Participatory Biodiversity Monitoring for REDD+

Considerations for national REDD+ programmes

KEY MESSAGES

1. **Monitoring biodiversity impacts** of national programmes, including REDD+ can contribute information on how countries are achieving the objectives of multilateral environment agreements, and existing national policies.
2. **Safeguard information systems** for national REDD+ programmes can benefit from the information provided by participatory biodiversity monitoring (PBM) approaches.
3. **PBM can benefit REDD+** programmes as a relatively cost-effective and sustainable component of national forest monitoring systems.
4. **PBM can empower and encourage** local stakeholder engagement in REDD+ processes and contribute to the full and effective participation of stakeholders, in particular women, indigenous peoples, and local communities.
5. **REDD+ schemes that can demonstrate biodiversity benefits** may be more attractive to gain support for the actions.
6. **PBM is likely not to be the best solution** in situations where complex equipment or expertise is needed to collect the data or where abstract indices of biodiversity are applied.

1 Why monitor biodiversity in REDD+?

REDD+[1] has the potential to benefit biodiversity, but there are also several potential risks (see Box 1). Monitoring the biodiversity impact of REDD+ can help ensure that risks are mitigated and benefits achieved. Additionally, the results of monitoring may help in demonstrating compliance with international conventions and agreements.

In recognition of these potential risks and benefits, the United Nations Framework Convention on Climate Change (UNFCCC) requested countries to promote and support a set of safeguards for REDD+. These form Appendix I of the 2010 Cancun Agreements, and include the request that "[REDD+ activities are] *consistent with the conservation of natural forests and biological diversity, ensuring that actions… are not used for the conversion of natural forests, but are instead used to incentivize the protection*

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[1] Reducing Emissions from Deforestation and forest Degradation, plus conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries

Box 1: Potential benefits and risks to biodiversity from implementing REDD+ activities (SCBD 2011)

REDUCING DEFORESTATION, FOREST DEGRADATION and CONSERVATION OF FOREST CARBON STOCKS

Benefits – retain the existing biodiversity and ecosystem services of the remaining forest and reduce pressures on biodiversity that are associated with fragmentation and loss of forest area. Decreasing degradation can reduce pressures on forest resources so that forest biodiversity and ecosystem services may recover.

Risks – displace conversion and extractive use pressures to lower carbon forests and to non-forest ecosystems due to continuing need for the production of food crops, pasture or biofuel, negatively impacting the biodiversity and ecosystem services these areas provided. Management activities could have unintended impacts (e.g. fire control could impede natural disturbance processes).

SUSTAINABLE MANAGEMENT OF FORESTS

Benefits – contribute to ensuring the long-term maintenance of forest resources that are already in use, e.g. by controlling from where and how much timber can be extracted

Risks – depends on the definition of sustainable use, which is not yet characterized in detail by the Parties to the UNFCCC. REDD+ revenues rewarding this activity could promote harvesting in unlogged areas.

ENHANCEMENT OF FOREST CARBON STOCKS (afforestation, reforestation and forest restoration)

Benefits – great potential, e.g. by increasing the connectivity between patches of intact forest; or reducing pressure on existing forest by providing alternative sources of wood products.

Risks – could result in low biodiversity, impact ecosystem functioning and promote spread of invasive species if monoculture plantations, non-native species, and unsustainably high inputs (e.g. water, fertilizer, etc.) are used; can harm important non-forest biodiversity and ecosystem services if implemented in places not previously forested.

and conservation of natural forests…". The UNFCCC also requested REDD+ countries to develop a system to provide information on how these safeguards are addressed and respected, a Safeguard Information System (SIS). This decision does not specifically mention monitoring. However, countries may choose to use information from biodiversity monitoring as a contribution to their SIS.

Biodiversity monitoring within REDD+ will be part of wider monitoring that is required within the UNFCC; including National Forest Monitoring Systems that aim to meet the UNFCC convention requirement of countries to provide "detailed information on its policies and measures ..., as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases" (UN-REDD Programme 2012).

Additionally, the Convention on Biological Diversity (CBD) encourages parties to "support the strengthening of inventorying and monitoring of biodiversity and ecosystem services at appropriate scales in order to evaluate the threats and likely impacts of climate change and both positive and negative impacts of climate-change mitigation and adaptation on biodiversity and ecosystem services", along with providing advice on the application of REDD+ safeguards (Decision XI\19, Hyderabad 2012).

