

**DRAFT:
Guidelines for
monitoring the
impacts of REDD+ on
biodiversity and
ecosystem services**

UN-REDD PROGRAMME

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Draft for comment



The UN-REDD Programme, a collaborative partnership between FAO, UNDP and UNEP, was created in response to, and in support of, the UNFCCC decision on REDD at COP 13 and the Bali Action Plan. The Programme supports countries to develop capacity to reduce emissions from deforestation and forest degradation and to implement a future REDD mechanism in a post-2012 climate regime. It builds on the convening power of its participating UN agencies, their diverse expertise and vast networks, and "delivers as One UN".

The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the biodiversity assessment and policy implementation arm of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organization. The centre has been in operation since 1989, combining scientific research with practical policy advice.

The United Nations has proclaimed 2010 to be the International Year of Biodiversity. People all over the world are working to safeguard this irreplaceable natural wealth and reduce biodiversity loss. This is vital for current and future human wellbeing. We need to do more. Now is the time to act.

Prepared by

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INTRODUCTION

These draft guidelines are intended to provide clear recommendations to UN-REDD Programme countries for monitoring the impacts, both positive and negative, of REDD+ on biodiversity and ecosystem services. On the one hand, successful implementation of REDD+ can help to secure the many services provided by forests, including biodiversity conservation, water provision, soil stabilisation and other ecosystem services in addition to carbon storage and sequestration. On the other hand, there is also a risk of some harms arising from REDD+, such as displacement of land use pressures and loss of biodiversity arising from plantation forestry.

It is important to monitor such impacts in order to determine whether the positive impacts are being realised and can be enhanced and whether and how harms can be avoided. Increasingly, safeguards are being formulated and adopted to ensure that countries address these potential opportunities and risks. The results of monitoring can be used to indicate whether the relevant safeguards are being met and to adjust how REDD+ is implemented to ensure a better balance of positive and negative impacts.

The UN-REDD Programme is in the process of developing Social and Environmental Principles and Criteria. More broadly the Cancun decision on REDD+ includes guidance and safeguards relating to environmental performance. Two of the most relevant provisions are that REDD+ activities should

Be consistent with the objective of environmental integrity and take into account the multiple functions of forests and other ecosystems; (-/CP.16 Annex 1 Paragraph 1(d))

and that when undertaking the REDD+ activities a number of safeguards should be promoted and supported including:

Actions are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in Paragraph 70 of this decision [the REDD+ activities] are not used for the conversion of natural forests, but are instead used to incentivise the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits; (-/CP.16 Annex 1 Paragraph 2(e))

Interpretation and operationalisation of these safeguards is still pending, but these provisions provide a clear signal that impacts of REDD+ on biodiversity and ecosystem services should be taken into account. Furthermore, the Cancun decision on REDD+ also requests that developing countries aiming to undertake REDD+ activities should develop:

A system for providing information on how the safeguards referred to in annex I of this decision are being addressed and respected throughout the implementation of the activities referred to in paragraph 70, while respecting sovereignty; (-/CP.16 Paragraph 71d)

Other standards or safeguards that are relevant include those of the Forest Carbon Partnership Facility of the World Bank and the REDD+ Social and Environmental Standards, the development of which has been facilitated by the Climate, Community and Biodiversity Alliance (CCBA) and CARE International.

The guidelines presented here, while aimed in the first instance at supporting UN-REDD countries, are designed to support any countries that wish to monitor their adherence to any of these safeguards, standards or principles.

The guidelines have been formulated for those responsible for the design and implementation of national REDD+ programmes, including monitoring their impacts. These impacts are generated both at site scale by project activities and at wider scales by policy and programmatic interventions and the combined effects of local actions. Therefore, tracking the overall impacts of REDD+ on biodiversity and ecosystem services requires monitoring at different scales; these guidelines are intended to help guide the development of monitoring activities at these different scales.

This document contains twelve short guidelines, each of which is accompanied by explanatory text. These are arranged into three groups: 'Scoping'; 'Design'; and 'Implementation'. These groups indicate at what stage in developing monitoring the guideline is most relevant, but the guidelines are not intended to be applied in a strict temporal order. Some of them will need to be considered simultaneously. Moreover, developing suitable monitoring is likely to be an iterative process, with consideration of the later guidelines being used to inform the application of the earlier ones.

