benefit from funds. It is suggested to establish an evaluation process, which assesses whether the FPA spends the payments effectively, and if the FPA actually makes progress in meeting the requirements of the commitment statement signed in context of the admission process. The evaluation might be carried out by existing organizations like FSC, IUCN or WWF, which would need to be accredited for this task.

The framework for FPA evaluation should be in line with the PoWPA (Suggested activity 4.2.1), which recommends the IUCN-WCPA framework for designing PA management effectiveness evaluations (MEE), a system used by more than 75 countries and organizations As the regional networks of the global network are developing, these MEE could also be carried out at system level rather than only for individual FPA (Hockings *et al.* 2006; Langhammer *et al.* 2007; Leverington 2007; UNEP/CBD/WG-PA/1/4; UNEP/CBD/WS-PA/AA/1/3; WWF 2004).

Coverage of start-up costs

The successful installation of the proposed financing mechanisms will not be possible at no cost and it will also take some time for them to deliver. Thus, a crucial issue concerning implementation is up-front financing. Sufficient funding is necessary for starting the admission process and the related task of providing financial and technical advice to FPA. Such start-up funding could either come from bilateral and multilateral ODA or by loans to be repaid once the mechanisms are working.

5 Outlook and Conclusion

This study underlines that sound and valuable approaches exist for the selection of FPA and their financing in the context of a global network; however, strong political will is necessary to initialize its implementation. An international agreement on a global FPA network at COP9 would be a crucial contribution to meeting the CBD 2010 biodiversity target and a strong political signal for the importance of joint action in forest conservation. It could be a major milestone in the implementation of the general PA network under the CBD and a role model for conservation efforts in other ecosystems. Furthermore, it provides the opportunity to create links and use synergies between the wide range of international institutions, organizations and processes directly and indirectly related to forests in general and FPA in specific, e.g., UNFCCC, UNFF, CPF, ITTO and the WTO.

Participation in the global FPA network is voluntary, fostered by additional financing, which is considered as a strong incentive for Parties to nominate existing and new FPA for the network. It is proposed to establish a learning network with elementary admission requirements and the objective of continuously increasing both, the number of participating FPA and their management effectiveness. Since all Parties with forest ecosystems should have the chance to nominate FPA, all FPA committed to these requirements are invited to join the proposed network, regardless whether they are located in virgin or strongly used forest areas. Elementary admission requirements are necessary to assure that FPA strive for management effectiveness and quality of conservation. Evaluation of these requirements should be required for FPA that seek additional financing in order to guarantee for the effective investment of funding from donors and investors.

The aspired FPA network should serve communicative, ecological and financial functions. Although a worldwide FPA inventory and gap analysis as well as the distribution of funds require a global perspective, the global network structure should be flexible enough to integrate regional initiatives. Ideally, the FPA network should consist of more closely knit regional networks, because regional conservation activities are vital to establish ecological network functions.

In 2010, the CBD will evaluate whether worldwide conservation efforts succeeded in effectively conserving *"at least 10% of each of the world's forest types"*. A global FPA network would be a major basis for evaluating progress towards, and finally meeting this target, although global consent on the world's forest types is urgently needed. It is obvious, however, that such a network cannot compensate for the lack of responsible and sustainable use of the majority of the world's forests. In particular, the growing demand for food, biofuels and timber is likely to further increase the land use pressure on forests and to intensify existing land use conflicts in the future. This underlines the importance of financial incentives for forest conservation. It also stresses the crucial function of buffer zones, which fall under IUCN category V and VI, to reduce direct and indirect land use pressure on FPA and to ecologically and conceptually integrate forest conservation in the wider landscape in accordance with the ecosystem approach. In fact, well managed FPA buffer zones and conservation corridors should be regarded as role models for the sustainable management of forests outside FPA. In addition to protecting 10% of each forest type under IUCN category I-IV until 2010, it is necessary to aim at conserving a large share of the remaining forests under all IUCN categories in the long run.

Achieving the 2010 target for forests requires strong willingness and enthusiasm of the Parties to nominate existing and new FPA for the global network and to work towards closing conservation

gaps. It is therefore essential that the benefits provided by FPA to society are recognized at local, national and global level. The current international debates on forest related issues, e.g., on the value of forest biodiversity, on their role in global climate change and their inclusion in the carbon credit scheme under the UNFCCC, contribute to stimulating public awareness on the global significance of forest ecosystems. This creates a “window of opportunity” for the issue of forest conservation, which should be used wisely with the aim to launch a global FPA network.