2 What is Participatory Biodiversity Monitoring?

PBM is an approach to biodiversity monitoring that aims to engage different stakeholders, from national government to the grassroots level (see Box 2). It can work in a range of forest tenure arrangements or management and governance systems: from public- or private-owned management boards contracting local people to perform certain monitoring functions, through to community forest management, where the State provides technical outreach services to villages managing their own forestland. PBM can be used to collect data on a range of indicators of biodiversity impact, through a variety of data collection protocols.

2.1 Why use participatory biodiversity monitoring in REDD+?

PBM can contribute to tracking the **biodiversity impacts** of a national REDD+ programme, and potentially provide input into a national REDD+ SIS. PBM can also help in identifying and observing biodiversity impacts of REDD+ at the site level, improving local natural resource management through generating data that can inform decision making through adaptive management. The effectiveness of biodiversity monitoring can be improved

Box 2: Defining characteristics and aspirations of PBM

- Engages different stakeholders, from national government to the grassroots level;
- Recognizes the rights and knowledge of local stakeholders, particularly women, indigenous peoples, and local communities and takes into consideration the gender-differentiated knowledge and use of forest;
- Applies indigenous and/or local knowledge;
- Uses the skills of local stakeholders, particularly forest managers and local government officers;
- Is not restricted to any particular forest tenure arrangement or management and governance system. Its application can range from public- or private-ownership through to community forest management;
- May employ several technical data collection protocols, for a variety of biodiversity indicators.

Source: adapted from Swan (2012)

through using valuable local knowledge. Data collected and managed by local stakeholders can contain both location and context specific information, identifying how and where biodiversity is changing, and under what conditions. Hence, PBM data can be relevant to local management needs as well as help to attribute biodiversity change to specific REDD+ interventions, which may not be possible from remote sensing data.

PBM can also strengthen stakeholder engagement, helping REDD+ activities to meet the 'full and effective participation of relevant stakeholders' and 'respect for the knowledge and rights of indigenous peoples and local communities' safeguards within the Cancun Agreement, as well as the requirement to respect gender considerations. Through fostering a direct link between monitoring and management of forests, PBM has the potential to create and stimulate dialogue between State and non-State actors on conservation priorities, resource use and forest management interventions, for instance, by encouraging constructive discussions on access to and use of resources (Mueller et al. 2010).

The **costs and sustainability** of PBM can compare favourably with those of conventional forester/ ecologist-executed monitoring. PBM can be more cost effective and collect data more frequently than involving external (non-local) technical experts due to lower labour, transport, subsistence and accommodation costs (Danielsen et al. 2011, Oldekop et al. 2011). On the other hand, initial investment costs of PBM may be high due to the need to train local stakeholders in data collection techniques. Additionally, most scientist-executed biodiversity monitoring projects in developing countries tend to have a short lifespan (Gardner 2010). Ensuring local stakeholder and government interest is maintained is important for sustaining monitoring schemes over time (van Rijsoort et al. 2010). Including participatory approaches in biodiversity monitoring schemes may help ensure continued local stakeholder engagement.

An illustration of PBM application to a national REDD+ programme is being piloted in Viet Nam (Box 3).

Box 3: Piloting participatory forest monitoring in Viet Nam

Viet Nam has developed a National REDD+ Action Programme (approved in 2012), which indicates participation as the key principle in monitoring the impacts of REDD+ implementation. The Viet Nam Administration of Forestry, together with local government and community stakeholders in the province of Lam Dong (southern Viet Nam) are now piloting a model of participatory forest monitoring (PFM). The initial focus has been on participatory carbon monitoring, building on preliminary piloting by SNV and the UN-REDD Programme in this province. SNV and VNFOREST will continue piloting, integrating PBM in 2013 and participatory monitoring of social impacts of REDD+ from 2014 onwards (Swan 2012). In parallel, UN-REDD is supporting the national and local stakeholders to pilot a participatory governance assessment (PGA) in the same province. The Programme has also undertaken a Gender Analysis to identify the local context in which REDD+ stakeholders are operating, to analyse their roles, needs, priorities and opportunities within their given socio-economic and political context. Such an analysis can help identify: the gender-defined differences in access to and control over resources; power dynamic between women and men; and different social, economic, and political inequalities and opportunities faced by women and men in areas affected by, or potentially affected by, REDD+.

Pleione Orchid in Moss Forest © Jeremy Holden, SNV

2.2 Where, when and how to use participatory biodiversity monitoring

PBM is likely to be most relevant where local stakeholders are actively involved in forest management and where the information needed to monitor the biodiversity impact of REDD+ is relevant for local resource management.

