Community-based Monitoring, Reporting and Verification (MRV): An assessment in the Oddar Meanchey Community Forestry REDD+ Site, Cambodia

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List of Acronyms

ANR	Assisted Natural Regeneration
CDA	Children Development Association
CCBA	Climate Communities and Biodiversity Alliance
CBM	Community Based Monitoring
CF	Community Forestry
CFMC	Community Forestry Management Committee
CFN	Community Forestry Network
FA	Forestry Administration
FCPF	Forest Carbon Partnership Facility
FPIC	Free Prior and Informed Consent
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
HCV	High Conservation Value
IPCC	Intergovernmental Panel on Climate Change
MRV	Monitoring Reporting Verification
MCF	Monks Community Forest Forestry Association
NGO	Non-Government Organization
OM	Oddar Meanchey
PDD	Project Design Document
REDD	Reducing Emissions from Deforestation and Forest Degradation
REL	Reference Emissions Level
RGC	Royal Government of Cambodia
SMS	Short Message Service
SOP	Standard Operating Procedures
TGC	Terra Global Capital
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCU	Verified Carbon Units

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Executive Summary

The monitoring of forests is an activity that has traditionally been conducted by external professionals using strict scientific methods. More recently, many of these monitoring responsibilities have been devolved to local communities, through participatory and locally appropriate methods of measurement. As the development of monitoring, reporting and verification (MRV) systems is underway in countries implementing the Reducing Emissions from Deforestation and Degradation (REDD+) mechanism, there is increasing evidence that community based monitoring (CBM) can be a vital data source in MRV. Involving local communities in MRV can make important contributions to national REDD+ MRV efforts while delivering benefits which are of value locally.

Cambodia is at an important stage of its REDD+ readiness process, with a host of management structures and mechanisms being established to support the national REDD+ program. While estimates show that only 3% of forest carbon stocks in Cambodia are under community forest management, the National Forest Program outlines the Royal Government of Cambodia's (RGC) policy commitments to expand community forestry to cover two million hectares[1] and create 1000 legally recognized community forests by 2030. The program also identifies community forestry as the preferred forest management model for engaging in REDD+. Given this significant commitment to community forestry in Cambodia and the important role that it will play in REDD+, local communities have an important stake in participating in the design and implementation of REDD+ MRV systems. CBM can also play a key role in addressing two of the four main REDD+ Readiness components; stakeholder engagement (participation & decision making) and ensuring the multiple benefits of forests and REDD+.

Data gathered by local communities and grassroots NGOs can provide detailed information on the effectiveness, efficiency and equity of REDD+ implementation on the ground. The suitability of CBM to REDD+ projects will vary according to a number of factors, such as the local context of the project. Likewise, if community-based MRV is not implemented correctly, there are also a number of potential risks and disadvantages, related to data accuracy and social exclusion. With the necessary safeguards, however, the benefits of community based MRV in REDD+ forestry projects include: improved forest management at the local level; enhanced local ownership over the REDD+ process which contributes to project success and sustainability; increased efficiency of MRV activities; greater opportunities to monitor degradation and forest enhancement; and the support of local livelihoods and REDD+ co-benefits through employment and capacity building. Without specific attention, these important benefits and local perspectives might not be included in national monitoring systems. In Cambodia, there is an important need to ensure that there are procedures in place at the subnational and national level that allow local communities to contribute to and inform the implementation of MRV activities.

The lessons learned on CBM from demonstration projects such as the Oddar Meanchey Community Forestry REDD+ (OM CF REDD+) Project can provide crucial insights to national REDD+ decision makers and help ensure that policies are supporting the role of communities in MRV. As the OM CF REDD+ Project is the most advanced REDD+ project in Cambodia, being the first community based mosaic REDD+ project in Asia to achieve VCS registration and CCB validation, the lessons learned from this project can play a crucial role in informing best practices for CBM throughout the country and the region.

CBM has played an important role in the OM CF REDD+ Project, and the monitoring framework and Work Plan that have been developed for the project have placed important emphasis on the role communities will play in MRV during REDD+ implementation. CBM in the OM CF REDD+ Project has so far involved a range of activities, including: capacity building

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[1] The National Forestry Programme sets this goal. Currently legalized CF's cover approximately 141,000 hectares.

activities for participatory monitoring; community participation in forest inventories, biodiversity assessments and forest patrolling; community patrol reporting through the use of the Frontline SMS mobile phone reporting system; and participatory use and analysis of project data.

These activities have demonstrated the integral contributions local communities can make to MRV requirements. They have also highlighted the important steps to ensure community involvement is best supported, and the challenges that can arise when trying to integrate a community driven monitoring approach into a very formalized, top down and technocratic data regime. The need to focus skill-based training and capacity building on a select group of community monitors, establish a feedback communication system for community generated data, and allow flexibility in adapting CBM processes to the local context, are some of the key lessons that have been learned in this process. The importance of ensuring CBM is supported with adequate financing, is gender inclusive and supports strong local leadership are also important findings from the OM CF REDD+ Project's experience.

As the current national REDD+ Roadmap lacks clear objectives and activities on how community involvement in the MRV process will occur, there is an important need for the roles and responsibilities of communities in the MRV process to be formally clarified and supported. It is important that the REDD+ Taskforce, the Royal Government of Cambodia (RGC) and other REDD+ stakeholders developing the national strategy on REDD+ put in place the necessary institutions, training and protocols needed for the effective integration of CBM into the national MRV system. Reflecting on the experience in Oddar Meanchey and other REDD+ forestry projects around the world, support for CBM will require: the development of standards and guidelines at the national level to support community data collection; training activities to strengthen the capacity of forest-dependent communities to engage in CBM; the development and dissemination of CBM training materials and equipment; consultations and workshops on the CBM of social and environmental safeguards; the inclusion of an advisor on CBM in the national REDD+ structure; the incorporation of gender mainstreaming in the national strategy on CBM; and the documentation, use and sharing of lessons learned from the CBM experiences of REDD+ demonstration projects in Cambodia.

Overview

As MRV systems have developed around the world, it has become increasingly apparent that the skills and knowledge local communities possess in regards to forest management can play an important role in contributing to and strengthening MRV systems (FCPF 2011). This is especially the case in REDD+ projects where local communities are actively engaged in forest management. Research has also shown that communities possess the skills to monitor environmental and social variables in their local areas, and that their knowledge of local circumstances puts them in the best position to design and conduct these assessments (Burgess et al 2010). This report will critically analyze the benefits and potential challenges of CBM within the context of Cambodia's current state of REDD+ Readiness. Policy prescriptions will be made based on lessons learned from the OM CF REDD+ Project and experiences other REDD+ implementing countries have had with CBM.

The report will firstly provide an analysis of the potential benefits of CBM based on a review of the current literature. The disadvantages, limitations and challenges to CBM will then be discussed, along with suggestions on how these challenges can be overcome and how CBM and national MRV systems can best be linked. This section will help to place the current situation in Cambodia within the broader global context, as a way of demonstrating the potential outcomes of CBM in Cambodia.

The current state of REDD+ Readiness in Cambodia will then be reviewed, with a specific focus on Cambodia's MRV requirements and the capacity gaps that currently exist. Following this, the case of the OM CF REDD+ Project will be discussed, which will involve a review of the projects MRV requirements and the important role that communities have played in addressing them. This section will document the lessons learned and the challenges that have been faced in engaging community participation in the projects various monitoring activities. Lastly, the study concludes with a list of policy recommendations on how CBM can best be supported in Cambodia's national REDD+ implementation process.

