Greening REDD+

Challenges and opportunities for forest biodiversity conservation

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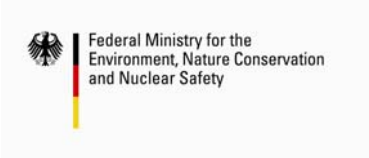

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Preface

This policy paper is an output of the research project "The protection of forests under global biodiversity and climate policy", a cooperation between the Institute of Forest and Environmental Policy (IFP)[1] and the Institute for Landscape Management[2], both University of Freiburg. The project is financially supported by the German Federal Agency for Nature Conservation (BfN) with funds from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The project aims at developing approaches for the currently evolving REDD+ mechanism that deliver synergetic effects for achievement of international climate and biodiversity objectives under the UNFCCC and the CBD, respectively. In light of this, the paper aims to provide scientific background and analyses as well as practicable policy options for the ongoing processes, especially with regards to the upcoming CBD negotiations at COP10 in Nagoya, Japan, and the subsequent COP16 of the UNFCCC in Cancún, Mexico.

The options and opportunities described are based on the results of the international expert workshop "Greening REDD+: Challenges and opportunities for forest biodiversity conservation" that was convened in Freiburg by the IFP and the Institute for Landscape Management from April 14th to 16th, 2010. The workshop brought together 37 international experts from eleven countries with academic, policy and practical backgrounds to jointly discuss central issues related to the consideration of biodiversity aspects in the context of REDD+. The authors would like to thank all participants for sharing their personal insights and for contributing to the workshop with inspiring enthusiasm and new ideas.

This paper is an independent study and the opinions expressed are the views of the authors.

[1] http://www.ifp.uni-freiburg.de/FoPo/forschung/redd
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Executive Summary

Fuelled by the continuing destruction of forests in developing countries, the aspired development and implementation of a REDD+ mechanism under the UNFCCC evolved into one of the major issues in the negotiations on a post-Kyoto agreement. Initially, it was often assumed that by successfully reducing emissions from deforestation and forest degradation, biodiversity and other ecosystem services would benefit automatically. However, the more the scope of the mechanism was widened, the more it became obvious that REDD+ would not necessarily generate additional benefits. To the contrary, many potential risks to other social and environmental objectives have been identified, and ultimately also to the long-term capacity of ecosystems to provide the targeted ecosystem service of carbon storage. This quantitative focus of REDD+ does not take into account that forests inseparably link the issues of mitigation and adaptation, and that biodiversity with all its components plays a vital role in this context: it provides the fundamental basis for all ecosystems to adapt to existing and expected climatic changes.

This policy paper identifies the needs and challenges evolving at different policy levels for the development of a comprehensive approach to REDD+ that adequately integrates biodiversity concerns and considerations. Chapter 1 provides a brief introduction to the issue. Chapter 2 outlines the evolving role of biodiversity within REDD+ under the UNFCCC negotiations and highlights other international processes such as the CBD that have a stake in this issue. Chapter 3 sheds light on the integration of biodiversity into the national REDD+ strategies currently developed in many countries with multilateral support and discusses the role of REDD+ pilot projects within this context. Chapter 4 presents a system for setting biodiversity objectives at different geographic scales based on sound principles, criteria and indicators. Furthermore, it illustrates the considerable amount of existing expertise for the description, evaluation and monitoring of biodiversity at both national and project scale and encourages stakeholders to make use of this wealth of information. Based on these analyses, chapter 5 suggests options and approaches regarding a comprehensive consideration of biodiversity issues in international and national REDD+ policy design as briefly summarized below.

Biodiversity in international REDD+ policy design

Since 2009 the UNFCCC negotiations have increasingly taken up the concerns regarding potential negative effects of REDD+ on the biodiversity of forest ecosystems, *safeguards* and *benefits* being key words in this matter. As an approach for clarification, we define *biodiversity safeguards* as the “minimum requirements for avoiding apparent risks to biodiversity”. In addition to avoiding risks, some activities may provide considerable synergies; initially they appeared in official UNFCCC documents as *co-benefits*. Since this term has resulted in a misleading discussion, we suggest the term “additional benefits” to relate to those “activities that contribute to both mitigation of greenhouse gases and the conservation of biodiversity and need to be determined according to specific national or local circumstances”. At the international level, there are four major issues that need to be addressed in order to facilitate a comprehensive integration of biodiversity into the REDD+ mechanism:

(1) Adequate definitions for forest types and forest-related management activities. Although still under negotiation, a major safeguard for inclusion in the official text is to avoid the *conversion of natural forest into plantations*. The value of this safeguard strongly depends on the definition of differently managed forest types and eligible activities such as *enhancement of carbon stocks*, e.g. through afforestation or reforestation. These definitions are important not

only in the UNFCCC context but basically in all forest-related policy processes at the international level. The FAO, UNEP-WCMC and other organizations, as well as the CPF, have been working on forest and forest management definitions, which are useful references also in the UNFCCC context, e.g. the FAO definitions for *primary forest, modified natural forest and planted forest (including plantations)*, or the UNEP-WCMC definitions for *restoration* and *rehabilitation.*

(2) Stringent concepts for SMF / SFM. There is a need for the international processes and polities to work together on the development of well-defined criteria and measurable indicators for SMF / SFM to ensure that these management concepts can serve as biodiversity safeguards. Such efforts should build on the work carried out by the CBD on the ecosystem approach. Besides, it is crucial to clarify whether the protection of forests is an activity included under these concepts; this pending issue determines if the application of SFM / SMF is acceptable in primary forests, or if it needs to be banned from these forests in order to avoid degradation.

(3) Safeguards to avoid inter-ecosystem leakage. There is a great risk of inter-ecosystem leakage, i.e., a REDD+ induced shift of land use activities such as agriculture to non-forest and low carbon forest ecosystems. The greatest concern relates to the drainage and conversion of non-forest peatlands that store enormous amounts of carbon. For this reason, a REDD+ decision should at least include a safeguard that impedes the conversion of peatlands. This could be complemented by carefully channeling additional international conservation funding from forest areas with high carbon content that are ideally targeted by REDD+ to threatened non-forest and low carbon forest ecosystems of importance for biodiversity.

(4) Documentation of safeguards. There is a need to document the impacts of REDD+ on biodiversity as a basis for evaluating and potentially readjusting the mechanism, e.g. regarding the eligible activities or the modalities of compensation payments. It is unlikely though, that the UNFCCC will specify decisions for the monitoring of biodiversity. Thus, the CBD seems the appropriate institution to develop guidance on this issue based on its broad expertise and on-going initiatives in national and international biodiversity assessment and monitoring.

Biodiversity in national strategies

With the international decisions still pending, REDD+ countries face the challenge and the opportunity to soundly integrate biodiversity issues into their national strategies. Even in the case that REDD+ is not adopted as anticipated, this bears the potential to shape comprehensive integrated land-use plans that can serve the sustainable development of a country. Countries can rely on a large amount of expertise and data accumulated by international and national NGOs and institutions, on evaluations of REDD+ pilot projects and on the reports and methodologies developed by the CBD, which many REDD+ countries already apply in meeting their reporting obligations. UN-REDD and FCPF which support countries in strategy development can push the consideration of biodiversity aspects by providing specific capacity building and establishing requirements for biodiversity assessment. The same holds true for the evolving REDD+ Partnership that bears the potential to facilitate biodiversity conservation through bilateral agreements. There are three crucial points to be considered in national strategy design:

(1) Integrated land-use planning. Developing the national REDD+ strategy touches on socio-economic, environmental and political aspects of land-use planning. It requires close cooperation between national ministries, especially UNFCCC and CBD focal points, public authorities and other relevant stakeholders such as indigenous peoples and local communities. In order to avoid different kinds of leakage – inter-ecosystem leakage, leakage into other forest

areas and temporal leakage – biodiversity and REDD+ need to be integrated comprehensively in national land use planning. Important decisions concern the kind of REDD+ activities best suited for different forest types and the selection of priority areas for forest conservation.

(2) Setting sound biodiversity objectives. Countries need to define their particular national biodiversity objectives as a reference for implementing biodiversity safeguards and additional benefits and a guideline for integrated land-use planning. This could be facilitated by compiling all available biodiversity data in a national biodiversity database, accompanied by the identification of gaps for further inventories and priority areas for conservation. The general clause on the establishment of safeguards against the *conversion of natural forests* could be specified nationally by aiming at maintenance of a certain percentage of each of the country's natural forest types. Consideration of the different natural forest types is important in order to deal with leakage and to ensure that the whole ecological spectrum of forests is adequately maintained. Progress towards achieving this objective could be measured using the spatial extent of each natural forest type over the years against its spatial extent in a baseline year.

(3) Documentation of safeguards and additional benefits. It is desirable that countries define and monitor reference conditions for biodiversity at the national level because concentrating biodiversity monitoring only on particular project areas may not capture the spatial shift of activities that are harmful to biodiversity. This task is intricately linked to the inventories necessary for the definition of biodiversity objectives, criteria and indicators. It could be facilitated by integrating provisions for biodiversity monitoring into the carbon monitoring activities that countries need to carry out for REDD+ in any case. Countries could use the above-mentioned national biodiversity database to aggregate data from ongoing carbon and biodiversity monitoring activities at project level together with national reports for the FAO FRA (FAO 2010) and national and international assessments of CBD targets for forest conservation. One possibility to encourage countries to establish national biodiversity monitoring systems would be to link reporting to existing international monitoring obligations of the CBD and to additional financial support for REDD+ capacity building.

Conclusions

Although there are many challenges associated with the sound integration of biodiversity issues into REDD+ design and implementation, this paper shows that there are ways and options to overcome these problems. Concerted efforts are necessary internationally and nationally to resolve the pending issues regarding forest-related definitions, leakage and safeguards. If REDD+ lacks social and environmental integrity, the mechanism can easily turn into a double-edged sword for biodiversity conservation worldwide. Eventually it could lose momentum and the support of donor and beneficiary countries that is strongly needed.

The CBD is predestined to play a guiding role in addressing the biodiversity-related REDD+ issues – especially regarding aspects connected to ecosystem-based adaptation, eligible activities, identification of priority areas and the monitoring of safeguards. A proactive stance of the CBD is necessary because once the UNFCCC has concluded and decided on the REDD+ framework, there are few ways to have a stake in, support and influence the modalities of the mechanism. The newly established Interim REDD+ Partnership together with UN-REDD and FCPF has the potential to push the consideration of biodiversity in national REDD+ strategies that are currently developed by many countries. The recent environmental catastrophes provide testimony to the fast pace of climate change and should enhance the global effort to make REDD+ a mechanism that contributes significantly to the mitigation of carbon emissions as well as to forest biodiversity conservation and the adaptation of forest ecosystems.