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Appendix 1: Definitions

Forest

The CBD has not agreed on an official forest definition. Acknowledging that many other useful forest definitions exist, the ad hoc technical expert group on forest biological diversity (AHTEG-FBD) considers the FAO forest definition (SCBD 2007a) as the basic one.

FAO Forest Definition (FAO 2006):

Forest is defined as land spanning more than 0.5 ha with trees higher than 5 m and a canopy cover of more than 10%, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m *in situ*. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10% and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate.

Includes: Areas with bamboo and palms provided that height and canopy cover criteria are met; forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest; windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m; plantations primarily used for forestry or protective purposes, such as rubber-wood plantations and cork oak stands.

Excludes: Tree stands in agricultural production systems, e.g., in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens.

Protected Area (PA)

According to the CBD (SCBD 2007b), a PA is "*a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives*". This definition is slightly different from the widely known IUCN definition (IUCN 1994), which defines PA as: "*areas of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*". The CBD definition focuses more narrowly on biodiversity conservation but Parties stated their support for the use of the IUCN Categories during the COP7 in February 2004 (Dudley and Phillips 2006).

Forest Protected Area (FPA)

The IUCN published guidelines (Dudley and Phillips 2006) on how to interpret the term "forest protected area", which are highly useful in the context of a global FPA network under the CBD. In the following, excerpts of these guidelines are presented.

Guidelines on the interpretation of the UNECE / FAO definition of a Forest for use in classifying Forest Protected Areas (Dudley and Phillips 2006, Chapter 2):

The UNECE / FAO definition should be used for forests in FPA with the following caveats:

- Planted forests whose principal management objective is for industrial roundwood, gum / resin or fruit production *should not* be counted
- Land being restored to natural forest *should* be counted if the principal management objective is the maintenance and protection of biodiversity and associated cultural values
- "Cultural forests" *should* be included if they are being protected primarily for their biodiversity and associated cultural values

This means that exotic plantations will almost always be excluded from FPA statistics, *whether or not they fall inside the boundaries of protected areas as defined by IUCN*. The only exceptions would be where exotic plantations have been deliberately established and managed as nurse crops to promote natural regeneration, or are subject to a management plan to convert them from industrial use to regimes more suited for biodiversity conservation.

What is a Forest Protected Area? (Dudley and Phillips 2006, Chapter 3):

FPA is defined as "*a subset of all protected areas that includes a substantial amount of forest as defined for the purposes of Forest Protected Areas. This may be the whole or a part of a protected area*". It is important that a standardised procedure is followed in determining the extent of FPA that gives meaningful and accurate data. FPA can be calculated as an unambiguous subset of national protected area statistics, capturing information on all protected forests but eliminating plantations and other forests managed for industrial purposes within the less strictly protected categories.

Strict reserves (e.g. Category I or II) will sometimes exist inside less restrictive PA categories (e.g. Category V or VI). To avoid the problem of counting the same area twice, where one category is nested within another, its area should be subtracted from the total area of the larger PA and accounted for separately.

Some PA, particularly Categories V and VI, may contain areas of forest that do not meet the definition of a forest proposed for use in PA. Currently they are sometimes recorded as being "protected" and thus can appear in official statistics as "FPA". Examples include exotic plantations in PA of Category V in Europe.

The IUCN Protected Area Management Category System (IUCN 1994)

No site can be considered as PA unless it meets the over-arching IUCN definition of PA (see above). Within this definition, IUCN further classifies PA into six management categories, which are based on primary management objectives (cf. Table), ranging from strictly protected nature reserves to areas that combine biodiversity protection with a range of other functions, such as resource management and the protection of traditional human cultures.

Category Ia: Area managed mainly for science

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

Category Ib: Area managed mainly for wilderness protection

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

Category II: Area managed mainly for ecosystem protection and recreation

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

Category III: Area managed mainly for conservation of specific natural features

Area containing specific natural or natural/cultural feature(s) of outstanding or unique value because of their inherent rarity, representativeness or aesthetic qualities or cultural significance

Category IV: Area managed mainly for conservation through management intervention

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

Category V: Area managed mainly for landscape/seascape conservation or recreation

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

Category VI: Area managed mainly for the sustainable use of natural resources

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

The IUCN PA Categories System is currently under revision to render the system more "user friendly" and to improve its worldwide applicability. The revised system is expected to be launched officially at the World Conservation Congress in Barcelona in 2008.

