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ANALYSIS OF POSSIBLE INDICATORS TO MEASURE IMPACTS OF REDD+ ON BIODIVERSITY AND ON INDIGENOUS AND LOCAL COMMUNITIES

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the sixteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice, a note prepared by a group of consultants presenting an analysis of possible indicators to measure the impacts of REDD+ activities on biodiversity and indigenous and local communities.

2. The document is circulated in the form and language in which it was received with some formal editing by the Secretariat.

* UNEP/CBD/SBSTTA/16/1.

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Analysis of possible indicators to measure impacts of REDD+ on biodiversity and on indigenous and local communities

A report to the Convention on Biological Diversity

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December 2011

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List of abbreviations and acronyms

BCP	Biocultural Community Protocol
BTFP	BioTrade Facilitation Programme
CBD	Convention on Biological Diversity
CCAD	Central American Commission on Environment and Development
CCB	Climate, Community and Biodiversity
CCBA	Climate, Community and Biodiversity Alliance
CIFOR	Center for International Forestry Research
COP	Conference of the Parties
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Program
FPIC	Free Prior and Informed Consent
FRA	Global Forest Resources Assessment
GCC	Global Climate Change
GCF	Governors Task Force on Climate and Forest
GEO-BON	Group of Earth Observations – Biodiversity Observation Network
HCVs	High Conservation Values
IIFB	International Indigenous Forum on Biodiversity
ILCs	Indigenous Peoples and Local Communities
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IPs	Indigenous Peoples
IUCN	International Union for the Conservation of Nature
KBAs	Key Biodiversity Areas
LADA	Land Degradation Assessment in drylands
LCs	Local Communities
LIDAR	Light Detection and Ranging
LULUCF	Land Use, Land Use Change and Forestry
MEAs	Multilateral Environmental Agreements
MRV	Measurement, Reporting and Verification
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organisation
PAMs	Policies and Measures
PRAIS	Performance Review and Assessment of Implementation System
PROMEBIO	Programa Estratégico Regional de Monitoreo y Evaluación de la Biodiversidad
RED	Reducing Emissions from Deforestation
REDD	Reducing Emissions from Deforestation and Forest Degradation
REL	Reference Emission Levels
RL	Reference Levels
R-PP	Readiness Preparation Proposal
RSPO	Roundtable on Sustainable Palm Oil
SBSTA	Subsidiary Body for Scientific and Technical Advice of UNFCCC
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice of CBD
SES	Social and Environmental Standards
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management
SICA	Integrated System of Central America
SIS	Safeguards Information System

SMF	Sustainable Management of Forests
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNPFII	United Nations Permanent Forum on Indigenous Peoples
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
VCS	Verified Carbon Standard
WCMC	World Conservation Monitoring Centre

Executive summary

This report has been produced for the Secretariat of the Convention on Biological Diversity (CBD), as part of the activities in response to decision X/33 paragraph 9 (h), in which the Conference of the Parties requested the Executive Secretary to '*...identify possible indicators to assess the contribution of reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries to achieving the objectives of the Convention on Biological Diversity, and assess potential mechanisms to monitor impacts on biodiversity from these and other ecosystem-based approaches for climate change mitigation measures, without pre-empting any future decisions taken under the United Nations Framework Convention on Climate Change, and to report on progress to the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting prior to the eleventh meeting of the Conference of the Parties*'.

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a key approach for addressing the threat of global climate change under the United Nations Framework Convention on Climate Change (UNFCCC). REDD aims to reduce greenhouse gases by conserving carbon pools and sequestration through financial incentives and other benefits to developing countries for carbon storage and reduced emissions from forest lands via different eligible activities. In December 2008, a 'plus' was added (REDD+) to indicate agreement on efforts to produce additional benefits beyond reducing deforestation and sequestering carbon, in particular to contribute to conservation and sustainable forest management with a focus on sustainable management of forests, conservation, and enhancement of carbon stocks. While REDD+ offers powerful synergies for achieving the CBD goals, it and other climate change mitigation measures also present potential challenges that could undermine CBD goals. This paper explores a path for harmonizing the goals of CBD and UNFCCC though the application of illustrative indicators that could be adapted to fit the CBD and UNFCCC monitoring and reporting systems.

The definition of forests, forest lands and degraded lands is critical for planning REDD+ activities and measuring their impacts on biodiversity and Indigenous Peoples and Local Communities (ILCs). Agriculturally-useful lands may be classified as degraded forest, including "wastelands" where wild biodiversity is critically important for grazing animals, wild foods, medicines, artesanal products, wildlife, etc., as well as for rotational agriculture and maintaining wild and weedy crop genetic resources. Hence, a consideration of indicators for monitoring REDD+ impacts should take into account the range of the two Ds. Attention to the distribution of biodiversity within landscape mosaics is particularly important given the rising focus on intensifying agriculture for global food security and thereby threatening corridors in landscapes that have been less intensively managed until now.

Positive and negative impacts can be caused by REDD-driven policy reforms, planning, and on-the-ground activities. Given the wide range of REDD+ activities, attribution of impacts to REDD+ alone will be difficult to establish, and can muddy the waters for assessing cause and effect relationship to REDD+ even if a baseline/reference scenario is established for monitoring.

Scale of measurement remains a concern, and the need to carry out effective ground-level surveys as part of any monitoring protocol is essential. Such a requirement brings issues relating to technical feasibility and cost-efficiency, which many countries may struggle to effectively achieve owing to capacity and resource limitations. Nested monitoring systems that leverage local monitoring by ILCs

and subnational governments can offer the dual advantage of cost-effective data collection and cross-scale collaboration.

The authors found that the approach proposed by Gardner *et al.* (2011) – taking a tiered approach to operationalising REDD+ impact monitoring at various scales for meeting goals related to REDD+ under the UNFCCC – could help overcome some of the challenges. While the authors recognise that considerable progress is needed to establish such accounting, such an approach would allow for a range of syntheses and meta-analyses using existing social, spatial, ecological and economic data for countries and regions where this is still lacking, as well as global assessments for other well-studied species groups such as reptiles, plants and well-studied insect taxa. It could also allow for the testing and development of simplified, robust and replicable field monitoring of biodiversity with ILC involvement, including using participatory approaches for collecting data, evaluating results for adaptive management decisions, and assessing or adjusting the "theory of change" on which REDD+ interventions are based.

This report offers a potential framework of indicators, organized and presented under thematic areas that correspond to the UN-REDD Programme Social and Environmental Principles and Criteria. The framework also accommodates indicators that have been proposed to monitor progress against the CBD 2011-2020 Strategic Plan for Biodiversity and the Aichi Goals and Targets, in particular relating to Targets 5, 7, 11 and 15, and indicators on land use planning, status of biodiversity, and ILC well-being associated with ecosystem health. The proposed indicator framework is complementary to, and compatible with, the Safeguards Information System (SIS) required under UNFCCC.

The eleven thematic areas (see below) should be seen as requisite for providing information required in forming programming and management decisions, although the proposed indicators framework should be considered flexible to allow for adaptation to take into account national or subnational circumstances.

Proposed headline indicators for monitoring the biodiversity and ILC impacts of REDD+:

- Policy support for REDD+
- Recognition of rights
- Conflicts
- Free, prior and informed participation
- Present and future well-being linked to forest and ecosystem health
- Carbon market and finance
- Forest economies
- Land use and forest planning
- Freshwater biodiversity
- Forest biodiversity
- Population densities, trends, and demands

With consideration of constraints due to limited data availability and capacity, the authors offer the following recommendations in order to develop an effective monitoring system for biodiversity and community well-being impacts of REDD+:

1. Prioritization of biodiversity and ILC indicators in relation to safeguards and desired outcomes at national and subnational levels would benefit by using a multi-stakeholder process.
2. Further research should be carried out on thresholds, sentinel taxa, and ecosystem service indicators.

3. Definitions of "forest" and different forests types need to incorporate a more ecological approach before they are harmonized with broad general definitions being used by FAO.
4. A stringent concept for sustainable management of forests and a reference for validating sustainable forestry management (SFM) should be established with independent, third party monitoring of SFM.
5. Safeguards and indicators are needed to avoid inter-ecosystem leakage, as well as leakage within the same ecosystem. Research on this area is urgently needed, as leakage is expected to become a more and more significant issue when REDD+ investments expand.
6. The capacity building and funding needs should be assessed in order to establish, strengthen and maintain indicator systems in order to ensure complementarity and avoid duplication of efforts.
7. Implementation of a monitoring system of REDD+ impacts on biodiversity and community well-being should be carried out using a phased approach in order to implement feasible indicators within an effective monitoring in any given country context.

Contents

1. Introduction

This report has been produced for the Secretariat of the Convention on Biological Diversity (CBD), as part of the activities in response to decision X/33 paragraph 9 (h), in which the Conference of the Parties requested the Executive Secretary to '*...identify possible indicators to assess the contribution of reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries to achieving the objectives of the Convention on Biological Diversity, and assess potential mechanisms to monitor impacts on biodiversity from these and other ecosystem-based approaches for climate change mitigation measures, without pre-empting any future decisions taken under the United Nations Framework Convention on Climate Change, and to report on progress to the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting prior to the eleventh meeting of the Conference of the Parties*'.

The views expressed in this publication do not necessarily reflect the views of the Secretariat of the CBD.

1.1. Overview of REDD+ history, activities, potential impacts and safeguard requirements

1.1.1. A brief history

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a key approach for addressing the threat of Global Climate Change (GCC) under the United Nations Framework Convention on Climate Change (UNFCCC), a 1992 multilateral environmental agreement (MEA) aimed at stabilizing greenhouse gas concentrations in the atmosphere. REDD aims to reduce greenhouse gases by conserving carbon pools and sequestration through financial incentives and other benefits to developing countries for carbon storage and reduced emissions from forest lands via different eligible activities outlined in § 70 of the Cancun decision 16 of 2010.

Another UNFCCC element, Land Use, Land Use Change and Forestry (LULUCF) is an emission sector under the Kyoto Protocol for industrialized countries. LULUCF covers cropland and grazing land management, land clearing, and forest management in developed/industrialized countries. There are discussions regarding the reconciliation of the indicators and monitoring frameworks for REDD and LULUCF; however, this paper does not evaluate these issues.

While the concept of paying for forests as "carbon offsets" arose in the 1990s, and REDD approaches have been taken up in the private voluntary market by firms and subnational governments seeking to reduce CO_2 emissions into the global atmosphere, REDD (as RED) was formally integrated into UNFCCC with consideration by its Subsidiary Body for Scientific and Technical Advice (SBSTA) in 2006, and has since rapidly evolved into a more complex element (Pistorius *et al.* 2011). In Bali, in 2007, the second D was added, and the interests of Indigenous Peoples and Local Communities (ILCs) were, for the first time, addressed and included in the Bali Action Plan for REDD development. In December 2008, a 'plus' was added (REDD-plus or REDD+) to indicate agreement on efforts to produce additional benefits beyond reducing deforestation and sequestering carbon, in particular to contribute to conservation and sustainable forest management with a focus on sustainable management of forests, conservation, and enhancement of carbon stocks, but without linking those efforts to any particular mechanism (Pistorius *et al.* 2011). The "plus benefits" leveraged in REDD+ have been broadly interpreted as environmental, social and/or economic. In Copenhagen, in 2009, REDD+ was further promoted as a partnership between industrialized and developing countries, in which industrialized countries would share the costs of undertaking REDD+ actions in developing

countries. In particular, adding "enhancement of forest stocks" as an eligible activity has expanded potential REDD+ activities (Pistorius *et al.* 2011).

In this paper, the term REDD+ refers to experiences in both (i) the voluntary market and (ii) activities emerging under government leadership following the three phases under UNFCCC: Phase one is the dialogue and strategy development stage; Phase two is the stage for Policies and Measures (PAMs), including tenure policy reforms, forest protection, reduced-impact logging, payments for environmental services, institutional adjustments, pilot projects supporting the approved REDD+ strategy, safeguards and monitoring systems establishment, and other related activities to bring deforestation under control; and Phase three includes carbon payments and monitoring.

While a REDD+ mechanism is still under discussion under UNFCCC and government REDD+ activities are only in preparatory and pilot stages, the private sector voluntary market has moved more quickly and developed carbon forest projects, now known as "early REDD+" from which lessons are being drawn. To date, sales have occurred in the voluntary market and 29% of entire voluntary market volume in 2010 was for REDD+; significant investments now underway for REDD+ pilots compliant with Voluntary Carbon Standards (VCS) are often being adapted to emerging national frameworks (e.g., Indonesia) (Olander 2010). Actors in the voluntary market include brokers (ranging from private foundations and non-governmental organisations (NGOs) to private sector corporations), finance industry providing capital, sellers (who range from communities and associations of communities, such as the Coastal First Nations in Canada, to subnational governments such as the British Columbia provincial government in Canada), and buyers (who range from private industry to subnational government associations such as the California-led Governors´ Climate and Forests Task Force, known as GCF). The private sector participation in the carbon market is growing (Brennan & Durschinger 2011).

There have been no sales of carbon or transfers of REDD+ implementation funds into nationally-regulated compliance markets, but subnational pilot work has been funded in a subset of REDD+-eligible countries to test approaches, principles, safeguards, and monitoring systems through the UN-REDD Programme, Forest Carbon Partnership Facility (FCPF), Forest Investment Program (FIP), and bilateral arrangements, with financial assistance also coming from private foundations. The full implementation stage of REDD+ is expected to begin in 2014, primarily through the FCPF based at the World Bank to coordinate REDD+ investments in eligible countries (37 countries as of September 2011). FCPF is currently focused on REDD+ Readiness, including financing of policy reforms, reference levels, safeguard establishment, and monitoring systems.

1.1.2. REDD+ actions and their potential Impacts on biodiversity and ILC

The types of REDD+-related actions considered likely to have impacts on biodiversity and ILCs include those identified in the regional workshops and summarized in the Global Expert Workshop on Biodiversity Benefits of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (Nairobi, 20-23 September 2010) (CBD 2010), listed immediately below:

> "At this stage, the biggest risk to biodiversity and indigenous peoples and local communities from REDD-plus is that a well-designed REDD-plus mechanism is not agreed upon and successfully implemented.
> 6. Other specific risks for biodiversity identified by the meeting include:
> (a) The conversion of natural forests to plantations and other land uses of low biodiversity value and low resilience; and the introduction of growing of biofuel crops;
> (b) Displacement of deforestation and forest degradation to areas of lower carbon

value and high biodiversity value;
(c) Increased pressure on non-forest ecosystems with high biodiversity value;
(d) Afforestation in areas of high biodiversity value.

7. Other specific risks of REDD-plus for indigenous peoples and local communities include:
(a) The loss of traditional territories and restriction of land and natural resource rights;
(b) Lack of tangible livelihood benefits to indigenous peoples and local communities and lack of equitable benefit sharing;
(c) Exclusion from designing and implementation of policies and measures;
(d) Loss of traditional ecological knowledge."

A series of subsequent regional workshops confirmed concerns about these risks identified in 2010, and contributed to the CBD submission to UNFCCC for UNFCCC COP 17 in September 2011 (CBD 2011a). The CBD submission compiled and analyzed information from the Global Expert Workshop on REDD-plus and Biodiversity Benefits, Nairobi, 20-23 September 2010 (UNEP/CBD/WS-REDD/1/3); the regional consultation and capacity building workshop for Asia-Pacific, Singapore, 15-18 March 2011 (UNEP/CBD/WS/CB/REDD/APAC/1/2); the regional consultation and capacity building workshop for Latin America and the Caribbean, Quito, Ecuador, 5-8 July 2011 (UNEP/CBD/WS/CB/REDD/LAC/1/2); as well as discussions in Nagoya and Cancun in 2010. The REDD+ risks for biodiversity and ILCs have also been explored in detail in other CBD publications, most notably in CBD (2011b).

