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Nairobi, 20–23 September 2010

REDD-PLUS AND BIODIVERSITY BENEFITS

NOTE TO READERS

1. The present document is presented as a background document for the Global Expert Workshop on Biodiversity Benefits of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, taking place from 20-23 September 2010, in Nairobi. The workshop report will be submitted as an information document to the tenth meeting of the Conference of the Parties (COP-10), 18-29 October 2010, Nagoya, Japan.

2. This document outlines key linkages between the objectives and relevant decisions of the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC) in relation to REDD-plus (Reducing emissions from deforestation and forest degradation in developing countries),[1] specifically in relation to the potential of REDD-plus to benefit biodiversity, indigenous and local communities, and climate change mitigation.

3. It is foreseen that this background document will be revised, based on the workshop results and an online peer-review, and subsequently published in the CBD Technical Series towards the end of 2010.

[1] With reference to decision 5/CP.15 of the United Nations Framework Convention on Climate Change (UNFCCC), REDD-plus refers to "policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries". The acronyms REDD and REDD-plus are used without any intention to pre-empt ongoing of future negotiations under UNFCCC.

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SUMMARY

The opportunities for REDD-plus and biodiversity synergies are immense

1. Tropical forests are home to an amazing diversity of life. The Amazon rainforest alone hosts about a quarter of the world's terrestrial species (Malhi et al., 2008). Effective efforts under the United Nations Framework Convention on Climate Change to curb deforestation and forest degradation could provide considerable benefits for biodiversity, in particular through the conservation of primary forests (SCBD, 2009). In forests that are already degraded, effective forest landscape restoration can be beneficial for biodiversity. Tropical forests can regain up to 80% of their original biodiversity in as little as 50 years[2] (Dent & Wright, 2009; Sberze et al., 2010). Harnessing the full potential of biodiversity benefits would also boost forest ecosystem services, which have been estimated to be worth on average US$ 6,120 per hectare per year in intact tropical forests (TEEB, 2009b).

Stable storage of carbon depends on stable and resilient forests

2. There is a strong correlation between biodiversity, ecological processes, and forest carbon stocks (Strassburg et al., 2010; Diaz et al., 2010). Primary tropical forests are generally the most carbon-dense forests, and they are also highly resilient, making it more likely that carbon will be stored over long periods of time (permanence) in forests of high biodiversity. Natural, diverse forests will be better able to withstand pressure from invasive alien species and other pests, and disturbances such as forest fires and storms, and will recover more quickly following such disturbances. A recent synthesis of more than 400 scientific studies on forest resilience concluded that long-term stability of the forest carbon stock against disturbance rests on forest ecosystem resilience, which in turn rests on biodiversity, at multiple scales (Thompson et al., 2009).

Biodiversity benefits can be easily optimized

3. Recent studies suggest that a focus on areas of high biodiversity and endemic species could double the biodiversity benefits of REDD-plus, and increase the delivery of ecosystem services. Areas of high biodiversity which are most threatened should be prioritized, while leakage should be avoided (see "Mitigating Risks" below). Targeted funding for biodiversity conservation could in turn contribute to and increase REDD-plus effectiveness (Venter et al., 2009; Diaz et al., 2010).

Different landscape contexts require different REDD-plus approaches

4. Primary tropical forests are the richest forests in terms of biodiversity and carbon stock, and conserving them will yield a double dividend for climate change mitigation and biodiversity conservation and sustainable use, and provide ecosystem services at local, national and global levels. In primary forests and other naturally regenerated forests, the total ecosystem carbon stock (in plants and soil) is on average 28% higher than in plantations (Liao et al., 2010). The replacement of natural forests with plantations decreases carbon stocks and harms biodiversity (Liao et al., 2010; Koh & Wilcove, 2008), and should therefore be excluded from any REDD-plus efforts. It is questionable whether forest plantations can contribute effectively to carbon storage in the long-term (SCBD, 2009).

Forest restoration (enhancement of forest carbon stocks) can provide biodiversity benefits

5. Environmentally sensitive restoration of degraded forest and reforestation on agricultural lands can provide biodiversity and climate benefits (SCBD, 2009). Over the long term, natural succession is generally more effective than tree planting for carbon sequestration (Liao et al., 2010) and provides more biodiversity benefits, if the factors that caused forest degradation can be effectively controlled (Sayer et al., 2004). Afforestation and reforestation activities in the context of REDD-plus, if implemented correctly could enhance ecological connectivity, which is essential in the context of the adaptation of ecosystems and species to the negative impacts from climate change.

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[2] However, some vulnerable and highly specialized species might not recover from forest degradation.

A long-term and holistic approach is needed for the success of REDD-plus

6. Forest restoration, management and conservation measures need to be planned at the appropriate spatial scale to ensure biodiversity benefits (Thompson et al., 2009). Such measures should also harness the benefits of biodiversity for carbon storage (Diaz et al., 2010). This requires spatial planning at the landscape, regional, or national level, and even in a transboundary context, where necessary. Spatial biodiversity data could inform REDD-plus design and planning to improve ecological connectivity in protected area networks, and to optimize biodiversity benefits. The national ecological gap analyses under the CBD programme of work on protected areas, carried out with stakeholder involvement and based on best available biodiversity data, is one source for this information. Early involvement of biodiversity experts at the national and local level, including holders of traditional knowledge, is essential for REDD-plus planning (SCBD, 2009).

Ecological tipping points or thresholds could endanger REDD-plus efforts

7. REDD-plus could be instrumental in safeguarding the Amazon basin and other major tropical forest regions. However, several modeling studies suggest there is a significant risk that removal of as little as 20% of the Amazon rainforest could push much of Amazonia into a permanently drier climate regime (currently, Amazon deforestation stands at around 17%), and that such a tipping point becomes more likely with temperature increases of more than 2ºC (SCBD, 2010; Leadley et al., 2010). Large-scale Amazon dieback and other possible major biodiversity tipping points have to be considered in the context of overall climate change mitigation efforts, including REDD-plus as they could reduce the effectiveness of REDD-plus investments and threaten the achievement of mitigation goals.

Key tools to enhance multiple benefits exist, but need further research and development

8. The CBD Secretariat has developed, through its LifeWeb Initiative and jointly with UNEP-WCMC, an online carbon and biodiversity mapping tool, which could help to inform decision-makers about synergies (cf. www.carbon-biodiversity.net). This tool is presently being further developed to include the national ecological gap analyses carried out under the CBD, which have been completed or are in the process of being completed in many developing countries, including most REDD pilot countries. With regard to monitoring of biodiversity benefits, a joint initiative of the Collaborative Partnership on Forests to monitor forest degradation, and other initiatives in which the CBD Secretariat is involved, can contribute to measuring the success of REDD-plus and its multiple benefits.

Indigenous peoples and local communities are key to the success of REDD-plus

9. More than 300 million indigenous peoples and members of local communities depend mainly on forests for their livelihoods (MEA, 2005), and have been effective stewards of forests for millennia. For example, in the Brazilian Amazon, the average probability of deforestation was found to be 7 to 11 times lower within indigenous lands and other protected areas than in surrounding areas (Ricketts et al., 2010). Equity and the full and effective participation of indigenous peoples and local communities are enabling conditions for REDD-plus, as its long-term success will stand or fall with local ownership and support (Agrawal & Angelsen, 2009). The CBD Ad Hoc Technical Expert Group recommends that the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) should be the basis for full and effective participation (SCBD, 2009).

Mitigating the risks of REDD-plus

10. Potential risks of poorly designed REDD-plus efforts include:

(a) Perverse incentives and inadvertent effects, such as artificially increasing the "threat level" to forests, thereby exerting pressure on the international community to provide payments, and risks of subsidizing forest conversion through REDD-plus payments (e.g. Karousakis, 2009);

(b) Leakage: the displacement of emissions through shifting pressure to other (remote) forest areas or other terrestrial or aquatic ecosystems, such as wetlands or grasslands (e.g. Harvey et al. 2010);

(c) Possibilities for "re-centralization" of forest governance, threatening recent successes empowering local stakeholders to manage forests sustainably (Phelps et al., 2010);

(d) Possibilities for "land grab" and displacement of indigenous peoples and local communities as forested land gains a new market value (for precedents in agriculture, see Daniel & Mittal, 2009).

11. These risks can be mitigated (i) through appropriate safeguards (for example against the conversion of natural forests); (ii) by ensuring that REDD-plus has a holistic approach to forest-based carbon storage (and possibly by considering all terrestrial ecosystem-based carbon); (iii) by setting appropriate baselines and reference scenarios; and (iv) by monitoring biodiversity impacts of REDD-plus efforts, for example in the context of reporting under CBD. In the context of baselines and monitoring, the question of whether to use gross or net deforestation rates is particularly important. The use of net rates[3] could hide the loss of mature forests and their replacement *in situ* or elsewhere with plantations. The conversion of natural forests to plantations has negative impacts on carbon stocks and on biodiversity (except in rare cases in which plantations are managed for carbon storage), and should therefore be excluded from any REDD-plus or other climate-change funding.

12. REDD-plus efforts could have both positive and negative impacts on biodiversity, while in turn, biodiversity plays an important role for effective and long-term carbon storage in forests. Therefore, it is crucial that biodiversity is appropriately considered in the development and implementation of REDD-plus. The potential to simultaneously address the biodiversity crisis and climate change is unprecedented, while poorly designed REDD-plus efforts could damage forest biodiversity and in the process threaten the continued provision of ecosystem services for human well-being. The CBD is supporting its Parties and key actors and stakeholders in ensuring that biodiversity benefits are at the forefront of the discussion on REDD-plus.

[3] Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2005 as overall deforestation minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

INTRODUCTION

13. Reducing emissions from deforestation and forest degradation in developing countries (REDD-plus) is first and foremost being developed as a climate change mitigation option. However, REDD-plus is expected to generate considerable biodiversity benefits, and also has the potential to generate benefits for indigenous and local communities. Achieving and optimizing these so called “co-benefits” (or multiple benefits) will require close coordination between key actors at local, national and international levels.

14. The Secretariat of the Convention on Biological Diversity (CBD), in collaboration with the UN REDD Programme, is organizing a global expert workshop, REDD-plus Biodiversity Benefits, from 20 to 23 September 2010 in Nairobi, with the objective to “*support Parties efforts to address reducing emissions from deforestation and forest degradation in developing countries in the framework of the United Nations Framework Convention on Climate Change”* while contributing to the implementation of the CBD programme of work on forest biodiversity (CBD decision IX/5).

15. This document serves as a technical background paper for the workshop, and aims to:

(a) Emphasize the importance of biodiversity and social “co-benefits” for the long-term success of REDD-plus;
(b) Outline possible risks of REDD-plus for biodiversity and indigenous communities, with a view to contribute to the development or improvement of appropriate policy recommendations;
(c) Outline possible support of CBD to the success of REDD, and in turn, to outline the potential of REDD to contribute to the objectives of CBD;
(d) Present various tools for achieving multiple benefits in planning and implementing REDD activities.

16. This document builds, *inter alia*, on the findings of the CBD Ad Hoc Technical Expert Group (AHTEG) on biodiversity and climate change, which was convened in 2008 and produced its final report in October 2009.

A brief history of REDD

17. REDD was first introduced into the UNFCCC negotiations by Papua New Guinea and Costa Rica at the eleventh session of the Conference of the Parties to UNFCCC in Montreal in 2005**.** In 2007, it became part of the Bali Action Plan, adopted at UNFCCC COP 13 in Bali. In 2008 and 2009, policy approaches and positive incentives relating to reducing emissions from deforestation and forest degradation in developing countries and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks were considered under the Bali Action Plan. More recently, the latter set of activities has drawn increasing attention.

18. Many of the discussions and activities on REDD-plus are happening in parallel to the United Nations process. Since Bali, various pilot and demonstration activities have started, notably with funding from the World Bank’s Forest Carbon Partnership Facility (FCPF) and Forest Investment Programme (FIP), the United Nations REDD Programme (UN REDD), the Global Environment Facility (GEF), the International Tropical Timber Organization (ITTO), and the REDD-plus Interim Partnership (see table 1).

19. The FCPF consists of two separate mechanisms, each with its own trust fund for which the World Bank acts as Trustee. The Readiness Mechanism is assisting 37 tropical and sub-tropical developing countries in preparing themselves to participate in a future, large-scale system of positive incentives for REDD-plus. This includes preparing a national REDD-plus strategy and/or complementing the country’s existing strategy, establishing a reference scenario against which countries will reduce emissions, and establishing a national monitoring, reporting and verification system for emissions and emission reductions. A few countries that will have successfully participated in the Readiness Mechanism may be selected, on a voluntary basis, to participate in the Carbon Finance Mechanism through which the FCPF will pilot incentive payments for REDD-plus policies and measures in approximately five developing countries. In addition to the Readiness and Carbon funds, the World Bank set up the Forest Investment

Programme (FIP), which provides support to investments needed to deliver benefits from REDD-plus. Relevant operational guidance of the FCPF in relation to biodiversity and indigenous and local communities, including World Bank environmental safeguards, is available at http://web.worldbank.org/.

20. The UN-REDD Programme was launched in September 2008 jointly by FAO, UNDP, and UNEP, building on agency-specific comparative strengths. UN-REDD actions serve the double purpose of assist developing countries to prepare and implement national REDD-plus strategies and, at the global level, help develop analyses and guidelines on issues such as measurement, reporting and verification of carbon emissions; ensuring that forests continue to provide multiple benefits for livelihoods and the environment; and supporting the engagement of indigenous peoples and civil society. Currently, the UN REDD Programme is funding nine pilot countries, and has welcomed 13 others to be observers and potential future pilot countries in the future. Operational guidance for the UN REDD Programme in relation to biodiversity benefits and indigenous and local communities is available at www.un-redd.org/.

21. The GEF first launched a pilot REDD incentive scheme in 2007. Currently, funding for sustainable forest management (SFM) and REDD-plus is mainly being provided through individual country allocations for biodiversity, climate change and land degradation. Developing countries eligible for GEF funding for SFM are those with forests capable of delivering benefits for biodiversity, mitigation of greenhouse gas emissions and local livelihoods. For the next funding cycle, 2010-2014 (GEF-5), the GEF will provide incentives for countries to generate multiple environmental and social benefits deriving from SFM and REDD-plus projects. Accordingly, the overall goal of the GEF-5 SFM/REDD-plus strategy is to achieve multiple environmental benefits from improved management of all types of forests (GEF 2010).

22. ITTO's Thematic Programme on Reduced Deforestation and Forest Degradation and Enhancing Environmental Services in Tropical Forests (REDDES) is set up in complementarity to the REDD-plus initiatives mentioned above. REDDES follows a comprehensive approach covering all environmental services. It is focused on strengthening sustainable forest management (SFM) in REDD-plus, particularly with regards to forest degradation. It also concentrates on capacity building, particularly with regards to local implementation of REDD-plus, and on REDD-plus demonstration activities. REDDES covers all ITTO member countries (including countries not covered by other initiatives).

23. In addition to the programmes of the World Bank, UN-REDD, GEF and ITTO, an initiative led by France and Norway resulted in the creation of an interim political partnership among 50 countries to formalize areas of agreement on REDD-plus. The REDD-plus interim partnership focuses on "fast track" financing of REDD-plus action to supplement the UNFCCC negotiation track. It also aims at sharing information and transparency about REDD-plus activities and scaling up financing, in addition to reaffirming commitment to a REDD-plus mechanism. The Partnership's pilot activities and interim arrangements will not set the rules for REDD-plus, but they provide lessons learned and precedents that feed into the negotiations.