These guidelines, and the supporting explanatory text, are formulated at a generic level. They are not intended to provide detailed information on how to monitor the impacts of REDD+ on biodiversity and ecosystems. The guidelines need to be supplemented with more specific information. The document that accompanies these guidelines, *An annotated guide to useful resources for monitoring the impacts of REDD+ on biodiversity and ecosystem services*, provides a guide to resources that give specific information on biodiversity and ecosystem services and practical guidance on monitoring these, in light of these guidelines.

These draft guidelines will be widely circulated for comment and testing, among UN-REDD countries and more broadly. Subsequently the guidelines will be revised and finalised. Comments from any sources will be gratefully received. Please send them to: Rebecca.Mant@unep-wcmc.org or Barney.Dickson@unep-wcmc.org.

A. SCOPING

Decide what needs to be monitored to evaluate the impacts REDD+ on biodiversity and ecosystem services

GUIDELINE 1: Identify what types of REDD+ activities will be undertaken and how they will be implemented.

Explanation

In order to design a system that will detect and monitor the impacts of REDD+ activities on biodiversity and ecosystem services it is necessary to first know what activities are being undertaken and how they are being implemented. The UNFCCC decision -/CP.16 on REDD+ allows for five different REDD+ activities: reducing emissions from deforestation, reducing emissions from forest degradation, conservation of forest carbon stocks, sustainable management of forest, and enhancement of forest carbon stocks. It is quite possible that individual countries will focus on particular REDD+ activities, rather than undertake the full suite. Knowing which activities are being undertaken and how they will be implemented will help determine which impacts need to be monitored. For example, a country may decide that it will focus on forest carbon stock enhancement. It could undertake this activity through the restoration of carbon in existing forests, reforestation, or afforestation. In turn, each of these measures could be implemented in different ways: different tree species can be selected, species can be planted in as mixed species or monocultures, and management may be intensive or mimic more natural processes. These different actions will have distinctive impacts on biodiversity and ecosystem services (see guideline 2).

An additional challenge facing any attempt to monitor the effects of REDD+ activities on biodiversity and ecosystem services is to determine which measures count as part of the REDD+ activity, and hence which effects are the result of the activity. It is likely that many countries will seek to integrate REDD+ activities into broader forest and development strategies. This has the consequence that it may not be straightforward to decide which changes in biodiversity and ecosystem services result specifically from the REDD+ activity and which are the consequence of the broader strategies.

GUIDELINE 2: Identify the potential benefits and harms to biodiversity and ecosystem services from the REDD+ activity that is being undertaken.

Explanation

Different REDD+ activities (and the different ways of implementing those activities) will result in different opportunities and risks for biodiversity and ecosystem services. Identifying these opportunities and risks will help determine what needs to be monitored. The biodiversity and ecosystem service benefits and/or harms that are typically associated with the different REDD+ activities are described below.

Reducing deforestation rates in natural forests is likely to generate benefits, both by retaining the existing biodiversity and ecosystem services of the remaining forest and by reducing pressures on biodiversity elsewhere that are associated with fragmentation and loss of forest area. The exact nature of the benefits will be influenced by the type of forest affected, its size, shape and location. The principal risk from reducing deforestation is that it may displace conversion pressures to other, lower carbon forests and to non-forest ecosystems because there is still a need for agricultural, pasture or biofuel production land. Conversion of such areas will negatively impact the biodiversity and the ecosystem services they provided. Monitoring for this risk would require monitoring land use change outside the areas where REDD+ is being implemented.

Additionally, measures undertaken to reduce deforestation may not eliminate other anthropogenic pressures on forest biodiversity and some may even create new pressures or increase current ones. For example, extractive pressures may increase if a forested area that would have been converted to agriculture continues to be used as a source of food products. Identifying the potential pressures and the resources that could be affected would help to indicate what needs to be monitored.

