Linking community monitoring to national Measurement, Reporting and Verification for REDD+

Policy approach on REDD+ calls for community monitoring

The Cancun Agreements of CoP16 encourage Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation, reducing emissions from forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest stocks (a policy approach generally known as REDD+). In this regard Parties are requested to ensure full and effective participation of Indigenous Peoples and local communities in REDD+. The agreements do not refer to the role of communities in monitoring per se, although the SBSTA is asked (in Appendix II) to develop modalities for MRV for the five activities mentioned, taking into account methodological guidance in accordance with decision 4/CP15 (Copenhagen, December 2009). Decision 4/CP15 refers directly to the role of communities in monitoring, in article 3, which states that the CoP *encourages, as appropriate, the development of guidance for effective engagement of indigenous peoples and local communities in monitoring and reporting*. This follows directly from earlier work by the SBSTA which recognized (at SBSTA30, Bonn, June 2009) the *need for full and effective engagement of indigenous peoples and local communities in, and potential contribution of their knowledge to, monitoring and reporting of activities relating to (REDD+)* and, furthermore, encouraged *the development of guidance for effective engagement of indigenous peoples and local communities in monitoring and reporting.* Thus it is clear that the Parties to the UNFCCC consider that community monitoring can play an integral part in MRV for REDD+ and should be explored as appropriate.

Many rural communities are already engaged in forest management

The idea that local people could monitor carbon stocks in their forests makes sense in the context of the fact that around 20% of the world´s forests are de facto owned and/or managed by communities; in Mexico, for example, 70% of the forest area is the legal property of communities. There is now widespread understanding that communities can often be more effective than governments in managing natural resources, provided there are enabling conditions present, particularly as regards clear rights to at least a part of the forest products. Programs in which communities have been engaged in forest management are well established in a large number of countries, for example in Nepal, India, Indonesia, Tanzania, Kenya, Mozambique, Mexico, Vietnam and several Amazon countries, although these represent a variety of different local governance regimes. It is significant that the majority of REDD+ plans submitted by countries to donors for REDD+ Readiness assistance include some form of community forest management as an element in their overall strategies. Different regimes are likely to result in different REDD+ outcomes (Table 1). If communities are to be involved in REDD+ through managing their forests more sustainably, a logical step may be to involve them also in monitoring.

Workshop explores potential to link community monitoring to national MRV systems

In response to this policy need, the Facility Management Team of the Forest Carbon Partnership Facility (FCPF), with financial support from the Global Environment Facility (Box 1), joined forces with the *Centro de Investigaciones en Geografía Ambiental, Universidad Nacional Autonoma de México* (CIGA-UNAM) to organize a workshop, which took place in Mexico City in September 2011. Sixty-five people from more than 15 countries took part, representing the MRV teams from national REDD+ programs in Africa, Asia and Latin America, indigenous community organizations, NGOs and technical experts. Entitled ´Linking community monitoring to national MRV for REDD+´, the purpose of the workshop was to reach consensus on the specific functions of community monitoring and how data generated by communities at the local level could support and enhance national MRV systems. It built on a body of published work on community monitoring (Box 2), and on the experience of the participants, many of whom have been actively engaged in community monitoring, and its main findings are summarized here. The final report of the workshop can be accessed together with all the presentations and papers, at www.ciga.unam/redd/events.

Table 1: The REDD+ outcomes of different community forest management regimes

Type of community forestry/governance regime	Reducing emissions from deforestation	Reducing emissions from forest degradation	Conserva-tion of forest carbon stock	Sustainable manage-ment of forests	Enhance-ment of forest carbon stock	*Notes*
Community, collaborative and participatory forest management on state land; management plans ensure off-take of forest products within sustainable limits, in return for community rights to these products (Nepal/Tanzania/Viet Nam/Kenya/Indonesia model)	Medium/low	High to very high	Medium	Medium to high	High	Highly dependent on administra-tion and allocation of rights to communities
Community management on land owned by communities, incentivized by subsidies from government for improved management and conservation - may involve sustainable extraction of timber and non-timber products, and conservation (Mexico/Costa Rica model)	Medium	High	Medium to high	Medium to high	Medium to high	Highly dependent on subsidies for sustainability
Indigenous peoples´ reserves – typically involves large forest areas, low population densities, where rights to ancestral lands formally recognized , deterring incursions by external loggers etc (Amazon model)	High	Medium to high	High	Low to medium	Low	Needs strong support from government to overcome external pressures

Note: Countries have different approaches to community forest management, and many of these are more effective in reducing degradation and promoting forest enhancement than in reducing deforestation. Source: Expert workshop *Linking community monitoring with national MRV for REDD+*.