Table 1: REDD-plus pilot and demonstration countries

Country	**FCPF**	**FIP**	**UN-REDD**	**ITTO REDDES**	**Total area of forests (1000 ha)**	**% of forest cover**
Argentina	X		X*		29400	11
Bangladesh			X*		1142	11
Bhutan			X*		3249	69
Bolivia	X		X	X	57196	53
Brazil		X		X	519522	62
Burkina Faso		X			5649	21
Cambodia	X		X*	X	10094	57
Cameroon	X			X	19916	42
Central African Republic	X		X*	X	22605	36
Chile	X				16231	22

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Colombia	X		X*	X	60499	55
Congo, Democratic Republic of	X	X	X	X	154135	68
Congo, Republic of	X		X*	X	22411	66
Costa Rica	X		X*		2605	51
Cote d'Ivoire				X	10403	33
Ecuador			X*	X	9865	36
El Salvador	X				287	14
Equatorial Guinea	X				1626	58
Ethiopia	X				12296	11
Fiji				X	1014	56
Gabon	X			X	22000	85
Ghana	X	X		X	4940	22
Guatemala	X		X*	X	3657	34
Guyana	X			X	15205	77
Honduras	X			X	5192	46
India				X	68434	23
Indonesia	X	X	X	X	94432	52
Kenya	X		X*		3467	6
Lao PDR	X	X			5666	47
Liberia	X			X	4329	45
Madagascar	X				12553	22
Malaysia				X	20456	62
Mexico	X	X	X*	X	64802	33
Mozambique	X				39022	50
Myanmar				X	31773	48
Nepal	X		X*		3636	25
Nicaragua	X				3114	26
Nigeria			X*	X	9041	10
Panama	X		X	X	3251	44
Papua New Guinea	X		X	X	28726	63
Paraguay	X		X		17582	44
Philippines			X*	X	7665	26
Peru	X	X			67992	53
Solomon Islands			X*		2213	79
Sri Lanka			X*		1860	29
Sudan			X*		69949	29
Suriname	X			X	14758	95
Tanzania	X		X		33428	38
Thailand	X			X	18972	37
Togo				X	287	5
Trinidad & Tobago				X	226	44
Uganda	X				2988	15
Vanuatu	X			X	440	36
Venezuela				X	46275	52
Vietnam	X		X		13797	44
Zambia			X		49468	67

* UN REDD observer countries
Sources: FCPF, FIP, UN-REDD, ITTO, Global Forest Resources Assessment 2010

24. Table 2 presents a proposed operational framework for the phases of REDD-plus developed by The Forest Dialogue (TFD) on frameworks for REDD-plus finance and implementation. The table maps key outcomes, safeguards, finance mechanisms and triggers.

Table 2: Summary of the operational framework for the phases of REDD-plus

	PHASE 1: Preparation and readiness	**PHASE 2: Policies and measures**	**PHASE 3: Performance-based payments**
Outcomes	• Development of national REDD-plus strategies • Assessment of drivers of deforestation • Clarification of rights • Institutional development • Demonstration activities • Deployment of multistakeholder processes	• Development of national portfolios • Benefit-sharing and equitable distribution • Development of institutional capacity, strengthening of forest governance, and accomplishment of land-tenure reform	• Third-party-verifiable emissions reductions and carbon-stock enhancements • Equitable distribution mechanisms • Social and environmental impact assessment
Safeguards	• Transparency • Participation and representation • Particular attention to women and most vulnerable poor	• Social and environmental audits • Governance and legality audits • Free, prior and informed consent • Installation of MRV system	• Free, prior and informed consent • Social and environmental audits
Finance Mechanisms	• Multilateral and bilateral grants • Mechanisms such as FCPF and UN-REDD • Voluntary carbon markets • Public-sector and private-sector funding	• The application of all possible financial tools within a portfolio framework • Scaled-up public sector and private sector investments • Implementation of equitable distribution mechanisms	• Compliance market • Non-market compliance • Underwriting risk • Equitable distribution mechanisms
Triggers/ Eligibility criteria	• Multi-stakeholder endorsement • Development of plan for overcoming governance and policy gaps	• Adequate legal rights and tenure systems • Endorsement of benefit distribution • National capacity to perform third-party auditing • Proxy indicators	

Source: The Forest Dialogue, 2010

Linkages between biodiversity and climate change, and between UNFCCC and CBD

25. It is now widely recognized that biodiversity and climate change are inextricably linked, not only because of the current and expected future impacts of inevitable climate change on biodiversity, but also because of biodiversity's essential role in climate change mitigation and climate change adaptation (SCBD, 2009; cf. also UN General Assembly Resolution 64/203 of 14 December 2009).

26. The nature and extent of the impacts of REDD on forest biodiversity, and on indigenous and local communities, will be determined by the design of a REDD mechanism and by the implementation of

REDD efforts at national and local levels (SCBD, 2009; Harvey and Dickson, 2009). The potential of REDD for synergies among the Conventions has been recognized by both the UNFCCC and the CBD in decisions of their Conferences of the Parties. The UNFCCC, in decision 2/CP.13, recognizes "that reducing emissions from deforestation and forest degradation in developing countries can promote co-benefits and may complement the aims and objectives of other relevant international conventions and agreements".

27. The Conference of the Parties to the Convention on Biological Diversity, at its ninth meeting, welcomed the consideration of the issue of reducing emissions from deforestation and forest degradation in the framework of UNFCCC (decision IX/16).

28. Further, in decision IX/5, the Conference of the Parties to CBD invited Parties, other Governments, and relevant international and other organizations to "ensure that possible actions for reducing emissions from deforestation and forest degradation do not run counter to the objectives of the Convention on Biological Diversity and the implementation of the programme of work on forest biodiversity; but support the implementation of the programme of work, and provide benefits for forest biodiversity, and, where possible, to indigenous and local communities, and involve biodiversity experts including holders of traditional forest-related knowledge, and respect the rights of indigenous and local communities in accordance with national laws and applicable international obligations".

Expanded programme of work on forest biological diversity

The CBD's expanded programme of work on forest biological diversity consists of 130 measures, which the Parties have agreed to implement in accordance with national priorities. The measures are clustered in three elements:

- Element 1 relates to measures for the conservation and sustainable use of forest resources and the equitable sharing of the multiple benefits arising from their use. The measures include activities to increase sustainable forest management, implement the ecosystem approach, establish effective protected areas, restore degraded forests, fight against forest fires and invasive alien species, and ensure equitable access and benefit-sharing with indigenous and local communities.
- Element 2 involves measures to further develop the institutional and socio-economic environment necessary to enable forest conservation, sustainable use and benefit-sharing. Measures in this cluster include activities to provide incentives for the use of sustainable practices (e.g., certification), to develop good practices in forest law enforcement and governance (FLEG), and to clarify land tenure and resource rights.
- Element 3 concerns scientific and technical measures for better knowledge, assessment and monitoring of forest trends. These measures include activities to advance assessment methods, research forest ecosystem functioning, develop a global forest classification system, and improve the infrastructure for data and information management.

The complete expanded programme of work on forest biological diversity, as adopted in the annex to CBD decision VI/22, can be downloaded at http://www.cbd.int/forest/pow.shtml

29. The Conference of the Parties requested the Executive Secretary in decision IX/5 to support Parties' efforts to address reducing emissions from deforestation and forest degradation in developing countries, in collaboration with the CPF members, in particular with the World Bank and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). In the same decision, the Conference of the Parties further requested the Executive Secretary to carry out thematic and/or regional workshops to support Parties' efforts in implementing the programme of work on forest biodiversity, based on the findings of the in-depth review of the programme of work (UNEP/CBD/SBSTTA/13/3) in close collaboration with members of the Collaborative Partnership on Forests (CPF). Relevant joint activities of the CPF include an initiative to improve the definition and monitoring of forest degradation, lead by FAO. The initiative is expected to report first results by the time of UNFCCC COP 16 (29 November to 16 December 2010).

30. The Conference of the Parties to CBD, at its ninth meeting (COP 9), in decision IX/16, "Invites the United Nations Framework Convention on Climate Change to take full account of opportunities for its work to provide benefits for biodiversity, including through collaboration among the subsidiary bodies of the three Rio conventions and the application of the ecosystem approach and sustainable forest management".

31. Following CBD COP 9, on the basis of decision IX/16, the CBD Ad Hoc Expert Group (AHTEG) on biodiversity and climate change developed basic recommendations to support Parties in their efforts to implement REDD in a way that is supportive of CBD provisions. A summary of the AHTEG guidance (cf. SCBD, 2009) is provided throughout the following chapters, while the full set of recommendations relevant to REDD is provided in annex I. Key aspects of the AHTEG recommendations are reflected in SBSTTA-14 recommendations to COP 10 (see below).

32. In decision 1/CP.15, the Conference of the Parties to UNFCCC requested the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA) to continue its work, drawing on its report to the Conference of the Parties at its fifteenth session (document FCCC/AWGLCA/2009/17, annex I.), including work on REDD safeguards[4] to ensure biodiversity and indigenous and local community benefits. In this document, FCCC/AWGLCA/2009/17, annex I, the Ad Hoc Working Group set out a number of draft safeguards, including:

(a) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

(b) Full and effective participation of relevant stakeholders, including in particular indigenous peoples and local communities;

(c) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that REDD-plus 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.

33. However, it is important to note that these safeguards are not yet adopted by the Conference of the Parties to UNFCCC, and that no operational-level guidance has been produced on the application of such safeguards for REDD, neither under UNFCCC nor CBD.

[4] The UNFCCC Secretariat will be invited to provide an update on the status of negotiations to workshop participants.

New post-2010 Strategic Plan of the Convention

34. The Conference of the Parties to CBD, at its tenth meeting, is expected to adopt a new Strategic Plan for the Convention, covering 2011 to 2010, and possibly a long-term vision for 2050. Several targets for 2020 of the draft Strategic Plan are linked to REDD-plus, in the sense that the success or failure of REDD-plus could determine the feasibility of achieving these targets. In turn, implementation of the CBD could support the success of REDD-plus. It seems advisable, therefore, to align forest-related targets of both Conventions, and to collaborate closely to achieve synergies.

35. The draft 2020 targets of the new Strategic Plan directly related to forest biodiversity are (cf. WGRI recommendation 3/5).

(a) Target 5: By 2020, the rate of loss and degradation, and fragmentation, of natural habitats, [including forests], is [at least halved][brought close to zero].

(b) Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

(c) Target 11: By 2020, at least [15%][20%] of terrestrial, inland-water and [X%] of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through comprehensive, ecologically representative and well-connected systems of effectively managed protected areas and other means, and integrated into the wider land- and seascape.

(d) Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Draft COP 10 decision related to REDD (SBSTTA-14 recommendation XIV/5)

The Subsidiary Body on Scientific Technical and Technological Advice *recommends* that the Conference of the Parties at its tenth meeting adopt a decision along the following lines:

The Conference of the Parties (...)

8. *Further invites* Parties and other Governments, according to national circumstance and priorities, as well as relevant organizations and processes to consider the following guidance on ways to conserve, sustainably use and restore biodiversity and ecosystem services while contributing to climate-change mitigation and adaptation:

(...)

Ecosystem-based approaches for mitigation including the reduction of emissions from deforestation and forest degradation, the conservation of forest carbon stocks, and the sustainable management of forest and forest carbon stocks

(m) Consider the achievement of co-benefits between ecosystem-based approaches for climate change mitigation and adaptation activities;

(n) Implement ecosystem management activities, including the protection of natural forests, natural grasslands and peatlands, the sustainable management of forests, the use of native communities of forest species in reforestation activities, sustainable wetland management, restoration of degraded wetlands and natural grasslands, conservation of mangroves, salt marshes and seagrass beds, sustainable agricultural practices and soil management as a contribution towards achieving and consistent with, the objectives of the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification and the Convention on Biological Diversity;

(o) In forest landscapes subject to harvesting, clearing and/or degradation, implement, as appropriate, improved land management, reforestation and forest restoration which, through the use of native communities of species, can improve biodiversity conservation and associated services while sequestering carbon and limiting the degradation of native primary and secondary forests;

(p) When designing, implementing and monitoring afforestation, reforestation and forest restoration activities for climate-change mitigation consider biodiversity and ecosystem services through, for example:

(i) Converting only land of low biodiversity value or ecosystems largely composed of non-native species, and preferably degraded ones;

(ii) Choosing, whenever feasible, local and acclimated native tree species when selecting species for planting;

(iii) Avoiding invasive alien species; and

(iv) Strategically locating afforestation activities within the landscape to enhance connectivity and increase the provision of ecosystem services within forest areas;

[(q) Enhance the benefits from reducing emissions from deforestation and forest degradation, and the conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries and other sustainable land management activities for climate-change mitigation for forest-dwelling indigenous and local communities, through, for example, considering land ownership and land tenure, respecting, preserving and maintaining the knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biological diversity, and ensuring space for the full and effective participation of indigenous and local communities in relevant policy-making processes;]

(r) Assess, implement and monitor a range of sustainable activities in the agricultural sector and in soil management that may result in the maintenance and potential increase of current carbon stocks and, at the same time, the conservation and sustainable use of biodiversity while recognizing potential risks from increased pesticide use through the promotion of ecologically beneficial tillage regimes and other means of sustainable crop and grass-land management, sustainable livestock management, and agroforestry systems;

(s) Adopt policies that integrate and promote biodiversity conservation, especially with regards to soil biodiversity, while conserving and restoring organic carbon in soil and biomass, including in peatlands and other wetlands as well as in grasslands, savannahs and drylands.

PART I: MITIGATING RISKS

1) Mitigating risks to biodiversity

36. Risks and opportunities of REDD-plus will vary according to such landscape contexts, and will also strongly depend on the local, national, and regional socio-economic and policy context. The following sections provide a broad overview of risks and opportunities of REDD-plus for biodiversity, without pretending to be exhaustive. An annotated bibliography is provided at the end of the paper, for further reading.

37. Opportunities for implementing REDD-plus will vary across different landscape contexts, according to current and historical land uses and socioeconomic conditions. Three broad types of landscapes can be identified, and a mixture of forest-related and agricultural options may be applicable in each of these landscapes (SCBD, 2009):

(a) In forest landscapes subject to ongoing clearing and forest degradation, climate change mitigation and biodiversity conservation can be achieved by reducing deforestation and forest degradation and improving forest management;

(b) In forest landscapes that currently have little deforestation or forest degradation occurring, the conservation of existing primary forests is critical both for protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity;

(c) In forest landscapes that have already been largely cleared and degraded, climate change mitigation and biodiversity conservation can be achieved by enhancing carbon stocks through restoration and improved forest management, creating new carbon stocks (e.g., afforestation and reforestation), and improving agricultural management.

Conversion of natural forests

38. One frequently discussed risk to biodiversity from REDD-plus is the possible creation of perverse incentives that would undermine biodiversity objectives, notably by subsidizing or otherwise facilitating the conversion of primary or other naturally regenerated forests[5] ("natural forests") into plantations. Forest plantations are generally much poorer in biodiversity than natural forests and often do not provide any significant local socio-economic benefits, but rather, in many cases, have undermined the rights, cultural identity and livelihoods of indigenous and local communities (e.g., Colchester, 2010). Forest conversion could theoretically occur directly because of REDD-plus efforts (if poorly designed, and if no appropriate safeguards are in place and enforced), or indirectly through leakage.