Abbreviations

AHTEG-BDCC	Ad Hoc Technical Expert Group on Biodiversity and Climate Change (CBD)
AWG-LCA	Ad Hoc Working Group on Long Term Cooperative Action (UNFCCC)
A/R	Afforestation and Reforestation
CBD	Convention on Biological Diversity
CCBA	Climate, Community and Biodiversity Alliance
CCBS	Climate, Community and Biodiversity Standard
COP	Conference of the Parties
CPF	Collaborative Partnership on Forests
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FRA	Forest Resources Assessment (FAO)
HCVF	High Conservation Value Forest
HYDICE	Hyperspectral Digital Imagery Collection Experiment
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
MRV	Monitoring, Reporting and Verification or Measuring, Reporting and Verification
NGO	Non-Governmental Organization
NBSAP	National Biodiversity Strategy and Action Plan
PDD	Project Design Document
PoW	Programme of Work
PoWPA	Programme of Work on Protected Areas
REDD, REDD+, REDD-plus	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice (CBD)
SBSTA	Subsidiary Body on Scientific and Technological Advice (UNFCCC)
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management
SMF	Sustainable Management of Forests
SPOT	Système Pour l'Observation de la Terre
UNEP	United Nations Environmental Programme
UNCCD	United Nations Convention to Combat Desertification
UNFF	United Nations Forum on Forests
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
WCMC	World Conservation Monitoring Centre

1 Introduction

In light of the continuing high rates of deforestation in developing countries and the resulting emissions of greenhouse gases (IPCC 2007, FAO 2010), addressing these problems gained new momentum in 2005 when the negotiations on a post-Kyoto regime began at the 11th Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC). Here, the proposal was put on the agenda to develop a mechanism that would create positive incentives for countries that succeed in *avoiding deforestation* and thus contribute to the mitigation of global greenhouse gas emissions. In contrast to many other agenda items negotiated under the climate regime, this issue was welcomed not only by potential beneficiary countries but also by many donor countries, science and non-governmental organizations (NGOs). However, many stakeholders have since voiced concerns, e.g. regarding the conservation of biodiversity, the contribution to poverty alleviation or the rights of local and indigenous peoples. This is partly due to the fact that the proposed mechanism, since COP15 in December 2009 negotiated as *Reducing Emissions from Deforestation and Forest Degradation in Developing Countries* (REDD+[3]), has become tremendously ambitious during its short history, while many of the accompanying technical, political and institutional challenges still remain unsolved (ANGELSEN *et al.* 2009).

At the beginning of the academic and political debate, it was widely assumed that the proposed mechanism, which only intended to avoid deforestation, would be generally beneficial for biodiversity (e.g. SANTILLI *et al*. 2005). Different countries, NGOs and the private sector were attracted by the prospects of arising opportunities for emission reductions and, at the same time, for significant new and additional financial resources. With this in mind, they successfully argued for broadening the scope of the mechanism and adding further land use activities as eligible activities in the negotiation texts – in particular the *sustainable management of forests* and *the enhancement of forest carbon stocks*. These additional activities relate to the "+" and resulted in the abandonment of the original idea of a rather simple mechanism.

The inclusion of *enhancement of forest carbon stocks* in particular has led to severe concerns by many scientists and NGOs. Assuming that the current forest definition (see chapter 2) remains unchanged, they criticize the present REDD+ design for considering forest biomass merely from the quantitative perspective of carbon storage; qualitative aspects referring to forest biodiversity are left unconsidered – despite their significance for the resilience of forest ecosystems and the permanence of forest carbon stocks (LOUMANN *et al.* 2009, THOMPSON *et al.* 2009). REDD+ focusing only on biomass production would pose severe risks to biodiversity if it provides incentives for a conversion of primary forests and degraded forests into commercial tree plantations. Further risks could result from "inter-ecosystem leakage", i.e. increased pressure on non-forest ecosystems with high relevance for biodiversity conservation[4] caused by a successful reduction of deforestation (UNEP-WCMC 2007, MILES 2007, MILES & KAPOS 2008). Last but not least, the inclusion of *sustainable management of forests (*SMF) raised much concern due to the lack of a common understanding and well-defined criteria and indicators to ensure that aspects relevant for biodiversity are adequately taken into account.

[3] Negotiated previously as "REDD", the official term used in the UNFCCC negotiations since COP15 is "REDD-plus". The term "REDD+" is predominantly used in the scientific debate in order to avoid direct reference to an as yet undecided mechanism subject to very dynamic negotiations.
[4] E.g. savannahs, non-forest peat lands or grasslands

It seems obvious that forest biodiversity will inevitably be affected by most potential REDD+ activities – positively or negatively. This has placed the negotiating Parties of the UNFCCC in a dilemma: on the one hand, the convention only has the mandate to set up a mechanism that solely focuses on the ecosystem service of carbon storage; on the other hand, it might create perverse incentives that impair other environmental objectives, e.g. those pursued by the Convention on Biological Diversity (CBD) (UNEP/CBD/COP/DEC/IX/5). The amplified scope of REDD+ made the original assumption of unconditional benefits for biodiversity and other ecosystem services (considered as *co-benefits*) obsolete. Therefore, the term has been replaced through *safeguards* in the negotiations of the UNFCCC which explicitly include both enhancing benefits for, and avoiding harm to, biodiversity. However, much confusion about these terms still exists among the political, scientific and NGO communities.

Safeguards: Avoiding risks to biodiversity, minimum requirement for all countries.

Additional benefits: Improvement of the state of biodiversity, depending on national and local circumstances.

As an approach for clarification, we define safeguards as the "minimum requirements for avoiding apparent risks to biodiversity". In addition to avoiding risks, some activities may provide considerable synergies – initially they appeared in official UNFCCC documents as *co-benefits*. Since this term has resulted in a misleading discussion, we use instead "additional benefits" to relate to those "activities that contribute to both mitigation of greenhouse gases and the conservation of biodiversity; they should be determined according to the national and local circumstances". If such additional benefits can be defined and measured, important prerequisites for their valuation would be fulfilled and supplementary incentives could be provided on a voluntary basis in addition to the agreed payments.

The objective of this paper is to contribute to one specific aspect of REDD+, i.e., to the environmental integrity of its overall design, facilitating implementation of biodiversity safeguards and additional biodiversity benefits. We intend to show that it is feasible to integrate biodiversity at different governance levels and to provide options and approaches for this purpose. The structure of this paper reflects the need for a coarse but coherent framework at the international level, for its specification at the national level and the implementation at the local level where currently many REDD+ pilot projects are being established. While acknowledging the crucial need to also consider the impact of REDD+ on development objectives and rights of indigenous and local peoples, this paper focuses on the implications for the conservation of biodiversity.

2 Biodiversity in international REDD+ policy design

2.1 How biodiversity issues entered the UNFCCC negotiations

As outlined in the introduction (chapter 1), concerns regarding potential impacts on biodiversity of the prospective mechanism entered the political debate with the inclusion in 2007 of activities beyond the original focus on the reduction of emissions from deforestation. Prior to this inclusion, possible harms to, and further benefits for, biodiversity had seldom been addressed within the official UNFCCC meetings and workshops. It was (and still is) often argued by negotiators in the UNFCCC process that the components of biodiversity are too difficult, if not impossible, to measure and that there is general disagreement on including such an unspecified term in the Convention text. However, in recognition of the potential biodiversity impacts of REDD, the Bali Action Plan (Decision 2/CP.13) already vaguely considered REDD as a mechanism that "*can promote co-benefits and may complement the aims and objectives of other relevant international conventions and agreements*"[5]. COP13 gave the mandate to the Subsidiary Body on Scientific and Technological Advice (SBSTA) to deal with methodological issues of a future REDD mechanism until COP15. This 2-year-period was used to discuss the main technical challenges to adequate approaches for monitoring, reporting and verification (MRV) of carbon stock changes as a basis for compensation payments (FCCC/TP/2009/1) or the development of reference (emission) levels (expert meeting in Bonn, March 2009, FCCC/SBSTA/2009/2).

In 2009, *co-benefits* became a prominent agenda item during the negotiations of the Ad Hoc Working Group on Long-Term Cooperative Action (AWG-LCA), the main negotiation track for REDD focussing on political issues[6]. A major change occurred when at the AWG-LCA intersessionals (Bonn, August 2009) the new term *safeguards* was introduced (non-paper 11):"*…[safeguards to protect biological diversity in host countries, including safeguards against conversion of natural forests to forest plantations, should be established]"*. The rationale behind this was to deal with the dilemma of not having a mandate to explicitly include biodiversity and the simultaneous need to ensure that REDD would not create incentives that could counteract the biodiversity objectives of the CBD. In later AWG-LCA negotiations *co-benefits* was replaced by *safeguards* (non-paper 18 & 39, FCCC/AWGLCA/2009/L.7/Add.6).

At COP15 the text on this matter reads: *"... the following safeguards should be [promoted] [and] [supported] (e) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions […] are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits"* (COP15, FCCC/AWGLCA/2009/L.7/Add.6). This current negotiation text reads promisingly but still lacks a basis for operationalization and needs to be specified as outlined in the following.

[5] E.g. in 2008 at a REDD-workshop in Tokyo: *"Parties discussed the importance of co-benefits, for example protecting biodiversity and water resources. It was noted that good policy design ensures the promotion of co-benefits. In turn, co-benefits are often the main drivers of positive changes in forest policies"* (FCCC/SBSTA/2008/11).

[6] *"…permanence and co-benefits such as biodiversity should be promoted…"* (AWG-LCA 5, Bonn, April 2009) *or "…co-benefits such as biodiversity [conservation] [and ecosystem services] should be promoted…"* (AWG-LCA 6, Bonn, June 2009).

2.2 Principal concerns and issues related to biodiversity and REDD+

The principal concerns for biodiversity are related to potential REDD+ incentives furthering a *conversion of natural forests*, a possible outcome in the context of the eligible activities *enhancement of carbon stocks* and of *sustainable management of forests* (SMF). Despite the safeguard clause, incentives for the establishment of forest plantations are not yet effectively excluded if the current UNFCCC forest definitions (Decision 11/CP.7)[7] are to be applied to REDD+ without modification: for instance, in order to avoid a *conversion of natural forests* it is important to clearly define what constitutes a "natural" forest (SASAKI & PUTZ 2009, PISTORIUS 2009a). Linked to the definition issue is the question of how countries will be allowed to determine their domestic reference (emission) levels.

Conversion of natural forests cannot be avoided if UNFCCC forest definitions do not differentiate between natural, modified and planted forests.

In theory, the eligible REDD+ activities[8] can be considered separately but in practice they are often intricately linked and could allow for unsustainable management practices due to the lack of specification and comprehensive definitions. Illustrative examples are different kinds of afforestation and reforestation (A/R) activities which are not clearly distinguished under the UNFCCC (Decision 11/CP.7)[9] and generally belong to the activity *enhancement of forest carbon stocks*; however, they can entail activities with highly variable impacts on biodiversity such as the establishment of monocrop forest plantations, forest restoration and forest rehabilitation.