Box 1

The Forest Carbon Partnership Facility (FCPF) is designed to pilot incentive systems for REDD+, providing a source of financing for the sustainable use of forests the more than 1.2 billion people who depend to varying degrees on forests for their livelihoods. It builds the capacity of developing countries in tropical and subtropical regions to reduce emissions from deforestation and forest degradation and to tap into any future system of positive incentives for REDD+. http://www.forestcarbonpartnership.org.

The Centro de Investigaciones en Geografía Ambiental (CIGA) of Universidad National Autónoma de México is based in Morelia, Mexico, and carries out research and teaching in environmental geography. An ad hoc work group entitled CIGA-REDD is engaged in developing MRV systems for use at local and national level, in research on the processes underlying deforestation and forest degradation, and on the potential for community monitoring of environmental services. http://www.ciga.unam.mx/redd.

The Global Environment Facility (GEF) provides grants to developing countries and countries with economies in transition for projects related to global environmental issues, including biodiversity and climate change. The GEF has financed over 300 projects and programs focusing on forest conservation and management, and has recently strengthened its support for forests by investing in projects that address both climate change and improved management of all types of forests. http://www.thegef.org.

Community monitoring is reliable, effective and economic

Local people and communities, as users of the natural resources in their vicinity, are usually familiar with the state of the forest, and if they are actively engaged in forest management under REDD+, this knowledge could be very useful. Research by the *Kyoto: Think Global, Act Local* program has already shown that communities may be trained to use standard forest inventory protocols for carbon stocks following IPCC recommended procedures, and that this is as reliable, but very much cheaper than, expert inventories, meaning that the transaction costs of REDD+ may be reduced if communities do the monitoring themselves (Table 2). The fact that there is a large workforce available at the community level means that data can be collected across scales not otherwise feasible and at regular intervals, for example, annually. Although systematic forest inventories will be necessary for full national carbon accounting, intensive monitoring at the local level in forests managed by communities can provide a valuable additional source of information on rates of forest enhancement for example.

Community monitoring enhances ownership and motivation

The engagement of communities in monitoring may also strengthen their rights and their stake in REDD+. In generating and ´owning´ the relevant data, communities may legitimize more strongly their claim to REDD+ incentives and rewards. The availability of the data may also form the basis for a fair distribution of benefits from REDD+, and may also help to alleviate fears that communities will be marginalized or dispossessed of their forest rights through REDD+. Finally, gathering of data on changing carbon stock in forests may also encourage better management, and the data may be used by the communities themselves to plan management activities.

Community monitoring enriches the national carbon database

Data gathered by communities in areas for which they are responsible can also be used to densify stock assessments in national forest inventories (that is, to provide data at much higher intensity in selected areas), supporting the information gathered in the basic grid. This will gradually contribute to richer national databases, particularly as these tend to be weakest on data relating to gradual changes in stock levels. If collected following standardized protocols, community data on stock change should be able to feed directly into national forest carbon accounting databases.

Table 2: The relative advantages of expert and community-based monitoring of carbon stocks

Monitoring component	External Consultants	Local Community Residents
Cost	High professional fees, travel and accommodation costs	High initial set-up and training costs followed by substantially lower salary, travel, accommodation costs over time
Local knowledge	Usually poor. Local guides and translators usually needed	Good. Residents typically know the area well in terms of access, logistics, local authorities, laws, and species names
Data quality	Good	Good, but dependent on appropriate training and data verification
Consistency	Potentially low if same consultants cannot continue with monitoring over lifespan of project	Potentially high if same team members or at least the same coordinators can be maintained
Intensity	Usually low. Too costly to spend long periods in field.	Good. Even if sampling is done part-time, substantial travel and set-up time is saved
Value addition	Low. Usually limited to technical input and project documentation compilation	High. Project success depends on local resource users. Monitoring by locals creates ownership.
Spin-offs	Maybe for consultants' business, not for community.	Participation adds to the skills levels and capacity of local residents. Possible spin-offs to other community PES activities
Management	Expected to be good	Potential area of concern in many communities.
Logistics	Consultants' flights, vehicles and accommodation costs are high. In remote areas, costs escalate when vehicles are needed.	If locally organized is cheaper and more appropriate, e.g. working by foot or animal can be effective because field surveys are spread over time.
Initial inputs, e.g., time	Low. Assumption is that professional teams need relatively little preparation time	High. Takes more time to identify, train and equip teams
Collection of socio-economically important data	Generally poor. Very challenging to understand local socio-economy and culture, time-consuming to collect the data	Good. In-built knowledge of local economy and culture; easy to collect initial information and monitor changes