REDD+ and MRV

A key issue in the REDD+ negotiations is the development of a credible MRV framework. Knowing the amount of emissions that can be avoided, reduced or captured, measuring carbon, reporting on progress and verifying this process are key parts of planning and implementing an effective REDD+ mechanism. Similarly, being able to monitor and report on the livelihood impacts that REDD+ projects have on local communities and indigenous peoples, such as the rights of access to resources and the distribution of income from REDD+ projects, is crucial to ensuring the positive socio-economic and environmental co-benefits that are anticipated from REDD+ (Angelsen and Atmadja, 2008). Furthermore, having a system in place to gather reliable and up-to-date information on the state of forest resources and other relevant indicators will play a key role in supporting decision-making for REDD+ policies and

> **Box 1: What is MRV?**
> MRV is the term ascribed to all forms of monitoring and reporting activities that are part of the REDD+ process, encompassing actions taken to measure, report and verify forest area change, carbon stocks and the social and environmental impacts of REDD+ projects. These MRV activities are key to developing countries rights to receive payments for REDD+ implementation, in that they provide evidence of 'results based actions'. The United Nations Framework Convention on Climate Change (UNFCCC) has identified MRV as one of the most critical elements necessary for the successful implementation of any REDD+ mechanism. According to the deliberations under the UNFCCC, MRV will need to *"transparently generate consistent and as far as possible accurate and complete estimates of carbon emissions and enhanced removals using comparable methodologies, and providing information on safeguards"* (UNFCCC 2009).

programs.

Why should communities be involved in REDD+ MRV processes?

High level policy commitments to CBM

The need for ensuring the involvement of local communities in the MRV process has been articulated at the highest policy levels. For example, decision 4 of article 3 of the Conference of the Parties (COP) 15, refers directly to the role of communities in monitoring, in stating that the COP "*encourages, as appropriate, the development of guidance for effective engagement of indigenous peoples and local communities in monitoring and reporting*". Additionally, the UN-REDD Programme Strategy (2011-2015) also expresses commitments to "*finding means of integrating local and Indigenous communities in MRV activities*", through targeted and ongoing support to National Programmes related to capacity building, guidelines, and technical assistance (UN-REDD Programme 2011).

CBM can strengthen accuracy and cooperation in developing national carbon databases and MRV systems

Data gathered by local communities can make significant contributions to national forest inventories and provide important value to national MRV systems (See Box 2). The information generated by CBM can act as an important additional data source to verify and compare with national forest inventory data being compiled by other sources such as remote sensing. In particular, data on the rates of change in forest degradation and forest enhancement could be a useful contribution to national databases, provided that the relevant data collection training is offered and standardized protocols are followed (FCPF 2011). Greater accessibility to forest areas allows communities to conduct more regular monitoring of REDD+ required data, which works to improve the statistical and scientific reliability of the results and can sharpen estimates on the rates of change in forest degradation and enhancement (FCPF 2011).

> **Box 2: Pilot Project - Participatory Carbon Monitoring for REDD+ in Vietnam**
> In Lam Dong Province of Vietnam, a participatory carbon monitoring (PCM) pilot project has involved the training of local community members into PCM teams made up of ten to fifteen people. These teams have been responsible for conducting basic forest measurements on the various carbon pools and then reviewing the collected data to make preliminary data conversions into forest biomass and carbon. The data collected is being used to build and strengthen the National Forest Inventory (NFI). This project has shown that local community members can be trained to conduct accurate carbon measurements and that this data can make important contributions to national forest inventories. This approach to carbon monitoring is currently being expanded to other districts in Vietnam as part of the national UN-REDD program.
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> *Source: UN-REDD Programme Vietnam (2011). Piloting Participatory Carbon Monitoring in Vietnam. http://vietnam-redd.org/*

By enhancing the interaction between different stakeholders involved in the REDD+ mechanism, CBM can also help to strengthen the social capital required for the REDD+ mechanism to work. For example, experiences with PCM in Vietnam found that 'collaborative work experience will promote a culture of cooperation between forest owners/communities, local government officers and national institutions responsible for other tasks related to PCM' (UN-REDD 2011). By fostering greater social cohesion amongst project stakeholders and community members, CBM can help to achieve an important co-benefit of the REDD+ mechanism.

CBM can be efficient

The benefits of involving local people in monitoring forest resources have long been proven, with a host of effective tools developed to assist with these initiatives[2]. With regards to MRV, ground truthing biomass assessments require trained personnel such as professional foresters which can incur significant costs on REDD+ projects. There is therefore a strong incentive to train and involve local people in forest carbon monitoring in order to reduce the significant transaction costs incurred by the use of external experts. Along with requiring fewer resources to conduct field assessments, CBM also enables real-time information to be provided on change events in the local area. Gaining timely information on the location, time, area and type of change events such as forest fires and other drivers of deforestation, for example, could be of considerable value to REDD+ projects (Pratihast & Herold 2011).

Community monitoring can be accurate

Many examples exist that show communities can carry out MRV activities in an effective manner[3], and that the data gathered can meet the requirements of the highest reporting tier of the IPCC. With proper field equipment and training, local communities can measure basic variables such as diameter at breast height (DBH), tree height, tree species and tree count, and can do this on a regular basis[4] (FCPF 2011, Danielson et al 2011). A study by Danielson et al (2011) on community forest biomass monitoring in India, Tanzania and Madagascar found that the data collected by local communities was of a level of precision comparable to that produced by professional forest inventory staff. To support community level forest inventory work, a number of organisations have prepared training manuals (see Box 2) that include instructions on both mapping and biomass measurements in accordance with IPCC approved standards.

CBM increases local ownership

A considerable degree of the criticism towards the REDD+ mechanism has

> **Box 3: Training materials for community monitoring in REDD+**
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> 1. The KTGAL project
> *A Field Guide for Assessing and Monitoring Reduced Forest Degradation and Carbon Sequestration by Local Communities*
> http://www.communitycarbonforestry.org/, the link is under Resources, Community Monitoring
>
> 2. The Nepal-based network ANSAB
> *Guidelines for measuring carbon stocks in community-managed forests*
> http://www.ansab.org/wp-content/uploads/2010/08/Carbon-Measurement-Guideline-REDD-final.pdf
>
> 3. UN REDD Vietnam
> *Technical Manual for Participatory Carbon Monitoring*
> http://www.un.org.vn/en/component/docman/cat_view/130-un-viet-nam-joint-publications/209-climate-change-joint-un-publications.html
>
> 4. Woods Hole Research Center
> *Field Guide for Forest Biomass and Carbon Estimation*
> http://www.whrc.org/resources/fieldguides/carbon/pdf/chapter6.pdf
>
> 5. Winrock International
> *A Guide to Monitoring Carbon Storage in Forestry and Agroforestry Projects*
> http://www.winrock.org/ecosystems/files/carbon.pdf

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[2] See Management Oriented Monitoring System (MOMS) http://www.orc.ub.bw/biokavango/content/management-oriented-monitoring-systems-moms-tubu-joint-management-pilot-site
[3] See Danielsen et al. 2011, Danielsen et al. 2010, Verplanke and Zahabu 2009
[4] In the Siem Reap Community Forestry REDD+ Proejct, local community members were trained by Pact to conduct household surveys, Pact staff believed that this process went well and that the social data collected was very accurate as the local volunteers knew the local context

been based on the grounds that REDD+ will be implemented by national governments and will further disenfranchise local people from tenure rights over forest resources (Chhatre & Agrawal 2009). By providing a role for local communities in REDD+ implementation, CBM can address some many of the criticisms that have been levelled towards REDD+. Ensuring that there is strong local involvement in the design, implementation, and use of MRV activities can help build the sense of trust and responsibility that local communities have towards the project. It can also enhance the relevance of the data that is being generated and the communities feeling of ownership over this data and the overall monitoring process.