The definition of forests, forest lands and degraded lands is critical for planning REDD+ activities and measuring their impacts on biodiversity and Indigenous Peoples and Local Communities (ILCs)[1] (CBD 2011b, Pistorius *et al*. 2010). Agriculturally-useful lands may be classified as degraded forest, including "wastelands" where wild biodiversity is critically important for grazing animals, wild foods, medicines, artesanal products, wildlife, etc., as well as for rotational agriculture and maintaining wild and weedy crop genetic resources. While considering REDD+ actions and impacts, it is essential to keep in mind the two Ds – deforestation and forest degradation. To date, most attention has been paid to slowing deforestation, and focused on monitoring that process and its outcomes. Relatively little attention has been paid to issues related to reversing deforestation (i.e., restoring forests) so far. Forest restoration is somewhat neglected so far in the negotiations as well as in donor and private sector investment. Hence, a consideration of indicators for monitoring REDD+ impacts should take into account the range of the two Ds (I-REDD+ 2011).

REDD+ actions that have been emphasized to date include a wide range of on-the-ground activities, including: natural forest protection; forestry production plantations; biofuel plantations; shade production of coffee, cacao, brazil nuts and other non-timber forest products; reforestation in degraded areas; afforestation in agricultural areas via plantations and/or natural regeneration and protected areas. REDD+ activities with impacts on biodiversity and ILCs also include micro-economic activities previously known under the rubric of community-based conservation (such as ecotourism, value-added artisanry, etc.) aimed to reduce pressure on forests in exchange for alternative income sources. Plantations of fast growing species financed in agricultural and pastoral areas may be done with an eye to stabilize migration out of deforested areas into forests, but at the same time this afforestation will affect the biodiversity, ecosystem services, and ILCs in the areas where new plantations are established and afforestation carried out, depending on multiple factors, including farmers´ participation in selecting areas for afforestation after evaluating the potential impacts of such afforestation.

[1] UNFCCC references Indigenous Peoples (IPs) and Local Communities (LCs) separately, while CBD currently merges the two under one concept ILC which implies IPs and LCs. For the purposes of this paper, the term 'ILC' is used.

REDD+ actions to stop deforestation trends include the implementation of PAMs that range from enforcement, policy reform, processes for civil society involvement, establishment of monitoring systems, and others. The actions to address forest degradation, including afforestation and reforestation in areas currently under other land uses, are more controversial and less well described, tending to have more attention under GCC adaptation and mitigation activities. REDD+ actions to address forest degradation in agricultural mosaic landscapes through afforestation and reforestation are likely to have significant impacts on biodiversity and ILCs. The impacts may be positive or negative, or mixed, depending on the ecological and social context. Fuelwood plantations for example can reduce pressure on natural forests, but assisted natural regeneration, rather than plantations, could have more positive biodiversity and carbon sequestration benefits (Dugan *et al*. 2003, Sasaki *et al*. 2011, Shono *et al*. 2007, Durst *et al*. 2011). Some REDD+ related actions may impact biodiversity indirectly, and the causal relationships linking impacts to REDD+ may be blurred, as in those actions that address deforestation drivers of migration, illegal logging, unsustainable resource extraction, infrastructure development, and perverse incentives for deforestation.

At the policy and planning level, REDD+ funders have required significant policy reforms by recipient governments, including tenure reforms, consultation and consent reforms, as well as reforms in the administration of public forest lands and concessions, protected areas, ecosystem service payments, import/export policies, financial sector policies, and agricultural subsidies that drive deforestation. The aim is to reduce or stop deforestation and, where possible, increase the land under forest cover. In some countries (e.g., Peru, Guatemala), the ministry of finance is receiving multilateral development bank and donor assistance to incorporate a climate change screening unit to review all development projects financed by the government and donors (Che Piu & García 2011). Similar screening of subnational government investments is being implemented by the San Martin regional government in Peru (Steininger *et al.* 2011). In the case of the San Martin regional government, land use plans are also integrating connectivity and biodiversity maintenance objectives into screening of all public investments/projects for their impacts on deforestation and ecosystem functioning. Such units will, among other things, incorporate REDD+ activities into proposed projects to offset impacts of development and possibly assess the proposed activities compliance with safeguards. Such REDD+ governance and budgeting reforms are seen as essential for bringing the forest sector under accountable control to achieve measurable increase in carbon sequestration by reversing the current trends of forest loss, without restricting economic development.

New policy restrictions on traditional agricultural practices, such as those on traditional rotating agriculture in forests, as well as restrictions on collection of fuelwood and other forest product harvests, will affect ILCs. Policies targeting "degraded" lands in agricultural mosaic landscapes for afforestation will affect ILCs who use these lands and the biodiversity found there. Concerns about these policies have been raised frequently by civil society in regions where ILC depend on forest ecosystems for their culture and livelihoods and on agricultural mosaic landscapes where "degraded" lands currently serve important functions for ILCs and maintain particular types of biodiversity (Brown *et al.* 2011, Loverna 2011, I-REDD+ 2011, RECOFTC 2011).

Some recent studies have also noted that policy reforms that would be seen as taking steps to decentralize forestry in very centralized governments could, if applied across the board, recentralize forestry in countries where community forestry currently functions through decentralization of control. This may undermine the ´+´ in REDD+ by marginalizing the local stakeholders who play a crucial role in its success (e.g., Phelps *et al*. 2010).

Concerns have also been raised regarding whether REDD+ could result in perverse incentives by artificially increasing threats to forested areas, because forested areas not under threat by

deforestation or destructive logging are not eligible for REDD+ funding; therefore protection offers less financial gain than the REDD "reward" for allowing deforestation threats to grow to the point where they become eligible for REDD+ (CBD 2011a, Epple *et al. 2011*, Miles & Dickson 2010). Some countries have recognized this weakness and have established separate (non-REDD) payment programmes for conserving biodiverse natural forests under indigenous and community control in areas where the threat of deforestation is relatively small (e.g., Ecuador´s Socio Bosque Forest Conservation Partnership program and Peru´s Programa Nacional de Conservación de Bosques). A related concern is that deforestation will only be spatially displaced from areas under REDD+ into areas that are not part of a REDD+ programme (e.g., increased illegal logging in reserves for uncontacted peoples by logging companies that have moved beyond their concession boundaries into these reserves after making REDD+ deals in the voluntary market for concessions that neighbour indigenous reserves) (Espinoza Llanos & Feather 2011).

Other concerns have been raised about the impacts of private sector carbon market investments outside the "regulated market" under government control. However, the private sector itself sees that fungibility, environmental and social safeguards, land tenure and ownership rights, and governance/corruption are the key issues that will influence successful private REDD+ investment (UNEP 2011). There is overlap in the policy reforms seen as key for positive impacts by private investors, donors and multilateral development banks, particularly in terms of clear tenure rights, good governance, and transparency.

New risks for biodiversity could also arise if REDD+ is integrated into an emerging strategy for addressing rising food security concerns (Searchinger 2011). If landscapes become more intensively managed for commercial agricultural production as a mitigation complement to REDD+ forest protection, the REDD+ impacts could be skewed. During climate change in such intensified agricultural landscapes, connectivity created by less-intensively managed spaces will be critically important for preventing massive species losses and subsequent unravelling of ecosystems. Harms from such intensive land use patterns associated with REDD+ may also include ILC loss of land and resources, ILC loss of traditional lifeways and traditional knowledge, ILC loss of food security through restrictions on access and traditional agricultural methods, conversion of biodiverse forests into plantations that may also disrupt ecosystem functions and services, greater social marginalization of ILC, greater social marginalization of women, and increased social conflict around natural resources. These outcomes would reduce the possibilities for REDD+ success. For instance, REDD+ carbon certification is being used by palm oil plantations, and being considered for sugarcane and soy (Searchinger 2011). While threats from expansion of these biofuel crops depend on the scale and management within landscapes (Colchester & Chao 2011), these three major commercial crops have been linked to land use changes including deforestation and displacement of vulnerable ILCs. Recently some landscape management proposals aim to dominate landscapes with intensified production for food security with limited areas for forest production/carbon sequestration and nature protection (e.g., Searchinger 2011).

Furthermore, a lack of consistent forest-related definitions both within and across conservation and climate change initiatives mean challenges in accurate monitoring and reporting, and thus measuring the benefits of REDD+ (Pistorius *et al*. 2010). Yamasaki & Tyrrell (2011) highlighted the increasing forest-related reporting expected of countries and that, while many questions may be similar across reporting, the information required may differ in part due to inconsistencies in the definitions in use. They recommend concerted effort by the MEAs to reduce the burden through improving the consistency and comparability of related definitions and indicators, and enhancing capacity in developing countries.

In short, positive and negative impacts can be caused by REDD-driven policy reforms, planning, and on-the-ground activities. Given the wide range of REDD+ activities, attribution of impacts to REDD+ alone will be difficult to establish, and can muddy the waters for assessing cause and effect relationship to REDD+ even if a baseline or reference scenario is established for monitoring (see Pistorius *et al*. 2011).

1.1.3. UNFCCC Safeguards and Safeguards Information System

In Cancun, in 2010, agreement was reached that a uniform Safeguards Information System (SIS) monitoring the implementation of REDD+ safeguards will be required, which were reaffirmed at the 17th meeting of the COP in Durban, South Africa, in December 2011. Furthermore, it was agreed that Parties could proceed with subnational reference levels and monitoring during initial years until the national systems are in place, at which time the subnational systems would be reconciled into the national systems (the "nested" approach). With the aim of preventing harms and ensuring benefits from REDD+ activities, UNFCCC COP 16 in Cancun established as a set of safeguard principles (see Box 1).

Box 1. Relevant excerpts from the Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (decision 1/CP.16).

70. Encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances:

(a) Reducing emissions from deforestation;
(b) Reducing emissions from forest degradation;
(c) Conservation of forest carbon stocks;
(d) Sustainable management of forests;
(e) Enhancement of forest carbon stocks;

71. Requests developing country Parties aiming to undertake activities referred to in paragraph 70 above, in the context of the provision of adequate and predictable support, including financial resources and technical and technological support to developing country Parties, in accordance with national circumstances and respective capabilities, to develop the following elements:

(a) A national strategy or action plan;
(d) A system for providing information on how the safeguards referred to in annex I to this decision are being addressed and respected throughout the implementation of the activities referred to in paragraph 70, while respecting sovereignty;

72. Also requests developing country Parties, when developing and implementing their national strategies or action plans, to address, inter alia, drivers of deforestation and forest degradation, land tenure issues, forest governance issues, gender considerations and the safeguards identified in paragraph 2 of annex I to this decision, ensuring the full and effective participation of relevant stakeholders, *inter alia*, indigenous peoples and local communities;

Appendix I. Guidance and safeguards for 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

1. Activities referred to in paragraph 70 of this decision should: ...

(d) Be consistent with the objective of environmental integrity and take into account the multiple functions of forests and other ecosystems;"

2. When undertaking the activities referred to in paragraph 70 of this decision, the following safeguards should be promoted and supported:

a) Actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;
b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;
c) 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 United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;
d) The full and effective participation of relevant stakeholders, in particular, indigenous peoples and local communities, in actions referred to in paragraphs 70 and 72 of this decision;
e) Actions are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in paragraph 70 of this decision are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of benefits;
f) Actions to address the risks of reversals;
g) Actions to reduce displacement of emissions.

In October 2011, the UNFCCC Expert Meeting on "Guidance on systems for providing information on how the safeguards for REDD-plus activities are addressed and respected"[2] produced the following findings:

"1. Information systems are useful because they:

- inform stakeholders
- are potential tools to improve governance
- are helpful for identifying opportunities and avoiding negative impacts
- could build confidence that the safeguards are addressed
- recognition of a diversity of national and international safeguard systems
- in most cases there is no need to develop new systems and indicators. It is more a matter of combining existing systems and instruments and of policy coherence
- addressing the safeguards and providing information on them is a learning process with continuous improvement

2. Guidance for information systems needs to be realistic in terms of national capacities

- it is useful to integrate safeguards in national planning from the beginning
- early stakeholder participation leads to increased confidence and creates long-term benefits
- implementing safeguard systems is costly and capacities are not always in place; that is one of the reasons why existing safeguard systems are not always implemented
- countries could provide information at the national level with a different frequency than at the international level
- countries could provide information through National Communications and biennial reports,

[2] http://unfccc.int/files/methods_science/redd/application/pdf/redd_expert_meeting_safeguards_cochairs_summary_131011.pdf

and also potentially through additional channels such as a web platform
- it could be useful to make a distinction between 'addressing' and 'respecting' the safeguards

3. Elements of COP decision
- recognition of existing systems and the usefulness of harmonization at the international level
- recognition of the consistency with national sovereignty, national legislation and national circumstances

Characteristics:
- simplicity
- consistency
- transparency
- completeness
- regularity
- accessibility for all stakeholders
- flexibility
- Comprehensiveness
- adequacy
- discussion about comparability and accuracy

Design:
- build on existing systems
- guidance should be general enough to accommodate different national circumstances and respect national legislation
- systems should be flexible to allow for improvement over time
- a matrix could be a useful tool to compare or map Parties´ existing safeguards to
- the 7 safeguards from the Cancun decision

Provision of information:
- use national communication, and potentially the use of biennial reports."

At present, the most widely-accepted REDD+ standards and safeguards relevant to ILC and biodiversity are the UN-REDD Social and Environmental Principles and Criteria, FCPF Strategic Environmental and Social Assessment (SESA) and the new "common approach" umbrella incorporating shared safeguards of the donor partners in FCFP, and CCBA-CARE REDD+ Social and Environmental Standards (SES). In addition, at the project level, there are several major standards including the Climate, Community and Biodiversity (CCB Standards) and the Verified Carbon Standard (VCS) often used to certify projects in the private market. The CBD submission to UNFCCC Durban (CBD 2011b) includes an assessment of gaps in safeguards in terms of addressing biodiversity and ILCs.

1.2. REDD+ within the CBD context

At its ninth meeting, held in Bonn in May 2008, the Conference of the Parties (COP) to the CBD welcomed the consideration of the issue of reducing emissions from deforestation and forest degradation under the UNFCCC (see decision IX/16). An *Ad Hoc* Technical Expert Group on Biodiversity and Climate Change was established under decision IX/16, *inter alia* with the mandate to (i) identify opportunities for, and possible negative impacts on, biodiversity and its conservation and sustainable use, as well as livelihoods of indigenous and local communities, that may arise from reducing emissions from deforestation and forest degradation; and (ii) identify options to ensure that possible actions for reducing emissions from deforestation and forest degradation do not run

counter to the objectives of the CBD but rather support the conservation and sustainable use of biodiversity (CBD 2011b).

In decision IX/5, the COP 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*."

At its tenth meeting, held in Nagoya in October 2010, the COP invited Parties, other governments, and relevant organizations and processes to enhance the benefits for, and avoid negative impacts on biodiversity from reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, and other sustainable land management and biodiversity conservation and sustainable use activities, taking into account the need to ensure the full and effective participation of indigenous and local communities in relevant policy-making and implementation processes, where appropriate; and to consider land ownership and land tenure, in accordance with national legislation (decision X/33, para. 8 (q)).