Reducing forest degradation should both reduce emissions and potentially increase forest carbon stocks. In doing so forest biodiversity and ecosystem services may be enhanced rather than just maintained. It would be important to monitor these changes. The potential harms to biodiversity and ecosystem services that may result from this REDD+ activity may be distinct from those caused by reducing deforestation. Where the factors causing degradation are extractive use, there is a risk that they may be displaced in ways analogous to the displacement of conversion pressure. It may be necessary to identify the factors causing degradation and potential risks from this activity on a case-by-case basis in order to decide what needs to be monitored and where.

Conservation of forest carbon stocks is likely to deliver similar benefits to the two previous REDD+ activities, although the precise nature of these benefits will depend on the type of forest, its size, shape, location, condition and biodiversity status, and on the management approaches used. It will be important to monitor both pressures on biodiversity and ecosystem services in these locations and the potential impacts of management actions. Management actions will have intended impacts (the objectives of management) and could have unintended impacts on biodiversity and ecosystem services (e.g. undertaking fire control could impede natural disturbance processes). Both these need to be identified and monitored to enable adaptive management.

Sustainable management of forests has not yet been characterised in any detail by the Parties to the UNFCCC. In the absence of such a characterisation it is difficult to determine what are the potential opportunities and risks to biodiversity and ecosystem services from this activity. It will

depend, in part, on how the term 'sustainable' is understood and on where this activity is implemented. Nevertheless, management actions and their impacts are likely to need monitoring.

Enhancement of forest carbon stocks could be implemented through such measures as afforestation, reforestation and forest restoration. Depending on how these measures are carried out, they could result in benefits for biodiversity and ecosystem services. However, this activity may also pose the most direct risks to biodiversity and ecosystem services, especially where monoculture plantations, non-native species, and unsustainably high inputs (e.g. water, fertiliser, etc.) are used. These could compromise ecosystem integrity, result in low biodiversity and a spread in invasive species. What needs to be monitored under this activity will therefore depend greatly on how it is implemented.

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GUIDELINE 3: Identify the main policy commitments related to the impacts of REDD+ on biodiversity and ecosystem services.

Explanation

Many countries already have a range of policy commitments that have a bearing on the impacts of REDD+ on biodiversity and ecosystem services. Some of these commitments are related specifically to REDD+, whereas others are concerned more broadly with biodiversity conservation and the maintenance of ecosystems. And some of these commitments are derived directly from international agreements that countries are party to, whereas others are, to a greater or lesser degree, national in origin. These different policy commitments provide a basis for setting biodiversity and ecosystem services objectives for REDD+ (see guideline 4) that would then indicate precisely what needs to be monitored. The following paragraphs outline some of these different policy commitments.

The Cancun decision on REDD+ has established safeguards one of which relates specifically to biodiversity and ecosystem services (-/CP.16 Annex I paragraph 2 (e)). The monitoring of this safeguard would need to establish whether REDD+ implementation is consistent with the conservation of natural forests and biodiversity, whether conversion of natural forests is taking place under REDD+, whether incentives for the protection of natural forests and their ecosystem services are being provided and, finally, whether enhancement of environmental benefits is achieved through REDD+. The results of this monitoring would enable countries to provide information on this safeguard is 'being addressed and respected' (Decision -/CP16, paragraph 71(d)) in the implementation of REDD+.

Most countries are signatories to MEAs, such as the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) or the Convention on Migratory Species (CMS). They may also have signed up to other statements, such as the *Non-legally Binding Instrument on All Types of Forests*. Some of their commitments under these instruments may be relevant to the risks and opportunities to biodiversity and the environment from REDD+.

Additionally, multilateral and bilateral donors investing in REDD+ may have their own requirements, provisions or standards with regards to forest biodiversity and ecosystem services. The UN-REDD Programme has prepared a draft set of Social and Environmental Principles and Criteria, which should be built into the national programmes receiving UN-REDD Programme funding. These principles and criteria are related to the UNFCCC safeguards but go into more detail to support countries in operationalising the UNFCCC decision on REDD+. The six principles include two social principles, one on coherence with the other social and environmental policies, and three environmental principles. Principle 4 deals with the protection and conservation of natural forests. Principle 5 deals with protecting and enhancing the multiple functions of forests and specifically suggests setting goals, developing management plans and monitoring in an adaptive management framework for biodiversity and ecosystem services. Finally principle 6 deals with minimising indirect land use change.