But PBM schemes are not suitable in all areas and contexts and cannot answer all questions related to the impact of a national REDD+ programme on biodiversity. To assess some aspects of the biodiversity impact of REDD+, a broader monitoring programme is needed. Information from other types of monitoring needs to complement that gathered through PBM. For example, remote sensing is most appropriate for collecting certain data on a large scale, for example country-wide land use change data.

PBM is likely not to be the best solution in situations where complex equipment or expertise is needed to collect the data or where abstract indices of biodiversity are applied. As with any biodiversity monitoring approach, several issues need to be considered in selecting what indicators and areas will be monitored using PBM, including, but not limited to: scale, attribution and bio-geographical differences.

Scale – all aspects of biodiversity in all areas probably cannot be monitored. There is a need to decide which impacts should be monitored in which areas (i.e. just in certain REDD+ activity locations or more widely). Indirect impacts especially, can occur over a wider scale and so information from outside or the edge of forests may be needed for assessing them. PBM may be most relevant in areas where local people are actively engaged in REDD+ activities.

Attribution – it is important to understand what particular changes in biodiversity are due to what drivers and activities, in order to attribute particular changes in biodiversity to REDD+ policies and measures. Monitoring drivers of change, including through PBM, in addition to monitoring the changes in biodiversity can help in attribution. Participatory monitoring can facilitate attribution in general terms, as it employs local actors with knowledge of local context. That knowledge can be applied in explaining changes in biodiversity detected through indicator-based monitoring, and whether these changes can be attributed to REDD+-financed activities. Participatory application of 'Theory of Change' has been proposed (and applied at the project level) as one method of demonstrating attribution of changes in biodiversity to REDD+ (Dickson & Kapos 2012; Richards & Panfil 2011).

Bio-geography – different species and ecosystems are found in different places. So, the impacts of REDD+ on biodiversity may vary spatially, and alternative indicators may need to be monitored across locations. Additionally, a decline in numbers of a species is likely to have very different consequences in different locations, depending on the specific species undergoing decline and its function in the ecosystem from which it has been lost. For example, the decline in a tree species that is the main food source for a rare/endangered animal in one area may be more important than changes in the same tree species elsewhere. Hence, location-specific information can be important for understanding the impact of REDD+ on biodiversity.

PBM © SNV Viet Nam

3 What are the concerns about participatory biodiversity monitoring?

Differing local and national expectations

Local and national stakeholders may have divergent expectations of PBM (Table 1) due to different priorities and information needs. Varying information needs may require different indicators and monitoring methods. These differences need to be reconciled if a successful PBM system is to be developed. It is important to select indicators and methods that can meet both local and national needs.

Indicators for national REDD+ programme applications will need to demonstrate changes in biodiversity that can be attributed to REDD+-financed activities and are, therefore, totally dependent upon the specifics of each countries' (or territories') REDD+ strategy. Local stakeholders, on the other hand, will be concerned with indicators of changes in local natural resources relevant to local or household economies, or subsistence, e.g. non-timber forest products. Reconciling the different objectives of (strategic) national and (tactical) local demands on monitoring data, together with the challenge of aggregating localised data into (subnational and) national datasets, are key challenges for a PBM approach.

Although differing local and national expectations can be a challenge for PBM, a participatory approach has the potential to reconcile local and external (national and international) agendas through the collaboration required to effectively operate and benefit from the monitoring work. By engaging local stakeholders in sharing functions and responsibilities, PBM also has the potential to contribute to improved forest governance.

Data quality

Data generated through PBM can be of comparable quality to that gathered by experts (Danielsen et al. 2011, Oldekop et al. 2011). However, concerns about data quality arising from PBM may be one of the reasons PBM has not been more widely adopted (Rist et al. 2010). There is the potential for PBM to produce lower quality data if people are not well trained, for example in tree species identification.

The use of data standards, protocols and quality control measures can help ensure reliability of data. Developing these is an important task within the development of a reliable PBM system (see section 4, table 2).