The difference regarding biodiversity becomes obvious when comparing the UNFCCC definitions for A/R with the approach of the UNEP-World Conservation Monitoring Centre (UNEP-WCMC)[10] for restoration, which adds a qualitative component by defining forest restoration as the effort *"to re-establish the presumed structure, productivity and species diversity of the forest originally present at a site. In time, the ecological processes and functions of the restored forest will closely match those of the original forest."* In the light of climate change this appears very ambitious,

Afforestation and reforestation (A/R) activities differ significantly regarding their objectives and impacts on biodiversity.

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[7] ***"Forest"*** *is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and* ***all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest****, as are areas normally forming part of the forest area which* ***are temporarily unstocked as a result of human intervention such as harvesting or natural causes*** *but which are expected to revert to forest;* (FCCC/CP/2001/13/Add.1)

[8] *"Decides that developing country Parties should contribute to mitigation actions in the forest sector by undertaking the following activities"* (FCCC/AWGLCA/2010/6, chapter VI, para3)*:*
(a) Reducing emissions from deforestation;
(b) Reducing emissions from forest degradation;
(c) Conservation of forest carbon stocks;
(d) Sustainable management of forest;
(e) Enhancement of forest carbon stocks;

[9] *"****Afforestation*** *is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources;"* (FCCC/CP/2001/13/Add.1)
*"****Reforestation*** *is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989."* (FCCC/CP/2001/13/Add.1)

[10] http://www.unep-wcmc.org/forest/restoration/fris/concepts.aspx

especially in heavily degraded areas. More pragmatic and feasible seems UNEP-WCMC's approach to forest rehabilitation activities (ibid.): *"to re-establish the productivity and some, but not necessarily all, of the plant and animal species thought to be originally present at a site. (For ecological or economic reasons the new forest might also include species not originally present at the site). In time, the protective function and many of the ecological services of the original forest may be re-established."*

Empirical evidence demonstrates the unique importance of primary forests for biodiversity conservation (BARLOW *et al.* 2007). Although some studies indicate that tree plantations do not necessarily have low biodiversity indices[11] (e.g. BARLOW *et al.* 2007, BROCKERHOFF *et al. 2008*) and can sequester significant amounts of carbon, others demonstrate the negative overall impact of large-scale timber plantations for biodiversity in cleared primary forest landscapes (e.g. KANOWSKI *et al.* 2005). Beyond that, the different elements of biodiversity in natural forests are crucial for a sustained provision of the different ecosystem services vital for human well-being (MEA 2005). Where natural forests have already been destroyed, careful restoration and rehabilitation activities for enhancing carbon stocks are likely to produce considerably more additional biodiversity benefits than the establishment of plantations (KAROUSAKIS 2009, PISTORIUS 2009a, b, HARVEY *et al.* 2010a, VON SCHELIHA *et al.* 2009).

Forest restoration and rehabilitation are long-term oriented activities which are often less profitable, and require more elaborate silvicultural approaches and expertise than establishing a tree plantation. To make the issue even more complex, there are many different types of plantations and a variety of silvicultural management approaches that can help to improve their value for biodiversity, e.g. by mixing (native) tree species, extending rotation periods and applying certified management practices. In addition, restoration and rehabilitation can also apply to forests areas degraded by destructive logging, poaching or wildfires (PUTZ & ZUIDEMA 2008, ASNER *et al.* 2005). This directly leads to another issue of concern, that being the eligible but unclear REDD+ activity of SMF. Generally, management activities have different impacts on both forests and their surrounding ecosystems – depending on the kind of activity and the specific circumstances of the area where it is implemented. For example, the implementation of "sustainable" management activities has more severe impacts on biodiversity in untouched primary forests than in forests that are already managed for timber (BARLOW *et al.* 2007, SCBD 2009a).

The REDD+ negotiations under the UNFCCC have created a new momentum and a further need to define sustainable forest management (SFM) in order to make it operational for REDD+. SFM is considered as an evolving concept; it is based on the "forest principles" adopted at the United Nations Conference on Environment and Development (UNCED) in Rio in 1992 and is to be specified, e.g. in regional processes, by *"formulating scientifically sound criteria and guidelines for the management, conservation and sustainable development of all types of forests"*[12]. So far, the negotiation texts use the unspecified term of SMF which is considered as a new and still rather neutral term compared to SFM which already has a long and controversial history. It is not apparent whether this is due to technical or political reasons, but we assume that SFM or SMF in the context of REDD+ ultimately have the same intention – to restore the functionality of forest ecosystems and to introduce management practices that allow for a sustainable use of all ecosystem services – provisioning, regulating and cultural alike.

[11] Depending i.a. on the sampled taxa or the kind of landscape matrix surrounding the plantations.
[12] http://www.un.org/documents/ga/conf151/aconf15126-3annex3.htm

The seven thematic components of SFM are widely accepted[13] and acknowledged by the United Nations Forum on Forests (UNFF). The regional processes, including the International Tropical Timber Organization (ITTO), have worked on a criteria and indicators system for SFM (ITTO 2005), and the Secretariat of the CBD and IUCN have published a good practice guidance on sustainable forest management (SCBD 2009b). The latter includes references to and examples from relevant work by other members of the Collaborative Partnership on Forests (CPF), e.g. ITTO/IUCN guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests.

Despite the above-mentioned work and the ongoing efforts to clarify the SFM concept, the prevailing lack of clearly defined criteria and indicators still allows for very divergent views on what SFM entails and results in skepticism and strong concerns: while some argue that the conservation of primary forests, e.g., in protected areas, could and should be an integral part of SFM, others associate SFM with the profit-optimizing exploitation of forest resources – even in primary forests. In this context, it remains unclear if the implementation of management activities such as reduced impact logging in primary forests can be characterized as sustainable (SCBD 2009a).

Both the yet undefined activity of *sustainable management of forests (SMF)* and the concept of *sustainable forest management (SFM)* lack criteria and indicators useful for supporting REDD+ biodiversity safeguards.

In conclusion, despite the present text on safeguards, the prospective REDD+ mechanism entails risks for biodiversity. The forest-related processes discussed here have diverging views and fundamental, perspective-based understandings of the terms *sustainable* and *management*. Differing, unspecified or non-existent definitions for crucial forest aspects and activities entail international key challenges, not only for developing a comprehensive and coherent REDD+ mechanism.

2.3 REDD+ under the CBD and in other multilateral processes

In view of the relevance of a REDD+ mechanism for terrestrial biodiversity, the CBD initiated the second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (AHTEG-BDCC) in 2008 to analyze the links between biodiversity and climate change adaptation and mitigation. The outcomes of this AHTEG are summarized in a report presented at a UNFCCC COP15 side event (SCBD 2009a); it provides an overview of the suggested activities within the scope of REDD+ and their potential positive and negative impacts on biodiversity (Table 1).

Though intended to provide input into the UNFCCC process and to foster a closer collaboration between the CBD and the UNFCCC, the report has had little impact so far on the negotiation process of the UNFCCC – one reason being that negotiators argue the report has not yet been officially accepted by a CBD COP. The recommendations made in the report were further discussed at SBSTTA14 (UNEP/CBD/SBSTTA/14/6), for potential inclusion in a COP decision at COP10 in Nagoya: "*SBSTTA Welcomes the report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (UNEP/CBD/SBSTTA/14/INF/21), and encourages Parties, other Governments, relevant organizations, processes and initiatives and the Executive Secretary to take its findings into consideration where appropriate when carrying out work on biodiversity and climate change.*" In addition, SBSTTA14 discussed the potential collaboration regarding further development of REDD+ of the CBD with the Secretariat of the UNFF, the World Bank, the Secretariat of the UNFCCC, and other CPF members and forwarded respective suggestions to COP10 (UNEP/CBD/COP/10/3).

[13] (1) Extent of forest resources; (2) Biological diversity; (3) Forest health and vitality; (4) Productive functions of forest resources; (5) Protective functions of forest resources; (6) Socio-economic functions; (7) Legal, policy and institutional framework. (http://www.fao.org/forestry/sfm/24447/en/)

Table 1: Links between biodiversity and REDD+ activities (adapted from SCBD 2009a).

Mitigation activity	Potential benefits	Potential risks	Possible actions
Reducing emissions from deforestation and forest degradation	– Reduced forest loss and reduced forest degradation – Reduced fragmentation	– Leakage into non-forest areas of high relevance for biodiversity (inter-ecosystem leakage)	– Prioritize REDD+ actions in areas of high forest biodiversity – Develop premiums within incentive measures to enhance additional biodiversity benefits – Improve forest governance – Promote broad participation
Forest conservation	– Conservation of intact forest habitat – Reduced fragmentation – Enhanced landscape integrity	- Leakage	– Prioritize high biodiversity forests – Maintain landscape connectivity – Conserve a high diversity of forest types
Sustainable management of forests (SMF)	– Reduced degradation of forests (relative to conventional logging)	– Potential encroachment in intact forest	– Prioritize SMF in forest areas that are already being intensively used – Apply best practice guidelines
Afforestation and reforestation (A/R)	– Habitat restoration of degraded landscapes (use of native species and diverse plantings) – Enhancement of landscape connectivity	– Introduction of invasive and alien species – Replacement of native grasslands etc.	– Apply best practice guidelines – Prevent replacement of intact forests and non-forest native ecosystems by forest plantations – Enhance landscape connectivity – Develop premiums within incentive measures for biodiversity co-benefits

During the brief history of the REDD+ mechanism, the issue has been taken up by many organizations and institutions. The foci are different but the overall objective is the same: making REDD+ operational as soon as possible. Next to the World Bank's Forest Carbon Partnership Facility (FCPF) and the UN-REDD Programme (see chapter 3) the Interim REDD+ Partnership (formerly called Paris-Oslo Initiative) has gained much momentum. Established in May 2010, its mission is to support a rapid implementation of REDD+ "*by serving as an interim platform for the Partners to scale up REDD+ actions and finance, and to that end to take immediate action, including improving the effectiveness, efficiency, transparency and coordination of REDD+ initiatives and financial instruments, to facilitate among other things knowledge transfer, capacity enhancement, mitigation actions and technology development and transfer*"[14] Regarding safeguards, the document explicitly states as goals:

- *to ensure the economic, social and environmental sustainability and integrity of our REDD+ efforts and to enhance social and environmental benefits*
- *to promote and support the safeguards provided by the AWG-LCA draft decision text on REDD+, adjusted by any UNFCCC COP decision on this matter, as well as existing programmatic safeguards, where relevant.*

Due to its voluntary nature the Interim REDD+ Partnership provides an opportunity to promote the implementation of biodiversity safeguards and the generation of additional biodiversity benefits at the national level. Without prejudging the UNFCCC negotiations, the partnership is likely to play an increasing role in the international arena because there is wide agreement that even if the logjam resulting from COP15 cannot be resolved, it is crucial to pursue and intensify the development

The Interim REDD+ Partnership is likely to play an increasing role in facilitating REDD+ implementation at the national level.