In the same decision, the COP requested the Executive Secretary to provide advice, for approval by the COP at its eleventh meeting, including on the application of relevant safeguards for biodiversity, without pre-empting any future decisions taken under the UNFCCC, based on effective consultation with Parties and their views, and with the participation of indigenous and local communities, so that actions are consistent with the objectives of the Convention on Biological Diversity and avoid negative impacts on and enhance benefits for biodiversity (decision X/33, para. 9 (g)).

The COP also requested the Executive Secretary, with effective consultation with Parties and based on their views and in collaboration with the Collaborative Partnership on Forests '*to identify possible indicators to assess the contribution of reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries to achieving the objectives of the Convention on Biological Diversity, and assess potential mechanisms to monitor impacts on biodiversity*' from these and other ecosystem-based approaches for climate change mitigation measures, without pre-empting any future decisions taken under the UNFCCC, and to report on progress to Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) at a meeting prior to the eleventh meeting of the COP (see decision X/33, para. 9 (h)).

The CBD submission to UNFCCC Durban meeting in September 2011 (CBD 2011b) asserts the needs for indicators that will complement existing safeguards in relation to the risks identified earlier:

> "29. Three existing frameworks for biodiversity and indigenous and local community safeguards were reviewed in detail: The *UN-REDD Programme Social and Environmental Principles and Criteria*; the relevant *World Bank Safeguard Policies*; and the *REDD+ Social & Environmental Standards.* Key overall gaps identified in the safeguards in regards to their addressing risks to biodiversity and ILCs include:
>
> > (iv) There are no specific safeguards that address the risk of inappropriate afforestation in areas of high biodiversity value. The guidance on afforestation, reforestation and forest restoration provided by the CBD in decision X/33 paragraph

8(p) could fill this gap, to cover the possibility that such activities are considered as part of 'enhancement of forest carbon stocks' under REDD-plus;

(v) The potential loss of traditional knowledge and of the cultural and spiritual identity of indigenous peoples and local communities is not sufficiently covered. This includes the concern that REDD-related payments could alter and undermine the traditional way of life and related knowledge and customary practices of indigenous peoples and local communities.

30. It would be useful to further harmonize existing frameworks, to simplify application at country level and allow for compatibility at global level. The standards, guidance, and other related tools developed at the international level should be harmonized to help countries to address safeguards.

31. Lack of tangible livelihood benefits to indigenous peoples and local communities and lack of equitable benefit-sharing between relevant stakeholders is a possible threat to the success of REDD-plus, and addressing this should be a priority.

32. REDD-plus efforts should build on community-based governance systems, where appropriate, and acknowledge the shared responsibility of national governments in strengthening community-based institutions of indigenous and local communities with regards to the sustainable management, use, and control of biodiversity and natural resources.

33. The 'Cancun safeguards' (UNFCCC decision 1/CP.16) should be understood to mean that under paragraph 2 (a) in Appendix I, special attention should be placed on consistency with the other Rio conventions: the CBD and the United Nations Convention on Combating Desertification (UNCCD), and on consistency with national biodiversity strategies and action plans.

34. Sufficient financial incentives and technical capacity to ensure the application of relevant safeguards, and to achieve biodiversity benefits, are missing in most countries."

1.3. Objectives and methodology

In order to provide background information to the request of the COP in decision X/33 paragraph 9 (h), this paper comprises an in-depth analysis and conclusions covering the following elements:

1. Summary of possible REDD+ impacts on biodiversity, and on ILCs, including possible impacts of afforestation and reforestation;

2. Analysis of the feasibility to measure REDD+ impacts on biodiversity as distinct from the impacts of other policies and measures to reduce deforestation and forest degradation and other causal factors;

3. Consideration of possible indicators to measure the impacts of REDD+ on biodiversity and on ILCs, and review the relevance and applicability of existing indicator frameworks to measure biodiversity impacts of REDD+;

4. Assessment of the applicability and feasibility of suggested indicators for monitoring impacts of REDD+ on biodiversity and on ILCs at national level, including by clarifying which information will be needed, and at which level, to apply proposed indicators at national level;

5. Identification of gaps in data availability; and,

6. Capacity to effectively monitor the proposed indicators.

The above objectives were achieved primarily through review and analysis of existing official CBD and UNFCCC documents and reports on REDD+ impacts on biodiversity and ILCs; existing documents from United Nations Permanent Forum on Indigenous Issues (UNPFII); existing documents proposing standards, indicators and indicator frameworks for REDD+ impacts on biodiversity and ILCs, including those used by public sector (FCPF, REDD+ Social and Environmental Standards, UN REDD Social and Environmental Principles and Criteria) and private sector (CCB, VCS, GCF); and relevant published articles. The review incorporates information on REDD+ impact indicators from the CBD Technical Series 41; CBD Global Expert Workshop on REDD-plus and Biodiversity, Nairobi, 20-23 September 2011, and the regional consultation and capacity building workshops in Singapore, March 2011, Quito, July 2011, and Cape Town, September 2011.

Input was also sought from experts from the CBD Secretariat and associated bodies, the Collaborative Partnership on Forests, FAO, UN-REDD Programme, organizations researching ILC concerns, and technical experts working with selected Parties.

In addition, experiences and progress toward indicator framework development at national and subnational levels in three regions were reviewed in selected countries: Ecuador, Panama and Peru in Latin America; India, Laos and Vietnam in Asia; Cameroon, Democratic Republic of Congo and Kenya in Africa, as well as reports and comments on monitoring frameworks from 21 countries (advance document for UNFCCC SBSTA 34, agenda item 4).

2. Feasibility of measuring REDD+ impacts on biodiversity and ILCs

Feasibility refers the likelihood of implementing a monitoring system and/or gathering good and verifiable data on possible indicators for measuring REDD+ impacts on biodiversity and ILCs. Aspects of feasibility include (i) financial (is there likely to be adequate budget to implement the system and gather the data?), (ii) technical (do most countries have access to the tools and techniques to implement the system and gather the data?), (iii) capacity (do most countries have the necessary communication networks and people necessary for gathering and analyzing the data for possible indicators and system?), and (iv) political stability (is citizen security adequate for gathering and for maintaining the data and the system or does unrest limit monitoring REDD+ areas?). Most of the suggested indicators and systems are not feasible for most REDD+ countries without foreign technical assistance and funding. Budget is a particularly serious issue that has been raised for Monitoring, Reporting and Verification (MRV) costs (Zarin *et al*. 2009).

In addition, there are technical issues in designing a mechanism and indicators for such complex and diverse topics as biodiversity and ILCs. Designing and assessing potential REDD+ indicators takes into account the fact that REDD+ operates at, and depends on, the interface between physical resources and human socio-political systems. Both of these aspects must be measured, with clear reference to the points of conjunction, in order for indicators to be useful for adaptive management beyond simply providing data as to whether REDD+ is being implemented according to plans and is or is not functioning to achieve its goals of carbon sequestration as per agreements/contracts. The physical successes or failures of REDD+ can be documented by measuring trends in the physical indicators that describe, and be used to evaluate, the ecosystem/vegetation present at a site over time. However, the presence/absence of vegetation/mammal/insect/bird species and the ecosystem qualities are themselves indicators of the success/failure of human management regimes being applied to that area and the socio-political pressures for/against that management regime. The management regime and practice itself ultimately depends on values, policies, economics, technologies, and risks.

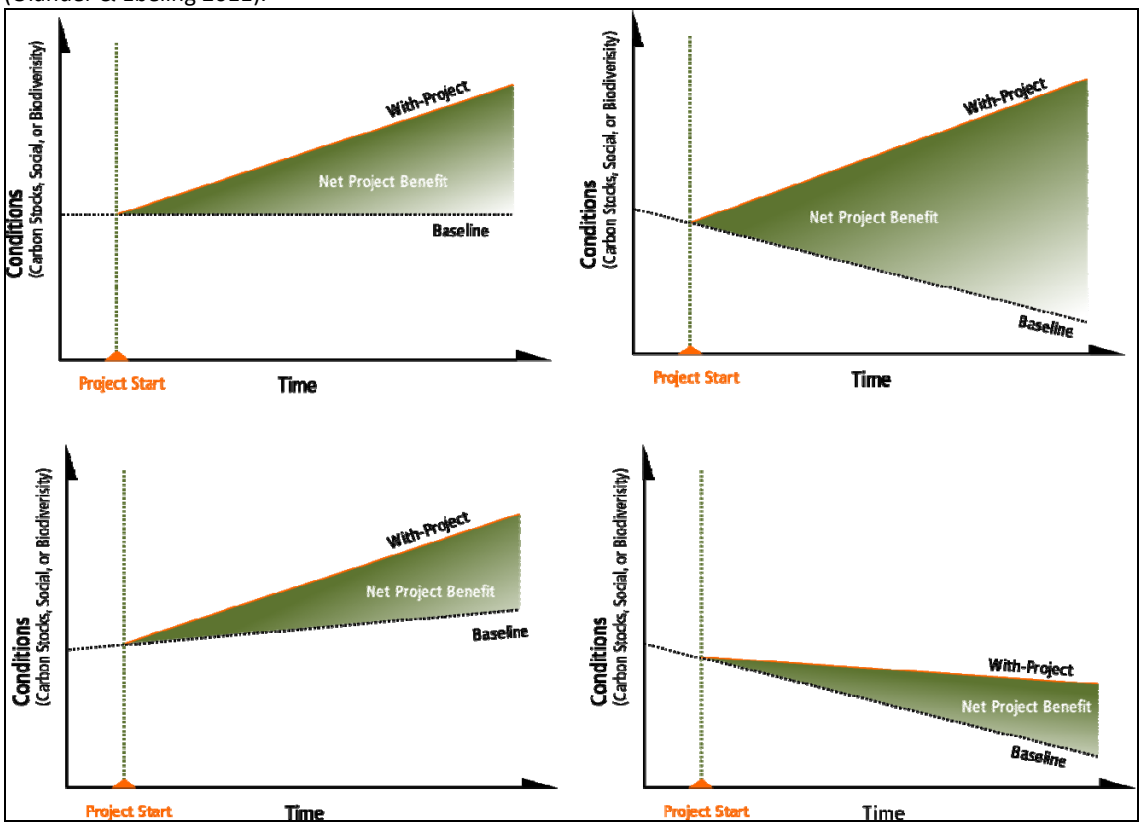
The challenge is for indicator systems to demonstrate significant correlations and ideally causation between REDD+ actions (including PAMs) and trends in biodiversity and ILC well-being of concern under the CBD. This will require interpretation of the indicator trends to assess whether the trends are indeed a result of REDD+ interventions that have gone well/wrong or due to some other factors that REDD+ is able or unable to address. Any indicator system that does not incorporate these interpretation links would fail the feasibility test of successfully monitoring REDD+ impacts on biodiversity and ILCs, as well as on carbon stocks. For an indicator system to be feasible, it is important to develop (i) an idea of the baseline that all the measured trends are compared against, as well as (ii) a plausible model of attribution to link these trends to real REDD+ policies and activities.

To determine the project's net impact, it is indispensible to accurately capture conditions at project start, from which quantified and evidence-based scenarios need to be developed to predict what would likely happen in the future (the baseline) and how an intervention will modify that outcome. For instance, under the CCB Standards, project developers must compile information on land-use agents and drivers and develop credible causal hypotheses about how the project will modify the business-as-usual scenario ("theory of change") (Richards & Panfil 2011).

Figure 1 illustrates a set of possible combinations of starting, baseline, and project conditions – though there are infinite possibilities (Olander & Ebeling 2011). Baseline conditions in these generic figures might refer to carbon stocks, social conditions, or the state of biodiversity. The first graph depicts a project in which initial conditions are projected to be stable or constant over time, with the

intervention projected to improve on these. Examples of this type of intervention might include a reforestation project increasing carbon stocks or wildlife habitat on degraded pasture lands. The second graph (bottom left) describes a situation in which initial conditions are improving under the baseline, and the project would accelerate this improvement. Examples of this might include cases where incomes (or other social conditions) are already improving for reasons independent of the intervention and where the intervention would contribute to further improvements, or where carbon stocks on degraded lands or forests are already increasing through regeneration but where improved management or reforestation will further increase these stocks. The third and fourth graphs (top right, bottom right) show baseline scenarios under which conditions are declining and where the intervention would improve on these. Examples of this might include an avoided degradation or integrated forest management project that halts degradation or reduces logging and so enhances carbon stocks or biodiversity values compared to the counterfactual. Many projects may aim not just to lessen the rate of reduction of carbon stocks, livelihoods, or biodiversity but to generate absolute improvements over starting conditions (as in the top right graph). But note that in the bottom right graph, the with-project conditions are projected to be inferior to initial conditions – indeed, carbon storage or biodiversity benefits need not necessarily be better than current conditions as long as they are a demonstrable net improvement over the baseline.

Figure 1. Four hypothetical baseline scenarios that illustrate the net positive impacts of an intervention (Olander & Ebeling 2011).



Overall, the feasibility of indicators and monitoring frameworks depends on: relevance, accuracy, cost-effectiveness/efficiency, compliance with obligations and legal frameworks, complementarity to existing information/systems, value of the information produced for management decisions, availability/feasibility of gathering required information, and acceptance by stakeholders and the general public. The UN-REDD Programme, CCBA, VCS, GCF, FCPF and other approaches have created constituencies and acceptance for their safeguards, standards and pre-investment prerequisites by

piloting feasible REDD+ standards and pre-investment preparations that have proven acceptable to governments and other stakeholders. These new frameworks in pilot countries, pilot subregions, and pilot projects are currently very open to adjustments as lessons are being learned. More countries are making the commitment to participate in REDD+, because these pilots have shaped expectations about acceptable frameworks in all countries.

Yet, these pilots do not yet contain monitoring and reporting systems to measure compliance with the widely-accepted standards and safeguards and/or the standards during implementation. Existing REDD+ monitoring focuses on implementation of preparation steps for REDD+ rather than upon monitoring measurable impacts on forests, biodiversity and ILCs. MRV systems are proposed for assessing forest cover changes, including through remote sensing technology, but the technical issues are not fully resolved and cost issues are limiting feasibility. The EU-funded I-REDD+ programme is researching methods to set forest degradation reference levels for degraded forest areas, which depends on the type of degrading activity, such as logging, fuelwood collection, or intensification of shifting cultivation and other changes likely in agricultural mosaic landscapes. Advances in technology, such as Light Detection and Ranging (LIDAR), can aid potentially more cost-effective monitoring systems (see Box 2). It is an open question as to what role MRV can play in monitoring biodiversity and ILC impacts, how reference scenarios for carbon levels can incorporate any biodiversity or ILC attributes that can be monitored in the MRV system established at national levels.

Box 2. Light Detection and Ranging (LIDAR)

LIDAR technology involves a scanning and ranging laser system that produces pinpoint accurate, high-resolution, topographic maps. The original technology has been in existence for 20-30 years, but the commercial applications for LIDAR generated topographic maps have only developed in recent years. Today the entire process of airborne laser mapping is highly automated from flight planning, to data acquisition, to the generation of digital terrain models.

The round trip travel time of the laser pulses from the aircraft to the ground are measured and recorded, along with the position and orientation of the aircraft at the time of the transmission of each pulse. After the flight, the vectors from the aircraft to the ground are combined with the aircraft position at the time of each measurement and the three dimensional XYZ coordinates of each ground point are computed.

The system can be operated at various scan frequencies and at different altitudes depending on the measurement accuracy dictated by the project requirements, as well as by the regulated eye-safe range of the particular laser. By accurately timing the round trip travel time of the light pulses to the surface it is possible to determine the distance from the laser to the ground; typically with a precision of 10 to 25 centimetres. The post-flight processing combines precise aircraft trajectories developed from differential GPS solutions with the corrected laser ranging data and aircraft roll, pitch, and heading information. Integration of this data produces a precise horizontal position and vertical elevation for each laser pulse. Each data point can be identified by type, i.e. ground, vegetation, building, power line or other object. Once classified, it is simple to manipulate data, remove layers of data points and create digital terrain models.