Table: Protected area management objectives and IUCN categories (IUCN 1994; 2004)

Management objective	Ia	Ib	II	III	IV	V	VI
Science	1	3	2	2	2	2	3
Wilderness	2	1	2	3	3	-	2
Biodiversity protection	1	2	1	1	1	2	1
Environmental services	2	1	1	-	1	2	1
Natural / cultural features	-	-	2	1	3	1	3
Tourism and recreation	-	2	1	1	3	1	3
Education	-	-	2	2	2	2	3
Sustainable use	-	3	3	-	2	2	1
Cultural attributes	-	-	-	-	-	1	2

1 = Primary objective; 2 = Secondary objective; 3 = Potentially applicable objective; - = Not applicable

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Appendix 2:
Examples for Regional Initiatives for Forests and Protected Areas

NB: Most ecological networks include protected areas as well as non-protected landscapes.

Governmental activities

- Central Africa: *Commission des Ministres en charge des Forêts d'Afrique Centrale (COMIFAC)*
  http://www.comifac.org
- Cameroon, Congo, Gabon: *Tri-DOM Ecological Network*
- Central America: *Mesoamerican Biological Corridor / Paseo Pantera*
  http://www.biomeso.net
- Denmark, Germany, Netherlands, UK: *Transnational Ecological Network (TEN)*
  http://www.ten-project.net
- EU: *NATURA 2000*
  http://www.bfn.de/0316_natura2000.html
- European non-EU countries: *Emerald Network*
  http://www.coe.int/t/e/cultural_co-operation/environment/nature_and_biological_diversity/ecological_networks/The_Emerald_Network/
- Europe: *Ministerial Conference on the Protection of Forests in Europe (MCPFE)*
  http://www.mcpfe.org
- Europe / northern Asia: *Pan-European Ecological Network*
  http://www.coe.int/t/e/cultural_co-operation/environment/nature_and_biological_diversity/ecological_networks/PEEN/
- Europe / northern Asia: *European Coastal and Marine Ecological Network* (part of Pan-European Ecological Network)
- Parties to the Bonn Convention on the Conservation of Migratory Species of Wild Animals: *Memoranda of Understanding and Agreements on particular species*
  http://www.cms.int

Non-governmental activities

- Bolivia, Peru: *Vilcabamba-Amboró Conservation Corridor*
  http://www.cepf.net/ImageCache/cepf/content/pdfs/final_2etropicalandes_2evilcabambaamboro_2ebriefingbook_2epdf/v1/final.tropicalandes.vilcabambaamboro.briefingbook.pdf
- Bosnia and Herzegovina, Croatia, Serbia, Slovenia, Montenegro: *Sava River Ecological Network*
  http://www.iucn-ce.org/econets/database
- Carpathian mountain range: *Carpathian Ecoregion Initiative*
  http://www.carpates.org
- Central Africa: *Central African Regional Programme for the Environment (CARPE)*
  http://carpe.umd.edu/
- East Asia and Australasia: *East Asian-Australasian Shorebird Site Network*
  http://www.environment.gov.au/biodiversity/migratory/waterbirds/infosrn1.html
- Europe (Fennoscandia, Central Europe, South-Eastern Europe): *European Green Belt*
  http://www.iucn-ce.org/econets/database
- North and South America: *Ecological Corridor of the Americas (EcoAméricas)*
- North and South America: *Western Hemisphere Shorebird Reserve Network*
  http://www.whsrn.org
- Southeast Asia: *Rewarding Upland Poor for Environmental Services (RUPES)*
  http://www.worldagroforestrycentre.org/sea/Networks/RUPES/

Appendix 3:
Global Ecological Forest Classification and Forest Protected Area Gap Analysis

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INTRODUCTION

Forests account for as much as 90% of terrestrial biodiversity. They provide ecosystem services such as protection of fisheries, watersheds, and soils, and are particularly important as carbon sinks. Forests also constitute an important resource for the rural poor, who depend on forest products to meet basic livelihood needs, and for industry, through provision of products such as rubber, cacao, and timber. Approximately 30% of the global land area is currently forested, but with mean global deforestation rates of 13 million hectares a year, the creation of a representative global network of forest protected areas is a high priority.

The expanded program of work on forest biodiversity of the Convention on Biological Diversity (CBD) (decision VI/22) calls for parties to "*assess the representativeness of protected areas relative to forest types*" and to "*establish biologically and geographically representative networks of protected areas*" (programme element 1, goal 3, objective 3). In addition, the framework for monitoring implementation of the achievement of the 2010 target (decision VIII/15) states that "*at least 10% of the world's forest types*" should be effectively conserved (annex IV). The assumption is that if all representative forest types are conserved the whole range of species and ecosystem functions related to these forest types are also conserved.