[14] REDD+ Partnership founding document, adopted May 27th, 2010, Paris-Oslo.

and up-scaling of capacities for REDD+. At the last meeting of the AWG-LCA in August 2010, the Partnership succeeded, after fierce debates, in agreeing on a concrete work plan for 2010 and on an indicative list of activities for the period of 2011 and 2012.

2.4 Resulting needs at the international level

If safeguards for biodiversity are considered as a minimum requirement and as a basis for the generation of additional benefits, two core questions arise: which is the appropriate governance level for their specification and how can they be implemented? Although the current UNFCCC negotiation text explicitly refers to the risk of the *conversion of natural forests* (section 2.1), it does not provide an operational basis for the implementation of this safeguard, nor does it deal with the possible implications for biodiversity from the activities eligible under REDD+.

Above all, there is the need to clarify terms and definitions related to forests and biodiversity in order to establish a common basis for further negotiations. This entails close collaboration with other international processes such as the CBD, UNFF and FAO that are also concerned with forest and biodiversity issues. In this context, the UNFCCC needs to decide on:

a) ***Adequate forest definitions or reference to more specific definitions for different forest types*** in order to avoid that REDD+ funding furthers the conversion of natural and semi-natural forests into commercial tree plantations.

b) ***A stringent concept for SMF or a reference to SFM under the provision of substantial specification***, which implies the development of well-defined criteria and measurable indicators to ensure that the concept itself serves as a safeguard.

c) ***Safeguards to avoid inter-ecosystem leakage.*** Potential shifts of land use change pressure to non-forest ecosystems (e.g. non-forest peatlands) are actually not yet addressed in the UNFCCC negotiation texts. Comparable shifts to low-carbon forest ecosystems are covered by REDD+ but could also occur if the REDD+ carbon accounting rules provide incentives to focus on high carbon forests.

d) ***Documentation of safeguards.*** If safeguards are agreed on at the international level, they will remain "toothless tigers" as long as there are no adequate systems in place to survey their performances. There is a need to document the impacts of REDD+ on biodiversity as a basis for evaluating and potentially readjusting the mechanism (e.g. regarding the eligible activities or the modalities of compensation payments) – especially if the safeguards do not provide the necessary level of effectiveness regarding the aspired environmental integrity.

Options and approaches for coping with these needs are proposed in chapter 5.

3 Biodiversity in national REDD+ strategies

National strategies constitute a key component of REDD+ because they will set the specific national framework for implementation of the mechanism. Although the negotiations are still ongoing, many developing countries are already preparing national strategies in anticipation of an adoption of REDD+. The UNFCCC can at most – if at all – provide general guidelines regarding the implementation of biodiversity safeguards and the achievement of additional biodiversity (see chapter 2). Thus, the successful integration of biodiversity aspects under REDD+ depends strongly on the adequate design and implementation of REDD+ strategies at the national level (DICKSON *et al.* 2009).

National strategies are key for implementing biodiversity safeguards and achieving additional biodiversity benefits from REDD+.

There is scope for individual countries to decide on particular biodiversity safeguards and additional benefits, and to tailor their national strategy to their particular political, environmental and socio-economic circumstances. The national strategies have to deal with a broad spectrum of different governance challenges, e.g. unclear forest laws, illegal logging, poor policy harmonization across sectors and unclear land tenure rights; therefore, countries are also required to select the appropriate types of political instruments to address the various main REDD+ elements (ANGELSEN 2009): reducing emissions from deforestation, reducing emissions from forest degradation, conservation of forest carbon stocks, SMF and enhancement of forest carbon stocks (FCCC/AWGLCA/2010/6). There are a range of possible political and juridical measures for implementation at national and subnational levels, e.g., forest law enforcement, land tenure reforms, policy changes in the agricultural sector and in incentive policies, provision of information as well as integrated landscape planning. These measures can be complemented by project-type activities at regional and local scales, e.g., forest conservation and A/R activities.

The decision process on how to integrate biodiversity objectives into national REDD+ strategies does not take place in a vacuum. In fact, it is being strongly influenced by the available information on the state of biodiversity in a country and by existing strategies to protect or restore biodiversity that have been defined prior to the REDD+ process (for guidelines on defining viable biodiversity objectives and indicators see chapter 4). Beyond that, there are two important aspects for the development of national strategies that will be illustrated further in the following: requirements of the World Bank´s FCPF and the UN-REDD Programme (section 3.1) and experience gained from REDD+ pilot projects (section 3.2).

REDD+ countries face the opportunity and the challenge to develop and implement their own biodiversity objectives and related policy measures.

3.1 Requirements of FCPF and UN-REDD

The World Bank's FCPF and UN-REDD assist developing countries in preparing for participation in the REDD+ mechanism through capacity building and financial support for national strategy development. In July 2010, the UN-REDD supported nine countries (eight of which also participate in the FCPF) with funding and through networking and knowledge sharing. Regarding FCPF, 37 countries submitted a Readiness Preparation Idea Note (R-PIN), the first step in the FCPF Readiness Mechanism, which serves as an overview of the current situation in the countries and possible elements of a REDD+ strategy. Eleven of these countries further submitted a Readiness Preparation Proposal (R-PP) and four countries a draft R-PP[15]. Due to the large number of participating countries, FCPF and UN-REDD have considerable influence on the scope, design and contents of REDD+ national strategies globally. This may

[15] http://www.forestcarbonpartnership.org/fcp/node/257 (as of July 2010)

even increase when FCPF and UN-REDD streamline their efforts by facilitating a joint management team under the REDD+ Partnership as decided in its work plan in August 2010.

Both programs have started to promote the consideration of biodiversity issues in national strategies following the rising attention on biodiversity safeguards and additional benefits within the international negotiations. The FCPF asks countries to carry out strategic environmental and social assessments (SESA) as part of the national REDD+ strategy development in order to prevent negative impacts resulting from REDD+. SESAs are intended to *"enable the REDD Country Participant to identify likely impacts and risks, as well as opportunities, and consequently make more informed and appropriate choices between strategic options"*[16]. Since March 2010, the FCPF has also provided guidelines based on the World Bank´s safeguard policies for participant countries to facilitate the incorporation of environmental and social considerations in readiness activities[17]. The guidelines target the identification of policy, legal, regulatory, institutional and capacity gaps that might undermine the environmental and social sustainability of REDD+.

FCPF encourages countries to carry out a strategic environmental and social assessment (SESA) for national REDD+ strategies but so far the focus is on social impacts.

SESA requires assessing potential environmental risks resulting from REDD+ activities, which appears to be a promising approach for a comprehensive national strategy; however, most FCPF participant countries are currently in the preparation phase and SESAs so far predominantly target the social impacts of REDD+ strategies. It is still uncertain, when and how the environmental assessments will be conducted and whether it will be possible to claim that they adequately consider ecological aspects.

The UN-REDD Programme provides countries with information, tools and guidelines regarding the incorporation of biodiversity issues into national strategies. For this purpose it cooperates closely with the UNEP-WCMC, e.g. by developing maps on the spatial distribution of carbon density in biomass and soil related to biodiversity in different UN-REDD pilot countries (MILES *et al.* 2009, LI *et al.* 2009, KAPOS *et al.* 2009) (see also chapter 4, Table 2). UN-REDD encourages but does not oblige countries to integrate biodiversity aspects into their national strategies. Until now, this optional approach has not been strong enough to guide the beneficiary countries towards developing comprehensive and farsighted strategies for biodiversity conservation under REDD+.

UN-REDD offers expertise on integrating biodiversity into national REDD+ strategies but does not provide specific requirements or incentives to do so.

3.2 Role of REDD+ pilot projects for national strategies

During the last five years, more than 50 REDD+ pilot projects[18], also called REDD+ demonstration activities, have been established. They have the objective to directly reduce emissions from deforestation and degradation in specific geographic areas comprising between 50,000 and 500,000 ha (WERTZ-KANOUNNIKOFF & KONGPHAN-APIRAK 2009) and are strongly focused on maintaining or increasing forest carbon stocks. Many REDD+ pilot projects were initiated by collaborations between NGOs and other stakeholders who regard REDD+ as a potential source of additional financial funding for conservation activities. As such, pilot

[16] http://www.forestcarbonpartnership.org/fcp/Node/243

[17] Incorporating Environmental and Social Considerations into the Process of Getting Ready for REDD plus, Forest Carbon Partnership Facility (FCPF), Readiness Fund, Note FMT 2010-9, Revised Draft, March 7, 2010.

[18] Since the landscape of developing REDD+ pilot projects is rapidly changing, project overviews can only be regarded as "snapshots" of information at a given time (CENAMO *et al.* 2009; CERBU *et al.* 2009; WERTZ-KANOUNNIKOFF & KONGPHAN-APIRAK 2009).

projects frequently developed from protected areas, e.g., the Kasigau REDD Project, Kenya (WILDLIFE WORKS CARBON LLC 2008), the Genesis Forest Project, Brazil (INSTITUTO ECOLÓGICA *et al.* 2008), and the Noel-Kempff Mercado Climate Action Project, Bolivia (SEIFERT-GRANZIN 2007). The overall notion is to use pilot projects as a test run for the implementation of REDD+ at the national scale.

Selling carbon certificates on the voluntary market has become an important source of funding for REDD+ pilot projects, although they mostly depend on upfront financing through other funding sources. Besides carbon certification, pilot projects rely on additional certification by a recognized standard that evaluates socio-economic and ecological impacts in order to add further financial value to their carbon credits. These standards partly require the setting and monitoring of biodiversity objectives (see chapter 4) and have thus contributed to promoting the synergetic effects of carbon stock and biodiversity conservation. Until now, the Climate, Community and Biodiversity Alliance (CCBA) project standard (CCBA 2008) has the strongest requirements for additional environmental benefits (MERGER 2008) and can be regarded as project standard with the most clearly defined provisions for biodiversity (ENTENMANN 2010, in press).

Pilot projects are ideal world scenarios of REDD+ because they cover a relatively small geographic area, have mostly been established by highly motivated stakeholders such as NGOs and often have a strong focus on activities that serve carbon, livelihood and biodiversity objectives. Notwithstanding their model character, first lessons learnt from pilot projects can yield crucial information for designing REDD+ strategies at the national level (WERTZ-KANOUNNIKOFF & KONGPHAN-APIRAK 2009, HARVEY *et al.* 2010b, VATN & ANGELSEN 2009): regarding biodiversity, the projects can demonstrate which measures and activities have had a positive impact on biodiversity and which tools and methods are useful to monitor those impacts (for details see chapter 4). Yet, due to the relatively small size of pilot projects, it will not be possible to upscale all project activities and monitoring methods to larger forest areas at the country scale. Pilot projects can also help to deal with the aspect of leakage; although they apply measures to prevent or reduce spatial dislocation of deforestation activities and other kinds of biodiversity degradation, it is to be expected that some leakage takes place in the areas outside the projects. Additionally, they can help to identify measures that have been successful in preventing leakage, e.g. implementation of viable alternative livelihood strategies (AUCKLAND *et al.* 2003).