LIDAR has found applications in forestry. Canopy heights, biomass measurements, and leaf area can be studied using airborne LIDAR systems, and trends in forest degradation and fragmentation may be used as key biodiversity proxy indicators. (Airborne 1 2010)

Establishment of monitoring systems to provide useful input into decision-making at national and international levels entails the (i) development of accepted indicators, (ii) a framework and means for linking social soundness monitoring with MRV so that the information generated can be used for assessing impacts of actions and learning lessons to improve REDD+ performance, and (iii) alternative models for interpreting the trends and their causes. UNFCCC generally encourages social and environmental soundness monitoring through SIS.

International treaties offer a mechanism for sharing REDD+ lessons and monitoring framework options that may fit the governance systems and socio-economic situations of signatory countries. CBD workshops and meetings of the Conference of the Parties have confirmed signatories' interest in supporting development of REDD+ impact indicators for biodiversity and ILCs, in collaboration with UNFCCC (see Section 1.1.2).

Indicators are only useful if they can be incorporated into feasible indicator systems that use the data from individual indicators to produce information that can be used to adjust actions in response to positive or negative trends from REDD+ investments. At a minimum, indicators and indicator frameworks must display the following characteristics in order to meet both scientific and political feasibility[3]:

- include expert data gathering and local data gathering;
- are locally verifiable;
- are remotely verifiable;
- link to permanent processes that include verifiable feedback incorporation;
- substantially engage key stakeholders[4];
- incorporate information regarding scale and limits/options for up-scaling from local and subnational scale data to national scale;
- provide data that addresses the needs of the analysis and decision framework;
- are analyzed and presented into that framework; and
- are covered within budgets at project, subnational, and national levels.

Feasibility analysis also must consider the processes for monitoring (gathering data, analyzing data, presenting results) when designing/assessing indicators so as to ensure that good data can be collected and analyzed. One key danger that can undermine the feasibility of all the other factors can be that data are compiled but not analyzed and/or the analysis is not in a form that can be incorporated into measurable responses. This includes a range of issues, e.g., collection of plant/biota specimens left to be studied and identified in the future, the compilation of local monitoring reports that are filed but not analyzed or used in decision-making, etc.

To the degree that the framework and indicators are able to leverage existing data collection systems, the budgetary feasibility may be enhanced (Bubb *et al*. 2011, Epple *et al*. 2011). On the other hand, there is a trade-off inherent in using existing data as it is likely to be localized and collected for other specific purposes – factors that can bias the results.

[3] While these characteristics could be separated into meeting scientific and political criteria, to be feasible in the real world, both must be integrated into the indicator system in order to create appropriate systems that can be used for generating and verifying the data. Interpretation of the data will largely depend on scientific analysis after verifying that the data is truthful and independently verifiable. Conclusions should be assessed with a broad set of stakeholder groups in order to generate consensus for remedial actions if needed, and/or continuing with activities that are having positive impacts.

[4] If communities are to be 'judged' based on indicators that they don't recognise, or that they don't use to 'judge' themselves, then the concept of adaptive management (using the indicators to guide appropriate changes to management practices) is moot.

Ideally the monitoring framework and system will be able to incorporate higher-level/macro-level information from local ecological and social observations (e.g., changes in water flows and animal behaviour, impoverization, loss of traditional trades due to lack of ecological services or products, etc.) that will add value to interpretations of the MRV data related to gross changes in tree cover revealed by analysis of remote sensing imagery as verified in small standardized plots. The use of baselines to act as reference levels in MRV, in particular concerning the presence of High Conservation Values (HCVs) and Key Biodiversity Areas (KBAs) as well as existing policy frameworks, should be incorporated (Epple *et al*. 2011, Pilgrim *et al*. 2011, Pistorius *et al*. 2010). In order to best interpret the causes behind trends, the national indicators can be complemented by indicators derived from context specific analysis involving local and other project/programme stakeholders. This allows attribution to be built into the indicators via the 'theory of change' approach (Richards & Panfil 2011), as well as contributing to strategic project/programme design, stakeholder ownership and adaptive management. It will be important for general national indicators to be complemented by context specific identification of indicators that are related to actual strategies and activities for promoting biodiversity and sustainable livelihoods in particular subnational areas/cultural or ecological zones (Richards & Panfil 2011).

Recognising issues relating to resolution, it has been suggested that remote sensing can provide useful information for the following indicators: extent of ecosystems, forest change, rate of deforestation/reforestation, forest intactness, area and number of large forest blocks, forest fragmentation, carbon storage, area and location of old growth forests/plantations, forest degradation, change in range and populations of alien species, fire occurrence, productivity, and extent to watersheds (CBD 2011a, Teobaldelli *et al.* 2010, Strand *et al.* 2007), as well as indirect data on the change in biodiversity or hydrological regimes owing to change in forest area. Remote sensing can do some of these things much more easily than others. It is difficult for remote sensing alone to provide information on carbon storage, degradation and alien species. Ground-truthing, including using participatory methods, is encouraged in this regard (Epple *et al*. 2011, Pistorius *et al*. 2010). Likewise, in the absence of feasible direct indicators on state, indirect measures on pressures or drivers may act as proxies (Epple *et al*. 2011, UNEP-WCMC 2011).

Transparent governance of the monitoring system and its placement close to decision-making authorities at national, subnational and local levels as appropriate will bolster feasibility and provide greater likelihood for adaptive response to the monitoring results. Multilateral development banks are providing incentives for placing this sort of screening and monitoring units in finance ministries. The indicator characteristics demanded from such units should be taken into account in the indicator feasibility analysis.

Since REDD+ success depends on social and environmental soundness for achieving forest permanence, to be feasible indicators should incorporate not only biological aspects such as tree cover and species diversity but must also cover relevant aspects of social and environmental soundness, including gender inclusion, tenurial rights, governance process, and social risk assessment in order to construct and maintain a long-term expectation of forest permanence by reducing deforestation drivers.

Indicators could be designed to address progress on enabling policy conditions for REDD+ success, such as tenure policy reforms as well as monitoring the functionality of administrative frameworks and lines of authority responsible for REDD+ implementation. For example, an indicator could report the presence/absence of an office within the financial ministry that reviews all development investments for contributions to reducing deforestation and monitor its influence on development planning, particularly in relation to land use and forest conversion. Linkages with MRV for

transparent remote verification are not yet in place; however there are opportunities to pilot linkages during the "phased approach" in subnational sites.

Finally, to ensure feasibility, the indicators and results of the monitoring system must be assessed for the strength of their linkage to REDD+ rather than to independent ongoing policy reform and/or market processes. For example, if a major global economic downturn significantly reduces infrastructure construction (a deforestation driver) and therefore reduces deforestation, policy-makers and investors will see the positive monitoring results that may or may not be related to REDD+ investments. This difficulty to assign causality should be acknowledged (Epple *et al*. 2011, Pilgrim *et al*. 2011), however the information that deforestation has slowed is important in and of itself for REDD+ programming, and may increase a country´s competitiveness in the global carbon market, ecosystem services market and biodiversity market, as well as alter political constituency strengths in relation to other GCC mitigation and adaptation opportunities.

3. Relevance of existing MEAs indicator frameworks to measure impacts

The FCPF readiness preparation proposal (R-PP) process requires countries to propose monitoring systems for carbon and other impacts and benefits, including synergies with achieving the country´s social and economic development priorities. Hence countries are at different stages of working out how each one will address monitoring safeguards, benefits and impacts. Similarly, the UNFCCC is moving forward with the creation of SIS, forest reference emission levels/reference levels (REL/RL), and systems for forest monitoring and MRV. The SIS will provide information of value for responding to CBD interest in ILC and biodiversity impacts of REDD+. At UNFCCC COP 17 in Durban, Parties concurred that guidance on systems for providing information on safeguards should be consistent with national sovereignty, national legislation and national circumstances, and recognizes the importance and necessity of adequate and predictable financial and technology support for developing the necessary elements. They also agreed that the SIS should provide transparent and consistent information that is accessible by all relevant stakeholders and updated on a regular basis, be country-driven and implemented at the country level, and build upon existing systems where possible. Developing countries are to provide a summary of information on how the safeguards are being addressed and respected throughout the implementation of the activities, with reporting frequency to be recommended by SBSTA and decided at COP 18.

While it is recognised that there are indicator systems under development by a number of the biodiversity-related MEAs[5], none have yet been made operational in national reporting systems. Ramsar Convention on Wetlands (COP10 DOC. 23), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; CoP15 Doc. 8) and Convention on the Conservation of Migratory Species of Wild Animals (CMS; UNEP/CMS/ScC15/Doc.14) have identified some indicators which have so far only been developed at the global level. Many of these indicators formed part of the suite to measure the CBD 2010 target (BIP 2010), and are expected to continue to be used for the Aichi targets (UNEP/CBD/SBSTTA/15/INF/6).

Owing to the expectation of national-level reporting and close relevance to the subject matter, this section considers the currently accepted indicator frameworks implemented or being initiated through the three Rio conventions – CBD, UNCCD and UNFCCC. Table 1 offers an indicative overview of whether the types of data collected under these MEAs would be suitable for measuring multiple benefits of REDD+ activities (Epple *et al*. 2010).

Assessing feasibility issues and adequate functioning of these current MEA mechanisms for linking with REDD+ monitoring of biodiversity and ILCs by evaluating reports submitted, interviews with users, etc., is beyond the scope of this report. While linking CBD monitoring of biodiversity and ILC impacts of REDD+ to the SIS system of UNFCCC might deliver many synergies and reduce costs, that UNFCCC mechanism is still in a design stage.

3.1. CBD

At the sixth meeting of the COP to the CBD in April 2002, governments committed themselves '*to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth*' (Decision VI/26). This '2010 Biodiversity Target' was later endorsed at the World Summit on

[5] In addition to the CBD, the biodiversity-related conventions are: Ramsar Convention on Wetlands, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on the Conservation of Migratory Species of Wild Animals (CMS), International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), and World Heritage Convention (WHC)

Sustainable Development (WSSD), and has been included in Millennium Development Goal 7 (MDG 7) under the 'reducing biodiversity loss' target.

In 2004, CBD COP 7 adopted a framework which recommended the use of a range of indicators (Decision VII/30), and requested SBSTTA to work further on these with a specifically-formed *Ad Hoc* Technical Expert Group (AHTEG). Based on SBSTTA Recommendation X/5, COP 8 in 2006 (Decision VIII/15) further elaborated this framework and acknowledged the establishment of the 2010 Biodiversity Indicators Partnerships (BIP). The BIP is a global initiative to further develop and promote indicators for the consistent monitoring and assessment of biodiversity by bringing together a host of international organizations working on indicator development, to provide the best available information on biodiversity trends to the global community. In 2010, the BIP published two documents (Butchart *et al*. 2010, BIP 2010) which demonstrated that the 2010 Biodiversity Target had not been met.

At the tenth meeting of the CBD COP in October 2010, the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets were adopted with an overall vision of a world of "Living in harmony with nature" where "By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people" (decision X/2).

The Strategic Plan includes 20 headline targets for 2015 or 2020 – commonly known as the "Aichi Biodiversity Targets" (see Appendix 1) – organized under five strategic goals. Of particular relevance are the following targets:

5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced;
7. By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity;
11. By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes; and
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 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

The goals and targets comprise both: (i) aspirations for achievement at the global level; and (ii) a flexible framework for the establishment of national or regional targets. Parties are invited to define nationally-appropriate targets based on the global Aichi Targets, and to revise their National Biodiversity Strategy and Action Plans (NBSAP) in light of the new approach. It has been encouraged that the setting of national targets is an inclusive process with a broad range of stakeholders at the country level, including those not traditionally associated with the Convention. At the international level, partnerships between the Convention and other conventions, international organizations and processes, civil society and the private sector are to be enhances with particular effort to, *inter alia*, ensure cooperation to achieve implementation of the Plan in different sectors; and promote synergy and coherence in the implementation of MEAs.

In November 2011, the 15th meeting of the CBD SBSTTA took the discussion forward on a suite of indicators to measure progress against the Aichi Targets, including reviewing reports from an AHTEG on Indicators for the Strategic Plan for Biodiversity 2011-2020 (UNEP/CBD/SBSTTA/15/INF/6), GEO-BON (UNEP/CBD/SBSTTA/15/INF/8) and UNEP-WCMC (UNEP/CBD/SBSTTA/15/INF/9) on the current and potential use of indicators and monitoring systems. SBSTTA recognised the need for a set of headline indicators to present policy relevant information on biodiversity to cover the ambitions set out in the Aichi Targets, and that the proposed indicator framework would provide a flexible framework for Parties which can be adapted, taking into account national priorities and circumstances. It acknowledged that Parties are likely to use different metrics and methodologies for their indicators depending on national targets and available data and methods, and that capacity may be limited. Parties to the Convention are encouraged to incorporate national target-related indicators into their revised NBSAPs and National Reports.

3.2. UNCCD

In 2007, with the adoption by the COP of a ten-year strategic plan and framework for 2008-2018 to enhance the implementation of the Convention (ICCD/COP(8)/16/Add.1), the UNCCD has made significant progress towards identifying an agreed global minimum set of appropriate physical, biological and socio-economic indicators to be used by all countries in monitoring the processes and impacts of UNCCD implementation). The Strategic Plan places an increased emphasis on results-based management and outlines four strategic objectives and five operational objectives. Support to national monitoring and vulnerability assessments as well as steps towards a harmonization of approaches to measuring biophysical and socio-economic trends are included among the intended outcomes of the strategy (outcomes 3.1 and 3.2).

In order to measure progress in the implementation of the Strategy, the ninth COP in 2009 introduced the Performance Review and Assessment of Implementation System (PRAIS) which is based on a provisional set of impact indicators to measure progress on the strategic objectives, and of performance indicators for the operational objectives. The two sets of indicators will be subject to a continuous adjustment and refinement in what is termed an “iterative process” based on lessons learnt and feedback from the Parties collected in the different reporting cycles.

Most importantly, it must be noted that the PRAIS framework introduces the obligation for all Parties and reporting entities to regularly report to the COP (every two years for the performance indicators and every four years for the impact indicators) based on the agreed sets of indicators, methodologies and reporting format. The PRAIS system is also supported by an on-line reporting platform (PRAIS portal) that will be linked to the overall Knowledge Management System of the UNCCD.

As decided by the COP, two indicators – (i) the proportion of the population in affected areas living above the poverty line; and (ii) land cover status – are the minimum subset of impact indicators required for reporting by affected countries during the 5th reporting cycle in 2012. The remaining nine impact indicators, while recommended, were considered optional for inclusion in this round of reports by affected countries and are currently subject to a further process of refinement. (ICCD/COP(9)/18/Add.1 – Decision 13/COP9). In the long run it is envisaged that all Parties will use the full list of indicators and related methodological guidance as a minimum set in fulfilling their monitoring and reporting commitments under the Convention. Only the impact indicators were used for this analysis.

3.3. UNFCCC

All Parties to the Convention are required to develop and periodically update national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases (Art. 4.1 (a)). The requested contents, methodologies and submission timeframes depend on the status of Parties, with different provisions for developed country Parties (i.e. countries listed in Annex I of the Convention), non-Annex I countries, and least developed countries.