The Forest Carbon Partnership Facility (FCPF) also has provisions with regards to the environment. It requires countries to develop a social and environmental strategic assessment (SESA), in which it is required to consider which World Bank safeguards apply. Bilateral donors may also have

requirement. For example, environmental safeguards are built into Australia's development assistance programme (AusAID). Any project funded under this programme is required to undergo several environmental assessments and include an environmental management plan.

Countries may thus solidify their commitments through explicit adoption of REDD+ and/or forest carbon standards, such as those being elaborated under the UN-REDD Programme or those created by other schemes, such as the REDD+ Social and Environmental Standards.

Finally, many countries have national priorities and targets that REDD+ could directly contribute to through provision of multiple benefits; for example specific biodiversity targets or plans, such as National Biodiversity Strategies and Action Plans (NBSAPs) under the CBD, or relevant initiatives under their Sustainable Forest Management (SFM) schemes.

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GUIDELINE 4: Articulate specific objectives for biodiversity and ecosystem services under REDD+ based on the identified policy commitments.

Explanation

There is a need to move from general policy commitments (guideline 3), to specific objectives for biodiversity and ecosystem services that support the achievement of policy commitments. Once relevant policy commitments on biodiversity and ecosystem services have been identified, articulating clear objectives (e.g. in terms of being impact-orientated, measurable, time-limited and specific) will help to identify what needs to be measured and monitored.

For example, if a country's commitment to conserving its biodiversity includes the conservation specific species, for example great apes, a hypothetical biodiversity conservation objective in REDD+ could be 'the populations of great apes in the forest where the REDD+ "reducing deforestation" activity is being implemented do not decline during the time span of REDD+'. Such a formulation establishes what needs to be monitored (great ape populations in REDD+ forests) and the measure of success (populations do not decline/remains stable or increases).

There may need to be more than one objective for biodiversity and ecosystem services under REDD+ because both terms encapsulate many things; biodiversity covers ecosystems, species and genes, while ecosystem services include soil stabilisation, water provision and non-timber forest products.

Objectives can relate to avoiding harms or pressures, such as 'to avoid spread of invasive species during REDD+ implementation', or to promoting benefits, such as 'to increase tree species diversity during "enhancement of forest carbon stock" actions'. Objectives can also be attached to specific management measures, such as 'ensuring that natural disturbance regimes are maintained in forests managed under REDD+'.

B. DESIGN

Decide on the design of the monitoring

GUIDELINE 5: Consult with stakeholders at key stages of the monitoring.

Explanation

The UNFCCC COP decision requests that REDD+ implementation ensures participation of relevant stakeholders (-/CP.16 paragraph 72). Involving stakeholders at different stages of the monitoring helps not only ensure an effective monitoring strategy but also promotes acceptance, ownership, empowerment, awareness, and ultimately sustainability of the process.

According to the 'Guidelines on Stakeholder Engagement in REDD+ Readiness' (Draft November 17, 2010) by the UN-REDD Programme and FCPF, stakeholders are "those groups that have a stake/interest/right in the forest as well as those that will be affected either negatively or positively by REDD+ activities". With regards to the monitoring of the impacts of REDD+ on biodiversity and ecosystem services a subset of the broader REDD+ stakeholders are appropriate to consult. These stakeholders include:

- i. Those that can inform the monitoring; NGOs, government departments and research groups may be undertaking monitoring that can be useful to REDD+ (guideline 8) or provide technical input (guideline 7).
- ii. Those that may be involved in the undertaking of monitoring; such as the technical experts (guidelines 9 & 10) and forest communities (guideline 11).
- iii. Those that have an interest in the results of the monitoring; policy makers, those involved in forest management and NGOs will require the information for different purposes, such as reporting or adaptive management (guideline 12).

Relevant stakeholders in each of these groupings may vary according to the region and its circumstances. For example, where mangrove forests are important for REDD+, monitoring stakeholders may include officials from the fisheries department and local fishermen.