To assess the current level of protection of the world's forest types, and to test the methods and datasets available for monitoring progress towards the 2010 targets, the Institute of Forest and Environmental Policy (IFP), University of Freiburg, contracted the *'Global ecological forest classification and forest protected area gap analysis'* project. These analyses form part of a larger IFP project *"Options for a global network of FPA under the CBD"* financed with funds from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The aim is to

provide scientific analyses and policy advice to the 9th Conference of the Parties (COP9) of the CBD, regarding the establishment of a global network of forest protected areas.

Global gap analysis is a powerful tool, used to measure the degree to which protected area networks are representative. Previous studies have measured global coverage of protected areas with regard to habitats (Hoekstra et al., 2005), species diversity (Rodrigues et al, 2004a), and conservation priority areas (Rodrigues et al, 2004b). The forest protected areas gap analysis in the framework of the IFP project is carried out by the consortium of the United Nations Environmental Program – World Conservation Monitoring Centre (UNEP-WCMC), the World Wildlife Fund, Inc**.** (WWF) and the World Resources Institute (WRI). The goal of the UNEP-WCMC, WWF, WRI project is to collate available information on forest type and coverage, together with various global systems of forest biodiversity priority analysis, and combine these with the latest protected areas coverage data in the World Database on Protected Areas (WDPA), to assess progress with achieving the CBD forest targets, and to identify gaps in the protection of the worlds forest areas.

PROJECT OBJECTIVES

This project has three main objectives:

1. **Develop a GIS database** for WWF forest ecoregions, countries, forest protected areas and priority conservation areas. This database will incorporate the data layers required for the following two objectives, and will provide a database template for the continued monitoring of progress towards the CBD 2010 targets for forest protected areas.
2. **Evaluate ecological feasibility of the WWF forest ecoregion concept.** The WWF ecoregions concept has high potential to serve as baseline reference for achieving and monitoring the forest protected areas representativeness target set by the CBD because it is a relatively detailed and widely accepted ecological classification system at global level. The type of classification system that is used to assess global forest coverage will influence the results of proportional analyses of protected forest types, and therefore this project will test the feasibility of using the WWF ecoregions as a forest classification baseline, by determining for which countries fine scale forest classification maps exist, and evaluating where further refinement of the WWF forest ecoregions is needed to represent all important forest types at global level
3. **Forest protected area gap analysis and recommendations.** Gap analysis will be used in this project to measure the current progress towards the 10% target for forest ecoregions. The coverage of forest ecoregions, of present-day forest cover, and of global priority areas for forest conservation will be used to assess the extent of currently protected forest. These analyses will then be used to assess the feasibility of the general 10% target for all forest ecoregions, and to provide recommendations regarding priority areas, including those forest ecoregions which require additional protection to achieve the 10% target, those which contain areas of global conservation priority, and those which require further fine-scale ecological assessments to identify particular conservation targets.

METHODS AND DATASETS USED

The consortium of UNEP-WCMC, WWF and WRI has addressed this project using a systematic, analytical approach and using the best available sets of data. The data obtained and the analyses being undertaken are outlined below, together with a provisional set of results.

Forest data sets

For the purpose of our analysis, 'forest' is defined as woody vegetation with 30% canopy cover. The best available data on the world's forest cover has been collated and summarized within a GIS database created for the project. Two main forest datasets have been obtained and organized for further analysis at the global scale. The UNEP-WCMC Global Forest Map (GFM) distinguishes 26 forest types: 11 temperate and boreal forests, and 15 tropical forests. As part of this project, the 2000 edition of the Global Forest Cover Map is being updated to represent the current extent of these forest types, using the MODIS Vegetation Continuous Fields global dataset (500m resolution), which was created by the University of Maryland in 2005. A questionnaire has also been developed by the consortium to try and systematically capture information on forest datasets at the regional, national and biogeographical scales, and has been sent out to our network of contacts globally.

Biodiversity priority datasets

Available biodiversity priority layers have been obtained and added to the GIS database. The principal analytical layer is the WWF ecoregion map which divides the world into ecologically coherent units: large areas of relatively uniform climate that harbour a characteristic set of species and ecological communities. Altogether there are 825 terrestrial ecoregions nested within 14 biomes and 8 biogeographic realms, including over 467 forest ecoregions. In addition, global forest 'priority areas', as defined by a number of international conservation organisations, have also been collated and added to the database, and will be used to determine which priority areas fall within current forest cover of forest ecoregions, and their degree of protection.

Protected area datasets

The latest version of the World Database on Protected Areas (WDPA) will be used as the primary source of protected area data. The WDPA contains data on over 120,000 protected areas around the world and is constantly being updated. The February 2008 version, which is not yet available on general release, will be used for these analyses.