39. A recent scientific synthesis of 86 peer-reviewed studies concluded that any conversion of natural forests creates a significant "carbon debt", and that plantations sequester and store on average 28% less carbon than natural forests (Liao et al, 2010). Therefore, from a climate change mitigation perspective alone, the conversion of natural forests should be excluded from any REDD efforts and related incentive measures, as well as from any climate change adaptation efforts. However, if only above-ground carbon is considered, this overall negative impact of forest conversion on climate change might not be fully considered.

40. The threat of forest conversion to biodiversity has recently been reviewed in South-East Asia, using the example of conversion of primary or other naturally regenerated forests to oil palm plantations. Globally, oil palm plantations increased from 3.6 million ha in 1961 to 13.2 million ha in 2006, and

[5] In line with terminology used in the 2010 Global Forest Resources Assessment, this document uses the terms "primary forests" and "other naturally regenerated forests". The term "natural forests" is used here to describe both primary forests, and other naturally regenerated forests, although the authors recognize that the biodiversity values and other parameters of naturally regenerated forests and of planted forests vary widely.

Indonesia and Malaysia are today the world's largest palm oil producers, with 4.1 million hectares and 3.6 million hectares, respectively, under cultivation (FAO 2007). Palm oil is now being produced in 43 countries, and production is expected to further increase substantially in coming decades (Danielsen et al, 2009; SCBD, 2008). A recent analysis by Pin Koh & Wilcove (2010) of conversion to palm oil plantations in Indonesia and Malaysia, based on land-cover data compiled by the FAO, indicates that during the period 1990–2005, 55%–59% of oil palm expansion in Malaysia, and at least 56% of that in Indonesia occurred at the expense of forests. The analysis also found that that conversion of either primary or secondary (logged) forests to oil palm may result in significant biodiversity losses.

41. Conversion of primary or naturally regenerated forests to plantations has detrimental effects on biodiversity and is usually highly undesirable from the perspective of indigenous and local communities (e.g. Barlow et al, 2007). The global study on The Economics of Ecosystems and Biodiversity (TEEB) notes that the conversion of natural tropical forests to monocultures is a form of market failure, as the profits from such efforts are limited to few individuals, while the true costs in the form of long-term losses of ecosystem services and related opportunity costs are carried by society as a whole—by present and future generations (TEEB, 2009b).

42. The risk of natural forest conversion could increase if only net (rather than gross) deforestation[6] is at the basis of REDD-plus calculations. The use of net rather than gross deforestation rates could obscure the loss of mature (i.e., primary and modified natural) forests by their replacement *in situ* or elsewhere with areas of new forest growth. This could be accompanied by significant losses of biodiversity as well as unrecorded emissions (SCBD, 2009).

43. One important argument against conversions of natural forests to plantations for climate change mitigation or adaptation purposes, and against the consideration of plantations in REDD efforts, is the greater uncertainty about carbon permanence in plantations and other forests with low resilience, as compared to primary forests or other biodiverse forests (see "Mitigating risks to REDD permanence from lack of resilience", below).

Leakage (displacement of emissions)

44. Leakage in the context of REDD-plus describes the displacement of emissions from deforestation or forest degradation from one forest area to another, or to another ecosystem. This can result when one forest area under REDD-plus is effectively conserved and emissions are reduced, but the pressure to convert or degrade the forest simply moves on to other areas, either forests or other ecosystems such as wetlands or grasslands, and either in the same country, or in a different country. In either case, the emissions would simply be displaced, and no significant reduction (or co-benefits) would occur. In many cases that are prone to leakage, the pressure results from demand for commodities such as palm oil, timber and food crops, and this pressure is expected to increase significantly over coming decades (SCBD, 2008). Figure 1 provides an overview of the leakage challenge in relation to REDD-plus.

[6] Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2005 as overall deforestation minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

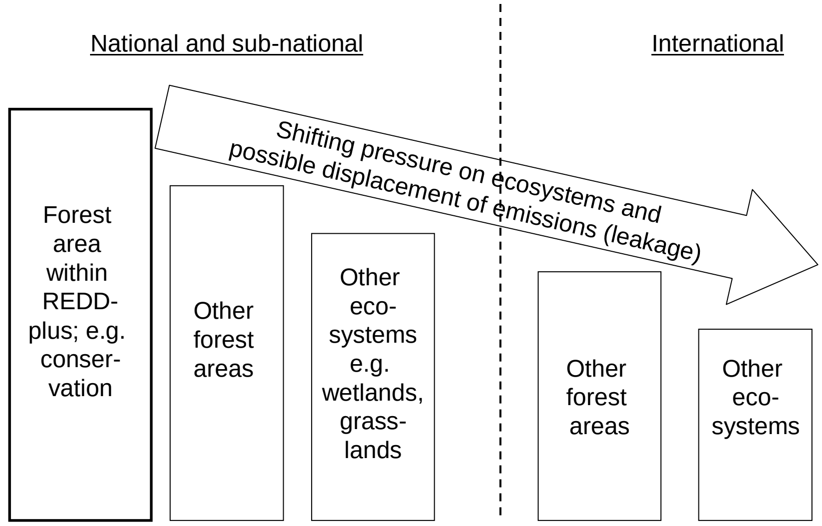


Figure 1: Leakage (displacement of emissions) in REDD-plus can be caused by displacement of land use pressure to other forests and other ecosystems, e.g. the pressure to convert natural ecosystems to agricultural land

45. Key challenges for the success of REDD-plus are therefore (i) creating a REDD mechanism that is inclusive enough to prevent leakage (at national and international levels); (ii) having a monitoring and reporting framework in place that can detect leakage and adapt REDD approaches; and (iii) ensuring that enough goods and services such as timber and food are produced in a way that does not require forest conversion. The success of REDD-plus is thus closely linked to increases in agricultural productivity and to the restoration of degraded lands, but also to the sufficient supply of timber from production forests that are not necessarily included in REDD-plus efforts, including plantations.

Biodiversity risks from afforestation and reforestation activities[7] *(enhancement of forest carbon stocks)*

46. Forest plantations for carbon storage are usually established using genetically uniform stock with high growth rates, but low adaptive capacity, which will ultimately diminish their performance in mitigation. For example, the largest monoculture plantation in the American tropics suffered a large-scale tree mortality as a result of water stress during the 1997 El Niño event. Increasing both genetic and species diversity in managed forest stands is likely to be important to increase forest resilience and resistance, and can be obtained by selecting a mix of species and range of age structures, including those that are likely to be adaptable to future climate conditions (SCBD, 2009). Recent studies have questioned the climate change mitigation value of plantations, and of afforestation and reforestation (Liao et al., 2010).

47. However, it should also be noted that under certain circumstances, and if properly planned and implemented, the establishment of plantations on deforested and/or severely degraded agricultural land

[7] In the context of land use, land-use change and forestry (LULUCF) under the UNFCCC Kyoto Protocol, "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; and "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; (decision 11/CP.7)

can result in net biodiversity benefits and increase the supply and quality of ecosystem services (Sayer et al., 2004; Brockerhoff et al, 2008; SCBD, 2009).

48. The AHTEG on biodiversity and climate change noted that afforestation activities can have positive or negative effects on biodiversity and ecosystem services depending on their design and management and the present land use. Afforestation activities that convert non-forested landscapes with high biodiversity values and/or valuable ecosystem services, increase threats to native biodiversity.

49. **Afforestation** activities could help to conserve biodiversity if they, for example, convert only degraded land or ecosystems largely composed of exotic species, include native tree species, consider the invasiveness of non-natives, and are strategically located within the landscape to enhance connectivity (SCBD, 2009).

50. **Reforestation** can provide both biodiversity and climate change mitigation benefits if it uses an appropriate mix of native species, incorporates any natural forest remnants, and results in a permanent, semi-natural forest. If appropriately designed and managed, reforestation activities on degraded lands can also relieve pressure on natural forests by supplying alternatives sources of sustainable wood products to local communities, thereby providing additional biodiversity and climate change mitigation benefits. Increasing the extent of tree plantations has often been proposed as both a mitigation and an adaptation measure (SCBD, 2009).

2) Mitigating risks to indigenous and local communities

51. REDD-plus carries a number of risks for indigenous and local communities. First, by monetizing forest carbon, REDD-plus might substantially increase the financial value of forests and could therefore trigger a "land grab" by governments and private investors, which could wrest forests away from indigenous and local communities. As in the case of the well-documented land grab in agriculture (e.g., Daniel & Mittal, 2009; World Bank, forthcoming), loss of forest access would undermine local livelihoods and could lead to evictions of local forest users. It could also mean the removal of tenure reform from the policy agenda.

52. In addition, REDD-plus poses risks to indigenous and local communities, which revolve around the issue of efficiency versus equity. In the interest of efficiency, to meet its additionality requirements, and at the expense of equity considerations, REDD-plus may give priority to the conservation of forests which would not otherwise be conserved. If designed in this way, REDD-plus would discriminate against indigenous and local communities who have already conserved forests or taken early action to do so (Kanninen et al., 2007).

53. Finally, there is a risk that REDD-plus could interrupt the promising trend towards decentralized forest management (Phelps et al., 2010). Effective decentralization policies allow indigenous and local communities increased rights and responsibilities, and help protect forests in many regions (Ribot et al., 2006). A recent study of 80 forest commons across 10 countries indicates that decentralized resource management is correlated with higher livelihood benefits and greater forest carbon storage (Chhatre & Agrawal, 2009). By substantially increasing the market value of forests, REDD-plus could provide new incentives to central governments to "re-centralize" control over forests. This would end autonomous decision-making about forest use at the local level and could involve the imposition of excessive control over indigenous and local communities. It could also lead to the displacement of local forest users, as in some national parks (Schmidt-Soltau, 2009).

3) Mitigating risks to the flow of ecosystem services

54. The Economics of Ecosystems and Biodiversity (TEEB) study estimates that intact tropical forests provide ecosystem services worth $US 6,120 per hectare per year on average (across 109 compared studies, while the maximum value calculated was $US 16,362, cf. TEEB, 2009b). Poor design and implementation of REDD-plus could result in substantial opportunity costs through lost ecosystem services. For example, if forests as part of REDD are only managed for the carbon (that, in old-growth

and mature secondary forests is mostly in woody biomass and in the soil), it could lead to the loss of important non-timber forest products, such as fruit, wildlife, fungi, and others. On the other hand, REDD-plus efforts that focus on and prioritize biodiverse forests could contribute to the flow of ecosystem services associated with these forests. However, as noted by TEEB and other recent studies, the value of the ecosystem services is often inadequately reflected in economic accounting and decision-making (TEEB, 2009b).

4) Mitigating risks to REDD permanence from lack of resilience

55. There is a strong correlation between biodiversity and forest carbon stock (Strassburg et al., 2010). Primary tropical forests are generally the most carbon-dense forests, and they are also highly resilient (more able to withstand and recover from disturbance), making it more likely that carbon will be stored over long periods of time (permanence). A recent synthesis of more than 400 scientific studies on forest resilience concluded that long-term stability of the forest carbon stock against disturbance depends on forest ecosystem resilience, which in turn depends on biodiversity, at multiple scales (Thompson et al., 2009). This has important implications for REDD design and implementation, as it indicates that carbon permanence will, in part, be determined by the biodiversity values of the forests that are part of REDD efforts. In other words, the more biodiverse a forest area is, the more resilient it will be to large-scale, drastic change, and the more secure will be the carbon it stores. However, this relationship holds true only to certain thresholds or "tipping points" (see below). There is great uncertainty as to what degree of environmental change would trigger these tipping points (SCBD, 2010).

Forest Resilience, Biodiversity, and REDD-plus

Resilience is the capacity of a forest to withstand (absorb) external pressures and return, over time, to its pre-disturbance state. When viewed over an appropriate time span, a resilient forest ecosystem is able to maintain its "identity" in terms of taxonomic composition, structure, ecological functions, and process rates. The available scientific evidence strongly supports the conclusion that resilience of a forest ecosystem, to changing environmental conditions is determined by its biological and ecological resources, in particular (i) the diversity of species, including micro-organisms, (ii) the genetic variability within species (i.e., the diversity of genetic traits within populations of species), (iii) the landscape diversity; and (iv) the regional pool of species and ecosystems.

Maintaining or restoring biodiversity in forests promotes resistance to environmental change and is therefore an essential "insurance policy" and safeguard against expected climate change impacts, while increasing the biodiversity in planted and semi-natural forests will have a positive effect on their resilience and often on their productivity and the number of other services provided by the system.

Resilience is also influenced by the extent and intactness of forest ecosystems (generally, the larger and less fragmented, the higher the resilience), and by the condition and characteristics of the surrounding landscape. A component of resilience is related to the capacity to resist invasion by alien species. Fragmented and degraded forests are more prone to invasion than intact fully functioning forests.

Primary forests are generally more resilient (and stable, resistant, and adaptive) than modified natural forests or plantations. Measures that promote their protection yield both biodiversity conservation and climate change mitigation benefits, in addition to a full array of ecosystem services. The total carbon pool is greatest in old primary forests, especially in the wet tropics, which are stable forest systems with high resilience and resistance.

The regional impacts of climate change, especially interacting with other land use pressures, might be sufficient to overcome the resilience of even some large areas of primary forests, pushing them into a permanently changed state. If forest ecosystems are pushed past an ecological "tipping point", they could be transformed into a new non-forest ecosystem state (e.g. from forest to savannah). In most cases, the new ecosystem state would be poorer in terms of both biological diversity and for delivering ecosystem goods and services.

Plantations and modified natural forests will face greater disturbances and risks for large-scale losses due to climate change than primary forests, because of their generally reduced biodiversity and low resilience. While it is relatively simple to plant trees and produce a short-term wood crop, the lack of diversity at all levels (i.e., gene, species of flora and fauna, and landscape) in these systems reduces resilience and resistance to disturbances, degrades the provision of goods and services that these modified systems can provide, and renders them vulnerable to catastrophic disturbance. The risks can partly be mitigated by adhering to a number of forest management recommendations, and by implementing sustainable forest management at a global scale:

o Maintain genetic diversity in forests by avoiding practices that select only certain trees for harvesting based on superior site, growth rate, or form.
o Maintain stand and landscape structural complexity, using natural forests and processes as models. Managers should try to emulate the natural stands, in terms of species composition and structure, by using silvicultural methods that relate to the major functional tree species.
o Maintain connectivity across forest landscapes by reducing fragmentation, recovering lost habitats (forest types), expanding protected area networks, and establishing ecological corridors.
o Maintain functional diversity and eliminate the conversion of diverse natural forests to monotypic or reduced-species plantations.
o Reduce non-natural competition by controlling invasive species and reduce reliance on non-native tree crop species for plantation, afforestation, or reforestation projects.
o Manage plantation and semi-natural forests in an ecologically sustainable way that recognizes and plans for predicted future climates. For example, reduce the odds of long-term failure by apportioning some areas of assisted regeneration for trees from regional provenances and from climates that approximate future climate conditions, based on climate modelling.
o Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genes, species, communities) by, for example, protecting tree populations that are isolated, disjunct, or at margins of their distributions. These populations are most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change.
o Ensure that there are national and regional networks of scientifically designed, comprehensive, adequate, and representative protected areas. Build these networks into national and regional planning for large-scale landscape connectivity.
o Develop an effectiveness monitoring plan that monitors climate conditions and results of post-harvest silvicultural actions, and adapt planning and implementation as necessary.

(Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). *Forest Resilience, Biodiversity, and Climate Change.* A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, 67 pages)

5) Mitigating risks to REDD from ecological tipping points

56. Large-scale ecological tipping points, such as Amazon dieback, could overturn any REDD efforts, if overall GHG emissions are not significantly lowered, and if deforestation is not sufficiently reduced overall. Several modeling scenarios suggest there is a significant risk that removal of as little as 20% of the Amazon rainforest could push much of Amazonia into a permanently drier climate regime (currently, Amazon deforestation stands at around 17%), and that such a tipping point becomes more likely with temperature increases of more than 2ºC (SCBD, 2010; Leadley et al., 2010). Forest-related tipping points could create feedback loops within the climate system, by which the additional release of GHG from collapsing or changing forest ecosystems could further increase temperature, leading to further tipping points.

57. Therefore, the overall success of REDD depends on its scale, which must be sufficient to ensure the health and resilience of the forests it targets, while its success depends at the same time on sufficient overall GHG reductions. The Ad Hoc Technical Expert Group on biodiversity and climate change suggested that deforestation of 35-40% of the Amazon basin, especially in eastern Amazonia, could shift the forest into a permanently drier climate, increasing the risk of fire and carbon release (SCBD, 2009).

58. However, as these risks lie outside of the focus of the workshop and of this paper, they are not further discussed herein. It is important to keep this "larger picture" in mind during the negotiations: that REDD will presumably only be a viable mitigation option if the sum of stringent mitigation measures can limit temperature rise to 2 degrees C or less (SCBD, 2009).

6) Mitigating risks to REDD from lack of involvement of indigenous and local communities

59. The permanence of forest carbon stocks is at risk if indigenous and local communities are not fully and effectively involved in REDD-plus design and decision-making, and if they are excluded from an equitable distribution of benefits arising from REDD-plus. Equity and the full and effective participation of indigenous and local communities is an enabling condition for REDD-plus, as its long-term success will stand or fall with the buy-in and support by local forest users. In this context REDD-plus can draw on the extensive experience in forest management and conservation, where examples abound of failures to achieve management objectives, due to the lack of inclusion of local stakeholders, and subsequent local resistance (e.g. Peluso, 1992). At the same time, valuable lessons for REDD-plus may be learned from the many examples of successful forest management and conservation efforts that involve local communities. For example in the Brazilian Amazon, the average probability of deforestation was found to be seven to 11 times lower within indigenous lands and other protected areas than in surrounding areas (Ricketts et al., 2010).

PART II: SEIZING OPPORTUNITIES

Key issue I: Opportunities for *in-situ* conservation of forest biodiversity

REDD-plus as an incentive to improve protected area management and provide connectivity between protected areas

60. The CBD programme of work on protected areas (PoWPA), adopted by the Conference of the Parties to CBD in decision VII/28, contains multiple objectives with time-bound targets. The overall goal is to complete ecologically representative networks of protected areas, and Parties were guided to begin by completing a gap analysis of their protected area systems with the full and effective participation of indigenous and local communities and relevant stakeholders by the end of 2006. Details of the protected area gap analysis process, including information on tools and case studies, are available in a guide developed by Parrish and Dudley.[8]

61. At present, several Parties have completed or have nearly completed gap analyses of their protected area systems (Table 3). Currently, UNDP GEF is supporting ongoing gap analysis in 22 countries. Portions of these biomes, many high in carbon stocks and currently without protection, could be protected under REDD-plus.

62. This information is relevant in the context of REDD because the ecological gap analysis can provide solid mapping data and tools for landscape-level planning efforts of REDD-plus actions in more than 20 countries plus 20 more under completion. Many of these countries are pilot countries within the Forest Carbon Partnership Facility (FCPF) and/or the UN REDD Programme.[9] Through their national gap analyses, countries have identified high priority sites (HiPs) to expand or improve protected area systems and networks (see figure 2) Technology and capacity are already available in countries that have completed or are undergoing gap analysis of their protected areas. HiPs are proposed for protection based on rigorous analysis of multiple GIS data layers, including ecosystem characteristics. Relevant stakeholders have been involved in the national gap analysis. The identified areas are of high value for biodiversity and important for the livelihoods of surrounding populations through the provision of ecosystem services. Protection of these areas under REDD-plus, or consideration of these areas as buffer zones and ecological corridors around and between protected areas could maximize biodiversity conservation, while also securing key ecosystem services such as provision of water, and supporting sustainable livelihoods.

63. However, the challenge in many countries, and at the regional and international level, is to make this information available, at the right time and in the appropriate format, to the relevant institutions and individuals involved in the design and planning of REDD-plus efforts.

Table 3. Status and contact for protected area gap analyses of selected countries.

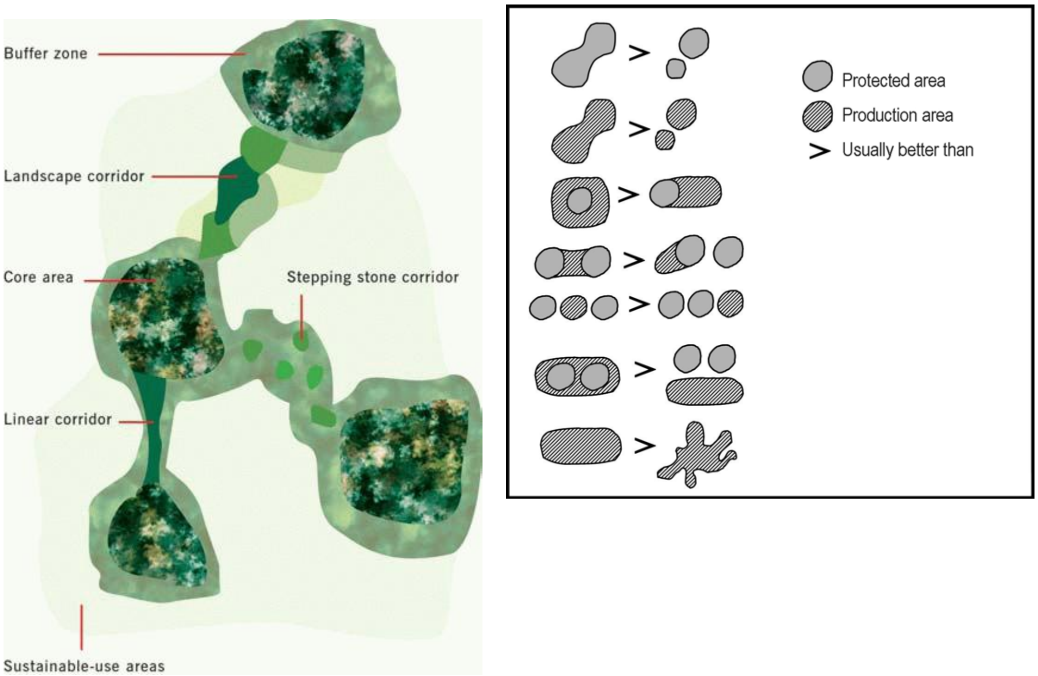
Countries	Contact	Status	Gap Analysis link (if completed and provided)
Algeria	Nadia Chenouf chenoufnadia@yahoo.fr	Nearly completed	
Bahamas	Tamica J. Rahming trahming@bnt.bs	Completed	
Belize	Hannah St.Luce Martinez hannahstluce@yahoo.com	Completed	http://biological-diversity.info/Downloads/NPAPSP/NPAPSP_2005.pdf
Benin	Ferdinand Claude Kidjo fkidjo@yahoo.fr	Nearly completed	
Bolivia	Edwin Camacho	Nearly	

[8] Closing the Gap: https://www.cbd.int/doc/publications/cbd-ts-24.pdf

[9] E.g. Bolivia, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Madagascar, Mexico, Nicaragua, Panama, Papua New Guinea, Peru.

Countries	Contact	Status	Gap Analysis link (if completed and provided)
	ecamacho@sernap.gob.bo	completed	
Cape Verde	Sonia Indira Araujo soniaraujocv@gmail.com	Nearly completed	
Costa Rica	Marco Vinicio Araya marco.araya@sinac.go.cr	Completed	www.gruas.go.cr
Ecuador	Isabel Endara Guerrero iendara@ambiente.gov.ec	Completed	
Grenada	Augustus Thomas augmas007@yahoo.co.uk	Completed	http://www.oas.org/dsd/publications/Unit/oea51e/begin.htm
Guatemala	Raquel Sigüenza; Fernando Castro rsiguenza@conap.gob.gt; fercastro@conap.gob.gt	Completed	
Guinea	Maadjou Bah bahmaadjou@yahoo.fr	Nearly completed	
Honduras	Oscar Arias oscarhernanarias@yahoo.com	Completed	
Jamaica	Carla Gordon cgordon@nepa.gov.jm	Completed	http://www.jamaicachm.org.jm/Document/Jamaica%20NEGAR.pdf
Japan	Tetsuro Uesugi tetsuro_uesugi@env.go.jp	Nearly completed	
Liberia	Nathaniel T. Blama, Sr. natpolo2000@yahoo.com	Nearly completed	
Madagascar	Sahoby Ivy Randriamahaleo sahobyivyrandriamahaleo@yahoo.fr	Nearly completed	
Mexico	Arturo Peña Jimenez; Carlos Eduardo Muñoz Cortes arpena@conanp.gob.mx; cmunoz@conanp.gob.mx	Completed	http://www.conabio.gob.mx/gap/index.php/Portada
Nepal	Mr. Shiv Raj Bhatta shivabhatta@hotmail.com	Completed	
Peru	Luis Alfaro Lozano lalfaro@sernanp.gob.pe	Nearly completed	Análisis del Recubrimiento Ecológico del Sistema Nacional de Áreas Naturales Protegidas por el Estado (CDC-UNALM/TNC, 2006)
Saint Lucia	Lavinia Alexander lalexander@slunatrust.org	Completed	
St. Vincent and the Grenadines	Andrew Lockhart nationalparks@vincysurf.com	Completed	Workshop report http://www.protectedareas.info/upload/document/report_1st_gap_workshop_svg.pdf
Samoa	Niualuga Evaimalo niualuga.evaimalo@mnre.gov.ws	Nearly completed	
Swaziland	Wisdom M. Dlamini director@sntc.org.sz	Completed	http://www.sntc.org.sz/bcpd/reports/sppstudy.zip

Figure 2; Ecological connectivity and different forms of landscape linkages



Source: ITTO, IUCN 2009 "ITTO/IUCN guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests", and Bennett, Graham 2001 "Linkages in Practice".

Case study: The protected area gap analysis of Mexico

64. Gap analyses for Mexican terrestrial protected area systems were completed by the National Commission of Mexico for Protected Areas (CONANP) in full partnership with the National Commission on Biodiversity of Mexico (CONABIO) and in consultation with NGOs and academia. Data were collected for the units of analysis (256 km^2, 100 km^2) by examining key elements of biodiversity (1450 elements), the criteria for conservation goals (goals of 5 to 99%), factors of threat and pressure (19 layers of information), and by using the MARXAN optimization program. Figure 3 presents the overall evaluation.[10]

65. Several gap analyses were necessary at different scales, and an ecoregional analysis was needed in order to consider an effective network of protected areas. Within the state of Oaxaca (Fig. 4), is the example of the Chimalapas region, the focus of the WWF Selva Zoque Program. An area of high biodiversity, it encompasses the largest expanse of well-conserved lowland humid tropical forest and cloud forest in northern Mesoamerica. Already identified as an extreme priority under the gap analysis, and threatened by deforestation, arguments under REDD-plus could further inform the selection process and provide additional support toward protecting the biodiversity, including the carbon stocks, of the region.

[10] For more information, contact CBD protected area focal point: Dr. Ernesto Enkerlin-Hoeflich E-Mail: enkerlin@conanp.gob.mx

Figure 3. The overall gap assessment of Mexico's terrestrial "spaces and species".

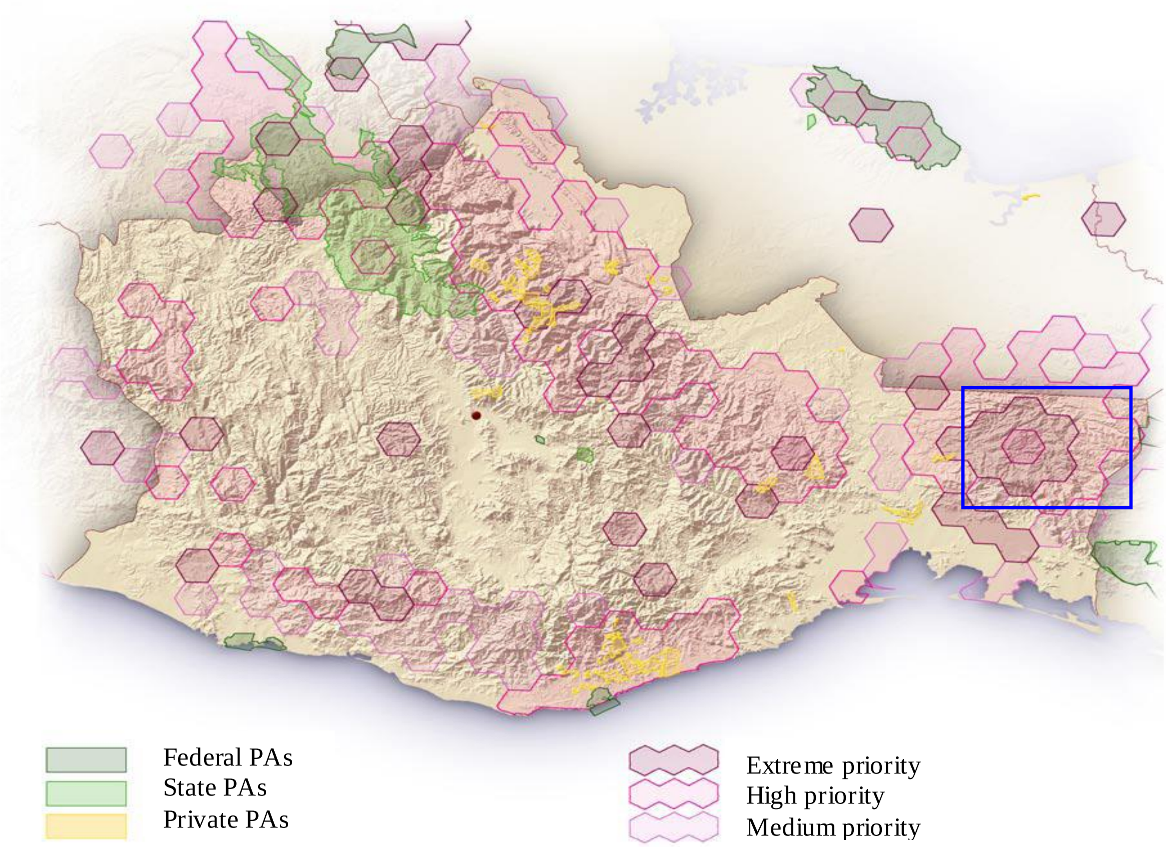


Figure 4. Protected areas vs areas of priority in the state of Oaxaca, Mexico. The Chimalapas region is located inside the blue box. The assessment highlights opportunities for REDD-plus to prioritize high biodiversity areas, and also enhance ecological connectivity between existing protected areas.