Table 1 National and local and expectations of participatory biodiversity monitoring

National expectations	Local expectations
• Information can inform *strategic* decision-making	• **Information is valuable to local-level *tactical* decision-making**
• Information gathered in different areas is comparable and can be combined for national summaries	• **Information meets specific requirements and takes into account local priorities**
• Information can be used to meet requirements of communication progress towards international conventions and agreements	• **Information enables more adaptive and sustainable management of natural resources**

Establishing protocols and standards for data collection and management from local to national level can ensure consistency and comparability between information from diverse locations. Data quality assessments can cover a number of aspects of importance for overall data quality, including the completeness, whether all relevant data has been entered and whether the agreed data collection protocol appears to have been followed. Analysis, including spatial and temporal comparisons, of the PBM data can help identify anomalies that are beyond the normal or expected range. Independent verification may also be used including random spot-checks or the use of high resolution remote sensing images (Danielsen et al. 2011). The quality of PBM data may also be improved by capturing different valuable and specific knowledge, for instance indigenous people's knowledge and also gender-differentiated knowledge.

Tenure and rights

The land ownership and access or use regimes, coupled with management system type and scale, can influence the feasibility for implementing PBM, the stakeholders involved, and the incentives to undertake PBM. A lack of clarity in tenure and rights presents uncertainty in who should receive benefits from REDD+ including through PBM. It is important that different tenure scenarios and management objectives are accommodated in planning PBM as part of a national forest monitoring system for REDD+.

Box 4: Incentives for local people to engage in PBM

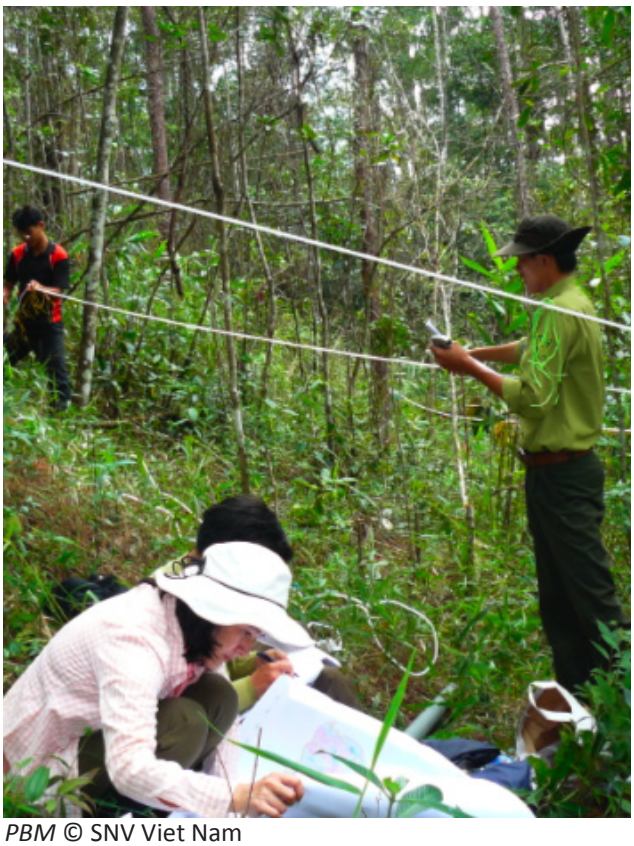
1. Creation/stimulation of dialogue on resource use among local stakeholders, as well as between local stakeholders and the national government (Mueller et al. 2010);
2. Increase of stake and legitimacy in management decision-making processes with regard to resources that are important to their livelihoods (Oldekop et al. 2011, Rist et al. 2010);
3. Improvement of natural resource management through informed decision making utilising monitoring data, in turn rewarding local people with more sustained harvests of higher quantity and/or quality; and
4. Attraction of external financing for the management of an area (Yasué et al. 2010).

Incentives

Although PBM could be more cost-effective than expert-based monitoring, there are still costs involved. One potential concern is how to incentivise and sustain participation in PBM, and ensure participants are compensated for their participation in PBM. Case studies suggest that the most frequent risk to the sustainability of PBM is that it is being considered as too time consuming over the medium and long term (van Rijsoort et al. 2010. There are different potential incentives for PBM (Box 4).
One additional issue of concern is if payments are linked to results, this could potentially provide an incentive to report false positive trends, so that rewards can be obtained, even if the biodiversity of an area is in actual decline (Nielsen & Lund 2012). Carefully considering the incentives for PBM and including spot checking may ensure the quality control.