CBM can improve local livelihoods

CBM tasks could provide important opportunities for local employment and income streams, which could be a much better use of carbon generated revenues than the distribution of compensation payments (FCPF 2011). In this way, CBM could work to strengthen the claims that local communities have over the benefits generated by REDD+ projects, while building skills and capacity at the local level contributing towards the goals of sustainable forest management.

Community engagement is critical in forest management

In developing countries, nearly 240 million people live in tropical forests (Peskett et al 2008). In addition to this, nearly 20 percent of the world's forests are owned or managed by local communities. In some countries this rate is much higher, such as in Mexico, for example, where 70 percent of forests are legally owned by local communities (FCPF 2011). The increasing decentralisation of forest management reflects growing awareness of the important role that local communities can play in managing natural resources. The majority of REDD+ Readiness plans devised by countries looking to gain involvement in REDD+ programs have incorporated a commitment to community forestry as an element in their overall strategy (FCPF 2011).

CBM can improve forest management

"Locally-based monitoring schemes often reinforce existing community-based resource management systems and lead to change in the attitude of locals towards more environmentally sustainable resource management" (Danielson et 2005).

Studies have shown that involving local communities in monitoring is positively correlated with improvements in forest management (Gibson et al 2005). Greater involvement in MRV activities for REDD+ implementation would enable communities to have a better understanding of the state of the forest and carbon stocks, MRV requirements and other activities relevant to the REDD+ project. Local communities generally hold important knowledge of the natural resources in their area which could be very useful to MRV and REDD+ implementation (Topp-Jorgensen et al 2005). For example, indigenous knowledge systems, such as knowledge on local tree species, wildlife and weather systems, could play an important role in sustainable forest management. Data collected by local communities could assist them in planning management activities and adapting interventions based on regularly recorded data. Furthermore, the enhanced presence of local people in forest areas could also help deter illegal loggers and poachers (Danielson et al 2010).

CBM is key to measuring forest degradation

In developing countries, forest uses such as fuel wood and timber extraction, charcoal production and livestock grazing make up a significant proportion of the loss in forest carbon. In the Brazilian Amazon, for example, 20 percent of total emissions are caused by forest degradation (Asner et al 2005). Furthermore, it has been estimated that degradation in the OM CF REDD+ Project accounts for up to one-quarter of forest carbon loss in the project area (TGC 2011). Studies have shown that the significant technical, financial and human capacity requirements needed to measure degradation accurately could render carbon credits financially unviable (Lubowski 2008). The involvement of community members may thus be the only economic way of gathering the data necessary for REDD+ countries to be able to claim credits for reduced degradation.

Villagers from Sorng Rokavorn CF remeasure a biomass inventory plot

Disadvantages, limitations and challenges to CBM

There are a number of potential disadvantages and risks associated with CBM that need to be taken into account in the design of these systems for REDD+ projects. One of these is the incentive that it could provide to local communities to overstate the condition of the forest, or the size of carbon measurements, as a way of securing a larger stream of payments for carbon credits. Regular third party verification to monitor results will help to overcome this problem. This could involve conducting regular statistical analysis on the community-gathered data, to help isolate any irregularities in the growth rates of trees, for example (FCPF 2011).

Another disadvantage is that governments could be accused of avoiding their monitoring and reporting responsibilities and the costs involved, and forcing them upon poor local communities. For example, vulnerable communities could be subjected to exploitative contracts, with the benefits generated by these activities being captured by elites (Danielson et al 2011). Ensuring that REDD+ implementation follows guidelines and legal standards such as Free Prior and Informed Consent (FPIC) can help prevent this from occurring. The social exclusion of certain community members and groups from participation in monitoring activities is also a risk.

The potential for CBM will depend on the local context

Another limitation is that CBM will only be available in areas where communities are present and actively engaged in forest management and REDD+ activities. The extent to which REDD+ projects can benefit from CBM will thus depend on a number of factors, including the type of REDD+ project that is being initiated, the involvement of community members in forest management and community development, and the existing relationship of affected communities with government agencies and institutions. The commitment and efficacy of local monitors in carrying out MRV activities, along with the capabilities of intermediary organisations assisting with training and capacity-building, will also vary significantly depending on the local and national context. These factors will all have an impact on CBM outcomes. A variety of protocols have been established to help overcome these challenges and assist with assessing the suitability of CBM for REDD+ projects (Danielson et al 2011). These

protocols outline the positive attributes required of the different stakeholders that would make local monitoring appropriate to the project. They can be used to help with the preliminary planning and implementation of local monitoring schemes.

Linking CBM with national MRV systems

Another important uncertainty that exists is the extent to which CBM will be integrated and linked into national MRV and REDD+ programs. In several REDD+ countries, stakeholders engaging in CBM at the subnational and local levels have been neglected in the national process due to significant institutional constraints (RECOFTC 2012). To allow for the effective integration of CBM with national MRV systems, it is important to ensure that the necessary institutions, training and protocols are in place to enable subnational and local level stakeholders to have meaningful and systematic inputs into the national MRV policy process. In Mexico in 2011, the Forest Carbon Partnership Facility funded a workshop on how CBM can contribute to national systems of MRV. More than 65 participants attended from 15 different countries. One of the sessions involved the participants identifying the key gaps and barriers to integrating CBM with national MRV systems. The four categories they came up with are illustrated in Table 1. Ensuring that there are policies in place at both the national level and international level to address these barriers will be key to allowing CBM to function effectively and make important contributions to national MRV systems.

Table 1 – Potential barriers to linking CBM with national MRV

Technical barriers	Social barriers	Financial barriers	Communication barriers
Local capacity to measure and monitor/special skills	Internal conflicts in the community, elite capture, social exclusion	No rewards for monitoring at present	'Different Languages' (technical/local)
Need for materials and equipment	Tenure and social problems	No certainty about rewards for carbon in the future/need clear definition of rewards now and in the future	Communities see things holistically, not in terms of carbon
Need for a clear protocol/data needs are not clear yet	Political problems at the State level		Lack of knowledge at community level about rights
Need clear reporting framework/tools for reporting (to national level)	Danger of carbon cowboys and false expectations	Need clarity on benefit sharing within community and between different levels	Sensitivity of safeguards data (biopiracy)
Lack of technical support and information	Fear of exploitation by outsiders/who will be making use of our data, for what purposes? Who owns the data?	Need to de-link monitoring from rewards system	The REDD discourse has raised high expectations which may not be met.
Safeguards indicators need to be locally defined	Top down approach to governance does not encourage local participation		Low literacy levels
Community projects cover only limited			

parts of the country´s forests			

(Source: FCPF 2011)

Having presented the benefits and disadvantages to CBM, and provided an overview of developments and experiences elsewhere in the world, this paper will now review Cambodia's case. Prior to analysing the potential for community participation in MRV processes in Cambodia, it is important to first provide an outline of the REDD+ context in Cambodia and the current state of MRV development.