Source: CBD Secretariat, 2009: The CBD PoWPA Gap Analysis: A tool to identify potential sites for action under REDD-plus

Different governance structures and the effectiveness of biodiversity conservation

66. Protected areas are commonly thought to be the most straightforward and effective tool for land management to ensure biodiversity conservation. Systems of protected areas maintain key habitats, provide refuges, allow for species migration and movement, and ensure the maintenance of natural processes across the landscape. Protected areas also safeguard ecosystem services, provide employment and income opportunities nationally and locally, and serve as symbols which unite and forge nations.

67. However, protected areas were also severely criticized for the displacement of indigenous and local communities, which occurred both in the form of the forced removal of people from their homes and the exclusion of people from particular areas in their pursuit of a livelihood (e.g. Brockington & Igoe, 2006; Agrawal & Redford, 2009). In reaction to this criticism, delegates at the IUCN World Parks Congress in Durban in 2003 highlighted their commitment "to involve local communities, indigenous and mobile peoples in the creation, proclamation and management of protected areas". One of the major goals of the Action Plan negotiated at Durban was to ensure the rights of indigenous and local communities are secured in relation to natural resources and biodiversity conservation.

68. Significantly, the Durban World Parks Congress also recognized the validity of applying a variety of protected area governance structures to all IUCN categories of protected areas. The most distinctive of these has been decentralized natural resource governance, including community conserved areas (Borrini-Feyerabend et al., 2004). At their most extensive, these decentralized approaches to conservation have allowed indigenous and local communities to redefine ownership, use and management of natural resources. The outcomes of these efforts vary, but when effective they have increased the rights and benefits of indigenous and local communities in terms of natural resources (Agrawal & Ostrom, 2008) and provided opportunities for biodiversity conservation at a reduced cost (Chazdon, 2008, Somanathan et al., 2009).

69. The CBD recognizes the importance of community conserved areas and their role in the diversity of governance types for protected areas. At its ninth meeting, in Bonn, Germany, in 2008, the Conference of the Parties to CBD invited Parties to:

> "Improve and, where necessary, diversify and strengthen protected-area governance types, leading to or in accordance with appropriate national legislation including recognizing and taking into account, where appropriate, indigenous, local and other community-based organizations;" (decision IX/18)

70. In the same decision Parties are invited to:

> "Recognize the contribution of, where appropriate, co-managed protected areas, private protected areas and indigenous and local community conserved areas within the national protected area system through acknowledgement in national legislation or other effective means."

71. Moreover, at its upcoming tenth meeting, to be held in Nagoya, Japan, from 18 to 29 October 2010, the Conference of the Parties will consider inviting Parties to recognize the role of indigenous and local community conserved areas and conserved areas of other stakeholders in biodiversity conservation, collaborative management and diversification of governance types. It may also invite Parties to develop appropriate mechanisms for the recognition and support of indigenous and community conserved areas, for example through formal acknowledgement and incorporation into official protected area systems, inclusion in listings or databases, or legal recognition of community rights to land and/or resources. Such mechanisms for recognition should respect the customary governance systems that have maintained community conserved areas over time.

Mitigation/adaptation synergies

72. REDD-plus is first and foremost a climate change mitigation effort. However, deforestation and forest degradation are accompanied by the loss of numerous vital ecosystem services, which provide a variety of income possibilities, material welfare, livelihoods, security, resiliency, social relations, health, and freedom of choices and actions (MEA, 2005). These ecosystem services, and their continuous supply, are becoming increasingly important in the context of adaptation to climate change.

73. The new Global Environment Facility (GEF) sustainable forest management strategy for the years 2011-2014 (fifth GEF replenishment period) is based on the understanding that financial support to forest projects has to achieve multiple globally agreed environmental objectives, such as climate change mitigation, climate change adaptation, and biodiversity conservation.

Mitigation consists of activities that aim to reduce GHG emissions, directly or indirectly, by avoiding or capturing GHGs before they are emitted to the atmosphere or sequestering those already in the atmosphere by enhancing “sinks” such as forests. Such activities may entail, for example, changes to behavioral patterns or technological development and diffusion.

Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities.

(IPCC 2001)

74. Adaptation in relation to forests broadly falls into two categories: *adaptation for forests*, i.e., adaptation which focuses on the management changes needed to increase the resistance and resilience of forests, and *forest for adaptation*, i.e., adaptation which targets the role that forests can play in helping societies adapt to climate change. It is important to consider both categories in the context of REDD. Substantial synergies and cost savings can be realized by achieving mitigation and adaptation simultaneously, through coherent policies and measures, and because a lack of adaptation of forest management to climate change would endanger the permanence of the carbon stocks and thereby undermine the ultimate objective of REDD.

75. The AHTEG has compiled a list (see below) of examples of ecosystem-based approaches to adaptation in forests, which would also have biodiversity and mitigation benefits. All of these examples could in principle be financed under REDD-plus.

Table 4: Examples of linkages between forest-based climate change mitigation and adaptation measures:

		Co-benefits			
Adaptation measure	**Adaptive function**	**Social and cultural**	**Economic**	**Biodiversity**	**Mitigation**
Mangrove conservation	Protection against storm surges, sea-level rise and coastal inundation	Provision of employment options (fisheries and prawn cultivation); Contribution to food security	Generation of income to local communities through marketing of mangrove products (fish, dyes, medicines)	Conservation of species that live or breed in mangroves	Conservation of carbon stocks, both above and below-ground
Forest conservation and sustainable forest management	Maintenance of nutrient and water flow; Prevention of land slides	Opportunities for Recreation Culture protection of indigenous peoples and local communities	Potential generation of income through: Ecotourism, Recreation Sustainable logging	Conservation of habitat for forest plant and animal species	Conservation of carbon stocks; Reduction of emissions from deforestation degradation
Establishment of diverse agroforestry systems in agricultural land	Diversification of agricultural production to cope with changed climatic conditions	Contribution to food and fuel wood security	Generation of income from sale of timber, firewood and other products	Conservation of biodiversity in agricultural landscape	Carbon storage in both above and below-ground biomass and soils
Conservation of medicinal plants used by local and indigenous communities	Local medicines available for health problems resulting from climate change or habitat degradation, e.g. malaria, diarrhea, cardiovascular problems.	Local communities have an independent and sustainable source of medicines Maintenance of local knowledge and traditions	Potential sources of income for local people	Enhanced medicinal plant conservation ; Local and traditional knowledge recognized and protected.	Environmental services such as bees for pollination of cultivated crops

Source: Ad Hoc Technical Expert Group on Biodiversity and Climate Change (SCBD, October 2009)

Forest landscape restoration

76. In a recent study, the World Resources Institute and IUCN estimated the global potential for forest landscape restoration to be at 1 billion hectare, or the equivalent of about one quarter of all present forest area, but consisting of degraded areas both within forests and on deforested and degraded agricultural land (WRI, 2010). They have identified the potential for forest landscape restoration in these degraded areas in two main categories: (1) Mosaic-type restoration, in more populated and higher-land-use areas with significantly reduced tree cover, and (2) broad-scale restoration, in areas where the land-use pressure is low and forests can grow more freely (GPFLR, 2010).

77. This global estimate, which is presently being verified and further detailed in several pilot countries, illustrates the immense opportunity for forest landscape restoration. REDD-plus (in particular activities to enhance forest carbon stocks) could play an important role in tapping this potential. However, it is essential to consider biodiversity aspects of afforestation and reforestation, as well as the rights of

indigenous and local communities, when designing and implementing forest landscape restoration activities (see XX above).

Key issue II: Improved Forest Management

Removal or Mitigation of Perverse Incentives, and the Promotion of Positive Incentives

78. REDD has the potential to address the fundamental market failure that drives most deforestation and forest conversion: that forests are worth more dead (or as agricultural lands) than alive. The Economics of Ecosystems and Biodiversity (TEEB) has compiled the economic basis to address this market failure. While some tradeoffs, in particular with agricultural land, might continue to be necessary, much of current deforestation and unsustainable forest management is driven or facilitated by the fact that the true costs of biodiversity and ecosystem loss, including deforestation, are invisible in current economic accounting, and the costs in terms of lost ecosystem services are carried by society at large (present and future), while the majority of short-term profits are usually realized by few individuals (TEEB, 2009b). REDD-plus is being developed as a form of payment for an ecosystem service, and lessons learned from REDD-plus could potentially also facilitate the development or further success of other payments for ecosystem services (PES) from forests.

Progress towards sustainable forest management (SFM) through improved forest management practices

79. Sustainable forest management (SFM) has been recognized by CBD as the key framework for the conservation and sustainable use of forest biodiversity, and can be seen as the application of the ecosystem approach in forests (decision VII/11); the Conference of the Parties has repeatedly urged Parties to implement SFM (e.g., decision IX/5). However, the application of the concept of SFM has remained elusive, partly because incentives, capacity and political will are lacking (SCBD, 2008b). REDD-plus could potentially trigger transformational change with regard to the implementation of SFM. The change needed in the forest sector to move significantly towards the implementation of SFM goes beyond the improvement of forest management techniques. The need for transformational change in the forest sector through the use of REDD-plus has been described in recent publications (e.g. The Forest Dialogue Ghana REDD readiness, 2010).

80. One example of SFM implementation that could be improved with REDD-plus incentives is reduced impact logging (RIL). It has been estimated that the potential for emission reductions through improved forest management is at least 10% of that obtainable by curbing tropical deforestation, and that RIL and other sustainable logging operations can result in reductions of up to 40% of emissions from forest operations, compared to business as usual (Putz et al., 2010). RIL and other sensitive logging techniques can also improve the impact of logging operations on biodiversity (Putz et al., 2009). REDD-plus might also further add to an emerging concept of managing forests for multi-purpose values in addition to timber production. It is often possible to manage forests for biodiversity values and multiple ecosystem services (such as carbon storage, drinking water supply and recreation) at the same time, and without significant tradeoffs, although often one management objective prevails. The challenge is that the knowledge and capacity to manage forests for multi-purpose functions is often lacking, especially in developing countries (SCBD, 2008).

Key issue III: Improved Forest Governance

81. REDD-plus also offers substantial opportunities for improved forest governance. As outlined above, improving forest governance is a pre-condition for REDD-plus to function effectively. It will be essential for the creation of a sense of ownership among local forest users and, thus, for ensuring the permanence of forest carbon stocks. In addition, improved forest governance is also an end in itself. REDD-plus provides a unique opportunity to address diverse forest governance issues, ranging from further curbing illegal logging and increasing the accountability of forest agencies, to the recognition of

the particular identities, experiences and visions of indigenous and local communities (Lawson, 2010; Sikor et al., 2010).

82. First, REDD-plus carries the momentum to make forest agencies at all levels more transparent, accountable and inclusive. To seize this opportunity, the design of REDD-plus would have to include the use of procedures in decision-making and implementation that encourage public participation, democratic control over forests, and the conduct of local affairs in ways that involve the participation of indigenous and local communities (Ribot et al., 2008). While some of these procedures still need to be developed, others can be readily applied. Among them are procedures seeking free, prior and informed consent (FPIC), decentralization of forest management to elected local governments, and the participation of indigenous and local communities in the management of local forests. In this context, the UN-REDD Programme has begun elaborating how FPIC should be applied to its activities and in REDD-plus readiness preparation more broadly (UN-REDD, forthcoming).

83. In addition, REDD-plus offers the chance to equitably distribute the benefits arising from the use of forest resources, including carbon. The equitable distribution of those benefits may take the form of giving indigenous and local communities fair shares in logging receipts, profits from community-company partnerships, and payments from ecosystem services. Equitable distribution may also involve the clarification and/or redistribution of forest tenure to (re-)define who has the right to access and market forest products and ecosystem services. Table 5 illustrates the diversity of conditions with regards to forest tenure that exists between the 30 most-forested countries. In the case of carbon, achieving an equitable distribution of benefits will require the clarification of carbon property rights, including the question whether those rights will be linked to forest tenure. It will also require the development of access and benefit-sharing mechanisms that reduce transaction costs (Katoomba Group et al., 2010).

Country	Public				Private			
	Administered by government		Designated for use by communities and indigenous peoples		Owned by communities and indigenous peoples		Owned by individuals and firms	
	2002	2008	2002	2008	2002	2008	2002	2008
Brazil	295.26	88.56	11.68	25.62	74.50	109.13	57.30	198.00
Congo, Democratic Republic of	109.20	133.61	0.00	0.00	0.00	0.00	0.00	0.00
Indonesia	104.00	121.89	0.60	0.23	0.00	0.00	0.00	1.71
Peru	nd	42.43	8.40	2.86	2.25	12.62	nd	5.29
India	53.60	49.48	11.60	17.00	0.00	0.00	5.20	1.07
Sudan	40.60	64.68	0.80	2.82	0.00	0.00	0.00	0.05
Mexico	2.75	nd	0.00	0.00	44.00	38.71	8.30	nd
Colombia	36.46	33.23	0.00	0.00	24.50	27.50	0.00	0.00
Bolivia	28.20	22.88	16.60	19.52	2.80	9.04	5.40	1.10
Venezuela	49.51	47.70	0.00	0.00	0.00	0.00	0.00	0.00
Zambia	44.68	42.44	0.00	0.10	0.00	0.00	0.00	0.00
Tanzania	38.50	31.79	0.40	1.58	0.00	2.05	0.00	0.06
Argentina	5.70	nd	0.00	nd	0.00	nd	22.20	nd
Myanmar	34.55	32.18	0.00	0.04	0.00	0.00	0.00	0.00
Papua New Guinea	0.80	0.26	0.00	0.00	25.90	25.51	0.00	0.00
Central African Republic	22.90	22.76	0.00	0.00	0.00	0.00	0.00	0.00
Congo, Rep. of	22.06	22.01	0.00	0.48	0.00	0.00	0.00	0.00
Gabon	21.00	21.76	0.00	0.00	0.00	0.00	0.00	0.00
Cameroon	22.80	20.11	0.00	1.14	0.00	0.00	0.00	0.00
Mozambique	nd	17.26	nd	0.00	nd	2.00	nd	0.00
Subtotal	924.12	755.34	41.68	68.53	127.7	173.23	67.90	201.99

(16 complete cases)								
Total (all cases)	932.57	815.03	50.08	71.39	173.95	226.56	98.40	207.28

Table 5: Forest tenure distribution in selected REDD-plus pilot and demonstration countries (all figures expressed in millions of hectares)
Source: adapted from Sunderlin et al., 2009

84. Last but not least, REDD-plus provides a unique opportunity to recognize the particular identities, experiences and visions of indigenous and local communities, which are often distinct from (and conflicting with) notions of the cultural mainstream (Sikor et al., 2010). The acknowledgement of social and cultural differences could help overcome stigmas attached to indigenous and local communities in many parts of the world and prevent the further loss of cultural diversity. To seize this opportunity, REDD-plus design and implementation would have to pay explicit attention to the cultural, social and economic identities of indigenous and local communities and their historical experiences of exclusion. They would also have to take into account the implications of transnational agreements on indigenous rights, such as the UN Draft Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as landmark decisions of international human rights courts.