According to the current UNFCCC Resource Guide for National Communications from non-Annex I Parties, Parties are encouraged to apply the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories published in 1997, 2000 and 2003. These guidelines define six sectors to be examined in the inventory: Energy; Industrial Processes; Solvent and Other Product Use; Agriculture; LULUCF; and Waste. Within these sectors, individual source and sink categories are defined.

The guidelines also offer advice on the methods to be applied in the estimation of emissions or removals of greenhouse gases from the different source and sink categories, describing the basic activity data that need to be collected and the choice of emission factors for use in calculating the related amounts of gases that are released or sequestered as a consequence of the activity. The available methods are classified into three so-called tiers, with 'Tier 1' representing the simplest methods (usually based on basic activity data and default emission factors), and 'Tier 3' the most elaborate methods, requiring more disaggregated activity data and specific emission factors.

While the calculated amounts of greenhouse gases exchanged with the atmosphere are usually of little direct relevance to the monitoring of multiple benefits from REDD+, the underlying activity data may often be more useful, especially in the inventory sectors for land use, land use change and forestry, agriculture and energy.

Another element of information requested in National Communications that might be of interest in the context of REDD+ monitoring is the description of steps taken to implement the Convention, i.e. an account of both the mitigation and adaptation measures that have been implemented (Art. 12.1).

3.4. Summary of overlapping monitoring expectations with regards to REDD+

There is a significant amount of commonality between the subjects addressed by existing or emerging processes related to monitoring under the Rio Conventions and the types of data that are likely to be of use for monitoring the multiple benefits of REDD+ activities. A summary overview of the degree of overlap is provided in Table 1.

Table 1. Indicative types of data for use in measuring multiple benefits of REDD+ activities and their relation with monitoring requirements of the Rio Conventions. Black = Data need likely to be comprehensively addressed; Grey = Some relevant data may be available; White: Data need not likely to be addressed. Adapted from Epple *et al.* 2010.

Data types	CBD	UNCCD	UNFCCC
Area covered by primary forest, secondary forest and plantations			
Area covered by different types of forest ecosystems			
Area covered by non-forest ecosystems of high biodiversity value			
Conservation status of areas classified as priority areas for conservation			
Conservation status of forest and non-forest species that have been selected as biodiversity indicators			
Area with ecosystem qualities selected as indicators for biodiversity			
Availability of sustainable flows of ecosystem services: clean water			
Availability of sustainable flows of ecosystem services: flood protection			
Availability of sustainable flows of ecosystem services: erosion control			

Data types	CBD	UNCCD	UNFCCC
Availability of sustainable flows of ecosystem services: prevention of anthropogenic fire damage			
Availability of sustainable flows of ecosystem services: timber			
Availability of sustainable flows of ecosystem services: non-timber forest products			
Availability of sustainable flows of ecosystem services: forest genetic resources			
Availability of sustainable flows of ecosystem services: attractions relevant for tourism			
Availability of sustainable flows of ecosystem services: cultural and spiritual values			
Financial, livelihood and governance-related benefit flows to local communities			
Forest area subject to non-sustainable land use practices			
Human-induced changes in occurrence of invasive alien species			
Fragmentation of natural areas			
Incidence of human-induced fires			
Type, extent, location and direct results of REDD+ activities			
Projected development of anthropogenic drivers and multiple benefits according to 'business as usual scenarios'			
Actual development of anthropogenic drivers of change outside the scope of REDD+ activities			
Occurrence of extreme events			
Changes in climate			

It shows that in line with the primary concerns of the Rio Conventions, parameters linked to the status of biodiversity, climate change, pressures from land use change and ecosystem services related to water and soils are particularly well covered by their monitoring frameworks and requirements. Other aspects, such as ecosystem services related to non-timber forest products and tourism, fall within the general scope of issues to be addressed by monitoring according to one or several of the Conventions, but have received less emphasis in decisions and guidance to Parties. Therefore, the amount of available data on these is generally lower and more variable between countries. This assessment also assumes full reporting by all Parties, which may not be the case (Bubb *et al*. 2011).

On the whole, the provisions on monitoring under the Rio Conventions are comprehensive enough to suggest that the data derived from their implementation should allow some form of inferences to be made on most aspects of the success of REDD+ activities in enhancing multiple benefits. However, there are also a number of limitations to synergy for both conceptual and practical reasons, including definitions (Epple *et al*. 2010, Yamasaki & Tyrrell 2011).

4. Relevance and applicability of other existing or proposed indicator frameworks

Multilateral Environmental Agreements are not the sole source of indicator-based assessment approaches. Indeed, indicators have long been utilised by civil society agencies and associations to measure forest biodiversity and community well-being. This section considers some of the current and proposed indicator frameworks that may be applicable in measuring the impacts of REDD+ on biodiversity and ILC well-being.

4.1. Global Forest Resources Assessment

The Food and Agriculture Organization of the United Nations (FAO), in cooperation with its member countries, has monitored the world's forests at 5 to 10 year intervals since 1946. These global assessments provide valuable information to policy-makers in countries, to international negotiations, arrangements and organizations related to forests and to the general public. The Global Forest Resources Assessments (FRA) are based on data that countries provide to FAO in response to a common questionnaire. By addressing seven broad topics aimed at monitoring progress towards sustainable forest management, the FRA provide valuable information to policy-makers in individual countries, to international negotiations and arrangements related to forests and to the general public.

The seven broad topics, also known as the thematic elements of sustainable forest management, are as follows:

1. Extent of forest resources and their contribution to the global carbon cycle
2. Forest health and vitality
3. Forest biological diversity
4. Productive functions of forests
5. Protective functions of forests
6. Socio-economic functions of forests
7. Legal, policy and institutional framework related to forests

The thematic and national approaches taken by the FRA make it clearly relevant to measuring the biodiversity impacts of REDD+. The latest FRA used the following indicators (FAO 2010), *inter alia*:

- Forest area as percent of total land area by country (million ha)
- Trends in forest area (million ha)
- Net change in forest area by country (ha/year)
- Changes in carbon stocks in forest biomass (Gt)
- Changes in area of planted forest (million ha)
- Proportion of planted forests consisting of introduced species (%)
- Forests designated for conservation of biological diversity (million ha)
- Proportion of forest area in legally protected areas (%)
- Proportion of forest significantly affected by forest fires annually (%)
- Trends in wood removals (million m^3)
- Value of wood removals (billion US$)
- Forest area covered by a national forest programme (%)
- Forest area with a management plan (million ha)
- Designated functions of the world's forests (%)
- Forest ownership patterns (%)
- Management rights in public forests (%)

4.2. Center for International Forestry Research

Center for International Forestry Research (CIFOR) was established in response to global concerns about the social, environmental and economic consequences of loss and degradation of forests. It operates through a series of highly decentralised partnerships with key institutions and/or individuals throughout the developing and industrialised worlds.

In an effort to create a suitable framework, Stork *et al*. (1997) proposed a set of forest biodiversity criteria and indicators to be applied at the forest management unit level:

1. Landscape Pattern
2. Habitat Structure
3. Guild Structure
4. Taxic Richness and Composition
5. Population Structure
6. Ecosystem Processes: Decomposition and the Nutrient Cycle
7. Water Quality and Quantity

While lacking implementation across the globe, this approach would be highly relevant to measuring the biodiversity impacts of REDD+.

4.3. Land Degradation Assessment in drylands

The Land Degradation Assessment in drylands project (LADA) develops tools and methods to assess and quantify the nature, extent, severity and impacts of land degradation on dryland ecosystems, watersheds and river basins, carbon storage and biodiversity at a range of spatial and temporal scales. It also builds the national, regional and international capacity to analyse, design, plan and implement interventions to mitigate land degradation and establish sustainable land use and management practices (Woodfine 2011).

The proposed approach is to develop a methodological framework, rather than a rigid method. It is expected that the framework would give enough flexibility, in terms of the procedures, techniques and state of the databases to accommodate the particular circumstances of the country or region where it is applied. Also, the methodology is designed to be able to accommodate new information that will come in the future with the development of studies and technology. To date, LADA has been piloted in six countries (Argentina, China, Cuba, Senegal, South Africa and Tunisia).

While clearly designed and implemented for dry and sub-humid lands, there is overlap in methodological approaches appropriate in some REDD+ areas. Data availability will remain an issue until further implementation occurs.

4.4. Programa Estratégico Regional de Monitoreo y Evaluación de la Biodiversidad

El Programa Estratégico Regional de Monitoreo y Evaluación de la Biodiversidad (PROMEBIO) creates a scientifically-based tool to track and evaluate regional biodiversity and provide easy access to this critical information for leaders, policy makers and others to promote the conservation and sustainable use of natural resources (Triminio Meyer 2011). Via the Integrated System of Central America (SICA), the institutional framework for collaboration among the Central American governments, and more specifically through the Central American Commission on Environment and Development (CCAD), the seven nations have been advancing a unified and actionable management strategy which will respond to the CBD goals. It has established nine indicators that would be relevant to measuring the co-benefits of REDD+:

- Species:
    - Endangered species
    - Presence of invasive species
    - Presence of indicator species
- Ecosystems:
    - Coverage by type of ecosystem
    - Size of declared terrestrial and marine/coastal protected area (including private protected areas)
    - Coverage of forest ecosystems
    - Ecosystem patch size
    - Shape of the target ecosystem patches
    - Distance between patches of the target ecosystem

4.5. Roundtable on Sustainable Palm Oil

The Roundtable on Sustainable Palm Oil (RSPO) was formed in 2004 with the objective of promoting the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders. A not-for-profit association, it links seven sectors of the palm oil industry - oil palm producers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental or nature conservation NGOs and social or developmental NGOs - to develop and implement global standards for sustainable palm oil. The RSPO established a set of principles and criteria for certification of mills and plantations, the associated indicators of which would be relevant to measuring some impacts of REDD+ (RSPO 2007). The eight principles are:

1. Commitment to transparency
2. Compliance with applicable laws and regulations
3. Commitment to long-term economic and financial viability
4. Use of appropriate best practices by growers and mills
5. Environmental responsibility and conservation of natural resources and biodiversity
6. Responsible consideration of employees and of individuals and communities affected by growers and mills
7. Responsible development of new plantings
8. Commitment to continuous improvement in key areas of activity

4.6. International Indigenous Forum on Biodiversity

The International Indigenous Forum on Biodiversity (IIFB), formed during the third meeting of the CBD COP in Buenos Aires, Argentina in November 1996, is a collection of representatives from indigenous governments, indigenous non-governmental organizations and indigenous scholars and activists that organize around the CBD and other important international environmental meetings to help coordinate indigenous strategies at these meetings, provide advice to the government parties, and influence the interpretations of government obligations to recognize and respect indigenous rights to the knowledge and resources. A Working Group under the IIFB was mandated to consider global indicators relevant to ILCs and biodiversity conservation, and in 2010 proposed the following (Carino 2011):

- Status and trends of linguistic diversity and numbers of speakers of indigenous languages (in collaboration with UNESCO)
- Status and trends in the practice of traditional occupations (ILO)
- Status and trends in land-use patterns in the traditional territories of indigenous and local communities (FAO)
- Demographic trends/data disaggregation (national statistical agencies)

Such indicators would be highly relevant to measuring the co-benefits of REDD+, subject to data being made available at the relevant scales.

4.7. Biocultural Protocols

The development of biocultural community protocols (BCPs) by ILCs is one way in which communities can increase their capacity to drive the local implementation of international and national environmental laws (Bavikatte & Jonas 2009, Salter & Von Braun 2011). A BCP is a protocol that is developed after a community undertakes a consultative process to outline their core ecological, cultural and spiritual values and customary laws relating to their traditional knowledge and resources, based on which they provide clear terms and conditions to regulate access to their knowledge and resources. BCPs have been supported by UNEP.

The process of developing a BCP involves reflection about the inter-connectedness of various aspects of ILCs' ways of life (such as between culture, customary laws, practices relating to natural resources management and traditional knowledge) and may involve resource mapping, evaluating governance systems and reviewing community development plans. It also involves legal empowerment so community members can better understand the international and national legal regimes that regulate various aspects of their lives, such as the Nagoya Protocol on Access & Benefit Sharing under the CBD, protected area frameworks, REDD, and other payment for ecosystem services schemes. Indicators are defined for a particular local area as part of creating a long-term development plan, similar to those defined by "life plans" developed by Indigenous Peoples in Amazonian countries, to guide and evaluate development interventions. Indicators could be aggregated for monitoring in areas where Biocultural Protocols and Life Plans have been established, and there would be clear relevance for them in measuring the co-benefits of REDD+.

4.8. BioTrade Initiative

Since its launch by the United Nations Conference on Trade and Development (UNCTAD) in 1996, the BioTrade Initiative has been promoting sustainable BioTrade[6] in support of the objectives of the CBD. The Initiative has developed a unique portfolio of regional and country programmes, and hosts the BioTrade Facilitation Programme (BTFP) which focuses on enhancing sustainable bio-resources management, product development, value adding processing and marketing. The BioTrade Initiative aims to strengthen the capacities of developing countries in formulating and implementing mutually supportive trade, environment, and sustainable development strategies in line with BioTrade and REDD+ practices through technical assistance and training (traditional learning and e-learning) to increase understanding of policy-makers and business leaders on the linkages between BioTrade and REDD+, and establishing a South–South platform for sharing of information and best practices.

The BioTrade Impact Assessment System comprises technical sheets per indicator to measure and track the social, environmental and economic impact of activities. The system includes ten indicators, divided into environment (5 indicators), socio-economic (4 indicators) and governance (1 indicator) and can be implemented for BioTrade activities related to flora and fauna. Such indicators would be relevant to monitoring REDD+ co-benefits.

[6] 'BioTrade' refers to those activities of collection, production, transformation, and commercialization of goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability.

5. Possible indicators to measure the impacts of REDD+ on biodiversity and on indigenous peoples and local communities

As noted in Section 2 on feasibility, indicators cannot be viewed in isolation. They must fit into systems and frameworks, and be acceptable to the Parties and other stakeholders. Hence the possible indicators with widespread potential applicability for measuring the impacts of REDD+ on biodiversity and ILC offered below should be viewed as illustrative and will need to be evaluated by the Parties for feasibility and "fit" at national and subnational levels.

Gardner *et al.* (2011) propose taking a tiered approach to operationalising REDD+ impact monitoring at various scales (Figure 1). While they recognise that considerable progress is needed on such accounting, such an approach would allow for a range of syntheses and meta-analyses using existing spatial, ecological and economic data for countries and regions where this is still lacking, as well as global assessments for other well-studied species groups such as reptiles, plants and well-studied insect taxa. It would also allow for the testing and development of simplified, robust and replicable field monitoring of biodiversity with ILC involvement, including using participatory approaches.

Figure 2. Incorporating biodiversity safeguards into REDD+ planning and assessment. The strategic planning stage determines where REDD+ investments will be made and for which activities. The assessment process occurs at an operational level in areas that have received REDD+ investments; it can be implemented through different tiers of data requirement and complexity. Adapted from Gardner *et al*. (2011).

	Readiness planning		Operational assessment		
	What	Where	Tier 1	Tier 2	Tier 3
Analysis	Spatial analysis of carbon and biodiversity trade-offs	Choice of REDD+ activities	Forest cover and ecological distinctiveness	National biodiversity data, landscape and forest structure and connectivity	Measured changes in biodiversity
Data	Best available data		Globally available	Nationally available	Field-based

Increasing consideration of biodiversity concerns within REDD+

Increasing need for additional investment outside the UNFCCC process

Feasible at some level, illustrative indicators for biodiversity and ILCs are presented below, having been derived from review of REDD+ standards, principles and safeguards currently being applied in many countries, recommendations to CBD by prior regional and global consultations, REDD+ Partnership 2011 workshops on safeguards, and measuring and monitoring REDD+, recommendations to the UNPFII, and lessons from community forestry and policy reforms being applied within project, subnational, and national frameworks in both the voluntary market and in the context of bilateral and multilateral agreements. Due to the high variability in gaps and capacity, in addition to the basic criterion of respecting national sovereignty, the proposed indicators and monitoring framework reviewed in this document are presented in a format that offers flexibility for CBD Parties. The operational scales suggested are based on expected data availability.