Background on REDD+ readiness in Cambodia

Cambodia has a total of 10 million hectares of forest cover, which comprise 57 per cent of its total land area. Pilot activities for REDD+ began in 2008, making Cambodia one of the first countries in the Greater Mekong region to initiate REDD+. A wide array of multilateral and bilateral donors, NGOs and other development partners have been supporting the REDD+ Readiness process in Cambodia, and while significant gaps remain, substantial progress has been made in capacity building for policy development (RECOFTC 2012). The Royal Government of Cambodia signed its UN-REDD National Programme Document in 2011, which outlines how the UN-REDD National Programme will aim to develop the necessary institutions, policies and capacity to advance REDD+ in Cambodia. Two of the four key outcomes of the UN-REDD Programme are the 'design of a monitoring system and capacity for implementation' and 'improved capacity to manage REDD+ at sub-national level'[5].

There are several REDD+ Pilot Projects in Cambodia that are currently being developed for the voluntary carbon market. The most advanced of these include the Seima Protection Forest and the Northern Plains projects being supported by the Wildlife Conservation Society (WCS)[6], the Southern Cardamom Project being supported by the Wildlife Alliance[7], and the Oddar Meanchey REDD+ Project being supported by Pact. These subnational demonstration activities can play an important role in trialling MRV pilots so that experience is gained before the roll-out of a national system.

Cambodia's National MRV System

In order to be able to analyse the role community based monitoring can play in Cambodia's MRV framework, it is important to first assess current MRV requirements and the capacity that exists to address them. A variety of different categories make up Cambodia's MRV obligations under the UNFCCC REDD+ Framework. These include: national greenhouse gas (GHG) accounting; forest cover change assessments; a national forest inventory; carbon stock change assessments; a national carbon registry; development of standard reporting procedures; and independent third party verification (UN-REDD National Programme). The information generated from these systems will be utilised and compared to a Reference Emission Level (REL) in order to determine the reduction in emissions from REDD+ implementation activities. The specific procedures and timeframes used for establishing national RELs are still not clear and may depend on national circumstances. The RGC will thus have to ensure that its national REL comply with the emerging international policy framework. Cambodia is aiming to achieve a

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[5]UN-REDD, (2011). 'Cambodia'. Available online:
http://www.un-redd.org/AboutUNREDDProgramme/NationalProgrammes/Cambodia/tabid/6896/Default.aspx
[6] WCS website: http://www.wcscambodia.org/conservation-challenges/climate-change/redd-demonstration-sites.html (Last Accessed 13th February 2012).
[7] http://www.coderedd.com/redd-project-devs/wildlife-alliance-southern-cardamom/

Tier 2 level of data for its estimate of historic emissions and reductions, meaning that it will use country-specific data for carbon stocks and carbon losses will be attributed to specific conversion processes (UN-REDD Programme 2010).

Some key capacity gaps still remain in Cambodia's national MRV system, outlined in the REDD+ Roadmap. Some of these include: limited technical skills that exist in forest management and carbon inventories; limited skills in data analysis of carbon stocks and GIS/mapping; the need to harmonize MRV with the National Forest Inventory and National Forest Programme; the need to develop methods to quantify and assess forest degradation; and the development of standardized definitions of forest class types, which could involve the inclusion of mangrove, freshwater wetlands and forest plantations that currently are not included as forest classes (RECOFTC 2012). It is important to note, however, that Cambodia is not alone in experiencing these capacity gaps in its MRV system. A scientific study of the forest and greenhouse gas monitoring capacities of 99 tropical non-Annex 1 countries found that 89 had a large to medium capacity gap, with 49 of these countries having a very large capacity gap[8] (Romijn et al 2012). In this study, Cambodia received a 'very good' rating for its forest area change monitoring capacity, an 'intermediate' rating for carbon pool reporting capacity, and a 'limited' rating for its forest inventory capacity. The study revealed the significant variation that exists in the MRV capacities of different countries, and called for important investments in the technical, political and institutional arrangements in place to ensure countries have sufficient means to conduct effective MRV.

The Cambodia REDD+ Roadmap outlines a plan for a technical team to be established to develop and inform the national MRV process. This MRV/REL Technical Team, comprised of key government agencies, development partners and civil society representatives, will be responsible for implementation of Sections 5 and 6 of the Roadmap: development of Cambodia's REL(s) and establishment of the MRV system. The MRV/REL Technical Team will be responsible for developing national-level protocols for forest carbon inventories. Nonetheless, in a recent country report on Cambodia's REDD+ capacity, RECOFTC contends that 'there does not yet appear to have been sufficient capacity building support for the development of a national MRV system and the technical MRV/REL secretariat' (RECOFTC 2012).

Background to the OM CF REDD+ Project

The Oddar Meanchey Reducing Emissions from Deforestation and Forest Degradation (OM CF REDD+) project was initiated in 2008 and is being implemented by the Cambodian Forestry Administration (FA) in partnership with Pact, Terra Global Capital (TGC) and several local actors. The aims of this 30-year project are to: mitigate climate change; improve local livelihoods and reduce poverty; and protect forests and biodiversity. The high demand for timber and agricultural and settlement land in Oddar Meanchey has resulted in a decline in forest cover at an average annual rate of 2.1%. This steep decline in forests relative to other areas in the country (the national level of deforestation is 0.5%) is one of the key reasons Oddar Meanchey was selected as the location for this REDD+ initiative.

Community forestry has played a key role in the emergence and development of the OM CF REDD+ project, which utilizes a 'mosaic' methodology linking up 13 separate CF sites that encompass 64, 318 hectares in total. Local communities in the province have long advocated for a collective, local approach to protecting the forest, in large part because it provides them more secure tenure for the forest resources they depend upon for their livelihoods. The average proportion of membership at CF sites in Oddar Meanchey is 88 percent. This high rate of

community participation in local forest management increases the need for a community-based monitoring approach in the OM REDD+ Project.

MRV requirements

The monitoring requirements for the OM CF REDD+ project have been set by the TGC 'mosaic' project methodology (2010) and Voluntary Carbon Standard project design document (PDD) (2011), as well as the Climate, Communities and Biodiversity (CCB) PDD (2009). Together, these documents set out monitoring, reporting and verification (MRV) requirements for carbon accounting (TGC 2011) and social and environmental values (CCB 2009). The project methodology, for example, outlines 98 monitoring parameters that must be recorded and monitored on an ongoing basis or at set intervals in order to meet VCS requirements. These parameters are used to develop a monitoring report, which is the basis for project verification by VCS-accredited verifiers. The monitoring requirements for the OM CF REDD+ project are thus highly demanding and involve considerable coordination between actors at local, national and international levels. An outline of these monitoring requirements is illustrated in Table 2.

Every two years, project implementers (currently Pact, TGC and FA) are responsible for facilitating project verification, which will involve developing a verification report as well as routine auditing activities conducted by a VCS-approved independent verifier. The VCS verification will provide the basis for the calculation of Verified Carbon Units (VCUs) which will then be sold on the voluntary carbon market at two-year intervals (corresponding with verification). During the VCS verification, the projects compliance with CCB standards will also be assessed, part of which will involve reviewing the findings from various social assessments (participatory rural appraisals and household surveys) and a biodiversity assessment.