85. The CBD has recognized the opportunities provided by REDD-plus for improved forest governance. It held, in cooperation with other relevant organizations, a Global Indigenous Peoples Consultation on REDD in Baguio City, Philippines, in November 2008, and formed an Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change, which met twice between November 2008 and July 2009. The Baguio City Consultations and the ATHEG both elaborated key guidance on REDD-plus governance (cf. SCBD, 2008; 2009). They conclude, *inter alia*, that:

- Addressing the underlying drivers of deforestation and forest degradation will require a variety of approaches to improve forest governance, including stricter enforcement of forest laws, land tenure reform, and sourcing commercial wood supplies from deforestation/afforestation projects rather than primary forest. If REDD-plus is to achieve significant and permanent emissions reductions, it will be important to provide incentives for REDD-plus to local forest users, including alternative sustainable livelihood options (e.g. employment, income and food security).
- The implementation of rights recognized in UNDRIP should guide all activities on REDD and indigenous peoples. REDD-plus could provide potential benefits to forest-dwelling indigenous and local communities but a number of conditions are important for realizing these benefits. Indigenous and local communities are likely to benefit from REDD-plus where they own their lands, where there is the principle of free, prior and informed consent, and where their identities and cultural practices are recognized and they have space to participate in policy-making processes.
- There is a need for greater awareness and capacity-building for indigenous and local communities on biodiversity and climate change issues, so that these groups can take an active role in deciding how to engage in REDD-plus activities. It is also important that indigenous peoples can exchange their knowledge and practices of biodiversity conservation and sustainable management among themselves and have the opportunity to raise general awareness of such practices. At the same time, Governments could benefit from indigenous and local communities" traditional knowledge and practices related to biodiversity and forest conservation and management.

Case study: Programa Socio Bosque

The Government of Ecuador has established in its National Development Plan the objective to reduce the current deforestation rate by 50%. To do so, the Government is implementing a new model of forestry governance. The central component of that model is the "Forest Partners Programme" ("Programa Socio Bosque" in Spanish), created this year.

With Socio Bosque, the Government of Ecuador provides an annual economic incentive per hectare of forest to individuals or indigenous communities who voluntarily decide to protect the native forest they own. This way, the Government intends to reduce logging and make programme participants active partners in the defense of the natural resources of the country while supporting sustainable development. Socio Bosque aims to protect 4 million hectares of native forest; reduce GHG emissions caused by deforestation (REDD); and improve the living conditions of 1 million people that are among the poorest of the country.

Forest Partners provides economic benefits in a direct and equitable manner to individuals or indigenous communities committed to conserve their forest. This way, the programme reconciles conservation and human well-being. By implementing the programme, Ecuador is proactively addressing global climate change.

(Source: http://www.ambiente.gob.ec/paginas_espanol/sitio/elprograma_es.html)

Key issues IV: Improved monitoring and reporting of biodiversity benefits

Forest categories and definitions in the context of REDD-plus

86. It has been argued that the absence of a sufficiently differentiated definition of "forest" makes it difficult to monitor forest degradation, as well as changes between different forest types (from primary to other naturally regenerated forests, to forest plantations), for example because the minimum canopy cover is currently only 10% in the most widely accepted forest definition (see below; cf. also Sasaki & Putz, 2009). The scientific community has recently called for an improvement of the definition of forests,[11] e.g. to raise the threshold of canopy cover to at least 40% for forests to be considered under REDD, and the CBD SBSTTA, at its fourteenth meeting, recommended to COP-10 to request the CBD Executive Secretary to "(…) investigate whether there are inadequacies in forest biodiversity reporting and monitoring, and if so, suggest ways to address these inadequacies, including by proposing improved definitions of forest and forest types, in view of further improving the biodiversity monitoring component of the Global Forest Resources Assessment and other relevant processes and initiatives".

The second D: the challenge of monitoring forest degradation

87. Tropical forest degradation is a major source of carbon emissions, reduces biodiversity, and often leads to deforestation (Ahrend et al, 2010). However, forest degradation is difficult and potentially expensive to monitor, because, *inter alia,* it requires a higher degree of "ground truthing" than deforestation, which is increasingly monitored using cost-effective remote sensing and GIS tools. Recognizing the need to both harmonize international definitions of forest degradation (see box), and to improve its cost-effective monitoring, the Collaborative Partnership on Forests (CPF) has established a Working Group on Forest Degradation, which is expected to produce a final report by December 2010. Preliminary results are available at (FAO degradation website).

[11] E.g. in the declaration of Association of Tropical Biology and Conservation, in its Resolution of … http://www.tropicalbio.org/index.php?option=com_content&view=article&id=172:un-misleading-forest-definitions&catid=51:resolutions&Itemid=79

88. The status and trends of forest biodiversity are important proxy indicators for forest degradation (Gardner, 2010), and the CBD Secretariat, CIFOR, and IUCN are leading on the development of biodiversity criteria and indicators within the CPF initiative, as part of a package to monitor forest degradation. Results will be available by December 2010.

In the absence of other globally agreed definitions, many international processes use as a default the FAO definition of forests (Global Forest Resources Assessment 2010):

Forest	Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 metres and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

UNFCCC forest definition (under the Kyoto Protocol / LULUCF):

"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. (UNFCCC, decision 11/CP.7) [1]

FAO (FRA 2010) lists the following categories of forests:

Category	Definition
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Other naturally regenerated forest of introduced species *(sub-category)*	Other naturally regenerated forest where the trees are predominantly of introduces species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
Planted forest of introduced species *(sub-category)*	Planted forest, where the planted/seeded trees are predominantly of introduced species.

(Source: FAO, Global Forest Resources Assessment, 2010)

Forest degradation

UNEP/CBD: A degraded forest is a secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests includes many non-tree components, which may dominate in the under-canopy vegetation.

IPCC: A direct human induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included.

FAO: The long-term reduction of the overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and other goods and services.[12]

Tools for optimizing multiple benefits

[12] Source: FAO 2006. *Definitional Issues related to Reducing Emissions from Deforestation in Developing Countries*. Forests and Climate Change Working Paper 5. FAO, Rome, Italy. As cited in: CPF – Strategic Framework on Climate Change (2009).

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Angelsen, A. with Brockhaus, M., Kanninen, M., Sills, E., Sunderlin, W. D. and Wertz-Kanounnikoff, S. (eds). (2009). Realising REDD+: National strategy and policy options. CIFOR, Bogor, Indonesia. http://www.cifor.cgiar.org/publications/pdf_files/Books/BAngelsen0902.pdf

This book develops scenarios of what REDD+ at the national level might look like in four areas: institutions and processes to build the REDD+ framework, broad policy reforms to enable REDD+ implementation, sectoral policies to change incentives, and demonstration activities to test and learn from different approaches.

Angelsen, A. (ed.) 2008 Moving ahead with REDD: Issues, options and implications.
CIFOR, Bogor, Indonesia.
http://www.cifor.cgiar.org/publications/pdf_files/Books/BAngelsen0801.pdf

This book discusses fundamental questions related to REDD: How can we measure reductions in emissions when data are poor or do not exist? How can we raise the billions of dollars needed to put a REDD mechanism in place? How can we make sure that any reductions in deforestation and degradation are real (additional), and that they do not lead to more trees being chopped down in other forest areas (leakage) or next year (permanence)? How can we make sure that the poor benefit?

Bond, I. et al. (2009). Incentives to sustain forest ecosystem services: A review and lessons for REDD. Natural Resouce Issues No. 16. International Institute for Environment and Development, London, UK, with CIFOR, Bogor, Indonesia, and World Resources Institute, Washington D.C., USA. http://www.iied.org/pubs/pdfs/13555IIED.pdf

Paying people to protect forests can be an effective way to tackle deforestation and climate change but only if there is good governance of natural resources, claims this study funded by Norway's Government. This report explores existing efforts to pay people in developing nations to protect ecosystems in return for the services they provide. It aimed to see if such payments could be used to help tackle climate change REDD. A review of 13 schemes in Africa, South-East Asia and Latin America concluded that they can be part of REDD but only if important preconditions are met.

Chomitz, K. (2007). At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests. World Bank, Washington, D.C.

This report examines the drivers and consequences of deforestation and forest poverty. It examines how governance, institutions, and policies shape those drivers and offers prescriptions.

Cotula, L. and Mayers, J. 2009. Tenure in REDD – Start-point or afterthought? Natural Resource Issues No. 15. International Institute for Environment and Development. London, UK. http://www.iied.org/pubs/pdfs/13554IIED.pdf

As new mechanisms for REDD are being negotiated in international climate change talks, resource tenure must be given greater attention. Tenure over land and trees will affect the extent to which REDD will benefit, or marginalise, forest communities. This report aims to promote debate on the issue. Drawing on experience from seven rainforest countries, it develops a typology of tenure regimes across countries, explores tenure issues in each country, and identifies key challenges to be addressed if REDD is to have equitable and sustainable impact.

Dalal-Clayton, B., Bass, S. (2009). The challenges of environmental mainstreaming: Experience of integrating environment into development institutions and decisions. Environmental Governance No. 3. International Institute for Environment and Development. London. http://www.iied.org/pubs/pdfs/17504IIED.pdf

This report is an initial synthesis of IIED's work with partners in 13 developing countries. It reviews the rapidly changing context and challenges to environmental mainstreaming, discussing what it takes to achieve effective mainstreaming, and provides a roadmap for selecting operational methods and tools. It calls for more attention both "upstream" and "downstream" of these plans, identifying advantages that can be gained through diverse media, business and civil society initiatives that assert environmental values in development.

Dickson, B., Dunning, E., Killen, S., Miles, L. & Pettorelli, N. (2009). Carbon markets and forest conservation: A review of the environmental benefits of REDD mechanisms. UNEP World Conservation Monitoring Centre.

UNEP-WCMC has undertaken a review of existing and planned measures to promote environmental co-benefits from REDD. It considers the options for how these measures might be developed in the future.

Forest Trends, the Climate, Community and Biodiversity Alliance (CCBA), Rainforest Alliance and Fauna & Flora International (FFI). (2010). Manual for Social Impact Assessment of Land-Based Carbon Projects.
http://www.forest-trends.org/publications.php.

The Manual is designed to be used by carbon project proponents aiming for validation under the CCB Standards, or other multiple-benefit carbon standards. The NGOs involved in this initiative believe that a combination of credible social impact assessment methods and robust standards for verifying the co-benefits provides an important way of promoting positive social outcomes of land-based carbon projects, and avoiding negative ones. A Spanish translation is in process.

Global Forest Coalition. (2009), REDD Realities: How strategies to reduce emissions from deforestation and forest degradation could impact on biodiversity and Indigenous Peoples in developing countries. http://www.globalforestcoalition.org/img/userpics/File/publications/REDD-Realities.pdf

REDD currently dominates the debate about forests and climate change. It is presented as a win-win situation; climate, forests, and people would all gain. But how does a theoretical success work out on the ground? In places where legislation on biodiversity is weak? Where safeguards to protect the rights of Indigenous Peoples do hardly exist? The new report "REDD Realities" explores this question. Nine member organizations of the Global Forest Coalition examined REDD strategies and activities in their countries.

Harvey, C., Dickson, B., Kormos, C. (2010). Opportunities for achieving biodiversity conservation through REDD. In: Conservation Letters. Vol. 3, no.3, pp.53-61

The paper explores how the design and implementation of REDD will impact biodiversity conservation, and highlights opportunities for achieving biodiversity conservation through REDD. The authors highlight that the most important immediate step is to ensure that REDD maximizes the area of tropical forest conserved. However, it may also be possible to include guidelines or incentives within a REDD framework or in national implementation to channel funding to areas of high biodiversity.

International Institute for Environment and Development. (2009). Protecting Community Rights over Traditional Knowledge: Implications of customary laws and practices. IIED, London. http://www.iied.org/pubs/pdfs/14861IIED.pdf

To sustain biodiversity-based lifestyles, communities need to maintain control over their knowledge and related bio-resources, preventing others from exploiting them, while taking advantage of market opportunities themselves. This report provides key findings and recommendations from an IIED and partner action-research project, focussing on developing tools to protect traditional knowledge, which are rooted in local customary laws rather than Intellectual Property standards.

Johns, T., Johnson, E., Greenglass, N. (2009), An Overview of Readiness for REDD: A compilation of readiness activities prepared on behalf of the Forum on Readiness for REDD. The Woods Hole Research Center. http://www.cbd.int/forest/doc/overview-readiness-redd.pdf

This document provides useful information on various REDD initiatives underway around the world, serving as an up-to-date register of on-going activities in a number of countries. The document allows interested stakeholders to get a snapshot of readiness activities taking place both globally and in their country or region, as a way to highlight potential gaps and synergies and encourage collaboration and partnerships in all facets of readiness efforts.

Kanninen, M. et al. (2007). Do trees grow on money? The implications of deforestation research for policies to promote REDD. Bogor, Indonesia: Center for International Forestry Research (CIFOR). http://www.cifor.cgiar.org/publications/pdf_files/Books/BKanninen0701.pdf

This paper summarizes what is known about the direct and underlying causes of deforestation and forest degradation, and the policy options available to reduce the resulting carbon emissions. The analysis suggests that many of the underlying causes of deforestation are generated outside the forestry sector, and alternative land uses tend to be more profitable than conserving forests.

Karousakis, K. (2009), "Promoting Biodiversity Co-Benefits in REDD", OECD Environment Working Papers, No. 11, OECD Publishing. http://www.oecd.org/dataoecd/33/42/44164572.pdf

This recent OECD report examines how biodiversity co-benefits in REDD can be enhanced, both at the design and implementation level. It discusses potential biodiversity implications of different REDD design options that have been put forward in the international climate change negotiations and proceeds by examining how the creation of additional biodiversity-specific incentives could be used to complement a REDD mechanism, so as to target biodiversity benefits directly.

Miles, L. and Kapos, V. (2008). Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation: Global Land-Use Implications. In: Science, Vol 320, No. 5882, pp. 1454 – 1455.

This paper argues that as a result of REDD actions some land-use change will be displaced to other locations. It argues for research on the selection of priority areas for REDD to deliver multiple benefits, on-the-ground methods to best ensure these benefits, and minimization of displaced land-use change into nontarget countries and ecosystems, including through revised conservation investments.

Palmer, C., Engel, S. (2009). Avoided Deforestation: Prospects for Mitigating Climate Change. Routledge, Oxford.

The edited volume brings together important research contributions on the policy and economics of avoided deforestation as a strategy for climate change mitigation. It is aimed at policy makers as well as academics interested in the theme.

Phelps, J. et al. (2010). What makes a "REDD" country? In: Global Environmental Change. Vol. 20, No. 2, pp. 322-332.

This paper argues that a future REDD mechanism should incentivise emissions reduction in all developing forested countries, and should address critical non-carbon dimensions of REDD *implementation—quality of forest governance, conservation priorities, local rights and tenure frameworks, and sub-national project potential.*

Phelps, J., Webb, E., Agrawal, A. (2010). Does REDD+ Threaten to Recentralize Forest Governance? In: Science, Vol. 328, pp. 312-312.

The paper argues that funding and requirements for REDD+ may undermine decentralization. With billions of dollars at stake, governments could justify recentralization by portraying themselves as more capable and reliable than local communities at protecting national interest.

Rights and Resources Initiative. (2010). The End of the Hinterland: Forests, Conflict and Climate Change. Washington D.C.

This report cautions that without clear rules to address land tenure and forests rights issues, REDD could increase conflict by boosting the perceived value of forest land. The report warns that this could jeopardize the effectiveness of REDD and put forest-dependent communities at risk of exploitation.