Lessons learnt from pilot projects can inform national REDD+ strategy design and implementation, particularly regarding the consideration of biodiversity aspects.

The successful implementation of safeguards and the achievement of additional biodiversity benefits depend on the careful selection of areas for pilot projects and other REDD+ activities. Forests in protected areas are important cornerstones in REDD+ programs because they are likely to encompass outstanding biodiversity elements and their effective management can contribute considerably to carbon storage (e.g. ANDAM *et al.* 2008, NELSON & CHOMITZ 2009, CAMPBELL *et al.* 2008a,b). Channeling REDD+ funding to forest protected areas, where governance structures, including conservation infrastructure and management plans, are already in place but not functional due to financial shortcomings, can be an efficient way to create long-term synergies for carbon, biodiversity and livelihood objectives. In addition, national strategies could aim at meeting carbon and biodiversity objectives by implementing forest conservation activities in priority areas for biodiversity conservation. Hereby, countries can rely on data and information that has been and is currently generated nationally, e.g. for the CBD gap analyses, as well as on international concepts and databases (for details see chapter 4).

Careful selection of priority areas for pilot projects and other REDD+ activities is crucial in meeting both carbon and biodiversity objectives.

3.3 Resulting needs at the national level

It is paramount that biodiversity issues are considered in national strategies from the very beginning of the planning process in order to create synergies between carbon and biodiversity conservation. For instance, countries need to answer the crucial questions regarding which aspects of biodiversity are considered important, how they are distributed nationally, where there are priority areas for biodiversity conservation and how to define the national biodiversity objectives (see also chapter 4). They can use this information to decide which areas are most suitable for the various elements of REDD+ and where spatial and temporal leakage might be a problem. In this context, there are three main challenges:

a) ***Integrated land use planning.*** Developing the national REDD+ strategy touches on socio-economic, environmental and political aspects and thus requires close cooperation between different ministries, public authorities and other relevant stakeholders such as indigenous peoples and affected local communities.

b) ***Setting sound biodiversity objectives.*** Each country needs to define biodiversity objectives that relate to the specific national circumstances and can serve as a reference for formulating and implementing safeguards and additional benefits.

c) ***Documentation of safeguards and additional benefits.*** Countries need to develop strategies for assessing the impacts of REDD+ on biodiversity in support of sustainable development and in order to fulfill donor requirements.

Options and approaches for coping with these needs are proposed in chapter 5.

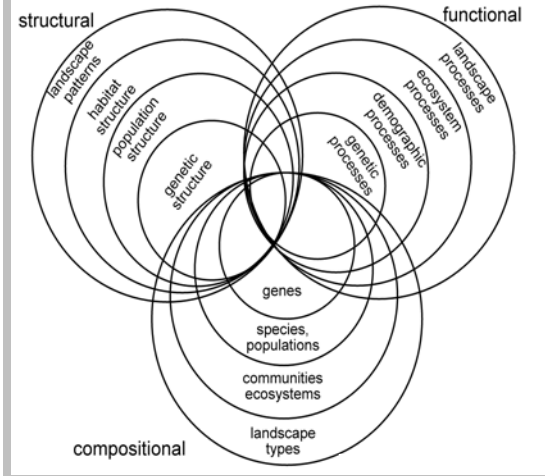
4 Defining and monitoring biodiversity

A major challenge in biodiversity conservation and monitoring is to overcome fundamental problems of terminology (GARDNER 2010, Box 1). Despite the increasing number of studies regarding the potential benefits of REDD+ for biodiversity (e.g., DICKSON *et al.* 2009, EBELING & FEHSE 2009, HARVEY *et al.* 2010a,b, KAROUSAKIS 2009), there is still much confusion on how to define biodiversity. In the following, it is shown that existing concepts and expertise can support the development of biodiversity objectives and monitoring schemes for REDD+ activities at national, subnational and local levels.

Box 1: The concept of biodiversity

The Convention on Biological Diversity (CBD) defines biodiversity as diversity of genes, species and ecosystems. Other approaches to describe biodiversity refer to structural, compositional and functional elements (see diagram).

Generally, our ability to describe and assess changes in biodiversity is severely restricted, in particular in the tropical developing countries with extremely high species richness. This is due to the stunning complexity inherent in the concept of biodiversity, the related requirements for biological and technical expertise and the financial investments necessary in order to employ trained staff and set up biodiversity monitoring systems (LACHER 1998, DANIELSEN *et al.* 2000).



Components of biodiversity according to NOSS (1990)

Biodiversity is mostly described using compositional (e.g. species) and structural (e.g. threatened habitats) aspects, because it is more difficult to capture the functional aspects of biodiversity (LINDENMAYER *et al.* 2000). The latter are processes, which require repeated surveys in specific intervals. Whereas this also applies to some degree to structural and compositional aspects, the temporal dimension is particularly important in measuring processes. Ecosystem services belong to the functional realm of biodiversity, and often involve biological measurement and economic valuation (PAGIOLA & PLATAIS 2005, WUNDER 2005). In order to cope with this complexity, there are simplified monitoring approaches that focus on particular species or species groups. Such approaches have to be carefully tested because meaningful monitoring usually also requires consideration of structural and functional aspects of biodiversity.

4.1 A framework for capturing biodiversity under REDD+

There are structured approaches for setting and monitoring biodiversity objectives in different contexts that can be modified to integrate biodiversity issues into REDD+ strategies and pilot projects. They are mostly based on classifying biodiversity objectives into principles, criteria and indicators (STORK *et al.* 1997, WIJEWARDANA 2008). This concept is widely used in defining management goals, developing monitoring and evaluation programs (GARDNER 2010), and has already been applied in REDD+ pilot projects (CCBA 2008). It provides a fundamental basis for the scientific assessment of forests and their ecological condition and can deliver comparable information needed by stakeholders of policy processes at different levels, e.g. for reporting as well as for policy and management decisions.

Principles are defined as “fundamental truths or laws [that are] the basis of reasoning for action” (STORK *et al.* 1997, GARDNER 2010). They are of a general nature and reflect the basic aims of any management action. Criteria, as the next subordinate element, are more specific and clearly defined objectives. Information needed to make appropriate management decisions in order to achieve the objectives laid down by principles and criteria is provided by the assessment of indicators (GARDNER 2010). Indicators include “any variables or components of an ecosystem or management system that are used to infer the status of a particular criterion” (GARDNER 2010). A distinction can be made between policy indicators, management indicators and performance indicators. Generally, policy indicators are used to monitor institutional or juridical approaches at the national scale, while management and performance indicators are more applicable at a local scale. Despite this general classification, all types of indicators are relevant for biodiversity monitoring on all different organizational levels.

Biodiversity objectives can be classified in
- principles (general objectives)
- criteria (specific objectives)
- indicators (measurable variables for specific criteria)

Under REDD+, the adoption of biodiversity safeguards and the creation of additional biodiversity benefits can be considered as the two major biodiversity principles that are crucial at all spatial scales from the international to the local level (see also chapter 2). In order to monitor whether these general biodiversity principles are being achieved, specific biodiversity objectives (criteria) and indicators need to be developed that are appropriate for the respective spatial scale and the data and capacity available.

4.2 Existing support for defining biodiversity objectives under REDD+

It is up to each individual REDD+ country to define its biodiversity objectives for inclusion into the national strategy. Besides the general biodiversity safeguards, the UNFCCC does not specify any activities related to the integration of objectives beyond the mitigation of emissions. Countries willing to integrate biodiversity objectives into their REDD+ strategy in order to address forest-related land use policies in a comprehensive way can draw on a large number of existing concepts and datasets for different geographic scales and political levels (Table 2).

Support for national scale REDD+ programs and activities

All developing countries that are currently preparing for REDD+ are Parties to the CBD. Most of them have elaborated national reports for the CBD that can help in developing national biodiversity objectives and indicators for REDD+, e.g. obligatory reports such as National Biodiversity Strategies and Action Plan (NBSAP) (article 6, CBD) as well as optional ones such as national gap analyses for protected areas. The NBSAPs contain national and partly also subnational strategies for the conservation and sustainable use of biodiversity. Central points are the identification of valuable biodiversity aspects and useful management approaches. In addition, many countries have completed or nearly completed a gap analysis of their protected area systems in the context of the CBD Programme of Work on Protected Areas (PoWPA) (DUDLEY & PARISH 2006). National gap analyses identify high priority sites to expand or improve protected area systems and networks; conservation gaps in forest ecosystems could potentially be filled with additional funding from REDD+.

Work carried out under the CBD can support countries in developing national biodiversity objectives and identifying key areas for different REDD+ activities.

Table 2: Examples for concepts and approaches that can be used as a basis for developing biodiversity objectives and indicators under REDD+ at national and project scale.

Concepts and approaches (EXAMPLES)	Source	Spatial scale
UNEP-WCMC data bases	www.unep-wcmc.org/ www.carbon-biodiversity.net	National to Global
REDD+ Social and Environmental Standards	CCBA 2010	National
FAO Forest Resources Assessment (FRA)	www.fao.org/forestry/fra/en/ FAO 2010	National
CBD Protected Area Gap Analysis	www.cbd.int/protected-old/gap.shtml www.protectedareas.info DUDLEY *et al.* 2005	National
CBD National Biodiversity Strategies and Action Plan (NBSAP)	www.cbd.int/nbsap/	National
CBD Programme of Work on Protected Areas (PoWPA)	www.cbd.int/protected/ SCBD 2008, ERVIN *et al.* 2010	Project to National
CBD Programme of Work on Forest Biological Diversity	www.cbd.int/forest/ SCBD 2002, ERVIN *et al.* 2010	Project to National
CBD Global Strategy for Plant Conservation	www.cbd.int/gspc/ SCBD 2009, PLANTLIFE INTERNAT. 2010	Project to National
Centres of Plant Diversity	DAVIS *et al.* 1996	Project, can be conclusively identified for the whole country
Important Bird Areas	BIRDLIFE INTERNATIONAL 2010	
Key Biodiversity Areas	LANGHAMMER *et al.* 2007	
Climate, Community and Biodiversity Standard (CCBS)	CCBA 2008	Project
Plan Vivo Standard	PLAN VIVO 2008	Project
High Conservation Values Forests	JENNINGS *et al.* 2003, JUDD *et al.* 2003	Project

Countries also regularly prepare national level data on forest cover, forest quality and forest types for the FAO Forest Resources Assessments (FRA) (FAO 2010) that are useful in national strategy design. Furthermore, many countries have provided records on their national protected areas to UNEP-WCMC that is exploring the overlay of protected area, biodiversity and carbon data as an information tool for REDD+ (Table 2).