There are several stages where involving stakeholders in monitoring can be not only useful but necessary:

- i. *Scoping*: stakeholder workshops can help determine what the opportunities and risks from REDD+ are (guideline 2) and shape specific objectives for biodiversity and ecosystem services (guideline 4).
- ii. *Design*: stakeholder workshops can help identify or develop the appropriate indicators (guideline 6).
- iii. *Implementation*: stakeholder consultation can help create synergies with on-going work (guideline 8) and identify the appropriate groups that may be able to conduct actual monitoring (guidelines 10 & 11) and provide a forum to feedback the results of the monitoring (guideline 12).

GUIDELINE 6: Carefully select indicators or sets of indicators to inform on progress towards the selected objectives.

Explanation

An indicator is a measure based on verifiable data that conveys information about more than itself. Indicators need to be purpose dependent, otherwise their use is limited and so choice of indicator is crucial. Simple indicators can be derived directly from a single measured parameter (e.g. area of forest, water pH or number of species) or simple statements (e.g. whether a management practice is in place or not), while more complex indicators and indices can be developed from several parameters according to a set formula (e.g. the living planet index, one of the CBD biodiversity indicators, is a composite measure of different vertebrate population trends). Indicators should be:

- i. Specific (clear and unambiguous)
- ii. Measurable
- iii. Easy and cost-effective to measure, collect and/or calculate
- iv. Scientifically sound
- v. Sufficiently sensitive to detect change over time
- vi. Able to differentiate between natural cycles and anthropogenic change

The choice of indicators or sets of indicators will depend on what the objectives for biodiversity and ecosystem services under REDD+ are (guideline 4) and therefore what the information needs for those objectives are. The choice of indicator(s) will be affected by the complexity of the information needs, data availability and quality, the need for early warning and adaptive management, and finally the challenge of attributing cause and effect.

While articulating objectives should provide a clear indication of what needs to be monitored, the information needs attached to these objectives may be complex thereby requiring several indicators. For example, it may not be possible to have a more specifically articulated REDD+ objective for conservation of biological diversity in REDD+ forests. In this case a single indicator would reflect only an individual aspect of biodiversity; using several indicators would provide a clearer view of changes in biodiversity encompassing a greater range of its components. Conversely the objective may be specific, for example where improved water quality is sought from REDD+, but assessing the objective requires (or is best achieved from – see next point) several measures; particulate matter, biological oxygen demand and content of micro-organisms are all used as indicators to assess the quality of the water.

Data, and specifically its accuracy, reliability and availability, are an important factors determining indicator(s) choice. For example, where an objective in REDD+ relates to populations of a species, measurements for the indicator of population size may not give an accurate picture of what is happening to the populations; adding another indicator, such as change in habitat size or condition, may strengthen the findings or make them easier to interpret. Similarly having more than one indicator for water quality strengthens the reliability of the data. It is also important to consider the monitoring logistics for the data. The availability of data and resources to gather the data will also determine the choice of indicators (guidelines 7-11).

In order to provide early warning of changes that need to be addressed and also in order to manage impacts effectively, it is useful to include alongside indicators of the state or condition of the

monitored subject (often called 'state indicators'), indicators relating to things that may cause harm to the objective (often called 'pressure indicators') and indicators relating to measures undertaken to achieve the objectives (often called 'response indicators'). For example, by the time a decline in species numbers is detected, it may be too late to address the situation (either because of sensitivity of the indicator or because of time lags). In this case including pressure indicators, such as change in habitat size or condition, or hunting, can provide earlier warning of adverse impacts. Moreover, threats and pressures are often easier to monitor than states. As another example, for the objective of sustainable resource use, using response indicators (e.g. harvest rate) alongside state indicators (e.g. state of resource or population growth rate) would allow adaptive management.