Table 2 – Monitoring Requirements for the OM CF REDD+ Project

Category	Method/data source	Frequency	Reporting	Responsibility
Social Assessment	Participatory Rural Appraisal (PRA)	Every 2 years	VCS / CCB	CDA, TGC, Pact
	Household Survey (HHS)			
Biomass inventory	Sample plot field survey	[See SOP]	VCS	Pact, TGC
Land use land class (LULC) change	Remote sensing	Every 2 years	VCS	TGC
Biodiversity assessment	Field observation	Ongoing & every 3 years	CCB	CFMCs, Consultant
Project documentation	Activity reporting Patrolling	Ongoing	VCS / CCB	CFMCs, CDA, Pact, TGC

Monitoring framework

In collaboration with project stakeholders, Pact have developed a monitoring framework for the OM CF REDD+ Project, which outlines an overarching framework for monitoring the project. The monitoring framework lays out the steps that need to be taken to enhance the involvement of local community members in the various stages of the monitoring and project cycle, and the cross-checking, triangulation and quality assurance procedures that will be put in place to ensure the accuracy of data from these participatory methods. The framework was developed with community consultations and input. For instance, data collection activities, results and

utilization procedures were identified by community members and integrated into the framework. Table 2 demonstrates

CBM in the OM CF REDD+ Project

Due to the important role that community forestry has played in the OM CF REDD+ project, Pact has worked hard to ensure that the planning and implementation of the MRV system allows for the active participation and input of community stakeholders. For example, the project will support the development of participatory forest and land-use plans to assist communities in managing and monitoring their forest resources.

In the 30-year implementation Work Plan for the project, objective number 5 states *'to establish an accurate project monitoring system and capacity for carbon accounting, biodiversity and livelihood generation'*. Meanwhile, deliverable number 1.2 in the REDD+ Signature Initiative Work-Plan (Pact 2011) is to '*develop a Community-based Monitoring System to meet the requirements of VCS and CCBA in which communities assume major responsibility'* which consists of '*a community based monitoring framework and training manual that can ensure accurate field data collection and transparent and accountable use of resource in order to satisfy VCS and CCB reporting requirements for successive verifications'*.

Project monitoring for the OM CF REDD+ project must balance demands for project accountability with improvements in project implementation. Project accountability is addressed through systematic and ongoing monitoring, reporting and verification to meet VCS requirements. At the same time as meeting VCS requirements, it is important for the OM CF REDD+ Project to manage and use information in a way that contributes to the improvement of project systems, processes and implementation activities. The development of a participatory monitoring system will play a central role in facilitating project ownership among community members and contribute to project sustainability and, thus, better ensure that "communities assume major responsibility".

The OM CF REDD+ Project has demonstrated the inherent difficulties that arise when trying to incorporate a community based monitoring approach into a project that has significant top down technical data requirements. The highly technical and formalised information requirements of the project have precluded, to some extent, the involvement of local community members. For instance, local communities do not currently have the capacity to analyse the carbon content of CF areas through assessing satellite imagery maps. This limitation has required Pact to initiate a flexible, balanced and innovative approach to meet MRV requirements in a way that builds the sense of ownership and control local communities feel towards the monitoring system. While there is an emerging body of work that demonstrates the benefits of CBM, the outcomes of community involvement in the OM CF REDD+ Project are still not entirely clear, and can be very difficult to measure. It will take time until the benefits of this approach, and the impacts that it has on contributing to local ownership and data quality, for example, are clear.

Adaptive planning approach to CBM

Involving stakeholders in the analysis, reporting and utilization of monitoring results provides an excellent opportunity to identify aspects of project operations that are working successfully and those that can be improved. In the OM CF REDD+ Project, adaptive planning has been undertaken primarily at the utilization (including data analysis, reporting and dissemination) and reporting stages of MRV. At the data analysis stage, local partners including CFMCs, MCF, CFN, CDA and local authorities have been given a chance to provide input into data interpretation. For instance, the results of forest patrolling and enforcement activities are

presented at quarterly CFN meetings and provide the basis for ongoing patrol planning. Pact will continue to support and build on this system once project implementation commences. Annual community forums, for example, will provide an opportunity for critical reflection on the success of project activities by local actors. In these forums, monitoring data will be fed back to local partners and be used for annual planning purposes.

Participatory monitoring training

Since July 2011, Pact staff have helped facilitate several participatory monitoring workshops to gain community input into the design and implementation of the OM CF REDD+ Project's monitoring and evaluation framework and to develop capacity at the provincial level for monitoring the project. The key objectives of these workshop have been to develop: participants understanding of project monitoring and their role within the MRV process; a joint understanding of the project and its aims in a project logic; the information requirements for project monitoring; data collection, analysis, reporting and use procedures; and opportunities for CFMCs to be involved in data management and the design of the MRV system. These workshops have been conducted in a staged process, to ensure that the local community have inputs throughout the various stages of the monitoring process. The first workshops focussed predominantly on what the communities were interested in monitoring, and how this monitoring should be conducted. Follow up workshops have been aimed at providing communities with a chance to analyse, interpret and use project data.

These workshops have also contributed to the development of a terms of reference (TOR) for the role of Community Monitors. The TOR will be used to appoint two community monitors to each CFMC (one woman and one man) in the project implementation phase (following funding). The community monitors will play a crucial role in conducting monitoring at the community level. Box 4 illustrates the range of monitoring activities that community monitors will be involved in, as selected by community representatives. The findings of these workshops are also being used to develop training materials for CBM, which will be used to strengthen community monitoring capacity at the local level.

> **Box 4: Community Monitor responsibilities identified by participants**
> - Conduct forestry inventory
> - Manage documents, minutes, reports, forest law
> - Monitor CF budgets
> - Monitor monthly meetings
> - Monitor illegal logging activities
> - Monitor forest cover in CF
> - Monitor timber and NTFP use
> - Monitor dissemination of forest laws
> - Assist in dispute resolution
> - Monitor benefit sharing
> - Monitor fire break construction and boundary maintenance
> - Participate in work plan development, monitoring and evaluation
> - Share information with CFMCs and other stakeholders
> - Ensure data quality
> - Maintain and store data

Challenges faced and lessons learned

Participatory monitoring workshops have provided an important opportunity for participants to increase their understanding of project monitoring and their role within the MRV process. The findings of these workshops have revealed a reasonably high degree of existing monitoring capacity among key CF members. Importantly, participants also appeared to be aware of the important role that CFs play in the MRV process. A key lesson learned in these training activities has been the importance of involving communities in each step of the monitoring process, from the design of the monitoring system, to data collection, use and analysis. Along with increasing the ownership and understanding local communities have towards the monitoring requirements of the project, allowing the community to have inputs into each step of the monitoring process can also have important impacts on project outcomes. For example, during a participatory data use exercise in September 2012, CF members were provided with satellite imagery maps of their CF areas illustrating forest cover in 2008 and 2012.

Community members utilised this data to develop action plans and have since used these maps as evidence in meetings with local authorities. This data has assisted community leaders to demonstrate to government officials the nature and timing of deforestation in the CF areas, and has been used to prove the illegality of agricultural and military settlements recently established inside some of the CF areas. Allowing communities to access and analyse project data has therefore played an important role in local forest protection activities.