Source: A review paper which summarized findings from a range of studies: Knowles, T. et al. (2010) Preparing community forestry for REDD+: engaging local communities in the mapping and MRV requirements of REDD´. In: Zhu, X et al. (2010) *Pathways for Implementing REDD+; experiences from carbon markets and communities*. UNEP Risoe Centre CD4CDM.

The niche for community carbon monitoring: assessing stock changes within forests

As Table 3 shows, changes in forest area due to deforestation and reforestation can be captured easily and cost-effectively at national level using remote sensing technology, but ground level information is nevertheless required for signaling change events and for validating/corroborating data, and communities may contribute to this. An even more important role of community monitoring, however, is in assessing changing stock levels in forests over time. Degradation is often caused by (unmanaged) community uses of forest, and forest enhancement is often the main result of improved community management (as shown in Table 1), and assessment of these processes involves measurement of stock at regular intervals. These changes cannot be assessed in sufficient detail using remote sensing, and data from national forest inventories is usually too sparse to capture the

impacts of management at the community level. The areas monitored by communities will be patchy, as not all forest is managed by them, but the data will be essential in areas where community management is to be rewarded as an element within the national REDD+ program.

Box 2: Research on community carbon monitoring

Among the many studies that have been made concerning the feasibility of community monitoring of carbon stocks are the following:

Kyoto Think Global, Act Local program (www.communitycarbonforestry.org), which based its conclusions on a study of 39 sites in 7 countries over 6 years. See also Skutsch, M (2011) Community forest monitoring for the carbon market. London: Earthscan

Danielsen, F. et al (2011) At the heart of REDD+; a role for local people in monitoring forests? *Conservation Letters* 4 (2) 158-167

Knowles, T. et al (2010) Preparing community forestry for REDD+: engaging local communities in the mapping and MRV requirements of REDD´. In: Zhu, X. et al (2010) *Pathways for Implementing REDD+; experiences from carbon markets and communities*. UNEP Risoe Centre CD4CDM.

Palmer Fry, B. (2011) Community forest monitoring in REDD+: the M in MRV? *Environmental Science and Policy* 14 (2) 181-187

Rana, E.B. et al (2010) Participatory carbon estimation in community forest: methodologies and learnings. *The Initiation* 2 (1) 91-98

Bey, A. (2009) Using technology to enable community based forest monitoring; from theory to implementation challenges and opportunities for REDD+ monitoring. Helveta White Paper, 11pp.

Table 3: How community-based monitoring may contribute within a national MRV system for REDD+

Forest Change Activity		Monitoring Options at National Level	Potential Contribution of Community Based Monitoring
Reforestation		• Remote sensing • National forest inventory • Monitoring through forestry companies	• Acquiring/signaling the location, time, area and type of change events (in near real time) • Ground level measurements for local implementation (i.e. of reforestation plots) • Independent local reference for national/other data sources
Deforestation		• Remote sensing • National forest inventory	
Forest degradation	Commercial activities, incl. selective logging	• National forest inventory • Commercial companies (i.e. harvest estimates) • Remote sensing	
	Wild fire	• Remote sensing, national forest inventory	• Acquiring/signaling date, area and type of change event (near real time)
	Subsistence forest use incl. fuel wood, charcoal, community forest management etc.	• Very limited historical data • Rough estimates using gain-loss methodology • National forest inventory data not sufficiently detailed	• Regular ground level measurements and reporting of forests and carbon stocks • Tracking growth/decrease of local activities (drivers)
Forest enhancement	Increases in biomass due to REDD+ activities at local level		

Note: The primary role of community-based data is in measuring changes in stock levels at the local scale, since such changes are often small compared to the total stock and take place gradually (including both losses and gains). Community data may also be valuable in signaling change events and can serve to corroborate and densify information derived from national forest inventories. Source: Input Paper no 1 for the Workshop: Pratihast and Herold (2011): Community based monitoring and potential links with national REDD+ MRV.