Secretariat of the Convention on Biological Diversity. (2009). Sustainable Forest Management, Biodiversity and Livelihoods: A Good Practice Guide. Montreal. http://www.cbd.int/development/doc/cbd-good-practice-guide-forestry-booklet-web-en.pdf

The guide aims to support governments, development agencies, businesses, and non-governmental organizations in their efforts to ensure that biodiversity conservation and poverty reduction proceed concurrently, including in the context of reducing emissions from deforestation and forest degradation (REDD). The guide also contains a powerpoint presentation template for training purposes.

Secretariat of the Convention on Biological Diversity (2009). Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. Technical Series No. 41. Montreal. http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf

The main messages conveyed in this report focus on the impacts of climate change on biodiversity; the role of biodiversity in climate change adaptation; the links between biodiversity conservation and sustainable use and climate-change mitigation, including REDD; and the ways and means to value biodiversity with regard to climate-change responses.

Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Technical Series no. 43, Secretariat of the Convention on Biological Diversity, Montreal. http://www.cbd.int/doc/publications/cbd-ts-43-en.pdf

The report strongly supports the conclusion that the capacity of forests to resist change, or recover following disturbance, is dependent on biodiversity at multiple scales. The findings are relevant for the further implementation of the CBD programme of work on forest biodiversity, as well as for efforts to reduce emissions from deforestation and forest degradation (REDD), as the resilience and stability of forest ecosystems are linked to the permanence of carbon stocks.

UN-REDD Programme. (2009). Multiple benefits – issues and options for REDD. http://www.un-redd.org/Portals/15/documents/events/Montreux/UN-REDD_PB2_Multiple_Benefits_Issue_Paper.pdf

This paper provides an overview of the issues surrounding and opportunities for achieving "multiple benefits" from REDD. The paper focuses only on the ecosystem aspects of multiple benefits as it is an output of the International Support Functions component of the UN-REDD Programme.

Venter, O. et al. (2009). Harnessing Carbon Payments to Protect Biodiversity. In: Science, Vol. 326. No 5958, p. 1368.

This article demonstrates spatial trade-offs in allocating funds to protect forests for carbon and biodiversity and shows that cost-effective spending for REDD would protect relatively few species of forest vertebrates. The article argues that minor adjustments to the allocation of funds could double the biodiversity protected by REDD, while reducing carbon outcomes by only 4 to 8%.

Von Scheliha, S., Hecht, B., Christophersen, T. (2009). REDD benefits: Biodiversity and Livelihoods. GTZ and SCBD. Eschborn and Montreal. http://www.cbd.int/doc/publications/for-redd-en.pdf

This brochure addresses the question how REDD can simultaneously address climate change, biodiversity loss and poverty. It identifies opportunities for synergies and mutual enhancement of the objectives of international agreements, particularly the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD). It also provides background information on the linkages between ecosystem-based adaptation and mitigation measures.

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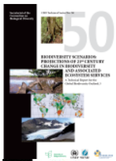

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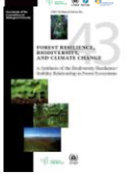

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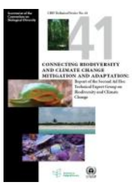

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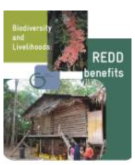

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All publications are available for download at: *http://www.cbd.int/forest*.
Copies can be ordered free of charge at secretariat@cbd.int.

Annex I

RECOMMENDATIONS OF THE SECOND CBD AD HOC TECHNICAL EXPERT GROUP (AHTEG) ON BIODIVERSITY AND CLIMATE CHANGE RELATED TO REDD

The full version of the report, published in October 2009, is available at www.cbd.int/ts.
This annex is excerpt of section 3 of the report, which contains the REDD-related findings of the AHTEG.

SECTION 3: Biodiversity and Climate Change Mitigation[13]

1. This section examines the links between biodiversity and climate-change mitigation with a particular focus on land use management activities and reducing emissions from deforestation and forest degradation. The section explores the potential contribution of biodiversity conservation and sustainable use to mitigation efforts and suggests ways in which co-benefits can be enhanced. This section also examines the potential positive and negative impacts of mitigation activities on biodiversity while highlighting those mitigation approaches for which additional research is required.

3.1. Role of ecosystems in carbon storage and the carbon cycle

Conserving natural terrestrial and marine ecosystems and restoring degraded ecosystems can contribute to achieving several key objectives of both the UNFCCC and the Convention on Biological Diversity

2. **Well-functioning ecosystems are necessary to meet the objective of the UNFCCC because of their role in the global carbon cycle and their significant carbon stocks.** Carbon is stored and sequestered by biological and biophysical processes in ecosystems, which are underpinned by biodiversity. About 2,500 Gt C is stored in terrestrial ecosystems, compared to approximately 750Gt in the atmosphere. An additional ~ 38,000 Gt C is stored in the oceans (~37,000 Gt in deep oceans i.e. layers that will only feed back to atmospheric processes over very long time scales, ~ 1,000 Gt in the upper layer of oceans) (table 3.1). A large amount of the terrestrial carbon is stored in forest (about 1,150 Gt C) with around 30-40% in vegetation and 60-70% in soil. However, significant carbon stocks, especially soil carbon, is found in other terrestrial ecosystems including wetlands and peat lands; e.g. peat soil has been estimated to contain nearly 30% of all global soil carbon whilst covering only 3% of the land surface.

3. **Each year terrestrial ecosystems take up through photosynthesis and release through respiration, decay and burning approximately 60 Gt C so relatively small changes in the net exchange are important in the global carbon balance.** For example, during the 1990s it is estimated that while 6.4 ± 0.4 Gt C per year were emitted from combustion of fossil fuels, 0.5-2.7 Gt C per year were released by land-use activities (e.g. deforestation, land-use change and land degradation). However, another 0.9 to 4.3 Gt C per year was taken up by the residual land sink as a result of enhanced growth of terrestrial vegetation from CO_2 fertilization; additional nitrogen released by human activities and increased temperature. Marine ecosystems exchange even greater amounts of carbon with the atmosphere (about 90 Gt C per year) and on average store about 2.2 ± 0.4 Gt C per year. The rate of storage is controlled by two "pumps", one biological and the other physical, that transport carbon into the ocean depths. Physical processes control the rate at which CO_2 dissolves in the oceans, and both physical and biological processes then determine how the dissolved inorganic carbon is transported within the oceans. These processes are also being affected by climate change.

Table 3.1. ***One estimate of global carbon stocks in terrestrial ecosystems*** (There remains uncertainty around estimates of carbon stocks due to differences in field data used to calculate carbon densities and

[13] The document largely uses the terms and definitions consistent with the UNFCCC decisions 1/CP.13 (Bali Action Plan and 2/CP.13 (REDD) without any attempt to pre-empt ongoing or forthcoming negotiations, or anticipate the outcome of these negotiations. The exception is when referring to terms that are defined differently under other international processes, or for which there is no general agreement of definition, in which case the use of the term is explained in the text.

methods for up-scaling these values. There is also great variation within any biome, e.g. wet temperate forests can be 2-3 more carbon dense than the biome average.)

Biome	Global Carbon Stocks (Gt C)		
	Vegetation	Soil	Total
Tropical forests	212	216	428
Temperate forests	59	100	159
Boreal forests	88	471	559
Tropical savannas	66	264	330
Temperate grasslands	9	295	304
Deserts and semi deserts	8	191	199
Tundra	6	121	127
Wetlands	15	225	240
Croplands	3	128	131
Total	466	2 011	2 477

4. The widespread and accelerating degradation of ecosystems has been and remains a significant source of greenhouse gas emissions, and is reducing the potential of ecosystems to sequester carbon. Although the largest share of CO_2 emissions are as the result of the combustion of fossil fuels, in 2005 about 18% of annual global greenhouse gas emissions were attributable to deforestation and other land use change and an additional 5.1-6.1 Gt CO_2 eq., or 10-12% of global emissions, stemmed from agricultural land management practices (mostly through release of nitrous oxide (N_2O) and methane (CH_4)), although there is still uncertainty around the range of estimates. Degradation of natural grasslands, for example, can be a large source of carbon loss since cultivated soils generally contain 50-70% less carbon than those in natural ecosystems. The continuing rapid loss and degradation of northern, temperate and tropical peatlands is also a major source of greenhouse gas emissions, with an estimated 3 Gt CO_2 eq. (or 10% of global emissions) released each year by the drainage and conversion of peatlands to agriculture or forestry, and peat fires.

5. **Given that forests contain almost half of all terrestrial carbon, continued deforestation and degradation at current rates would significantly hamper mitigation efforts.** An estimated 7 to 13 million ha of forests are cleared each year,[14] releasing about 1.5 Gt C (5.5 $GtCO_2$) into the atmosphere. In addition, 2 to 3 million hectares of tropical forests are degraded each year by unsustainable management. Reducing these emissions would make a key contribution to climate mitigation and is critical for avoiding dangerous climate change.

6. **There is a wide range of different forest contexts: from primary forests to monoculture plantations and these differ in their carbon stock, carbon sequestration potential, biodiversity value and their resilience to climate change.** Primary forests are generally more carbon dense and biologically diverse than other forest ecosystems. Modified natural forests (i.e. those that have been logged or degraded through other land use activities) normally have lower carbon stocks and less biodiversity than primary forests. Plantation forests store and sequester carbon but, *inter alia*, stands are usually harvested at a young age and therefore the time-averaged stock is relatively smaller than the natural forest they replace. Also, they are less biologically diverse than the natural forests they replace. Among plantation types, those with diverse mixtures of native species have potential for more positive consequences for biodiversity than those comprised of monocultures or exotic species. Different forest areas could have similar carbon stocks and carbon uptake potential but differ in their biodiversity value (e.g. landscape situation, representativeness, degree of species endemism). Table 3.2 summarizes the contributions of different forest types to both mitigation of climate change and conservation and sustainable use of biodiversity.

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[14] Estimates of the area of deforestation vary according to methodology, definitions of what constitutes a forest and due to natural variation from year to year.

Table 3.2. ***Total ecosystem carbon and biodiversity benefits of main forest contexts***[15].

Forest context[16]	**Carbon stock**	**Carbon sequestration potential**	**Biodiversity**	**Value of ecosystem goods and services**
Primary forest	+++	+*	+++	+++
Modified natural forest	++	++	++	++
Plantations[17] (indigenous species)	+	+++ (depending on species used and management)	+(+)	+
Plantations (exotic species)	+	+++ (depending on species used and management)	+	(+)

* Potential for additional sequestration depends on several elements.

7. **Given the importance of ecosystems in the global carbon cycle, a portfolio of land use management activities, including reduced deforestation and forest degradation, in addition to stringent reductions in fossil fuel emissions of greenhouse gases, can play an important role in limiting increases in atmospheric greenhouse-gas concentrations and human-induced climate change.** The potential to reduce emissions and increase the sequestration of carbon from land use management activities is estimated to range from 0.5-4 $GtCO_2$-eq per year for forestry activities (REDD, afforestation, forest management, agroforestry), and 1-6 $GtCO_2$-eq per year for agricultural activities.[18] Achieving this potential, however, will be dependent upon the design and mode of implementation of these activities, and the extent to which they are supported and enabled by technology, financing and capacity building.

3.2. Forestry- related climate change mitigation opportunities and considerations

8. **There is a wide range of forestry-related mitigation options that could potentially also provide important biodiversity conservation benefits, including reducing emissions from deforestation and forest degradation, forest conservation, sustainable management of forests and enhancement of forest carbon stocks.**[19] **Such activities can also could potentially also provide important biodiversity conservation benefits,** though the extent to which they deliver these benefits will depend on how and where these activities are implemented (annex IV). The effect of different climate change mitigation options are also time dependent. For instance, reducing emissions from deforestation and forest degradation has an immediate effect whereas the mitigation effect of afforestation and reforestation will build through time.

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[15] This table provides a general overview. Actual situations may vary depending on forest types and biomes, e.g. between boreal and tropical forests

[16] Forest definitions are a simplified version of FAO classification.

[17] Plantation forests store less carbon because stands are usually harvested at a relatively young age, and young trees store less carbon than older trees. Also, timber harvesting causes emissions from collateral damage to living and dead biomass and soil carbon. This is also why modified natural forests store less carbon than primary forests.

[18] These estimates include models that assume effective prices ranging from <US$ 20/tCO_{2e} to US$100/$tCO_{2e}$ in 2030

[19] The document uses the terms and definitions consistent with the UNFCCC decisions 1/CP.13 (Bali Action Plan and 2/CP.13 (REDD) without any attempt to pre-empt ongoing or forthcoming negotiations, or anticipate the outcome of these negotiations.

9. **Opportunities for implementing forest-related climate-change-mitigation options will vary across different landscape contexts, depending on the land-use history, current land use activities and socioeconomic conditions.** Three broad types of landscapes can be identified (table 3.3) and a mixture of forest-related and agricultural options may be applicable in each of these landscapes:

(a) In forest landscapes subject to ongoing clearing and forest degradation, climate change mitigation and biodiversity conservation can be achieved by reducing deforestation and forest degradation and improving forest management;

(b) In forest landscapes that currently have little deforestation or forest degradation occurring, the conservation of existing primary forests is critical both for protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity;

(c) In forest landscapes that have already been largely cleared and degraded, climate change mitigation and biodiversity conservation can be achieved by enhancing carbon stocks through restoration and improved forest management, creating new carbon stocks (e.g., afforestation and reforestation), and improving agricultural management.

Table 3.3. ***Relevance of different climate change mitigation options to different landscape contexts***

	Landscape context		
Land use management and forestry-based climate change mitigation options	**1.Landscapes where active deforestation and forest degradation are occurring**	**2. Landscapes where there is minimal or no deforestation and forest degradation**	**3. Landscapes which have largely been deforested**
Reducing deforestation and forest degradation	*X*		
Forest conservation	*X*	*X*	
Sustainable management of forest carbon stocks	*X*		*X (potentially applicable to remnant forest patches in landscape)*
Afforestation, reforestation and forest restoration	*X (on already-deforested or degraded land)*		*X*
Implementation of sustainable cropland management	*X (on deforested land)*		*X*
Implementation of sustainable livestock management practices	*X (on deforested land)*		*X*
Implementation of agroforestry systems	*X (on deforested or degraded land)*		*X*
Conservation and restoration of peatlands, mangroves and other forested wetlands	*X*	*X*	*X*

10. The conservation of existing primary forests where there is currently little deforestation or forest degradation occurring, provides important opportunities for both protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity. Most of the biomass carbon in a primary forest is stored in older trees or the soil. Land-use activities that involve clearing and logging reduce the standing stock of biomass carbon, cause collateral losses from soil, litter and deadwood and have also been shown to reduce biodiversity and thus ecosystem resilience. This creates a carbon debt which can take decades to centuries to recover, depending on initial conditions and the intensity of land use. Conserving forests threatened by deforestation and forest degradation and thus avoiding potential future emissions from land use change is therefore an important climate change mitigation opportunity for some countries. Avoiding potential future emissions from existing carbon stocks in forests, especially primary forests, can be achieved through a range of means including:

- Designating and expanding networks of protected areas,
- Establishing biological corridors that promote conservation in a coordinated way at large scales and across land tenures,
- Establishing payments for ecosystem services including carbon uptake and storage,
- Developing conservation agreements, easements and concessions,
- Providing incentives to compensate land owners, stewards and indigenous peoples on their traditional lands, for opportunity costs associated with forgoing certain kinds of development,
- Promoting forms of economic development that are compatible with conservation and sustainable use of biodiversity, and
- Adopting sound and effective technological and financial transfer mechanisms for conserving carbon stocks and biodiversity in those countries where forests still represent a significant asset.