The indicators are organized and presented under thematic areas which follow the seven principles proposed under the UN-REDD Programme Social and Environmental Principles and Criteria (UN-REDD 2011). The thematic areas should be seen as requisite for providing information required in forming programming and management decisions, although the proposed indicators framework should be seen as flexible to allow for adaptation to take into account national or subnational circumstances. Opportunities to link data collection and assessment into ongoing national and international data collection and assessment systems are indicated.

5.1. Principle 1 – Apply norms of democratic governance, including those reflected in national commitments and Multilateral Agreements

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *policy support for REDD+*				
Number of processes completed that clarify tenure rights	National, Subnational	Existence of appropriate recognition of tenureship in areas under REDD+. USAID Land Tenure and Property Rights tool (Espinosa *et al*. 2008) offers a framework for assessment	IIFB	
Number of titles registered according to national processes and standards	National, Subnational	Existence of appropriate recognition of tenureship in areas under REDD+	IIFB	
Trends in the demarcation and legal protection of ILC rights to own, manage, and use lands and natural resources	National, Subnational	Existence of appropriate recognition of tenureship and traditional knowledge and practices in areas under REDD+	IIFB	
Number of processes using FPIC	National, Subnational, Project	Existence of appropriate recognition of tenureship and traditional knowledge and practices in areas under REDD+		
Number of forced resettlement from forested areas	National, Subnational	Proxy measure for lack of recognition of ILC rights		
Extent of forest cover in REDD+-designated areas that have secure tenure, and that do not have secure tenure	National, Subnational	Extent of forest habitats derived from remote sensing, linked to protected area or similar data	IIFB	
Presence of local/subnational statutes or customary law in REDD+ active areas	National, Subnational, Project	Existence of appropriate recognition of traditional knowledge and practices in areas under REDD+		
Presence of statutes in ILCs governing REDD+-related activities	National, Subnational, Project	Existence of appropriate recognition of traditional knowledge and practices in areas under REDD+	IIFB	
Presence of grievance mechanisms to address REDD+-related damage claims	National, Subnational, Project	Legally-binding system to allow for loss of rights to be recognised and acted upon		
Presence and implementation of legislation and policies protecting ILC cultural heritage	National, Subnational, Project	Existence of appropriate recognition of traditional knowledge and practices in areas under REDD+	IIFB	

5.2. Principle 2 – Respect and protect stakeholder rights, including human rights, statutory and customary rights, and collective rights

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *recognition of rights*				
Relevant UNDRIP articles[7] for assessing REDD+ impacts on ILCs implemented	National	Recognition of international commitments		
Headline indicator: *conflicts*				
Trends in conflicts over natural forest resources	Global, National, Subnational	Recognition of potential disagreements, and transparency in conflict resolution		
Number of local conflict resolution committees addressing conflicts over forests and natural resources in REDD+ areas	National, Subnational, Project	Recognition of potential disagreements, and transparency in conflict resolution		
Headline indicator: *free, full and informed participation*				
Number of exchanges among ILCs involved in REDD+ to share ILC knowledge and experiences with biodiversity and forests with each other, including through the use of traditional fora	National, Subnational	Existence of appropriate recognition of traditional knowledge and practices in areas under REDD+	IIFB	
Number and size of areas with Biocultural Protocols in place	National, Subnational	Recognition of ILC strategies and plans	Biocultural Protocols	
Number of women leaders participating in local, subnational, and national REDD+ decision-making meetings and providing input into REDD+ design, implementation and monitoring	National, Subnational, Project	Gender equality		
Number of REDD+ dialogues (mesas) with civil society in which ILC participate each year	National, Subnational	Existence of appropriate recognition of traditional knowledge and practices in areas under REDD+		
Number of languages into which REDD+ relevant documents are published and disseminated	Global, National	Recognition of stakeholders in areas under REDD+		
Number of ILC representatives participating in the COP and REDD+ fora	Global	Recognition of traditional knowledge and practices		
Number of ILC participants involved in REDD+ verification activities in each REDD+ area	Subnational, Project	Recognition of stakeholders in areas under REDD+		

[7] Articles 10, 18, 19, 20, 26, 27, 28, 31, 32

5.3. Principle 3 – Promote and enhance forests' contribution to sustainable livelihoods

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *present and future well-being linked to forest and ecosystem health*				
Trends in child mortality rates owing to malnutrition in forest-dwelling populations	National, Subnational, Project	Food security of forest communities measured through this proxy indicator	CBD, UNCCD	Trends in distribution, condition and sustainability of ecosystem services for equitable human well-being
Trends in life expectancy of forest-dwelling populations	National, Subnational, Project	General health indicator		
Trends in diseases and accidents related to forest-based occupations	National, Subnational, Project	General health indicator		
Trends in drinking water quality	Subnational, Project	Proxy indicator for dietary health		
Trends in game/fish population health as reflected in local diet and/or off-take monitoring by resource users for reporting into system	Subnational, Project	Proxy indicator for dietary health		
Trends in mercury/herbicides in ecosystem/fish/humans integrated into health monitoring systems	Subnational, Project	Proxy indicator for dietary health		
Number of universities and research institutions assisting in monitoring REDD+ activities in relation to ILC impacts	National, Subnational, Project	Proxy for monitoring efforts underway		

5.4. Principle 4 – Contribute to low-carbon, climate-resilient sustainable development policy, consistent with national development strategies, national forest programmes and commitments under international conventions and agreements

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *carbon market and finance*				
Number of associations of carbon sellers and buyers (contract holders) registered with government	National, Subnational	Transparency in registration process		
Financial benefits shared to ILC as a proportion of REDD+ investments and carbon sales	National, Subnational, Project	Trends in monetary gain benefitting ILCs		
Trends of private contracts with ILCs and NGOs	National, Subnational	Transparency of registration process, and recognition of benefits due to ILCs and civil society		
Headline indicator: *forest economies*				
Extent of forest fragmentation owing to illegal logging	National, Subnational, Project	Trends in forest habitats derived from remote sensing, overlaid with legal forest concessions	CBD, CIFOR, PROMEBIO	Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture
Economic trends in traditional biodiversity-based occupations/commodities marketed by selecting nationally relevant forest-based products (e.g., brazil nuts, gums, medicines, etc.)	National, Subnational, Project	Trends in monetary gain from traditional livelihoods		
Number of arrests/fines due to illegal logging practices	National, Subnational, Project	Proxy for implementation of forest conservation legislation		
Extent of forest concessions relative to ILC lands	National, Subnational, Project	Trends in forest habitats derived from remote sensing, overlaid with ILC tenureship	CBD, IIFB	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives
Extent of forest concessions relative to mining and other extractive concessions	National, Subnational, Project	Trends in forest habitats derived from remote sensing, overlaid with legal concessions	CBD	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives

5.5. Principle 5 – Protect natural forest from degradation and/or conversion to other land uses, including plantation forest

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *land use and forest planning*				
Coverage of protected forest	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing, overlaid with protected areas or similar data	CBD	Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches
Extent of area and number of communities' collective areas covered by ILC life/development plans that have been incorporated into national and subnational land use plans	National, Subnational	Recognition of community-level strategies and plans	Biocultural Protocols	
Extent of area and number of forest management plans incorporating REDD+ activities in the conservation of natural forests	National, Subnational	Existence and spatial extent of relevant management plans		
Number of subnational (provinces/regions) land use plans that include forest zoning and incorporate ecosystem management across landscape	National, Subnational	Existence and spatial extent of relevant management plans. May include forest certification schemes	CBD, RSPO	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives
Number of universities and research institutions assisting in monitoring REDD+ activities in relation to biodiversity impacts	National, Subnational, Project	Proxy for monitoring efforts underway		

5.6. Principle 6 – Maintain and enhance multiple functions of forest to deliver benefits including biodiversity conservation and ecosystem services

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *freshwater biodiversity*				
Trends in water quality	Subnational, Project	Water quality in freshwater and coastal areas within and downstream of REDD+ areas	CBD, CIFOR	Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers
Trends in populations or abundance of key or sentinel species in freshwater ecosystems dependent on forest ecosystems	Global, National	Trends in such species can be a proxy for broader biodiversity, including habitat, health	CBD, CIFOR, PROMEBIO	Trends in abundance, distribution and extinction risk of species
Headline indicator: *forest biodiversity*				
Trends in extent of forest ecosystems	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in indicator invasive species that move into disturbed forest	National, Subnational, Project	Evidence of invasive species may indicate loss of original ecosystem function, leading to losses in biodiversity and community well-being	CBD, PROMEBIO	Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers
Extent of different forest types under REDD+ activity	National, Subnational, Project	Trends in forest habitats derived from remote sensing, such as LIDAR, overlaid with REDD+ activities	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in forest fragmentation	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in forest degradation	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Trends in land-use change from forest ecosystems	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in trends in abundance of key bird or other sentinel species	Global, National	Trends in such species can be a proxy for broader biodiversity, including habitat, health	CBD, UNCCD, PROMEBIO	Trends in abundance, distribution and extinction risk of species
Trends in forest extent in REDD+ active areas considered HCV or KBA	Global, National	Trends in forest habitats derived from remote sensing, overlaid with KBA or HCV data	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in forest extent outside the REDD+ active areas considered HCV or KBA	Global, National	Needs to be further analysed regarding causality and REDD+ “leakage”	CBD, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Number of biodiversity records from REDD+ active areas	National, Subnational, Project	May be derived from GBIF through www.protectedplanet.net	PROMEBIO	
Trends in forest extent outside the REDD+ active areas impacted due to "leakage"	Global, National, Subnational, Project	Trends in forest habitats derived from remote sensing, overlaid with REDD+ activities	CBD, FRA, CIFOR, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in area of natural terrestrial ecosystems (e.g. wetlands, grasslands, drylands)	Subnational, Project	Needs to be further analysed regarding causality and REDD+ “leakage”	CBD, PROMEBIO	Trends in extent, condition and vulnerability of ecosystems, biomes and habitats
Trends in crop genetic resources (wild relatives and native varieties of cacao, rubber, coffee, tropical fruits, etc.) being conserved by REDD+ activities	Global, National, Subnational, Project	Such wild species may be maintained by ILCs	CBD, BioTrade	Trends in genetic diversity of species

5.7. Principle 7 – Minimise adverse impacts (direct and indirect) on non-forest ecosystem services and biodiversity

Metric	Applicable scale(s)	Comments	Relevance to above frameworks	Relevant proposed CBD 2020 headline indicator
Headline indicator: *population densities, trends, and demands*				
Trends in human population density in forest area	Global, National, Subnational, Project	Increasing human populations may drive unsustainable resource use	UNCCD, IIFB, LADA	
Trends in migration into or out of forest areas for permanent or temporary periods	Subnational, Project	Increasing and sustained human populations may drive unsustainable resource use		

6. Gaps in data availability and capacity needs to effectively implement the proposed indicators

The gaps between general feasibility and the feasibility in particular countries vary over time and amongst countries. Some nations have great biological and cultural diversity, and strong commitment to the CBD and UNFCCC processes but low capacity to implement monitoring systems. Other countries have relatively less biological and cultural diversity, but high capacity to implement monitoring systems. Selected REDD+ pilot countries have been receiving assistance to develop baselines and associated monitoring systems which increases their capacity to monitor impacts alone or in collaboration with international agencies.

GEO-BON (2011) noted that there are several major gaps in the existing observation systems, including incomplete spatial coverage and limited availability of time series data. In particular, more data are available for the developed world than for the developing world, and many countries lack a regular monitoring system for habitats, ecosystems, and species population. GEO-BON (2011) argue that this deficiency of time series information complicates distinguishing between anthropogenic effects and natural variability, and there is a more urgent need for data from developing countries as pressures increase in often biodiversity-rich areas.

Challenges and potential gaps in relation to data availability and capacity to monitor REDD+ impacts on biodiversity and ILCs have been highlighted through the REDD+ regional workshops organised by the CBD Secretariat (see Section 1.1.2). Of relevance to this study included a need for awareness raising and education of ILCs and government staff on REDD+ and associated monitoring, a lack of data sharing and other horizontal coordination mechanisms across national government agencies, and a lack of recognition of ILCs as stakeholders. Additional challenges identified by the authors of this paper include:

- Data availability:
    - population and migration data from remote rural areas;
    - health and nutritional state data from rural areas;
    - economic data on rural livelihoods;
    - water quality data;
    - conflict data, including cases filed with ombudsman agencies;
    - data on wildlife population, including forest and aquatic species;
    - data on status of crop genetic resources on which people depend; and
    - data on voluntary and involuntary resettlements, and systems for managing that data.
- Capacity:
    - systems to enable rural people to participate in providing data;
    - systems for comparing and integrating local, subnational, and national land use zoning and land use plans;
    - system for monitoring policy reforms associated with REDD+ preparation and implementation that impact ILCs;
    - systems for compiling data on biocultural protocols and other local plans and analyses at national and subnational levels;
    - systems for compiling and evaluating complaints regarding illegal logging by ILCs;
    - systems for registering private ILC associations that could function to assess REDD+ impacts on ILCs;
    - systems for registering ILC agreements in the voluntary market; and
    - systems for registering and mapping ILC lands and forests, both titled and claimed under customary law.

There are a number of potential capacity gaps that exist in some countries. The ability to seek out and obtain comparable data and information from remote rural communities, and to integrate rural perspectives into the transparent review of data and analysis, are fundamental to the ground-truthing of any monitoring system. The capacity to provide long-term storage for baseline and monitoring data, and to store them in formats that will be accessible into the future is essential and requires expertise and financial resources. Finally, communication and data-sharing gaps between relevant institutions at national levels – both within and between governmental and non-governmental organisations – must be enhanced to ensure the sustainability and effective use of any monitoring process.

These are gaps and issues that cannot be resolved quickly nor covered by international monitoring systems/processes. While the approach offered by Gardner *et al*. (2011) is a possibility for indicator developers, an alternative for initial and immediate application would be to incorporate expert spot-checking in-country in order to gain a general sense of trends to raise attention and suggest adjustments in REDD+ implementation and capacity building. At the invitation of the country, this may be an annual process that would include public consultations.

7. Conclusions & Recommendations

Both REDD+ as well as biodiversity and community well-being assessment and monitoring are dynamic fields of policy development and research where new insights and methods are quickly evolving (UNEP-WCMC 2011, Pistorius *et al*. 2010, CBD 2011a), and there is a wide range of expertise and concepts available to support countries and organizations in setting and monitoring such objectives at different spatial scales. Thus it is important to view the monitoring of social and biodiversity impacts of REDD+ as evolving field under both the UNFCCC and the CBD, and under other policy fora and assessment mechanisms. Ultimately, it is by considering biodiversity and well-being at the national level through their respective and associated components that real progress can be assessed.

Scale of measurement remains a concern, and the need to carry out effective ground-level surveys as part of any monitoring protocol is essential. Such a requirement brings issues relating to technical feasibility and cost-efficiency, which many countries may struggle to effectively achieve owing to capacity and resource limitations. Nested monitoring systems that leverage local monitoring by ILCs and subnational governments can offer the dual advantage of cost-effective data collection and cross-scale collaboration.