Carbon monitoring involves a number of different tasks, some of which can be carried out by communities

Following the general advice provided by IPCC Good Practice Guidance, there are five main tasks associated with carbon monitoring in forests: (1) mapping and geo-referencing the boundaries of the area under consideration, if this is not already established, and subdividing it into relatively homogeneous forest strata; (2) establishing a system of permanent plots; (3) regular measurement of the biomass in each plot (at minimum for above ground biomass, involving identification of species, diameter at breast height, tree height);(4) calculation of the carbon stock per plot and overall in the forest; and (5) assessment of leakage (emissions displacement). There is increasing evidence that communities can deal adequately with the majority of these tasks, given some basic training and initial supervision (Box 2).

There are at least five manuals available to support community level forest inventory (Box 3), some of which include mapping as an activity and some which restrict themselves to instructions for biomass measurements. User friendly software for mapping is available for use in handheld computers and even smart phones (Box 4), but simple maps drawn on paper by local people can also be geo-referenced. It has been shown that community members with 4-6 years of primary education and no prior experience of computers can be taught to use these applications in as little as half a day. Training in taking biophysical measurements can also be imparted easily to villagers who quickly appreciate the need for accuracy in measurement. Calculation of carbon from these parameters can be carried out automatically if the data is entered directly into the handheld device during the inventory itself, provided suitable allometric equations have been installed in the device.

Box 3: Training materials for communities

Several manuals for training communities in carbon monitoring are being used by REDD+ countries:

Woods Hole Research Center
http://www.whrc.org/resources/fieldguides/carbon/pdf/chapter6.pdf

The KTGAL project
http://www.communitycarbonforestry.org/, the link is under Resources, Community Monitoring

The Nepal-based network ANSAB
http://www.ansab.org/wp-content/uploads/2010/08/Carbon-Measurement-Guideline-REDD-final.pdf

UN REDD Vietnam
http://www.un.org.vn/en/component/docman/cat_view/130-un-viet-nam-joint-publications/209-climate-change-joint-un-publications.html

Winrock International
http://www.winrock.org/ecosystems/files/carbon.pdf

Setting out the permanent plots however necessitates a level of expertise not usually available in rural communities, since it requires statistical manipulation of preliminary data to determine the standard error in the estimate of mean carbon stock, so that necessary sample size can be calculated. Technical assistance would therefore be required to support this task. Once the number of permanent plots needed is established, they need to be laid out in a randomized systematic pattern across the whole forest area, which will also need technical skills not yet present in all communities. Leakage assessment may also be difficult for local communities to assess, since it would require not only taking measurements in nearby areas to which forest extraction activities may have been displaced but also assessments of wider impacts involving substitution of forest products.

For a consistent approach, and to ensure that data from all communities is compatible with national data needs, clear protocols would be required, laying out exactly how the different tasks are to be carried out, in terms which can be well understood by the communities and their technical assistants.

Box 4: Supporting technology for community carbon monitoring

A variety of hardware/software packages have been developed for use in local level carbon monitoring, with the aim of mapping and geo-referencing the data gathered, for example:

Google´s Open Data Kit, developed by the University of Washington, uses Android mobile devices to collect data in an offline environment with an app called ODK Collect.

Cybertracker, first developed for use by animal trackers, has been adapted for local level REDD+ monitoring using smartphones.

ESRI´s ArcPad programme has been used with HP iPAQs and other PDAs and tailor-made databases with dropdown menus for easy data entry.