Participatory monitoring workshops

CF participants analyse and discuss forest changes they observe from satellite imagery maps of their CF's, during a participatory data use workshop

have also exposed some of the challenges that exist to achieving equal participation in CBM. For instance, out of the 23 participants at the initial participatory monitoring workshop, there were only four women. It is believed that fewer women came to the training since there is a perception that monitoring is closely linked to patrolling which is an area more familiar to men. As a way to overcome this gender imbalance in CBM training activities, Pact requested that a woman and a man from each CF attend the training workshops that followed, and the gender balance improved to 10 women out of a total 24 participants. The low representation of women in monitoring activities reflects a broader trend of gender inequity in community forestry in Cambodia. A recent gender assessment in Oddar Meanchey found that men are taking a primary role in community forestry and REDD+ activities, including forest monitoring activities (Bradley et al 2012). The study found that women participate less actively in meetings, trainings, forest patrolling, and forest assessment work due to a number of constraints such as lower membership on elected committees (with approximately 80% of seats held by men), lack of confidence in speaking, lower literacy levels, childcare and household duties, security issues, and a perceived lower level of knowledge in such things as tree and wildlife species.

A failure to address these gender inequities in the design and implementation of community MRV mechanisms could work to further reinforce gender imbalances. For example, women may face difficulties in gaining involvement and employment in some community MRV tasks such as

forest patrolling, due to cultural constraints that preclude their participation in these activities. Safeguards will need to be put in place to ensure that project benefits and opportunities are shared in an equitable manner and are contributing to broader community development objectives. This will require project implementers to devise innovative strategies that harness women's existing forestry skills and provide adequate training to ensure CBM results in positive outcomes for gender equality. Pact is challenging these gender imbalances by requesting communities to select one man and one woman from each CF group to be trained as community monitors.

Community involvement in forest inventories

The OM CF REDD+ project has necessitated the establishment of more than 120 permanent forest plots in order to measure biomass and estimate carbon sequestration. Field teams have involved local community members, FA officials, and soldiers in establishing and re-measuring 50 x 50 meter plots inside the CF areas. Local communities have played an important role in the biomass inventory work for the OM CF REDD+ Project and are an integral component of the inventory teams. For example, villagers have played a key role in identifying the names of local tree species, an important requirement of the forest inventory work.

A woman from Rumchek CF measures a biomass inventory plot

Challenges faced and lessons learned

A number of important lessons have been learned in the process of engaging community members in the forest inventory field work. These lessons will be valuable to forest inventory efforts across the country and should be taken into account in the design of national protocols designed to assist and support community carbon monitoring.

As the local communities in the project areas have had no prior experience conducting biomass inventories, there has been an important requirement for training at the local level. This training has been conducted to ensure community participants are aware of how to conduct forest inventories and why this type of fieldwork is necessary. Providing practical field based training, after a short classroom introduction, seems to be the most effective strategy for conducting this training. The development of a Standard Operating Procedure (SOP) manual, in both English and Khmer, has been an important tool in training community members how to conduct forest plot sampling work. The visual nature of this document, which contains many photos and diagrams of example activities, has been useful in explaining carbon measurement procedures to community participants.

Many of the tasks required for biomass inventories require the use of specific equipment, such as a GPS unit to record locational data, clinometers to measure slope and tree height, and spherical densiometers to measure canopy cover. The need for these technologies, and the community's unfamiliarity with them, can restrict the extent to which local villagers can contribute to inventory work. GPS units, for example, are only displayed in English which may preclude the involvement of some community members. Developing GPS interfaces in local

languages could thus play an important role in allowing greater use of these tools by community members. Furthermore, while the initial training of community participants was effective, there have been continual changes to the volunteers that partake in inventory activities. This has meant that significant amounts of time have been spent training community members who are new to these activities.

The continual change in community participants has prevented field teams from being able to build on the important skills that participants require. As a result, community participants have so far only been playing a supportive role in the inventory work (cutting trails, identifying local tree species, measuring and tagging trees, installing markers) and have not yet been able to fulfil the role of team leader. As biomass inventory work is a skill intensive task, training should focus on a select group of community members from each CF group to ensure that their capacity to conduct precise measurements increases over time. In the participatory carbon monitoring project in Vietnam, for example, technical training was concentrated on

Box 5: Google ODK Collect
A range of different technologies have recently been developed to assist the role of community MRV in REDD+ fieldwork, such as the use of hand-held devices or phones to conduct data collection for carbon monitoring. The Open Data toolkit uses Android mobile devices to collect data in an offline environment with an app called ODK Collect. This technology has been trialed by the Surui Indigenous people in the Brazilian Amazon. Once the data collector is back online, the data can be exported as a spreadsheet and hosted on different online programs so that geo-referenced data can be visualized on a map or a table. This platform also provides options to include bar codes attached to trees, which enable automatic tree recognition on repeat measurements. Field collected data can contain text, numeric data, GPS location, photos, videos and audio clips, which would enable the data to be used for other components of MRV, such as biodiversity assessments.

participatory carbon monitoring facilitators who were then responsible for PCM teams made up of 10 to 15 people. This helped to overcome some of the technical barriers and allowed community members to play a more significant role in the forest inventory work. A variety of different technologies (See Box 5) have also recently been developed as a way to assist communities conduct forest inventories.

While the Community Forestry Chiefs supposedly select volunteers based on their knowledge of the local forest, selection may in many cases reflect social relationships within the community rather than the actual knowledge or experience of a given volunteer. Pact staff have noticed that the motivation and work ethic of community participants can vary significantly, which can sometimes result in less precise measurements in the field. Pact staff attribute this variation to the extent to which community volunteers understand the project and believe in the benefits that it will generate. Poor motivation may in some cases reflect a lack of hope in the project, due to the fact that there have so far only been indirect benefits for community members that participate in the project and in monitoring. This volunteer burnout may have been caused by the high expectations certain community members have regarding the benefits of the project, or by their lack of understanding on the project and the relevance of and need for carbon monitoring. The varying levels of community motivation can have implications for the accuracy and consistency of the data being generated across the 13 project sites, and require project staff to adopt a deliberate and cognisant approach when working with and coaching community participants.

Another constraint to community involvement in the biomass inventory work is the availability of certain skilled and motivated participants, which can vary according to the preoccupation villagers have with other tasks at the time of the inventory. The field team has found that in the dry season, more community members are available to help as they are less busy with agricultural tasks. Forest access is also a lot easier during this time of year due to the better condition of roads. This improved access can help to enhance the involvement of women in

these activities. Another important finding has been the need to record the contact details of village volunteers, in order to be able to contact them to clarify any quality assurance and quality control issues that arise in entering or analysing the data that they have helped generate.

Building the capacity of local FA staff that assist with the biomass inventory work has also proven problematic. While FA staff tend to have better skills in utilizing the necessary equipment for forest inventories, national policies within the FA require provincial staff to change location every five years. This requires renewed biomass inventory training to be conducted to officers each time they move into the area, which has made it challenging to build and maintain technical capacity amongst the FA at the local level. There has also been a shortage in the availability of FA staff that could be used to conduct this type of work and train other villagers. The province of Oddar Meanchey has only 36 FA staff in total, spread throughout the province, which results in each FA staff being responsible for nearly 13,000 hectares of forest land.