Finally, establishing for certain whether it is the REDD+ activity that is having an effect (be it positive, negative or nonexistent) on the stated objective is challenging. For instance a change in the number of species in a forest where a REDD+ activity is being implemented may not be ultimately attributable to REDD+. It may then be necessary to monitor not only the state of the subject of interest (e.g. species population) but also pressures (e.g. hunting) and responses (e.g. number of patrols made in the forest). This is because if you just measure the subject of interest, there is no indication as to whether a change is due to REDD+ implementation or not. However, if you can also monitor pressures and responses, it may be clearer whether changes in either pressures or responses correspond to changes in the state of the subject of interest.

The development of indicators for any chosen objective is usually an iterative process that includes a testing phase. This is important as the proposed indicator may not ultimately provide the right information (guideline 12). However, for some objectives, there already exist proven indicators fulfilling the six criteria mentioned above that can be drawn upon or adapted as necessary. For example, there are standard indicators of water quality that can be used.

GUIDELINE 7: Be realistic about what is feasible in monitoring the impacts of REDD+ on biodiversity and ecosystem services.

Explanation

It is very important when choosing indicators and designing a monitoring scheme for the impacts of REDD+ on biodiversity and ecosystem services to consider the feasibility of its design and implementation. Feasibility has three important but interrelated aspects: technical, financial and human resources.

The technical feasibility of monitoring the impacts of REDD+ on biodiversity and ecosystem services will limit what indicators are selected and how they are measured. The science and understanding around biodiversity and ecosystem services is not fully developed and therefore limits what indicators can be used for these. Moreover, undertaking measurements for selected indicators may be limited by the technical capability of current technology.

Financial considerations are a central but not necessarily ultimate aspect of feasibility. While having a comprehensive suite of indicators covering all aspects of biodiversity, ecosystem services may be desirable, it may not be realistic. Indeed, past experience has shown that using large numbers of indicators can generate unwieldy data requirements, bureaucracy and high demand for resources, which combine to inhibit effective monitoring. It is important therefore to choose a small set of indicators. If a chosen indicator requires specialised equipment, trained technical staff and/or lengthy analyses, there is a strong chance that the lack of resources, capacity and budget may prevent its implementation. This requires financial consideration not only of equipment, data collection and training, but also of data storage, data analysis and reporting.

Human resources considerations relate in part to the financial aspects of resources and capacity to undertake the monitoring. However, motivation, willingness, ability and availability to be involved in implementing the monitoring are also crucial in their own right. Involving stakeholders can mitigate this issue (see guideline 5).

Some of these obstacles may be overcome by building synergies with other on-going monitoring (see guidelines 8). Taking all these issues into consideration will inevitably change the design of the monitoring to what is feasible rather than what is desirable.

C. IMPLEMENTATION

Decide on the form of the implementation of the monitoring

GUIDELINE 8: Make use of existing monitoring activities. If necessary and feasible adapt existing monitoring activities.

Explanation

Monitoring relevant to biodiversity and some aspects of ecosystem services and the environment is currently being done by a number of institutions at international, regional, national and local levels, though not necessarily in the most useful forms for the REDD+ context.

Government agencies in many countries may already collect environmental data, such as data on water quality, because this information is important to human well-being. Such data may be relevant to determining the impacts of REDD+. Meteorological data, usually gathered on a regular basis in most countries, can also be used for formulating indicators; for example relating to water regulation services and soil stabilisation (e.g. rainfall data is can be used in calculating run-off and flooding).

Many countries have established National Biodiversity Strategy and Action Plans (NBSAPs), and may have associated ongoing biodiversity monitoring. In some cases, the monitoring schemes established to generate these indicators may also provide data relevant to monitoring biodiversity benefits from REDD+. Similarly, the data gathered in National Forest Inventories (NFI), especially if these contain biodiversity or ecosystem health data, can be used. Alternatively, NFIs could be modified so as to include relevant data on biodiversity or ecosystem services.

Non-governmental organisations (NGOs) may collect regular information that could be tapped into. For example, wildlife/conservation organisations may regularly monitor species' populations. NGOs may also collect information on resource use and livelihoods, which may be useful for indicators relating to ecosystem services, such as the provision of non-timber forest products, or for pressure indicators.