ANALYSES OUTLINE

Three separate analyses will be undertaken:

1. Assessment of the validity of the WWF ecoregions concept

The feasibility of using the WWF ecoregions as a forest classification baseline has been analysed in two ways. First, an internal expert opinion review of WWF expertise has been undertaken, focussing on where there are known flaws in the ecoregional delineation and proposing solutions to those problems. Second, the forest cover map developed above has been overlaid on the forest ecoregions

defined by WWF, in order to highlight systematically the mismatches between the WWF ecoregional lines and the map of global forest cover.

2. Forest gap analyses

An overlay of the protected areas spatial data held in the WDPA onto the updated Global Forest Map and the WWF Ecoregion Map will be used separately to analyze the level of global protected area coverage for different forest types, measuring progress towards the 10% forest coverage 2010 targets set by the CBD (COP Decision VII/30). Comparison of the results using these two different forest maps will be used to assess whether the WWF forest ecoregions distinguish between the various forest types identified in the updated Global Forest Map, and their use for assessing the protection of different forest types at regional or global scale. For each of these forest classifications, the coverage by protected areas will also be split by IUCN protected area management category, providing a proxy for the level of protection from extraction that each protected area affords: I-IV (limited extraction), V – VI (sustainable use) and total coverage (I – VI).

3. Gap analyses for biodiversity priority areas

Gap analyses will also be undertaken against other biodiversity 'priority areas', including: forest Hotspots and Wilderness Areas (Conservation International), Global 200 ecoregions (WWF), World Intact Forest Landscapes (WRI-GFW/Greenpeace), Important Bird Areas (Birdlife International), Endemic Bird Areas (Birdlife International), AZE points (Alliance for Zero Extinction), and Last of the Wild (WCS). The results will be presented in terms of percentage protection for each forest type and global priority area, and by each of the IUCN protected area category groups.

These results will then be used to identify progress towards the CBD 2010 targets. The forest types, priority areas, and regions that would benefit from further development of the protected areas network will also be identified. Additionally, the role of WWF forest ecoregions as a tool for measuring progress towards global and regional targets for forest protection will be discussed.

PRELIMINARY RESULTS

Global forest map

Significant progress has been made by WRI in updating the Global Forest Map (GFM), using current information on forest extent from the Modis VCF global dataset.

An overlay of the GFM with the Modis VCF has highlighted areas of forest cover which are identified by both the Modis and the GFM. WRI have also identified areas where the two datasets do not agree (i.e. forest identified by the Modis dataset which falls outside of the GFM) for further refinement of the new map. This new Global Forest Map will form the basis for further work within the project.

The amount of forest which is still considered to be intact, by forest type, has then been calculated using these two forest cover datasets. In this analysis 'forest' has been defined as 30% canopy cover, and the percentage surface area coverage per forest type calculated. The preliminary results of this analysis suggest that the most intact forests are found in Central Africa, Indonesia and the Brazilian Amazon, whereas the least intact forests are found towards Southern Africa, Turkey, India and the east coast of America.

Inventory of forest datasets

Initial research shows that there are at least 5 global forest datasets, and that all the major forested regions, and nations have their own forest datasets – developed using a variety of base data sets and analytical approaches. Some highly detailed forest cover and forest change datasets have also been developed for key areas of the world, often by international NGOs working on forest conservation issues in those countries. Inventory and collection of freely available datasets is continuing.

Assessment of the utility of the WWF Ecoregions Concept

Preliminary results of the overlay of the updated Global Forest Cover Map with the WWF forest ecoregions shows that a number of forest types are often represented within a single forest ecoregion. This preliminary analysis points to problems with the forest ecoregion concept in parts of South and Central America, and South-East Asia, where as many as 14 forest types are present in one ecoregion.

Comparison of the updated Global Forest Map with the WWF forest Ecoregions layer has revealed that the global extent of forest cover (defined as >30% canopy cover) is only partially covered by the extent of forest ecoregions. The internal review of WWF forest ecoregions has also identified a number of problems with the forest ecoregions concept. For example, some 'non-forest' biomes contain forest habitats according to the definition used here (e.g. African miombo and mopane woodlands). The WWF ecoregions also do not recognise mountain cloud forests, although these have important biodiversity and ecosystem functions that make them distinct from other mountain forests.

Gap analyses based on the updated forest map and the current WDPA version, as well as additional refinement of the WWF forest ecoregions, will help to identify the most optimal application of the WWF forest ecoregions concept as a tool for forest conservation, and will inform forest conservation policy and planning activities worldwide.

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