Community monitoring for safeguards

Community monitoring need not be limited to carbon assessment. It is equally important in the context of safeguards, both social and environmental. Communities may self-evaluate the impacts of REDD+ initiatives on their well-being and on the health of the forest, generating data which is highly specific yet essential in assessing the success of REDD+ at the national level in achieving its broader goals. Local knowledge may complement scientific indicators of biodiversity and ecological variables in a very positive way, and if communities make these assessments themselves, the evaluation should better reflect local values and priorities. Research indicates that communities possess the skills to monitor both environmental and social variables in their local areas (Box 5). Ample evidence was also presented at the workshop concerning communities´ abilities in this regard. Indigenous laws, knowledge, cultures and customary practices should be respected in the development of safeguards, while at the same time principles of equity, including gender equity, need to be taken into account. The difficulty is that there is no unanimity about what data need to be gathered. A number of sets of indicators have been developed by different organizations concerned with REDD+ and sustainable management in general, but many of these are driven primarily by scientific rationale and most have not been designed with community monitoring in mind. Of those available, the REDD+ Social and Environmental Standards developed as part of an initiative launched by the Climate, Community and Biodiversity Alliance and CARE may be considered the most robust and best suited for community use. But an underlying difficulty is that the situation varies greatly from place to place, both as regards physical conditions and social values, hence establishing a standardized set of indicators is impossible. Some basic indicators could be based on international treaties such as the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and

Box 5: Research on community monitoring of other environmental and social variables

There have been a large number of studies evaluating the capacity of local communities to gather data on biodiversity and other environmental indicators, as well as on social impacts. These include:

Burgess, N. et al (2010) Getting ready for REDD+ in Tanzania; progress and challenges. *Oryz* 44, 339-351

Danielsen, F. et al (2005) Special thematic issues: Monitoring matters; examining the potential of local level approaches. *Biodiversity and Conservation* 14, 2507- 2820 (collection of papers, 313 pp)

Danielsen, F. et al (2009) Local participation in natural resource monitoring; a characterization of approaches. *Conservation Biology* 23 (1) 31-42

Danielsen, F. et al (2010) Environmental monitoring; the scale and speed of implementation varies according to the degree of peoples´ involvement. *J. of Applied Ecology* 47, 1166-1168

Berkes, F. et al (2000) Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10, 1251-1262

Moller, H. et al (2004) Combining science and traditional ecological knowledge: monitoring populations for co-management. *Ecology and Society* 9 (3)

on principles of Free, Prior and Informed Consent (FPIC). However, given the difficulties of developing a standardized set of indicators, countries may first need to reach consensus on an institutional structure for managing the safeguards process, including the establishment of bodies to make decisions and to deal with grievances.

Community monitoring and national MRV development have mutually supportive benefits

National REDD+ MRV can benefit from community monitoring in various way, particularly in terms of obtaining data on local level stock changes and impacts of REDD+ activities. This data will be valuable in carbon accounting especially for reduced degradation and forest enhancement; it may sharpen the estimates of rates of change and increase the level of confidence in these estimates, and provide excellent information on the non-carbon impacts of REDD+. For community monitoring to function well as an integral element within the national MRV system, however, there is a need for governments at the national level to formally define the role of community forest monitoring within the REDD+ MRV system and to develop the necessary institutions, training and protocols to set it in motion. Before communities commit themselves, it is likely that they will also need information on future benefit sharing mechanisms under REDD+, so that they can make rational choices as to whether or not to participate.

All protocols for monitoring should be based on IPCC Good Practice Guidance and be internationally acceptable, but need to be presented in a way that can be easily understood at the local level. The protocols should include instructions for mapping, sampling, measurement, data storage and reporting. The reporting structure should be well defined, with clear communication channels so that the data can be entered into national databases, and there should be a clear code of ethics regarding who can access the data for what purposes, since it may in some cases be confidential (for example information on land tenure and rights). Many communities may need support in dealing with conflict situations under REDD+ and legal status of land may have to be determined before monitoring for REDD+ can go ahead.

It is clear that national governments need to (i) take the lead in clarifying the role communities will play in MRV and developing the necessary institutions, training and protocols, and (ii) support an inclusive and participatory process with regard to the development of environmental and social safeguards that include monitoring by local communities and indigenous groups. To promote this, the need for the involvement of communities and indigenous groups specifically in monitoring for REDD+ should be underlined at the level of the UNFCCC.

FOR MORE INFORMATION

Prepared on behalf of the World Bank Carbon Finance Unit (Forest Carbon Partnership Facility) by the *Centro de Investigaciones en Geografía Ambiental, Universidad Nacional Autonoma de México* (CIGA-UNAM). Comments are welcome: fcpfsecretariat@worldbank.org. For more information, please contact Alexander Lotsch (Forest Carbon Partnership Facility, The World Bank) at alotsch@worldbank.org , or Margaret Skutsch (CIGA-UNAM) at mskutsch@ciga.unam.mx.