11. **Addressing forest degradation is important because forest degradation leads to a loss of carbon and biodiversity, decreases forest resilience to fire and drought, and can lead to deforestation.** The definition of forest degradation is open to debate and can include unsustainable timber harvesting for commercial or subsistence use, in addition to other damaging processes such as fire and drought; all of which lead to reductions in carbon stocks and negatively impact biodiversity. Estimates of the extent of forest degradation are still uncertain, due to differences in the way in which forest degradation is defined and limited data availability. However, in some regions of the world, the area of logged and degraded forest is comparable to that deforested.. For example, it is estimated that forest damage from logging in the Amazon results in a 15 per cent reduction in carbon stocks, and increased susceptibility to fire damage. At the same time, forest degradation generally threatens biodiversity by reducing habitat and the provision of ecosystem services.

12. **While protected areas are primarily designated for the purpose of biodiversity conservation, they have significant additional value in storing and sequestering carbon and potentially preventing future deforestation.** There are now more than 100,000 protected sites worldwide covering about 12 per cent of the Earth's land surface. Approximately 15 per cent of the terrestrial global carbon stock is currently under some degree of protection. The designation and effective management of new protected areas,[20] together with the improved management of the current protected-area network, could contribute significantly to climate-change-mitigation efforts. However, the extent to which protected areas are effective at conserving their carbon stocks depends on effective management, enforcement, and sustainable funding, especially in areas under anthropogenic pressure. The effectiveness of protected areas also depends on future climate change, due to their vulnerability.

[20] The programme of work on protected areas under the Convention on Biological Diversity (decision VII/28, annex) encourages "the establishment of protected areas that benefit indigenous and local communities, including by respecting, preserving, and maintaining their traditional knowledge in accordance with Article 8(j) and related provisions."

13. **In forest landscapes currently subject to harvesting, clearing and/or degradation, climate change mitigation and biodiversity conservation and sustainable use can be best achieved by addressing the underlying drivers of deforestation and degradation, and improving the sustainable management of forests.** Sustainable forest management (SFM) refers to a tool kit of forest-management activities that emulate natural processes. These tools include planning for multiple values, planning at appropriate temporal and spatial scales, suitable rotation lengths, often decreasing logging intensities, and reduced impact logging that minimizes collateral damage to ground cover and soils. The application of internationally accepted principles of SFM in forests that are being degraded by current forestry practices can contribute to both climate change mitigation and biodiversity conservation and sustainable use goals, by enhancing carbon stocks and reducing greenhouse gas emissions. For example, a recent study demonstrated that improved management of tropical forest through reduced impact logging can reduce carbon emission by approximately 30 per cent. Globally, it is estimated that the sustainable management of forests could reduce emissions by a total of about 6.6 Gt C by 2030, which is approximately 3 per cent of current emissions. However, especially in tropical forests, whilst such practices constitute a significant improvement on a "business as usual approach" they still result in depletion of *in situ* carbon stocks and increased emissions, along with reduced resilience and biodiversity loss, compared to an intact primary forest. If SFM practices are applied to previously intact primary forests, this could lead to increased carbon emissions and biodiversity loss, depending on the specific practices and the forest type.

14. **Reforestation can make a significant contribution to enhancing forest carbon stocks and biodiversity within landscapes that have been largely deforested and degraded, if the reforestation is designed and managed appropriately.** While reforestation with fast-growing monocultures, often exotics, can yield high carbon sequestration rates and economic returns, this type of reforestation often has little value for biodiversity conservation. However, reforestation can provide both biodiversity and climate change mitigation benefits if it uses an appropriate mix of native species, incorporates any natural forest remnants, and results in a permanent, semi-natural forest. If appropriately designed and managed, reforestation activities on degraded lands can also relieve pressure on natural forests by supplying alternatives sources of sustainable wood products to local communities, thereby providing additional biodiversity and climate change mitigation benefits.

15. **Afforestation can have positive or negative effects on biodiversity, depending on the design and management.** Afforestation that converts non-forested landscapes with high biodiversity values (e.g. heath lands, native grasslands, savannas) and/or valuable ecosystem services (e.g. flood control) or increases threats to endemic biodiversity through habitat loss, fragmentation and the introduction of invasive alien species will have adverse impacts on biodiversity. However, afforestation activities can support biodiversity, if they convert only degraded land or ecosystems largely composed of invasive alien species; include native tree species; consist of diverse, multi-strata canopies; result in minimal disturbance, consider the invasiveness of non-native species, and are strategically located within the landscape to enhance connectivity.

3.3. Other (non-forest) land-use management climate change mitigation options

Agriculture and other land use management activities on non-forested land can also make an important contribution to climate change mitigation and biodiversity conservation

16. **In addition to forest-based climate-change-mitigation options, there is a wide variety of activities in the agricultural sector which can maintain and potentially increase carbon stocks, while also contributing to the conservation and sustainable use of biodiversity**. Key examples of agricultural activities that can deliver multiple benefits, include conservation tillage and other means of sustainable cropland management, sustainable livestock management, agroforestry systems, reduction of drainage systems in organic agricultural soils, improved management of fertilizers, and maintenance or restoration of natural water sources and their flows including peatlands and other wetlands (see annex IV for further information). The restoration of degraded cropland soils, for example, may increase soil carbon storage and crop yields, while contributing to the conservation of agricultural biodiversity,

including soil biodiversity. The global sequestration potential through increasing soil organic carbon via improved agricultural practices is estimated to be 1-6 Gt C/yr.

17. **Policies that integrate and promote the conservation and enhanced sequestration of soil carbon, including in peatlands and wetlands, can contribute to climate change mitigation and be beneficial for biodiversity and ecosystem services.** Peatlands and wetlands have very high carbon stocks, particularly below ground, with an average carbon sequestration value of almost 1400t C/ha. Globally, peat lands and wetlands harbour an estimated 550 Gt of carbon. Human disturbances, such as drainage for agriculture and forestry production or the use of fire, have transformed large areas of peatlands from being a sink of carbon to a source. For example, tropical peat lands in South-east Asia emit 600 Mt CO_2 eq. per year (excluding peat fires). There is significant and cost-effective potential to reduce emissions from degraded peat land by restoring drained peat lands and preventing further fires and drainage in intact peat lands.

3.4. Enhancing the contribution of land-use management (including REDD) to biodiversity conservation

18. **Although forest and other land-use management climate-change-mitigation activities can contribute to both climate change mitigation and biodiversity conservation and sustainable use, if designed and managed appropriately, the extent to which they deliver these benefits will depend on how and where these activities are implemented.** Annex IV outlines the potential benefits and risks to biodiversity from different forest and other land-use management climate change mitigation activities, and highlights potential means of increasing biodiversity benefits or reducing negative impacts. Reducing deforestation and forest degradation, and conserving moist tropical forests will have the greatest and most immediate impact on biodiversity conservation, as tropical forests host more than 60 per cent of the world's known species. However, all of these land-based climate-change-mitigation activities can have positive impacts on biodiversity if they result in additional conservation or restoration of diverse, natural ecosystems, promote the sustainable use of native species, and maintain landscape connectivity, and if they avoid displacement of deforestation, forest degradation or land use change into other ecosystems. In addition, if climate-change-mitigation strategies are implemented in areas of high biodiversity value (e.g., areas with high numbers of endemic or threatened species), the biodiversity benefits will likely be greater than if these activities are implemented in areas of lesser value.

19. **There may be some trade-offs between designing and managing activities for climate change mitigation and biodiversity conservation and sustainable use goals**. For example, the optimal age and species composition of plantation trees for wood supply may be different that that required to maximize biodiversity values or carbon storage. Similarly, the forest areas that may provide the largest, most immediate emissions reductions will not necessarily be those of greatest conservation value. In particular, some regions that currently have high forest cover may be of critical importance for biodiversity conservation, but of lower immediate importance for emissions reductions due to current low deforestation rates (e.g., the so-called, high-forest/low-deforestation countries).

3.5 Potential interactions between REDD and biodiversity

20. **In general, reducing deforestation and forest degradation (REDD) can result in positive consequences for biodiversity by protecting important forest habitat and maintaining landscape connectivity.** Tropical forests have extremely high levels of biodiversity, including areas with a high density of endemic species. The Amazon rainforest alone hosts about a quarter of the world's terrestrial species. However, if deforestation and forest degradation is simply displaced to other forest areas, or if it is shifted from an area of lower conservation value to one of higher conservation value, the biodiversity gains will be much reduced. Similarly, if deforestation and forest degradation is displaced to other native ecosystems- such as wetlands or savannahs, it could negatively impact the species native to these ecosystems.

21. **REDD also has the potential to contribute considerably to biodiversity conservation by allowing forest ecosystems to adapt naturally to climate change.** In order to enhance the contribution of REDD to adaptation, activities could be prioritized which minimize fragmentation, maximize resilience and aid in the maintenance of corridors and ecosystem services. This could be achieved in particular through maintaining connectivity of forest protected areas and other forests, at a landscape level.

22. **The exact impact of REDD on biodiversity will depend on its design and implementation, including its scope, carbon accounting methodology, monitoring and verification, and what strategies are implemented to reduce deforestation and forest degradation and promote more sustainable land management practices**. There are several REDD design issues which will influence its potential to contribute to biodiversity conservation and sustainable use:

- **REDD methodologies based on assessments of only net deforestation rates could have negative impacts on biodiversity.** The use of net rather than gross deforestation rates[21] could obscure the loss of mature (i.e. primary and modified natural) forests by their replacement *in situ* or elsewhere with areas of new forest growth. This could be accompanied by significant losses of biodiversity as well as unrecorded emissions.

- **Addressing forest degradation is important because forest degradation may lead to the persistent loss of carbon and biodiversity, decreases forest resilience to fire and drought, and can lead to deforestation.** Monitoring to detect the severity and extent of forest degradation is therefore a key issue which needs further development.

- **Both intra-national and international leakage under REDD can have important consequences for both carbon and biodiversity and therefore needs to be prevented or minimized**.

- **Implementing REDD in areas identified as having both high biodiversity value and dense carbon stocks can provide especially important co-benefits for biodiversity and climate-change mitigation.** Several tools and methodologies are under development that could potentially be used to enhance the contribution of REDD to biodiversity. For example, existing information on critical forest areas for biodiversity conservation (e.g., critical bird areas, alliance for zero extinction sites, key biodiversity areas, and others) could be overlaid with information on deforestation rates and carbon stocks to determine which forests offer both the greatest climate change mitigation and biodiversity potential. The national gap analyses carried out by Parties under the programme of work on protected areas of CBD could also be a valuable tool for identifying areas for the implementation of REDD schemes in forest areas that offer the greatest biodiversity co-benefits.

3.6. REDD and other land-use management activities, human livelihoods and indigenous peoples

While it is generally recognized that REDD and other land-use management activities could provide potential benefits, including critical ecosystem services , to forest-dwelling indigenous and local communities, a number of conditions are important for realizing these co-benefits

23. **The implementation of rights recognized in the United Nations Declaration on the Rights of Indigenous Peoples could be taken into account as a means of linking indigenous peoples' biodiversity-related practices to the potential benefits from REDD and other land management activities.** While it is generally recognized that REDD and other land-use management activities could provide potential benefits, including critical ecosystem services, to forest-dwelling indigenous peoples and local communities (ILCs), a number of conditions are important for realizing these co-benefits. Indigenous peoples are likely to benefit from land use management climate change mitigation options

[21] Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2005 as overall deforestation minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

where they own their lands, where there is the principle of free, prior and informed consent, and where their identities and cultural practices are recognized and they have space to participate in policy-making processes as outlined in table 3.5 below.

24. **There is a need for greater awareness and capacity building for indigenous peoples and local communities on biodiversity and climate change issues, so that these groups can take an active role in deciding how to engage in climate change mitigation activities.** It is also important that indigenous peoples can exchange their knowledge and practices of biodiversity conservation and sustainable management among themselves and have the opportunity to raise general awareness of such practices. At the same time, governments could benefit from indigenous peoples and local communities" traditional knowledge and practices related to biodiversity and forest conservation and management.

25. **Addressing the underlying drivers of deforestation and forest degradation will require a variety of approaches.** Possible approaches include improved forest governance, stricter enforcement of forest laws, land tenure reform, forest management planning, providing incentives for REDD, expansion of protected areas, improved forest management, adoption of agroforestry to ensure fuelwood and timber access, the establishment of alternative livelihood activities, and sourcing commercial wood supplies from reforestation/afforestation projects rather than primary forest, among others. The selection of approaches to reduce deforestation and forest degradation depends on local, regional and national circumstances and include both economic and non-economic incentives and activities, including as the ones described in section 4.3 below.

26. **If REDD is to achieve significant and permanent emissions reductions, it will be important to provide alternative sustainable livelihood options (including employment, income and food security) for those people, especially the rural poor who are currently amongst the agents of deforestation and forest degradation.** Specific livelihood options are most likely to be successful when they are tailored to specific social, economic and ecological contexts and consider sustainability under both current and projected future climate conditions.

Table 3.5. ***Overview of key issues for indigenous peoples and local communities (ILCs) related to biodiversity conservation and sustainable use and climate change mitigation***

Issue	**Relevance to biodiversity conservation**	**Relevance to climate-change mitigation**
Recognition of rights and generation of opportunities	Land tenure, access and benefit sharing, and participation in the decision-making process would give ILCs opportunities to manage and protect biodiversity on which they rely for their livelihoods and culture, and facilitates the distribution of benefits.	Promotion of alternative and sustainable production activities, which take into account local and indigenous knowledge and needs can reduce forest deforestation and forest degradation.
Awareness, capacity-building and dialogue	Need for awareness, capacity-building and knowledge exchange on biodiversity issues to ILCs. Governments could benefit from ILCs' traditional knowledge and practices related to biodiversity	Need for awareness, capacity=building and knowledge exchange on climate change issues to ILCs. Governments could benefit from ILC's traditional knowledge and practices related to climatic events (including adaptation).
Governance and equity	Free, prior and informed consent is important to the effective management of biodiversity by ILCs in so far as it facilitates decision making based on traditional structures, addresses the lack of law enforcement and poor forest management, and avoids perverse	Climate change mitigation strategies could take into account ILC processes or the possible negative impacts on ILCs. Free, prior and informed consent of ILCs could improve the effectiveness of REDD and other land management activities.

	incentives.	
Policy and legislation	Policies and legislation developed with the effective participation of ILCs are more likely to be supported by them and contribute to biodiversity conservation. ILCs concept of forest management based on local and indigenous knowledge can contribute to the global and national debate on the conservation and sustainable use of forest biodiversity.	Policies and legislation developed with the effective participation of ILCs are more likely to be supported by them. ILCs concept of land and forest management based on local and indigenous knowledge can contribute to the global and national debate on REDD and other land management activities.
Gender	Women and elders hold valuable knowledge on forest biodiversity which should be safeguard and promoted with their prior informed consent.	Women and elders hold valuable knowledge on climate change impacts in forests and possible response activities which should be safeguarded and promoted with their prior informed consent.