The REDD+ social and environmental standards are yet another source of information for the integration of biodiversity aspects into national strategies (CCBA 2010). They are currently being developed through a participatory process and aim at ensuring additional social and environmental benefits of REDD+ policy programs at all administrative levels. They call, e.g. for impact assessments to mitigate negative and enhance positive biodiversity impacts of REDD+, the definition of monitoring plans and the development of indicators for measuring biodiversity and ecosystem values potentially affected by REDD+ activities. Currently the REDD+ social and environmental standards are *de facto* guidelines rather than standards, since there are to date no mechanisms to verify compliance with the standards.

The CCBA REDD+ social and environmental standards provide valuable guidelines for national strategy design.

Support for subnational to local scale REDD+ programs and activities

National strategies can include subnational or regional programs or identify smaller geographic areas for particular REDD+ activities. These smaller scale programs have scope for setting more detailed biodiversity objectives and use more elaborate indicators than the overall national strategy. They can draw on concepts and expertise provided by the CBD, project standards, NGOs, as well as REDD+ pilot projects (Table 2).

The CBD has published a broad range of guidelines regarding biodiversity monitoring and impact assessment in the context of the PoW on Forest Biodiversity (e.g. SCBD 2001), the PoWPA, e.g. studies on protected area management effectiveness (HOCKING *et al.* 2000, DUDLEY *et al.* 2005), and the Global Strategy for Plant Conservation (SCBD 2009, PLANTLIFE INTERNATIONAL 2010). Most of these guidelines refer to the project scale and are too detailed for adoption at the national level.

The standards that evolved with regard to the voluntary carbon markets are another important resource for developing practical biodiversity criteria and indicators. The Climate, Community and Biodiversity Standard (CCBS) (CCBA 2008) is one of the leading forestry standards on the voluntary carbon market, together with the Carbon Fix Standard, the Plan Vivo Standard and the Voluntary Carbon Standard (MERGER 2008). The CCBS has the most detailed provision for biodiversity benefits to be delivered by projects and is a widely recognized non-carbon standard for REDD+ pilot project certification (ECOSECURITIES 2010, ENTENMANN 2010, in press). For instance, it requires projects to aim for the maintenance of Key Biodiversity Areas (KBA) and High Conservation Value Forests (HCVF)[19] as important biodiversity objectives (CCBA 2008).

Carbon and project standards, especially the CCBS, provide useful frameworks for recognizing biodiversity under REDD+.

Next to KBA and HCVF, there are other approaches for identifying priority areas for conservation at local and regional scales (for a comprehensive overview see SCHMITT 2007, SCHMITT *et al.* 2009). They can provide important background information for the national distribution of biodiversity and the development of biodiversity objectives; examples include Alliance for Zero Extinction sites (RICKETTS *et al.* 2005), Important and Endemic Bird Areas (BIRDLIFE INTERNATIONAL 2010), Centres of Plant Diversity (DAVIS *et al.* 1996) and Important Plant Areas (PLANTLIFE INTERNATIONAL 2010).

Evaluation of how biodiversity aspects are integrated into existing REDD+ pilot projects can provide further insights into the development of criteria and indicators, also with regard to the subnational and national level (see section 3.3). Pilot projects that have been audited under the CCBS or are currently undergoing the evaluation process presumably encompass rather detailed biodiversity requirements due to the provisions of the standard (CCBA 2008). Evaluation of their Project Design Documents (PDDs)[20] showed that projects mainly used the presence of endemic and threatened species according to the IUCN Red List of Threatened Species to identify HCVF. The PDDs argued that the higher the degree of endemism and the higher the threat of extinction, the higher is the biodiversity benefit created by the project if populations of these species increase or cease to decline. Other important elements for defining HCVF were the provision of ecosystem services, such as provision of water and protection against soil erosion, although specific indicators were not always provided.

[19] WWF (2007) has developed the HCVF approach to provide a framework for the identification, management and monitoring of areas with outstanding biological, social and cultural significance, including representative protected area networks consisting of core and buffer zones.
[20] PDDs available at: http://www.climate-standards.org/standards/index.html

The existing concepts, standards and guidelines are highly useful in the identification of biodiversity criteria for REDD+, but they also illustrate the challenges inherent in such an endeavour. Most of these approaches define biodiversity according to the abundance of particular charismatic species, particular taxa or threatened species. Species are an important compositional aspect of biodiversity but the inventory and monitoring of species, particularly at national scale, is a major and expensive task (see Box 1). Furthermore, it is crucial to take into account other elements of biodiversity such as diversity of ecosystems as well as structural and functional aspects (NOSS 1990). For instance, at national level it could be feasible to define biodiversity objectives in terms of habitat and ecosystem diversity because these can easily be identified and monitored also at a larger scale. Capturing the functional aspects of biodiversity such as ecosystem services is crucial because they illustrate the socio-economic benefits of conservation (PAGIOLA & PLATAIS 2005, WUNDER 2005); however, their assessment is a difficult task that is likely to be accomplished only for particular countries or regions (FAO 2004, MEIJERINK 2008, WUNDER *et al.* 2008).

Ideally, biodiversity criteria and indicators capture compositional, structural and functional aspects of biodiversity.

4.3 Approaches to biodiversity monitoring

The development of biodiversity objectives with appropriate criteria and indicators for REDD+ activities at national, subnational and project level requires good knowledge of the present state of biodiversity in the respective area. In areas where the rehabilitation of particular forest types or the reintroduction of certain species is an issue, information on the past state of biodiversity is also needed. Subsequently, monitoring schemes that aim to identify the progress made towards achieving the predefined biodiversity objectives require definition of a reference condition (GARDNER 2010). This corresponds to the notion of setting a reference level for the MRV of carbon dynamics in REDD+ activities; however, while carbon can be measured in metric tons, the previous sections illustrated that there are no clearly defined units for the quantification of biodiversity. As such, the choice of appropriate methodology and data to define a reference condition for biodiversity depends on the particular area and the spatial scale considered.

Biodiversity monitoring requires definition of a reference condition.

Regarding the actual monitoring of biodiversity, there are two recognized methodological approaches: expert-based monitoring and participatory monitoring (DANIELSEN *et al.* 2007). Both can be applied to assessing the biodiversity impacts of REDD+ activities, depending on the spatial scale and the biodiversity elements considered. Participatory approaches are more appropriate for local level monitoring, whereas expert-based monitoring is also applicable at national and subnational levels. It includes the use of remote sensing techniques and the aggregation of different biodiversity data sets. While participatory methods are relatively cheap and quick, it is desirable to complement them by more sophisticated methods, which are operated by highly skilled staff (DANIELSEN *et al.* 2007). In some projects, e.g. professionally educated rangers are employed to monitor the population dynamics of certain species in order to complement inventories conducted through participatory methods.

In addition, there are ongoing efforts to integrate biodiversity issues into remote sensing techniques in an attempt to cover larger areas in biodiversity monitoring (e.g. TURNER *et al.* 2003, BOYD & DANSON 2005, DURO *et al.* 2007, STRAND *et al.* 2007). Landsat, Aster and SPOT images that are widely available and relatively cheap can be used to monitor large areas, e.g., regarding the coverage of different forest ecosystems and the extension of (monoculture) plantations (KERR & OSTROVSKY 2003). Images with high spatial or spectral resolution

(Quickbird or Ikonos and HYDICE, respectively) are more costly but might be applied in some areas of special interest complementary to the large-scale coverage of Landsat and SPOT images. They can be used, e.g. to monitor particular tree species (CLARK *et al.* 2005).

Remote sensing is likely to become the major tool for setting reference levels and monitoring trends in carbon dynamics in the national MRV of carbon (IPCC 2006). There is great potential to broaden the scope of these remote sensing activities that will be carried out for carbon in any case in order to include biodiversity issues. For instance, data and maps for carbon monitoring can be analyzed for biodiversity features such as ecosystem types. In addition, forest degradation is an important issue in monitoring both carbon dynamics and structural aspects of biodiversity (GRAINGER 1999, GOFC-GOLD 2009). Remote-sensing data produced for carbon monitoring could also be complemented by ground-truthing methods in key areas to gain additional information on particular species or habitats (STRAND *et al.* 2007).

4.4 Resulting needs for biodiversity assessment and monitoring

Biodiversity assessment and monitoring is a dynamic field of research where new insights and methods are quickly evolving. Nevertheless, this chapter has shown that there is a wide range of expertise and concepts available to support countries and organizations in setting and monitoring biodiversity objectives at different spatial scales. The key message is that the veritable integration of biodiversity issues into REDD+ strategies and activities requires breaking down the broad term “biodiversity” into measurable components, deciding on a reference condition for biodiversity monitoring, and setting clear biodiversity objectives against which progress can be assessed. In addition, biodiversity criteria and indicators need to be developed that are appropriate for the given spatial scale and the capacity available. The challenge is to define these criteria and indicators in such a way that they provide sufficiently detailed information to capture important biodiversity trends, while remaining technically feasible and cost-efficient to allow for continuous monitoring.

5 Options and approaches

In the previous chapters, we outlined the challenges and needs related to successful implementation of biodiversity safeguards and additional benefits in the context of REDD+. This chapter is dedicated to sketching options and approaches for addressing the issues raised. Bearing in mind the need for pragmatism in order to make progress and the challenge to adequately integrate biodiversity in the REDD+ framework, we focus on approaches that appear to be politically and technically feasible; yet, we are aware that some issues, especially regarding the international policy arena, are highly sensitive and have been discussed for years without significant process. The analyses and options presented in this paper will hopefully contribute to moving one step ahead in the right direction.

The UNFCCC is in charge of setting a robust and coherent framework for REDD+ and there is consensus regarding the need to include biodiversity safeguards and to enable additional benefits. Owing to its mandate and expertise, the CBD appears predestined to provide guidance on this issue; however, effective cooperation between the three Rio conventions (UNFCCC, CBD and the United Nations Convention to Combat Desertification (UNCCD)) has proven to be protracted and difficult for reasons of mandates and confusion about terms. Despite the difficulties related to enhancing formal cooperation between the UNFCCC and the CBD on the international level, the CBD can support the consideration of biodiversity in REDD+ strategies and programs nationally. The same holds true for the Interim REDD+ Partnership.

Accordingly, the options and recommendations outlined in the following are not restricted to the UNFCCC process but build on the often reiterated objective to enhance the collaboration between the different institutions involved. They need to play a more active role as soon as possible not only in the development but also in the implementation of REDD+ in order to ensure its environmental integrity; this holds true especially for the CBD, UNFF and the UNCCD but also for other relevant institutions, in particular the FAO, the CPF, which combines the large international forest policy processes, the Interim REDD+ Partnership, the UN-REDD Programme and the World Bank's FCPF.

5.1 Biodiversity in the international REDD+ framework

The integration of biodiversity considerations into the REDD+ mechanism still faces many technical and political obstacles. This section outlines policy options and approaches for the four major pending issues identified in chapter 2: (a) definitions of forest categories, (b) eligible activities in the respective categories, (c) inter-ecosystem leakage and (d) documentation of safeguards.