Research institutions may also be involved in long-term data collection. This could include not only field-based measurements and socio-economic data collection but also remote sensing data collection. Information sources vary in the extent and scale of their coverage and, especially in the case of research organisations, ease of access to the information. For some regions or topics, networks exist to bring together monitoring information.

Making use of and further refining current monitoring efforts could provide information pertinent to both REDD+ and other initiatives, resulting in clear synergies. However, gaps in many current monitoring schemes, as well as their different objectives, mean that it is likely to be necessary to collect extra information to determine the impacts of REDD+ on biodiversity and ecosystem services. Synergies could also be created by working with relevant stakeholders. The ongoing collection of data and calculation of indicators may require building the institutional and technical capacity for this work. This capacity may not exist within a single agency, and may also require the establishment of partnerships between non-governmental and governmental agencies.

GUIDELINE 9: Make use of other REDD+ monitoring to gather data on the selected biodiversity and ecosystem service indicators.

Explanation

The monitoring of greenhouse gas (GHG) emissions is central element in the REDD+ mechanism. Furthermore, monitoring the social impacts of REDD+ will also be important, since the Cancun decision on REDD+ includes social safeguards. The monitoring of impacts on biodiversity and ecosystem services may be able to draw on some of the information generated from the GHG monitoring, as well as on any monitoring of the social impact.

A national forest monitoring system for REDD+ will entail monitoring the different REDD+ activities to establish changes in forest carbon stocks and greenhouse gas (GHG) emissions. Such monitoring will involve collecting information on land use and land use change and information that can be used to estimate carbon density, through remote sensing, field-based measurements or a combination of both. Remote sensing can be used to derive indicators pertinent to biodiversity and ecosystem services (guideline 10). Using the same remote sensing data acquired for GHG monitoring for biodiversity monitoring would be a cost-saving solution. Field work for determining carbon stocks can provide data that could be directly used. For example, tree species information can be also used in biodiversity indicators, while information on dead wood (one of the carbon pools) can give an indication of ecosystem maturity and diversity. Additionally, these field work trips could provide an opportunity to collect additional data specifically for biodiversity and ecosystem services, and their associated harms.

The UNFCCC REDD+ safeguards also address issues of governance, social benefits and Indigenous Peoples' rights, and respect and engagement of local communities. Social indicators are collected either using data from ongoing monitoring, such as national censuses, or through non-measurement-based techniques, such as interviews, questionnaires, focus groups or document analyses; while governance monitoring involves analysis of institutions and processes. Nevertheless, monitoring for the social and institutional aspects of REDD+ can also be used for monitoring the impacts of REDD+ on biodiversity and ecosystem services. Natural resource use, for example, can be both an environmental and social indicator for REDD+. Indeed, a single indicator can inform different purposes. For example, the number of roads can be an environmental pressure indicator, or a livelihood indicator (access to markets). It is therefore worth taking these different needs into consideration when choosing indicators for REDD+ (guidelines 6 & 7). Furthermore, if on the ground data collection is ongoing for social indicators, collecting relevant qualitative information for biodiversity and ecosystem services would generate synergies.

GUIDELINE 10: Make use of remote sensing data to establish ecosystem scale indicators.

Explanation

Scale is an important consideration in monitoring. The appropriate data collection method for biodiversity and ecosystem services and harms will depend on the most appropriate scale for the chosen indicator. For indicators of change in biodiversity and ecosystem services at broader scales, e.g. ecosystem or watershed scale, remote sensing (RS) can generate the required data. RS is any method that collects information about the Earth's surface from a distance. In some cases RS can provide broad scale information at a cheaper and faster rate than ground-based measurements. Furthermore, due to its vantage point, and the assortment of sensors that are available, many different types of data and indicators can be collected.

In the context of REDD+, RS 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, alien species, fire occurrence, productivity and extent of watersheds. RS can also provide indirect data for indicators. For instance, an estimation of change in forest area provided through RS, especially if the type of forest is known, will give an indication of change in biodiversity, even though the relationship between area and biodiversity is not linear. Data on land use change derived from RS can also be used in conjunction with modelling to provide estimates of change in the hydrological regime. The information collected by RS will depend upon its resolution and type of sensor so that quite varied data and indicators can be generated.