Lastly, the recent history of Oddar Meanchey Province has meant that landmines have posed a challenge to biomass inventory work. While the areas with landmines have been mapped, the local knowledge gained from involving community members who were former soldiers in the forest inventory teams has been crucial to avoiding areas of risk. Consulting with local community members about the risk of landmines in the area should be a key requirement to commencing any form of REDD+ related field work in Cambodia.

Community based forest patrolling

One of the key monitoring activities that local communities have been involved in for the OM CF REDD+ project is forest patrolling. Due to the high rate of illegal activities in some of the CF areas, and the important reliance that local communities have on forest resources, community members have been active in joining together to conduct patrols and deter illegal loggers and poachers from entering CF areas. Villagers volunteer their time and resources to conduct regular patrols both during the day and at night. Most communities patrol their community forests several times per month, and these patrols range in length from several hours to several days. This community action began prior to the legal designation of the forest areas as community forests. Since this legal status has been granted and CF regulations have been enacted, the involvement of local communities in these activities has increased as have their legal rights to confront and prosecute offenders.

Challenges faced and lessons learned

While village patrols have achieved success in forest protection and have strengthened the capacity of local communities to work together and monitor and report on illegal activities, a number of important constraints have restricted the efficacy of these field activities. Key amongst these has been the lack of available funding to support community based forest patrolling. This constraint reflects a broader financing problem facing REDD+ demonstration projects in the developing world. As stated in a 2011 report by the Center for Clean Air Policy (CCAP), 'the lack of up-front investments has been and continues to be one of the greatest barriers for the development of REDD+ in developing countries' (CCAP 2011). Resource constraints have prevented CF areas from being properly demarcated with boundary poles and signage, and have meant that less resources are available to support the associated costs of community patrolling activities (e.g., fuel, food, motorbikes, training). They have also prevented the community from implementing other important forest management activities, such as the building of fire breaks.

Pact field staff have observed that the lack of available resources to support forest monitoring and management activities has negatively impacted upon the motivation of some CF members

to stay involved in these activities. It has also been the cause of social conflict in the community, due to the strain that forest monitoring activities can impose on family resources. For example, some wives have reportedly resented the household financial resources that their husbands expend on patrolling the forest, along with the time that they have to spend away from the family while on patrol.

Another important lesson from the community patrolling process is the lack of a timely and effective reporting system at the local level. Pact staff have observed that the skills that exist at the local level to manage documents, file reports and follow up on reports submitted can sometimes be deficient. This may partly reflect financial constraints in the project that have prevented CF chiefs from being trained on reporting and supported for the costs they incur in traveling to the local FA or Commune Council offices to submit regular patrolling reports. When reports are submitted, CF chiefs rarely follow up and work to ensure that action was taken on the issue reported. While the lack of follow up reflects a lack of capacity and skills at the local level, it is also attributable to the resource constraints the FA face in taking action on illegal activities. Community members also often have limited time to follow up on reports and engage in formal government reporting procedures, due to preoccupation with agricultural and other livelihood-related tasks.

The difficulties local community members have faced in documenting and reporting illegal activities to local authorities also reflect governance issues at the local level, and the inherent clash between government institutions that function on formal reporting requirements and procedures and the local community, where literacy is limited and problems are generally resolved through other means than written reports. For example, although CF Chiefs often gain information informally from CF members that witness illegal activities while in the forest, this information is rarely formalized and documented in the form of a written report. The fact that this local reporting does occur, however, should be supported by the monitoring system as it is useful information and it shows that CF members are engaging in the project. While these challenges demonstrate the important need for flexibility and adaptation in CBM systems, they also reveal the important improvements in human, financial and social capital that will be needed at the local level to support an effective community-based monitoring and reporting system.

Box 6 – The Monks Community Forest in Oddar Meanchey

A key figure in the community action to protect the forest in Oddar Meanchey has been the Venerable Bun Saluth, a Buddhist monk who has helped establish the Monks Community Forest Association (MCF) and has played an instrumental role in the environmental movement in Oddar Meanchey. Bun Saluth's role in organising and inspiring monks and local villagers to conduct joint patrols has proven to be effective in controlling illegal logging by soldiers and businessmen, and his stewardship of the area has been highly respected by local communities. Key to this approach has been the use of 'soft' methods, which include an explanation to offenders on why the forest is protected and the provision of three chances to offenders caught conducting illegal activities. Another effective aspect of this approach has been asking offenders to sign a contract with their thumbprint, confirming they will never again conduct illegal activities in the CF. Confiscating materials and taking photographs for their files is also an important part of this strategy, as this evidence assists the FA to prosecute the crimes. Cameras and GPS have thus proven very useful in helping village patrol teams document forest crimes and gain the cooperation of offenders.

The Venerable Bun Saluth has played a leading role in

forest patrolling and protecting Sorng Rokavorn CF.

The experience of the Monks Community Forestry Association (see Box 6) has demonstrated how successful forest monitoring can be when it is linked to the local cultural context, in this case integrating Buddhist philosophy and the leadership of local monks in the CF development process and forest protection activities. It is important that the financial and technical support from the OM CF REDD+ project for community forest monitoring and reporting activities reinforces existing strategies and ideals and does not cause detriment to the strong volunteer spirit that has been critical to protection thus far. Identifying and supporting agents of change such as Bun Saluth, that have strong character and leadership qualities, will be important for community based REDD+ monitoring activities nationwide. These individuals can assist the engagement of communities in the REDD+ monitoring process, and can ensure that community needs and interests are safeguarded throughout the design and implementation of MRV systems. The experience with this community action on forest monitoring in Oddar Meanchey has also revealed the benefits of establishing REDD+ projects where community forest projects already exist.

Supporting community-based MRV through mobile phone SMS technology

An important component of CBM in the OM CF REDD+ Project has been the use of the Frontline SMS monitoring system. This mobile phone reporting system has enabled community members to cost-effectively send regular and timely reports in Khmer on forest patrols via SMS to a central server currently administered by Pact, by using the Frontline Forms[9] function of this software. This system has been utilised as a way to help overcome some of the difficulties and inefficiencies that exist with the current reporting system. Other benefits of the use of SMS for forest patrol reporting include: the opportunity for real-time monitoring; adaptive planning; increased responsiveness; and improved data verification. In order to distribute this technology, training workshops have been held in which community representatives were taught how to use the system and submit reports, and were provided a training manual in Khmer.

Village leaders from Romdoul Veasna CF learn how to report on forest patrols using Frontline SMS

Due the efficient way in which this system enables CF groups to submit information on their forest management activities, and the crucial role this information plays in proving that community actions have decreased deforestation and generated carbon credits, a range of other Frontline SMS forms will soon be distributed for community use to capture different information. An enforcement form has been designed with community input and is currently being trialled to capture information about illegal logging activities in the CF areas. Along with meeting monitoring requirements, the information generated by this form will be useful to the relevant authorities (FA) responsible for enforcing forestry laws. Pact is currently designing a system that will enable this information to be shared effectively with the relevant authorities, including a Mobile Enforcement Unit. Once the community's capacity to use this form has improved, forms capturing information on agricultural land expansion, illegal settlements, biodiversity and fire incidents will be distributed for community use.