Recognising that the safeguards are considered the minimum requirement and basis for the generation of additional benefits, it was considered more appropriate to align more on the UN-REDD+ Programme Social and Environmental Principles and Criteria under development. While these are not yet agreed, the additional specificity provided allow for clear consideration of a range of social, economic and ecological issues required and arising from the effective implementation of REDD+.

In order to develop a monitoring system for biodiversity and ILC impacts of REDD+, the authors offer the following recommendations:

Prioritization of biodiversity and ILC indicators at national and subnational levels would benefit by using a multi-stakeholder process. A multi-stakeholder process is needed to identify feasible indicators that can be monitored to flag positive and negative impacts of REDD+; linked to analytical processes that can assess the data collected and link to analyses of MRV data to combine local information with spatial assessments of changes; and linked into policy processes that can encourage adjustments to improve REDD+ long-term success.

Further research on thresholds, sentinel taxa, and ecosystem service indicators is strongly needed. System resilience indicators (ability to adjust to disturbance without "flipping"), and connectivity indicators are needed both at landscape level for biodiversity as well as interconnectivity/synergies amongst ILCs. The challenge is not just scale but spatial distribution.

Definitions of "forest" and different forests types need to incorporate a more ecological approach before they are harmonized with broad general definitions being used by FAO currently (i.e., *"land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds* in situ"). In order to effectively collect appropriate and comparable data, clear definitions need to be provided both on the range of forest types and associated processes such as 'deforestation' and 'degradation' so that REDD+ funding avoids furthering the conversion of natural and semi-natural forests into commercial tree plantations (c.f. Putz & Redford 2010, Yamasaki & Tyrrell 2011).

A stringent concept for sustainable management of forests (SMF) and a reference for validating

sustainable forestry management (SFM) should be established with independent third party monitoring of SFM. This should occur under the provision of substantial specification, which implies the development of well-defined criteria and measurable indicators to ensure that the concept itself serves as a safeguard. SFM is likely to expand under REDD+. While less than 2% of forests in tropical Africa, Asia and Latin America are certified, and there are few independent studies of the impacts of SFM, there is a widespread belief that SFM conserves biodiversity (Zagt *et al.* 2010).

Safeguards and indicators are needed to avoid inter-ecosystem leakage, as well as leakage within the same ecosystem. Research on this area is urgently needed, as leakage is expected to become a more and more significant issue when REDD+ investments expand. Potential shifts of land use change pressure to non-forest ecosystems (e.g., non-forest peatlands) are actually not yet addressed in the UNFCCC negotiation texts. Comparable shifts to low-carbon forest ecosystems are covered by REDD+ but could also occur if the REDD+ carbon accounting rules provide incentives to focus on high carbon forests. This challenge is related to leakage into areas that are supposed to be offlimits for forest extraction, such as the reserves for uncontacted peoples in Peru (Espinoza Llanos & Feather 2011).

The capacity building and funding needs should be assessed in order to establish, strengthen and maintain indicator systems. REDD+ countries and donors should work together to assess such needs, taking into account the ongoing training and investments by all donors in REDD+ relevant areas in order to avoid duplication and create synergies.

Implementation of a monitoring system of REDD+ impacts on biodiversity and community well-being should be carried out using a phased approach, with expectation of a need for evolution to occur as data availability and capacity improve. The tiered approach proposed by Gardner *et al*. (2011) is encouraged owing to its allowance for initial implementation using currently available information.

References

References cited

Airborne 1. 2010. *(LiDAR) or Light Detection and Ranging: How LiDAR works.* URL: http://www.airborne1.com/how_lidar.html.

Bavikatte, K. & Jonas, H. (eds) 2009. *Bio-Cultural Community Protocols: A Community Approach to Ensuring the Integrity of Environmental Law and Policy*. UNEP and Natural Justice, Nairobi, Kenya.

BIP (Biodiversity Indicators Partnership). 2010. *Biodiversity Indicators and the 2010 Target: Experiences and lessons learnt from the 2010 Biodiversity Indicators Partnership*. (Lead authors: Tyrrell, T.D., Chenery, A., Bubb, P., Stanwell-Smith, S. & Walpole, M.) Technical Series no. 53. Secretariat of the Convention on Biological Diversity, Montréal, Canada.

Brennan, K. & Durschinger, L. 2011. *The emerging market for forest and land-use carbon: A new asset class with early-stage investment opportunities that generate extensive environmental and social benefits*. Terra Global Investment Management, San Francisco, USA.

Brown, H.C.P., Smit, B., Sonha, D.J., Somorin, O.A. & Nkem, J. 2011. Institutional Perceptions of Opportunities and Challenges of REDD+ in the Congo Basin. *Journal of Environmental Development*, 8 November 2011, DOI: 10.1177/1070496511426480

Bubb, P., Chenery, A., Herkenrath, P., Kapos, V., Mapendembe, A., Stanwell-Smith, D. & Walpole, M. 2011. *National Indicators, Monitoring and Reporting for the Strategy for Biodiversity 2011-2020*. UNEP-WCMC, Cambridge, UK.

Butchart, S.H.M., Walpole, M., Collen, B., van Strien, A., Scharlemann, J.P.W., Almond, R.E.A., Baillie, J.E.M., Bomhard, B., Brown, C., Bruno, J., Carpenter, K.E., Carr, G.M., Chanson, J., Chenery, A.M., Csirke, J., Davidson, N.C., Dentener, F., Foster, M., Galli, A., Galloway, J.A., Genovesi, P., Gregory, R.D., Hockings, M., Kapos, V., Lamarque, J-F, Leverington, F., Loh, J., McGeoch, M.A., McRae, L., Minasyan, A., Hernández Morcillo, M., Oldfield, T.E.E., Pauly, D., Quader, S., Revenga, C., Sauer, J.R., Skolnik, B., Spear, D., Stanwell-Smith, D., Stuart, S.N., Symes, A., Tierney, M., Tyrrell, T.D., Vié, J-C. & Watson, R. 2010. Global Biodiversity: Indicators of Recent Declines. *Science* **328**(5982): 1164-1168

Carino, J. 2011. *Indicators for Assessing Progress Towards the 2010 Biodiversity Target: CBD Strategic Plan 2011-2020, Status of Traditional Knowledge, Innovations and Practices*. Presented to CBD SBSTTA 15, November 2011.

CBD. 2010. *Outcomes of the Global Expert Workshop on Biodiversity Benefits of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, UNEP/CBD/WS-REDD/1/3*. CBD, Montreal, Canada.

CBD. 2011a. *Submission by the Secretariat of the Convention on Biological Diversity to the Secretariat of the United Nations Framework Convention on Climate Change: On methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD-plus), specifically related to systems for providing information on how safeguards referred to in appendix I to UNFCCC decision 1/CP.16 are addressed and respected*. 26 September 2011. Convention on Biological Diversity, Montreal, Canada.

CBD. 2011b. *REDD+ and Biodiversity*. CBD Technical Series 59. Convention on Biological Diversity, Montreal, Canada.

Che Piu, H. & García, T. 2011. *La Situación de REDD en el Perú*. Derecho Ambiente y Recursos Naturales (DAR), Lima, Peru.

Colchester, M. & Chao, S. (eds.) 2011. *Oil Palm Expansion in Southeast Asia: Trends and Implications for Local Communities and Indigenous Peoples*. FPP and Sawit Watch, Bogor.

Dugan, P.C., Durst, P.B., Ganz, D.J. & McKenzie, P.J. (eds). 2003. *Advancing assisted natural regeneration (ANR) in Asia and the Pacific*. RAP, Bangkok, Thailand. (available at http://www.fao.org/DOCREP/004/AD466E/ad466e00.htm)

Durst, P.B., Sajise, P. & Leslie, R.N. (eds) 2011. *Forests beneath the grass: proceedings of the regional workshop on advancing the application of assisted natural regeneration for effective, low-cost forest restoration*. 19-22 May 2009, Bohol, Philippines. RAP Publication 2010/11. FAO, Bangkok, Thailand.

Epple, C., Doswald, N. & Dickson, B. 2010. *Potential links between monitoring for multiple benefits of REDD+ and the monitoring requirements of the Rio Conventions*. Multiple Benefits Series. Prepared on behalf of the UN-REDD Programme. UNEP-WCMC, Cambridge, UK.

Epple, C., Dunning, E., Dickson, B. & Harvey, C. 2011. *Making Biodiversity Safeguards for REDD+ Work in Practice: Developing Operational Guidelines and Identifying Capacity Requirements*. Summary Report. UNEP-WCMC, Cambridge, UK.

Espinoza Llanos, R. & Feather, C. 2011. *The reality of REDD+ in Peru: Between theory and practice, Indigenous Amazonian Peoples´ analysis and alternatives*. AIDESEP and FPP, Lima, Peru.

FAO. 2010. *Global Forest Resources Assessment, 2010*. Food and Agriculture Organization of the United Nations, Rome Italy.

Gardner, T.A., Burgess, N.D., Aguilar-Amuchastegui, N., Barlow, J., Berenguer, E., Clements, T., Danielsen, F., Ferreira, J., Foden, W., Lees, A.C., Roman-Cuesta, R.M., Parry, L., Schmitt, C.B., Strange, N., Khan, S.M., Theilade, I. & Vieira, I.C.G. (2011, in press). A framework for integrating biodiversity concerns into national REDD+ programmes. *Biological Conservation*.

GEO-BON. 2011. *Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets: A report prepared by the Group on Earth Observations Biodiversity Observation Network (GEO BON) for the Convention on Biological Diversity*. Group on Earth Observations Biodiversity Observation Network, Pretoria, South Africa.

I-REDD+. 2011. *The Forgotten D: Challenges of Addressing Forest Degradation in REDD+*. Impacts of Reducing Emissions from Deforestation and Forest Degradation Carbon Stocks (I-REDD+) Policy Brief No. 1, Edinburg. (DRAFT November 2011)

Lovera, S. 2011. *Discussion paper on the ´do´s and don´ts´ of supporting forest conservation and restoration initiatives by local communities and indigenous peoples*. IUCN Commission on Environmental, Economic and Social Policy (CEESP) and Global Forest Coalition, Asuncion, Paraguay.

Miles, L. & Dickson, B. 2010. REDD+ and biodiversity: opportunities and challenges. *Unasylva* **236**(61): 56-63.

Olander, J. & Ebeling, J. 2011. Building Forest Carbon Projects: Step-by-Step Overview and Guide. In J. Ebeling & J. Olander (eds). *Building Forest Carbon Projects*. Forest Trends, Washington, DC, USA.

Olander, J. 2010. *Nested approaches and mobilizing early-start private finance for REDD*. Presentation to USAID 4 October 2010, Katoomba Group. Available at http://www.forest-trends.org/documents/files/doc_2609.pdf.

Phelps, J. Webb, E.L. & Agrawal, A. 2010. Does REDD+ Threaten to Recentralize Forest Governance? *Science* **328**:312-313.

Pilgrim, J., Ekstrom, J. & Ebeling, J. 2011 Biodiversity Impacts Guidance: Key Assessment Issues for Forest Carbon Projects. In: J. Ebeling & J. Olander (eds). *Building Forest Carbon Projects*. Forest Trends, Washington, DC, USA.

Pistorius T., Schmitt C.B., Benick D. & Entenmann S. 2010. *Greening REDD+: Challenges and opportunities for forest biodiversity conservation*. Policy Paper, University of Freiburg, Germany.

Pistorius, T., Schmidt, C.B., Benick, D., Entenmenn, S. & Reinecke, S. 2011. *Greening REDD+-challenges and opportunities for integrating biodiversity safeguards at and across policy levels*. AFJZ 82-97.

Putz, F.E. & Redford, K.H. 2010. Tropical forest definitions, degradation, phase shifts, and further transitions. *Biotropica* **42**: 10-20.

RECOFTC. 2011. *REDD+, Governance, and Community Forestry*. IIED and RECOFTC, Bangkok, Thailand.

Richards, M. & Panfil, S.N. 2011. *Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects: Part 1 – Core Guidance for Project Proponents*. Version 2. Climate, Community & Biodiversity Alliance, Forest Trends, Fauna & Flora International and Rainforest Alliance, Washington DC, USA.

RSPO. 2007. *Principles and Criteria for Sustainable Palm Oil Production: Including Indicators and Criteria*. Roundtable on Sustainable Palm Oil, Kuala Lumpur, Malaysia.

Salter, M. & Von Braun, J. 2011. Bridging the gap between customary, national and international law. *Effectius* **14** (Environmental Justice).

Sasaki, N., Asner, G.P., Knorr, W., Durst, P.B., Priyadi, H.R. & Putz, F.E. 2011. Approaches to classifying and restoring degraded tropical forests for the anticipated REDD+ climate change mitigation mechanism. *iForest* **4**:1-6.

Searchinger, T.D. 2011. *The Food, Forest Challenge*. Background paper for The Role of Commodity Roundtables & Avoided Forest Conversion in Subnational REDD+, Agriculture, and Food Security & Greenhouse Gas (GHG) Accounting. University of California at San Diego, USA.

Shono, K., Cadaweng, E.A. & Durst, P.B. 2007. Application of Assisted Natural Regeneration to Restore Degraded Tropical Forestlands. *Restoration Ecology* **15**(4): 620-626.

Steininger, M., Thoumi, G., Alcorn, J.B. & Parra, A. 2011. *Integrated REDD+ Assessment of Peru: Report for USAID*. FCMC Project, Tetra Tech ARD, Washington DC, USA.

Stork, N.E., Boyle, T.J.B., Dale, V., Eeley, H., Finegan, B., Lawes, M., Manokaran, N., Prabhu, R. & Soberon, J. 1997. *Criteria and Indicators for Assessing the Sustainability of Forest Management: Conservation of Biodiversity*. Working Paper No. 17. CIFOR, Jakarta, Indonesia.

Strand, H., Höft, R., Strittholt, J., Miles, L., Horning, N., Fosnight, E., Turner, W. (eds.) 2007. *Sourcebook on Remote Sensing and Biodiversity Indicators*. CBD Technical Series 32. Secretariat of the Convention on Biological Diversity, Montreal, Canada.

Teobaldelli, M., Doswald, N., Dickson, B. 2010. *Monitoring for REDD+: carbon stock change and multiple benefits*. Multiple Benefits Series 3. Prepared on behalf of the UN-REDD Programme. UNEP-WCMC, Cambridge, UK.

Triminio Meyer, S. (coordinator) 2011. *Manual de Protocolos para los Indicatores del Programa de Monitoreo y Evaluacion de la Biodiversidad de Centroamerica (PROMEBIO)*. CCAD, El Salvador.

UNEP. 2011. *REDDy-Set-Grow: Part II - Private sector suggestions for international climate change negotiators*. UNEP Finance Initiative and Ecosecurities, Geneva, Switzerland.

UNEP-WCMC 2011. *Developing ecosystem service indicators: Experiences and lessons learned from sub-global assessments and other initiatives*. CBD Technical Series 58. Convention on Biological Diversity, Montréal, Canada.

UN-REDD. 2011. *UN-REDD Programme Social and Environmental Principles and Criteria, version 3*. Draft for consultation, September 2011. UN-REDD, New York, USA.

Woodfine, A. (ed.) 2011. *Land Degradation Assessment in Drylands: Methodology and Results*. FAO, Rome, Italy.

Yamasaki, S.H. & Tyrrell, T.D. 2011. *On the harmonization of definitions and the streamlining of reporting in forest biodiversity monitoring by UN agencies: A report on alleviating reporting burden*. EcoTerra Solutions, Montreal, Canada.