The use of RS data is still a resource intensive monitoring method, requiring technical staff to analyse and validate the data, but it can generate very useful information at the national and subnational scale. Therefore, making use of on-going monitoring using RS (guideline 8-9) may be most cost-effective.

GUIDELINE 11: Recognise that communities can play an important role in monitoring the impacts of REDD+ on biodiversity and ecosystem services.

Explanation

Community monitoring is the involvement of people living close to the forest in collecting data pertinent to specific indicators. The COP decision -/CP.16 paragraph 72 “requests developing country Parties, when developing and implementing their national strategies or action plans, to address, inter alia, [...] 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.”

Community monitoring has been used for monitoring biodiversity in a number of developing countries. Furthermore, in many countries, local people play a significant role in managing forests. In Viet Nam, for example, 25% of forests are under community ownership. Including monitoring alongside management would ensure cost-effectiveness as well as the potential for adaptive management.

Community monitoring is likely to require some training with its associated costs, but end costs are significantly less than employing technical staff. Accuracy of measurements made by local people can be similar to those of experts. However, technical staff may still be required to collect some information, depending on the indicators chosen, and especially that related to remote sensing validation field visits.

Community monitoring would be particularly useful for monitoring biodiversity and ecosystem service indicators that are relevant to the local community in question, such as resource use and resource yield, and pressure indicators important to the community, such as hunting and other disturbances. It would also be important to consider community monitoring for collecting information for other indicators where little training is involved, or for those that require community participation (e.g. focus groups).

GUIDELINE 12: Ensure that the results of the monitoring are communicated in the right form to the appropriate audience.

Explanation

It is important to consider who the target audience for the results of the monitoring is. There may be different audiences with different needs. We can distinguish four categories of information needs:

- i. *Policy needs:* decision-makers need to be able to use the results of the monitoring for policy interventions. The information therefore needs to be presented as clear messages and facts relevant to national (and international) decision-making.
- ii. *Environmental management:* forest managers need the results of the monitoring to adapt their REDD+ management interventions. The information needs to be detailed and specific to inform local and subnational interventions.
- iii. *Reporting needs:* different policy commitments may have different reporting needs. However, information needed for the UNFCCC is likely be clear national level information for respect for REDD+ safeguards. Additionally some of the results of the monitoring could be used to report for other policy commitments (e.g. CBD).
- iv. *Broader interests:* this category encompasses all other stakeholders that have an interest in monitoring the impacts of REDD+ on biodiversity and ecosystem services. How the information is presented therefore depends on the audience: simple and clear for a broad audience and more detailed for a research audience for example.

Ensuring that the results are presented to different audiences in the right form to meet their needs is vital. The choice of indicators, how they are presented and explained play a large role in this because indicators are primarily communication tools. The level of information presented will depend not only on the audience but also appropriate to the question that needs answering. For example, an indicator showing the change in forest biodiversity at the national level may be useful for reporting to the UNFCCC whether REDD+ is consistent with the conservation of biodiversity. It will not be useful, however, for the forest manager at the local scale to find out how biodiversity is changing with respect to specific REDD+ interventions. In both these examples, it is possible that a single indicator will not be enough to give the full story on the impacts of REDD+ on biodiversity (see guidelines 4 & 6). Furthermore, indicators by themselves provide only a partial understanding (indication) of an issue. They always need some analysis and interpretation of why they are changing and how those changes relate to the system or issue as a whole.

The presentation of results is important because different people respond differently to presentation, and some forms of data are better suited to particular forms of display. For example, graphs, maps, tables, statistics and key messages could all be used to convey the results of an indicator.

Finally, it is also important to relay the results of the monitoring to stakeholders not only for these to be used but also to further refine indicators with them if necessary. Feedback with stakeholders will determine the usefulness and clarity derived from an indicator. Consultations with stakeholders can determine whether issues arise due to the indicator not being the right one, not being well communicated, not sensitive enough, whether it may require additional indicators to answer the question or whether in fact the processes creating a change in the indicator are not properly

understood. This feedback therefore allows the indicators and monitoring to be adjusted accordingly to provide for the information needs of different audiences.

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