(a) Definitions

The necessity to develop and apply sound and comprehensive biome-specific forest definitions has already been recognized during the negotiations on Land Use, Land Use Change and Forestry (LULUCF) under the Kyoto Protocol. Paragraph 2 (b) of the Marrakesh Accords (Dec 11/CP.7) showed the Parties' awareness of the problems inherent in the UNFCCC forest definition and gave a mandate to SBSTA to *"investigate the possible application of biome-specific forest definitions for the second and subsequent commitment periods with a view to the Conference of the Parties at its tenth session recommending a decision for adoption on the use of such biome-specific forest definitions for future commitment periods to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol at its first session;"*. This

was never achieved but the current AWG-LCA text on safeguards reiterates the need for a distinction between different degrees of naturalness; possible criteria are, e.g. how a stand was established, the origin of tree species, forest structure, ecosystem functions or characteristics that maintain those functions (FAO 2005). Practices and intensity of forest management have an influence on these characteristics and thus the respective definitions are closely interrelated.

As Lund (2008) showed, there are more than 800 different definitions for forests and forest-related activities. Accordingly, there is a plethora of different ways to address this issue. However, it seems impossible for the UNFCCC to negotiate and agree on an entirely new set of forest-related definitions within the tight timeframe given. Rather than starting from scratch, we therefore outline pragmatic options which draw on existing FAO definitions (2005, 2006, 2007, 2010) and adapt them to the needs for REDD+.

Under the umbrella of the CPF, the FAO organized three expert meetings to harmonize forest-related definitions for the use of different stakeholders and discussed i.a. the key terms *natural forests, planted forests, forest plantations*, as well as *managed* vs. *unmanaged forests* (FAO 2005). The idea was not to standardize but to improve the consistency, compatibility and comparability of existing definitions. A **natural forest** is defined as *"forest stands composed predominantly of native tree species established naturally. This can include assisted natural regeneration, excluding stands that are visibly offspring/descendants of planted trees."*

For FRA 2005 and the upcoming FRA 2010, the FAO uses a specific definition for **primary forest** which could be used to define natural forests under REDD+: *"Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed. Some key characteristics of primary forests are: They show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes. The area is large enough to maintain its natural characteristics. There has been no known significant human intervention the last significant human intervention was long enough ago to have allowed the natural species composition and processes have become re-established"* (FAO 2007).

For FRA 2005, a set of definitions for forests with differing degrees of management was introduced (FAO 2006). Here, a **modified natural forest** is defined as a *"forest of naturally regenerated native species where there are clearly visible indications of human activities. Includes, but is not limited to: selectively logged-over areas, naturally regenerating areas following agricultural land use, areas recovering from human-induced fires etc.; areas where it is not possible to distinguish whether the regeneration has been natural or assisted"*. This is to be distinguished from **semi-natural forests**: *"Forest of native species, established through planting seeding or assisted natural regeneration. Includes areas under intensive management where deliberate efforts, such as thinning or fertilizing, are made to improve or optimize desirable functions of the forest. These efforts may lead to changes in the structure and composition of the forest."*

A **planted forest** is described in FRA 2010 as *"Forest stand in which trees have predominantly been established by planting [both native and non-native species], deliberate seeding or coppicing, where the coppicing is of previously planted trees"* (FAO 2010). Planted forest can be divided into forest plantation and other planted forest. A **forest plantation** is distinguished from other planted forests if it consists of only few tree species and if the trees are of even age and planted with regular spacing. These attributes fit to practically all problematic palm oil, eucalypt and other monocrop tree plantations.

On the basis of these different and partly overlapping definitions, we derived two options for the kind of forest categories considered under REDD+:

Option 1: Distinguish between two forest categories: use the coarse CPF definition (FAO 2005) for *natural forests*, which, to a certain extent, includes modified natural forests, and consider all other forests separately (*semi-natural forests, planted forests* incl. *plantations*).

The option of using the coarse and unspecific CPF definition for *natural forests* would cover primary forests and also include, to a certain extent, modified (degraded and / or managed) forests; accordingly, such forests would also be subject to the safeguard which aims at preventing a conversion into plantations. The problem with this option lies in the general character of the definition for natural forests that does not reflect on the specific value of intact primary forests for biodiversity – if a forest remains "natural" after human interventions (e.g. after being logged over), this set of definitions would prevent a conversion but could still lead to severe impacts on biodiversity, e.g. by degradation. Another disadvantage is that it is difficult if not impossible to draw the line in practice between *modified natural* and *semi-natural forests*. In a nutshell: it would be possible that countries receive REDD+ payments despite converting their degraded forests into planted forests. In addition, intact primary forests could become subject to degradation and still count as natural forests. These risks support the adoption of option 2 as a more sophisticated approach.

Option 2: Draw on the FAO FRA definitions and distinguish between three forest categories: *natural forests, modified natural forests* and all other forests (*semi-natural forests, planted forests, plantations*).

This could be implemented by using the FRA 2010 definition of *primary forests* to specify the term *natural forest* (FAO 2007). The FAO definition for *modified natural forests* could apply to all forests that do not meet the criteria of *natural* (i.e. *primary*) or *planted forest* (FAO 2006). To avoid the transformation of degraded forests into planted forests, the current safeguard clause (COP15, FCCC/AWGLCA/2009/L.7/Add.6) should be broadened: *"(e) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions […] are not used for the conversion of natural* ***and modified natural*** *forest"*. This option would allow for a better differentiation of eligible REDD+ activities and restrict REDD+ payments in primary forests to conservation. However, the proposed forest classification would require a comprehensive assessment of the current forest cover at the national level.

(b) Sustainable management of forests (SMF)

The term SMF as currently used in the REDD+ context lacks a conceptual basis except for the closely related but highly contentious term SFM. Although these terms are kept apart by different stakeholders, it stands to reason that they have the same intention. There is an urgent need for a common understanding of what *sustainable management* is in order to make SFM or SMF operational on the ground. Whether SFM / SMF harms or benefits biodiversity strongly depends on the local situation – the biodiversity of intact natural forests is likely to be negatively affected, whereas the introduction of sustainable forestry practices in managed forests can improve the forest condition (PUTZ & ZUIDEMA 2008). This links the issue to the previous section on definitions: SFM / SMF could be a key REDD+ activity for modified and planted forests but should be explicitly excluded from natural forests as long as there is no common agreement that SFM / SMF also includes forest conservation, in the sense of effectively managed forest protected areas. The following key questions should be addressed to

dilute concerns regarding biodiversity and enable a meaningful contribution of SMF / SFM to the implementation of biodiversity safeguards under REDD+ activities:

- Are the existing common global principles for SFM sufficient for REDD+, and at which level should specific criteria and measurable indicators be defined?[21]
- Is it possible to identify general management practices which improve the carbon balance of managed forests and at the same time have little impact on biodiversity, such as reduced impact logging and other careful silvicultural methods adapted to the respective forest ecosystem (PUTZ *et al.* 2008)?
- What are the gaps and the overlaps between the terms *SFM*, *conservation and sustainable use of forest biodiversity* and the *ecosystem approach* as defined and used by the CBD, e.g. decision VI/22 on the PoW on forest biodiversity?

Some of these questions have been touched by the CBD AHTEG-BDCC, but comprehensive solutions will require further debate on the most appropriate levels for implementation on the ground – often the national and local levels. As it seems unlikely that SBSTA will define SMF under REDD+, there should be a clear reference to existing principles and approaches. The CPF seems to be an appropriate forum to further discuss these issues and develop a common approach that is applicable for all the processes it represents in a series of joint expert workshops.

(c) Inter-ecosystem leakage

The risk of inter-ecosystem leakage – a REDD+ induced shift of land use activities such as industrial agriculture to non-forest ecosystems – depends very much on the national circumstances, including the presence of suitable land, the drivers and underlying causes for land use change, economic and demographic factors. Accordingly the degree of risk may vary considerably. Particularly if land use pressures shift to non-forest peatlands, this could result in additional net emissions and severe impacts on biodiversity due to the tremendous amounts of carbon stored and the overall ecosystem value of peatlands. Acknowledging that it will be difficult to achieve a political quorum for further complicating the REDD+ negotiations under the UNFCCC, the Russian peat fires of 2010 impressively underline the need to avoid any type of incentive for peat draining activities. The crucial question is at which level this complex issue should be dealt with. There are different options for approaching this tricky issue:

Option 1: Further broadening the scope of REDD+ to also include terrestrial non-forest ecosystems (REDD++).

Although desirable in the future, this appears to be an extremely costly and unrealistic option at this point of time. Currently, not even Annex I countries are capable of providing an adequate MRV of greenhouse gas fluxes in soils of non-forest ecosystems.

Option 2: Oblige countries to report on emissions from draining and converting non-forest peatlands and reduce the REDD+ compensation payments accordingly.

This option would at least reduce the risk of REDD+ induced inter-ecosystem leakage to non-forest peatlands which are an important pool for greenhouse gases and often harbour exceptional biodiversity; however, it would not address the risk of inter-ecosystem leakage to other non-forest and low carbon forest ecosystems. Besides, this option would require a

[21] Much progress in this area has been made in recent years through forest certification, as well as through processes that aim to develop SFM criteria and indicators, such as the Montreal Process.

complex accounting and monitoring of non-forest ecosystems for those countries that do not abandon conversion of peatlands; countries successfully avoiding such land use change could be exempted from reporting on changes from these pools.

Option 3: Include a specific safeguard clause in the REDD+ text, which restricts any type of REDD+ compensation payments to countries that do not fully abstain from draining and converting non-forest peatlands.

This option is more rigorous than option 2, and is thus unlikely to achieve a political quorum.

Complementary measure: Assess the needs and revise the preferences of bi- and multilateral funding for protected areas to enhance protection of non-forest and low carbon ecosystems threatened by conversion.

In addition to one of the above options, complementary policies and instruments for protecting threatened ecosystems that do not attract REDD+ funds should be developed at the international level. This idea is based on MILES & KAPOS (2008) who suggest dealing with the risk of inter-ecosystem leakage by shifting bi- and multilateral conservation funding from forest areas with high carbon content (being targeted by REDD+) to non-forest and low carbon forest ecosystems with a high conservation value. The question remains with regards to how much funding would be available if REDD+ is implemented, and whether such conservation funding for non-forest ecosystems would be sufficient to compensate the land use pressure.

(d) Documentation of safeguards

Appropriate MRV systems for carbon have been subject to the REDD+ debate since its very beginning. More recently, there have been discussions to broaden the MRV requirements to include MRV of biodiversity safeguards in order to ensure that safeguards do not remain a clause on paper. Due to the complexity of this issue, it seems unlikely that specified decisions for the monitoring of biodiversity will be made under the UNFCCC which in addition has no mandate to deal with such issues. Many scientists and stakeholders regard the CBD as the most appropriate institution to develop respective guidelines and approaches. However, SBSTTA14 of the CBD has shown that many Parties feel that the CBD also has no mandate to discuss issues related to REDD+ as long as there is no final UNFCCC decision. To solve this dilemma, the UNFCCC could support a process guided by the CBD that aims at developing a "good REDD+ practice guidance" on how to monitor biodiversity safeguards and support respective capacity building at the national level, e.g. by a establishing a joint work programme.