4 What is needed for participatory biodiversity monitoring?

In carrying out PBM for REDD+, a series of tasks need to be undertaken, including the development of a system for data collection and data management. A key part of PBM is the participation of local stakeholders in tasks, but certain tasks will also need to be implemented at the national level in order to ensure consistency in approaches so that



PBM © SNV Viet Nam

Table 2 Overview of generic tasks to be undertaken at national (N), sub-national (S) and local (L) levels in development and implementation of participatory biodiversity monitoring as part of a national REDD+ programme

	Operational level		
Task	**N**	**S**	**L**
Objective setting			
Identification of the main biodiversity benefits and possible risks from REDD+	X		
Review of existing biodiversity information and monitoring systems	X	X	
Identification of key objectives for biodiversity monitoring for REDD+	X	X	X
Identification of possible synergies with other monitoring schemes, including for REDD+	X		
Framework design			
Identification of possible biodiversity indicators to measure identified objectives	X	X	X
Identification of appropriate data collection methods	X		X
Development and establishment of information management systems	X	X	X
Development of data quality measures: data protocols, standards and quality assessments	X	X	X
Assessment of PBM cost and management of PBM budget	X	X	X
Assessment of needs for and development of PBM incentives	X	X	X
Assessment of influence of land tenure situation on PBM feasibility		X	X
Implementation			
Identification of participants to collect the data		X	X
Training of participants			X
Establishment of sampling plots, transects, and other sampling units in the landscape			X
Biodiversity data collection			X
Data recording and analysis	X	X	X
Communication of monitoring results to different audiences	X	X	X
Use of monitoring data for planning and adaptive management	X	X	X

the data can be used and combined nationally (Table 2). The detailed order in which the tasks need to be carried out and the organizations undertaking them will vary depending on the setting.

One important task in establishing a PBM system is identifying relevant existing monitoring systems already operated within developing countries. PBM should ideally build upon and complement other existing monitoring schemes, to allow best use of limited resources and increase the feasibility of monitoring. Identifying the overall objectives for biodiversity monitoring within REDD+ along with more specific site-level PBM capacities to meet these objectives is also essential. If the monitoring is intended to inform a SIS, the indicators will need to be aligned with the relevant Cancun safeguards and any specific national interpretation of these.

Once the objectives have been identified, indicators, data protocols and procedures to manage the data and ensure its quality need to be developed (Tucker et al. 2005; Evans & Guariguata 2008). Integration of PBM with any other biodiversity monitoring system for REDD+ can help ensure compatibility and avoid duplication of effort when, for example, developing data management systems.

A range of data collection methods and protocols may be implemented through PBM (Box 5) (ANSAB 2010; Evans & Guariguata 2008; Tucker et al. 2005). Different methods are likely to be relevant depending on the main objectives identified for PBM. The data collection protocols for PBM methods may benefit from new and sophisticated digital technologies (smart phones, tablet computers, digital camera traps, etc.). Hand-held digital devices can supply information directly to databases, removing the need for data to be transcribed, although they require a substantial initial capital investment and maintenance can be a challenge. The protocol used will also depend on local level PBM capacities, which can vary significantly from one place to another. Case studies suggest simplicity in methods may be paramount, and the use of pencil and paper datasheets often remains the most effective option.

Finally, a strong local REDD+ monitoring team requires a committed and competent group of community members, and a participatory, transparent, and inclusive selection process to choose these people is critical.

Box 5: Indicative data collection methods for PBM, their advantages (+) and disadvantages (-), as applied to national REDD+ programmes

Using permanent temporary sample plots that have been set up for forest biomass assessments

+ Infrastructure is already in place, can decrease operational costs and avoid duplication of effort

- Sites selected for biomass monitoring may not be representative of ecosystems that need to be monitored

Field observation records of indicator species (or indirect evidence thereof)

+ Can encourage local REDD+ stakeholders to be observant of changes in the use of forest resources and the abundance of species

- Individuals may spend different and inconsistent amounts of time observing biodiversity during patrols, so can be difficult to compare data gathered by this method and to correct for effort

Village group discussions (a non-indicator based method)

+ Can encourage dialogue between local REDD+ stakeholders on the status of forest resources and management, and can enhance local ownership of the monitoring system

- Is unlikely to provide the kind of information needed for national and international information provision on biodiversity impacts of REDD+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The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the specialist biodiversity assessment centre of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organisation. The Centre has been in operation for over 30 years, combining scientific research with practical policy advice.

The SNV REDD+ programme has been established in 2009 and identified three main intervention areas necessary to make REDD+ work, while supporting the poor and enhancing biodiversity. The SNV REDD+ team of experts pilot interventions in these areas in selected countries across Asia and Africa.

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