Zagt, R.J., Sheil, D. & Putz, F.E. 2010. *Biodiversity conservation in certified forests: an overview*. ETFRN News 51, September 2010.

Zarin, D., Loisel, C., Angelsen, A., Brown, S., Peskett, L. & Streck, C. 2009. *Reducing Emissions from Deforestation and Forest Degradation (REDD+): An Options Assessment Report*. Prepared for the Government of Norway. The Meridian Institute, Washington DC, USA.

Additional bibliography

AIDESEP. 2011. *Building an Indigenous REDD: Bringing REDD+ in Peru Into Line With the Rights and Cultures of Indigenous Peoples*. Interethnic Association for the Development of the Peruvian Amazon (AIDESEP), Lima, Peru.

Alcorn, J.B. 2011. *Tenure and Indigenous Peoples: The importance of self-determination, territory and rights to land and other natural resources*. Issues Brief for USAID, Washington DC., USA.

Anderson, P. 2011. *Free, Prior, and Informed Consent: Principles and Approaches for Policy and Project Development*. RECOFTC and GIZ, Bangkok, Thailand.

Brotto, L. 2010. The impact of REDD+ projects on chainsaw milling in Peru. *ETFRN News* **52**:105-113.

CBD. 2009. *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. CBD Technical Series 41. Convention on Biological Diversity, Montreal, Canada.

CBD. 2011. *Report of the Ad Hoc Technical Expert Group on Indicators for the Strategic Plan for Biodiversity 2011-2020. High Wycombe, United Kingdom, 20-24 June 2011*. UNEP/CBD/AHTEG-SP-Ind/1/3. Convention on Biological Diversity, Montreal, Canada.

Chhatri, A. & Agrawal, A. 2009. *Carbon Storage and Livelihoods Generation through Improved Governance of Forest Commons*. International Forestry Resources and Institutions Program (IFRPI) Working Paper No. W09I-01, University of Michigan, Ann Arbor.

Climate, Community and Biodiversity Alliance. 2008. *Climate, Community & Biodiversity Project Design Standards*. Second Edition. CCBA, Arlington, USA.

Danielson, R., Skutsch, M., Burgess, N.D., Jensen, P.M., Andrianandrasana, H., Karky, B., Lewis, R., Lovett, J.C., Massao, J., Ngaga, Y., Phartiyal, P., Køie Poulsen, M., Singh, S.P., Solis, S., Sørensen, M., Tewari, A., Young, R. & Zahabu, E. 2011. At the heart of REDD+: a role for local people in monitoring forests? *Conservation Letters* **4**:158–167.

DAR. 2011. *Transparencia en el Sector Forestal Peruano: Mejorando la gobernanza a través de la transparencia*. Informe Anual 2010. Derecho Ambiente y Recursos Naturales (DAR), Lima, Peru. Available at: http://www.dar.org.pe/informe-transparencia-forestal-2010.htm

Dooley, K, Griffiths, T., Martone F. & Ozinga, S. 2011. *Smoke and Mirrors: A Critical Assessment of the Forest Carbon Partnership Facility*. FERN and Forest Peoples Programme, UK.

Ebeling, J. & Olander, J. (eds.) 2011. *Building Forest Carbon Projects*. Forest Trends, Washington DC, USA.

EIA. 2011. *Peru´s Forestry Sector: Ready for the New International Landscape?* Environmental Investigation Agency (EIA) Global, UK.

Erler, D., Frank, S., Hein, J.-I., Hotz, H., Santa Cruz Melgare, A.-M. & Zelli, F. 2011. *Inclusión social en el processo REDD en el Perú: Una perspectiva de gobernanza en múltiples niveles*. Conservación de Bosques Comunitarios Project, Nota Tecnica 2, DIE and GIZ, Lima, Peru.

Espinosa, D., Marquardt, M. Niyonkuru, R.C. & Rugadya, M. 2008. *Land tenure and property rights assessment tool: Field test of the LTPR intervention sequencing tool*. Report to USAID. ARD, Burlington, USA.

FAO. 2011. *Expert Consultation on "A Long-term Strategy for Global Forest Resources Assessment", Pajulahti, Finland, 13-15 September, 2011*. Food and Agriculture Organization of the United Nations, Rome Italy.

FAO. 2011. *Forest beneath the Grass - Assisted Natural Regeneration*. Food and Agriculture Organization of the United Nations, Rome Italy.

FAO. 2011. *Forests beneath the Grass. Report presented during UN Asia-Pacific Forestry Week, October 2011*. Food and Agriculture Organization of the United Nations, Rome Italy.

Forest Carbon Partnership Facility (FCPF). 2011. *FCPF Common Approach to Environmental and Social Safeguards for Multiple Delivery Partners*. World Bank, Washington DC, USA.

Forest Trends. 2011. *Field testing the theory of change approach: Approach to Social Impact Assessment of REDD+ Projects: Case Studies from Brazil, Guatemala and Peru*. Report to World Bank PROFOR ("Pro-Poor REDD – How will we know?" Project ID 7152226), Washington DC, USA.

Galloway McLean, K. 2010. *Advance Guard: Climate Change Impacts, Adaptation, Mitigation and Indigenous Peoples – A Compendium of Case Studies*. United Nations University – Traditional Knowledge Initiative, Darwin, Australia.

GCF. 2011. *GCF Design Recommendations for Subnational REDD Frameworks*. Task Force Report for Discussion. Governors Climate and Forest Task (GCF), August 7, 2011.

GCF. 2011. *Governors Climate and Forest Task Force, Day Three Wrap Up and Recommendations*. September 22, 2011.

Global Witness. 2011. *Forest Carbon, Cash and Crime*. Global Witness, UK.

Greenoxx. 2009. *Project Design Document*. Madre de Dios Amazon REDD Project, Montevideo, Uruguay.

IFAD. 2009. *Evaluation manual: methodology and processes*. Office of Evaluation, International Fund for Agriculture and Development. Rome, Italy.

IIED. 2011. *Assessing Social Impacts of National REDD+ Policies/Programmes: Exploring Options*. March 2011, IIED, London, UK, Minutes prepared by: Pam Jagger for CIFOR.

IIFB. 2011. *Potentials and pitfalls in exchange of knowledge systems in cross-scale ecosystem assessments. Report from an informal expert meeting with representatives of the International Indigenous Forum on Biodiversity (IIFB), EU experts and scientists engaged in TK and IPBES*. Jokkmokk June 21-22, 2011. Report compiled by Maria Tengö (SRC), Marie Kvarnström (NAPTEK), Pernilla Malmer (SwedBio/SRC) and Maria Schultz (SwedBio/SRC).

IUCN. 2011. *The Value of Investing in Locally-Controlled Forestry: The Economic Impacts of Scaling Up LLS Experiences in Africa, Asia & Latin America*. LLS Programme, IUCN, Gland.

LaViña, A.G.M. & Lang, LG. 2011. *Implementing the REDD+ Safeguards: The Role of Social Accountability*. Affiliated Network for Social Accountability in East Asia and the Pacific (ANSA-EAP) Working Paper, Manila, Philippines.

Ministerio de Ambiente, Ecuador. 2011. *Exchange Workshop on REDD+ design processes: Report*. 14th February 2011, Hotel Akros, Quito, Ecuador.

Mitlacher, G. & Kraljevic, A. 2011. *Biodiversity safeguard for REDD+ in the UNFCCC and the CBD - Analysis of Data and Observation Systems for the Conservation of Natural Forests and Biological Diversity*. Working Document. WWF, Berlin, Germany.

Murphy, D. 2011. *Safeguards and Multiple Benefits in a REDD+ Mechanism*. ASB Partnership for the Tropical Forest Margins at the World Agroforestry Centre (ASB-ICRAF) & International Institute for Sustainable Development (IISD), Winnipeg, Canada.

Norway Government. 2011. *Norway´s REDD+ Policy and Efforts: Experiences from Southeast Asia*. http://www.euflegt.efi.int/files/attachments/euflegt/flegt_redd_seminar_2__norway_s_redd_policy_and_efforts_-_experiences_from_sea.pdf.

Olander, J., Siefert-Granzen, J., Chagas, T., Streck, C. & O´Sullivan, R. 2011. *Nested Approaches to REDD+: An Overview of Issues and Options*. Climate Focus and Forest Trends, Washington DC.

Oviedo, G., Van Griethuysen, P. & Larsen, P.B. (eds.) 2006. *Poverty, Equity and Rights in Conservation - Technical papers and case studies*. IUCN, Gland, Switzerland.

Poffenberger, M., De Gryze, S. & Durschinger, L. 2009. *Designing Collaborative REDD projects: A Case Study from Oddar Meanchey Province, Cambodia*. Community Forestry International, Antioch, California, USA.

PricewaterhouseCoopers LLP. 2011. *Funding for Forests: UK Government Support for REDD+*. PwC, Climate Focus, Winrock and IUCN, UK.

ProForest. 2010. *REDD+ SE Standards, Briefing on complementarities with other REDD+ social and environmental safeguards mechanisms*. ProForest, Oxford, UK.

Ramos Urrutia, I. 2010. *Entendimiento REDD a Través del Derecho de los Pueblos Indígenas, Apuntes Conceptuales Para Los Países Andino Amazónicos*. inWent Capacity Building International, Germany and Derecho Ambiente y Recursos Naturales (DAR), Lima, Peru.

RECOFTC. 2010. *Decoding REDD: Effective REDD+ Safeguards, Lessons from Forest Certification, An Asia-Pacific Perspective*. The Nature Conservancy and The Center for People and Forests (RECOFTC), Bangkok, Thailand.

RECOFTC. 2011. *Call for Action, Conclusions From the Second Regional Forum for People and Forests*. The Center for People and Forests (RECOFTC), Bangkok, Thailand.

RECOFTC. 2011. *Forests and Climate Change after Cancun: An Asia-Pacific Perspective*. The Center for People and Forests (RECOFTC), Bangkok, Thailand.

REDD+ Partnership. 2011. *Co-Chairs Summary, REDD+ Meeting and Workshops, 28-30 September 2011, including Workshop on Safeguards and REDD+*. Workshop on Measuring and Monitoring REDD+, Panama City.

REDD-Net. 2011. *Monitoring, Reporting and Verification of Social and Development Issues*. Fact Sheet funded by DFID and NORAD.

Richards, M. & Panfil, S.N. 2011. Towards cost-effective social impact assessment of REDD+ projects: Meeting the challenge of multiple benefit standards. *International Forestry Review* **13**(1).

Satoyama Initiative. 2011. *Indicators for resilience in socio-ecological production landscapes*. Satoyama Initiative, Bioversity International, Rome, Italy.

Schreckenberg, K., Camargo, I., Withnall, K., Corrigan, C., Franks, P., Roe, D., Scherl, L.M. & Richardson, V. 2010. *Social Assessment of Conservation Initiatives: A review of rapid methodologies*. Natural Resource Issues No. 22. IIED, London, UK.

Skutsch, M.M., McCall, M.K., Karky, B., Zahabu, E. & Peters-Guarin, G. 2009. *Community Measurement of Carbon Stock Change for REDD: Case Studies on Measuring and Assessing Forest Degradation*. Forest Resources Assessment Programme Working Paper 156. FAO, Rome, Italy.

SNV-GDG-LIWG. 2011. *Workshop on Communal Land Titling: The case of Sangthong District, Minutes*. Land Issues Working Group (LIWG), 6 October 2011.

Sommerville, M. 2011. *Land Tenure and REDD+: Risks to Property Rights and Opportunities for Economic Growth*. Issues Brief for USAID, Washington DC, USA.

SPDA. 2011. *Overview of Peruvian Legal and Policy Framework, Peru REDD+ Assessment*. Forestry Program, Peruvian Society for Environmental Law (SPDA), Lima, Peru.

Springate-Baginski, O. & Wollenberg, E. (eds) 2010. *REDD, forest governance and rural livelihoods: the emerging agenda*. CIFOR, Bogor, Indonesia.

Stefani, S. 2009. *Indigenous rights: risks and opportunities for investors*. Center for Australian Ethical Research, EIRIS Network, London, UK.

Steppacher, R. & Griethuysen, P. (eds.) 2008. Climate Change, Energy Change, and Conservation. *Policy Matters* **16**.

Tassa, D.T., Da Re, R. & Secco, L. 2010. *Benefit sharing mechanisms and governance issues in Participatory Forest Management-REDD related projects: A Community Forest case-study in Tanzania.* Berlin Conference on the Human Dimensions of Global Environmental Change, Berlin, 8-9 October 2010. LEAF – Land, Environment, Agriculture and Forestry - University of Padova, Italy.

UNFCCC. 2011. *Report of the Subsidiary Body for Scientific and Technological Advice on its thirty-fourth session, held in Bonn from 6 to 16 June 2011*. FCCC/SBSTA/2011/2.

UNFCCC. 2011. *Views on methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, for Subsidiary Body for Scientific and Technological Advice Thirty-fifth session*. Durban, 28 November to 3 December 2011, Item 4 of the provisional agenda, Advance Version, 19 October 2011.

UNFPII. 2008. *Indicators of well-being, poverty and sustainability relevant to indigenous peoples*. Summary report submitted by Victoria Tauli-Corpuz, Forum member, on regional and thematic workshops on indicators relevant to indigenous peoples under the Convention on Biological Diversity and the Millennium Development Goals. UN Economic and Social Council, E/C.19/2008/9, New York.

UN-REDD. 2011. *REDD+ Partnership Meeting and Workshops 28 and 30 September 2011.* Panama City, Panama, Co-Chairs' Summary. UN-REDD, New York, USA.

UNU-IAS. 2009. *Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD): A Guide for Indigenous Peoples*. United Nations University – Institute for Advanced Studies, Yokohama, Japan.

USAID. 2011. *Social Dimensions of REDD+ Experts Workshop: Issues for Discussion*. October 2011, Airlie House, Virginia. USAID, Washington DC, USA.

Vatn, A. & Vedeld, P. 2011. Getting Ready! A Study of National Governance Structures for REDD+. Noragric Report No 59. Department of International Environment and Development Studies, Norwegian University of Life Sciences.

Westholm, L., Ostwald, M., Henders, S. & Mattsson, E. 2011. *Learning from Norway – A review of lessons learned for REDD+ Donors*. Focali Report No 2011:03, Gothenburg, Sweden.

Wiley, L. 2011. *The Status of Customary Land Rights in Africa Today Rights to Resources in Crisis: Reviewing the Fate of Customary Tenure in Africa*. Brief #4 of 5. Rights and Resources Institute, Washington DC, USA.

Wiley, L. 2011. *The Global Land Rush: What This Means for Customary Land Rights to Resources in Crisis: Reviewing the Fate of Customary Tenure in Africa*. Brief #5 of 5. Rights and Resources Institute, Washington DC, USA.

Appendix: 2020 Aichi Biodiversity Targets

No.	Target	Summary
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society		
1	By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Public awareness
2	By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	Value of biodiversity understood
3	By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	Removal of perverse incentives
4	By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Sustainable production / consumption
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use		
5	By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Loss of natural habitats
6	By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Sustainable fisheries
7	By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Sustainable agriculture
8	By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Pollution
9	By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Invasive alien species
10	By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	Climate change / ocean acidification
Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity		
11	By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	Protected areas
12	By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Species
13	By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic	Genetic diversity

No.	Target	Summary
	diversity.	
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services		
14	By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Ecosystem services
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 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Ecosystem-based carbon sequestration enhanced
16	By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Nagoya ABS Protocol operational
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building		
17	By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	Revised NBSAPs implemented
18	By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	Traditional environmental knowledge and practices respected
19	By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Knowledge transfer
20	By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	Resource mobilisation