5.2 Opportunities for biodiversity conservation at the national level

Effective inclusion and implementation of biodiversity safeguards and the achievement of additional benefits for biodiversity strongly depend on the design of REDD+ strategies at the national level. Allowing for flexibility and scope in national REDD+ design pays heed to the sovereignty of the Parties and also to the highly variable conditions in beneficiary countries. Similar to the UNFCCC negotiations, however, the focus of most national strategies so far is on carbon mitigation, and impact assessments mainly target social issues. In order to incorporate biodiversity considerations into their national strategies, countries need the same support and assistance for building capacity as they do for the other readiness factors. Since many strategies are currently being developed with the support of multilateral institutions there is a window of opportunity to encourage beneficiary countries to strive for a maximum of synergies between climate and biodiversity objectives and to view this big task as an opportunity rather than a burden.

The development of the national strategy bears the potential to design a comprehensive program for integrated land use planning that will serve the sustainable development of a country, even if REDD+ is not adopted as anticipated. As many examples show, unsustainable land use reduces future income possibilities and increases the vulnerability against natural disasters (MEA 2005, STERN 2007). Besides these economic reasons, carefully designed REDD+ strategies can help countries in meeting other international obligations, e.g. those under the CBD. For instance, there are still serious gaps in forest conservation worldwide regarding the mutually agreed CBD target to effectively conserve at least 10% of each of the world's forest types (Decisions IX/5, Programme of Work on Forest Biological Diversity) (SCHMITT *et al.* 2009). Since most countries have already developed NBSAPs in accordance with decisions of the CBD, the national REDD+ strategies should strive for coherence and build on this work by incorporating new findings and identifying synergetic activities.

Currently, there are no obligations for countries to define their biodiversity objectives in significant detail. The two major international support programs UN-REDD and FCPF only have rather general guidelines for the consideration of biodiversity in national strategies (see chapter 3). They could provide incentives for countries to use the REDD+ social and environmental standards (CCBA 2010). They could also combine the requirements for biodiversity impact assessments with the provision of expertise and data on biodiversity. The same holds true for the evolving Interim REDD+ Partnership that bears the potential to facilitate biodiversity conservation through bilateral agreements. In the following, we outline some crucial aspects in national strategy development:

(a) Integrated land use planning

Developing the national REDD+ strategy touches on socio-economic, environmental and political aspects of land use planning and development. In order to avoid all different kinds of leakage – inter-ecosystem leakage, leakage into other forest areas and temporal leakage (i.e. permanence) – comprehensive land use planning with the participation of local stakeholders is crucial. Further, close cooperation between ministries and public authorities appears a prerequisite, especially between those directly involved with implementing policies resulting from the UNFCCC and the CBD processes. This is also necessary when deciding on which areas are best suited for the different types of REDD+ activities, for instance A/R activities may compete with agricultural or infrastructural investments, while forest areas with importance for

carbon storage and biodiversity should be considered as priority areas for forest conservation. Integrated land use planning can be further supported by channeling biodiversity funding to non-forest and low carbon forest ecosystems with high biodiversity, as outlined in the previous section (MILES & KAPOS 2008). Valuation and communication of the benefits of biodiversity conservation for human lifestyle can also contribute to these objectives (see TEEB 2009)

(b) Setting sound biodiversity objectives

Since the eligible REDD+ activities touch on many issues of land use planning, countries need to make sure that they do not run counter to agreed national biodiversity objectives. As outlined in chapter 4, there is much background information and support available for countries regarding the setting of national biodiversity objectives. We suggest that countries compile the available biodiversity data in their country strategies (e.g. by setting up a national biodiversity database as described below), identify gaps for further inventories and identify priority areas for carbon and biodiversity. This requires concerted efforts by policy makers, scientists and practitioners. Keeping track of the biodiversity status of a country, as well as documenting achievement of biodiversity safeguards and additional benefits, is only possible if databases and assessments are carefully designed.

One important biodiversity principle at the international level is the establishment of safeguards against the *"conversion of natural forests"* (COP15, FCCC/AWGLCA/2009/L.7/Add.6). This general principle could be further specified by national scale biodiversity criteria, e.g. the maintenance of a certain percentage of each of the country's natural forest types. It is important to consider the different natural forest types within a country in order to detect and deal with (inter-ecosystem) leakage, as well as to ensure that the whole ecological variety of forests is adequately maintained. Assessment of progress towards this criterion could be measured using the spatial extent of each natural forest type over the years against its spatial extent in a baseline year. Forest monitoring should be combined and streamlined with other reporting tasks, e.g. national reports for the FAO FRA (FAO 2010) and international assessment of the CBD target for the conservation of at least 10% of each of the world's forest types (SCHMITT *et al.* 2009). Thus, the quality of data available at different spatial levels could be improved significantly.

(c) Documentation of safeguards and additional benefits

It is desirable that countries define a reference condition for biodiversity at the national level because concentrating biodiversity monitoring only on particular project areas may not capture the spatial shift of activities that are harmful to biodiversity. This task is intricately linked to the data inventories that are necessary to define biodiversity objectives and indicators (section 4.2, Table 1). It appears extremely complicated to use historic biodiversity data due to the difficulties in separating the impacts of past and current land use activities, climatic effects and REDD+ measures on the biodiversity status of a given area.

Countries could establish and sustain a national biodiversity database that collects and aggregates all relevant and available data from ongoing monitoring activities. For instance, REDD+ pilot projects that integrated biodiversity criteria into their project design often apply for certification by a non-carbon standard (see section 4.2). These standards, especially the CCBS (CCBA 2008) provide relatively differentiated approaches for assessing the impacts of REDD+ activities on biodiversity. The aggregation of such data from small scale biodiversity monitoring at project and subnational level together with data from larger scale forest

monitoring, e.g. national forest inventories and maps created by remote sensing techniques, could help to continuously update the national biodiversity database.

To date, reporting and verification of biodiversity aspects are carried out for some REDD+ projects, mostly because there are financial incentives to do so in order to sell carbon credits on the voluntary carbon market. Verification is tricky at project scale, and it is even more complicated to imagine a third party verifying or assessing the implementation of safeguards and the generation of additional benefits at the national level. One possibility for encouraging countries to establish national biodiversity monitoring systems in relation to REDD+ would be to link reporting to existing international monitoring obligations, e.g. the CBD, and to financial support for REDD+ capacity building. Verification and possible certification could be carried out against the REDD+ social and environmental standards (CCBA 2010) (see section 4.2).

6 Conclusions

REDD+ was initiated as a mechanism for the mitigation of CO_2-emissions. It attributes a value to forest ecosystems based on just one of the many ecosystem services they provide – the quantifiable storage of carbon and the ability to sequester CO_2. Despite good reasons for such a practicable approach, it becomes increasingly evident that forest ecosystems are crucial for both mitigation and adaptation and that this link is inseparable. In this regard, REDD+ probably started off on the wrong foot because the simple quantitative focus on biomass is too narrow and results in considerable risks to other social and environmental objectives. These risks also concern non-forest ecosystems and their long-term capacity to provide the service of carbon storage. Biodiversity with all its components is crucial in this context because it is the fundamental basis of all ecosystems for adapting to climatic changes. Further losses of biodiversity will decrease the capacity to cope with rapidly changing climatic conditions.

Generally speaking, coherence as well as social and environmental integrity are prerequisites for REDD+ to become successful; without these attributes the future of the mechanism will be at risk because donor and beneficiary countries alike could eventually lose faith in the mechanism and will subsequently deny the necessary support to overcome the tremendous challenges associated with curbing unsustainable forest exploitation. On the international level, the Parties to the UNFCCC will decide on the framework for REDD+; this includes agreeing on eligible activities, providing sound and operational definitions, establishing biodiversity safeguards and setting the rules for documentation. So far, the negotiation text contains a promising clause on safeguards but the tricky issue of their implementation through clear and operational definitions still remains a challenge. The same holds true for a specification of the term *sustainable management of forests*.

The CBD is predestined to play the guiding role in all biodiversity-related REDD+ issues – especially regarding aspects connected to ecosystem-based adaptation, risks and additional benefits of eligible activities, identification of priority areas and the monitoring of safeguards. Despite the many decisions of both conventions to enhance their collaboration, there is still a lack of consensus among the Parties to the CBD on its role in the REDD+ process. However, a more proactive stance from the CBD regarding this issue is crucial and urgent because once the UNFCCC has concluded and decided on the REDD+ framework there are few ways to have a stake in, support and influence the modalities of the mechanism. On the one hand, the CBD could give advice to the ongoing UNFCCC negotiations, on the other the CBD has a vast collection of data and expertise that can support the sound integration of biodiversity issues into national REDD+ strategies. The enhanced cooperation between the secretariats of the CBD und UNFF is a promising first step and could serve as a blueprint for other processes. A joint work programme on REDD+ between CBD and UNFCCC with the inclusion of scientific expertise could be a further way forward. The cross-cutting character of REDD+ discussions on a common understanding of forest definitions and terms could facilitate an enhanced collaboration not only between the Rio conventions and the UNFF but possibly also between other multilateral forest-related processes; the CPF appears to be a suitable forum for this.

The recently established Interim REDD+ Partnership has the potential to build a bridge between the UNFCCC and the CBD. Many modalities of this young initiative are yet unclear and it will have to withstand the threat of becoming a subsidiary process inheriting the divergent interests of the UNFCCC negotiations. However, due to its voluntary character and greater flexibility, it provides a significant opportunity to merge biodiversity considerations into the national REDD+ strategies that are currently developed by many countries. They are key for biodiversity

conservation, and also for sustaining the livelihoods of local and indigenous peoples, because the implementation of REDD+ activities and safeguards will take place at the national level. Thus, countries need to be encouraged and supported in developing comprehensive national strategies that adequately consider and integrate biodiversity, e.g. by identifying forests of special importance for conservation. Hereby they can build on a vast range of expertise and concepts regarding the setting and monitoring of biodiversity objectives at different spatial scales provided by the CBD and other international institutions, NGOs and science. Besides they will require additional financial support and capacity building for national strategy development that could be provided through bilateral partnerships, FCPF and UN-REDD.

Although there are many challenges associated with REDD+ design and implementation, there are also ways and options to overcome them. This requires a continuously strong political will of all public and non-public stakeholders, as well as mutual building of trust between donor and beneficiary countries. Despite the concerns, a vast majority of the "REDD+-community" wants to make fast and measurable progress in addressing the increasingly urgent issues of deforestation and forest degradation. In light of the increasing evidence of rapid climate change, the recent and current environmental catastrophes should further fuel the efforts to make REDD+ a successful mechanism which contributes significantly to the mitigation of emissions, the adaptation of forest ecosystems and forest biodiversity conservation.

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