Challenges faced and lessons learned

Since this technology has been expanded to all the CF groups, usage rates have varied according to each CF group. There are a variety of reasons for this variation, which include: the availability of resources CF members have to conduct patrols; the degree of safety and security in the CF areas; time availability (seasonal); the perceived benefits from participating in this system; and the ease/difficulty of adopting the new technology. While many view technology as the solution to the problems that arise in participatory monitoring, integrating the use of this technology as a tool in project monitoring has exposed a range of challenges. These challenges have demonstrated the important need to utilise a very considered and adaptive approach when introducing new technologies to support CBM. As the use of mobile phones to text is relatively

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[9] See http://www.frontlinesms.com/resources/frontlineforms/

new to some users, there has been an important need to provide consistent follow up support and technical assistance to participants. The use of clear training materials (shown in Figure 1) has assisted with this, as has the use of a staged approach of introducing variables to the communities and building the system up over time as capacities increase. A staged approach has been taken in order not to overwhelm the community with data requirements at the beginning. Difficulties were faced with one CF expecting additional resources to conduct patrols; which Pact was unable to provide. It has been important to develop a clear understanding with community groups on the expectations and requirements for mobile monitoring including expected commitment, benefits, available support and resources. It is important that technologies provided to support CBM are viewed as tools for the project and not personal items.

Select "Illegal logging Form 1" ⟶

Enter Patrol ID Number ⟶
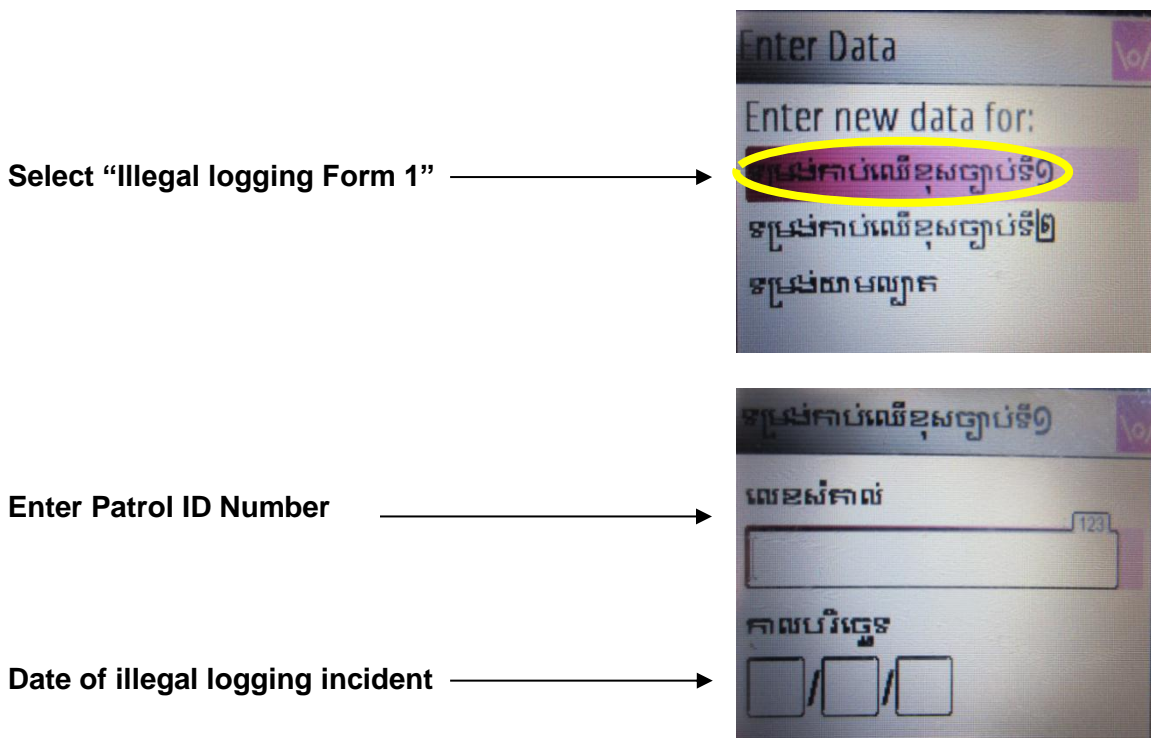
Date of illegal logging incident ⟶

Figure 1. An example of the training materials used to assist community patrollers submit patrolling information by SMS reports using Frontline Forms

A key lesson that has been learned from this reporting system is the importance of sharing the information generated through the Frontline SMS system back with the communities participating. Information has been shared with the community in the form of monthly reports that summarize the data generated by the SMS reports in a visual format. By allowing the Frontline SMS users to see a visual representation of the data they have been submitting, and enabling them to compare the patrolling activities of each of the different CF groups, Frontline users have become more engaged and interested in this technology. This bidirectional data flow has been an important way of incentivizing communities to participate in this reporting system.

Hosting workshops to gain feedback from the users of this technology, and providing them with an opportunity to provide inputs into what data is being gathered, has also been an important way of building a sense of local ownership and relevance towards this method of data collection.

Another important lesson learned has been the importance of building the sense of value community members have towards these project tools. Three out of the thirteen Frontline SMS phones distributed free of charge to community users in Oddar Meanchey have been lost or

misplaced by community members. If the project had required each CF to provide the funding for these phones out of their CF budgets, for example, they may have attached more value to these items and taken better care of them.

Community involvement in biodiversity monitoring

The OM CF REDD+ Project requires a periodic biodiversity assessment in each of the CF areas, as one of the criteria for CCB verification. These assessments will involve a capacity building element and will review the extent to which CF member's knowledge and skills related to monitoring biodiversity have changed over time. Communities can play a key role in the monitoring and reporting of biodiversity data. Their knowledge of the local ecology, along with the continual data they can access, will be crucial to biodiversity monitoring and the development of an bi-annual biodiversity report (Birdlife International 2010). The first biodiversity assessment for the OM CF REDD+ Project was conducted in collaboration with Birdlife International in 2010. Community members played an important role in this month long study.

Community interviews were conducted which provided reliable information on local mammal species. For example, community members were able to identify specific areas where the team had the greatest potential to identify different mammal species.

A local community member assisting with the biodiversity assessment in Sangkrous Preychheu CF

Challenges faced and lessons learned

While the local knowledge of community members assisted this biodiversity assessment, the assessment team concluded that the community still requires training and support to be able to make accurate and professional assessments of biodiversity in the CF areas. For example, while able to identify the presence of wild dogs from footprints, community members were unable to make distinctions between the two different types of wild dog that live in the forests of Oddar Meanchey. Similarly, many villagers often mistake various cat species in the forests to be tigers. Furthermore, in the case of birds, community generated information was generally considered tentative. The ability to correctly make the distinction between different wildlife species is critical to identifying High Conservation Value (HCV) species, which is an important aspect of biodiversity monitoring.

Informed by the results of surveys, Birdlife International prepared a biodiversity monitoring strategy for the project that aims to build on the existing skill base of the local community members in the short-term whilst recommending additional components that can be implemented with training. Training will commence following the provision of financial and logistic resources over the 30-year period of the project, and will involve training community monitors on how to: take quality photos of wildlife tracks and other photos; use GPS and record track logs; identify and record bird and mammal species; set up camera traps and record data

into data sheets. The monitoring strategy includes a list of key species (e.g. Banteng, Pileated Gibbon) found to occur within the CFs that would be not only beneficial but also possible for local non-scientific personnel to monitor.

The assessment called for the supply of supporting materials to community members, such as binoculars and field guides, to assist them in identifying different species and build their knowledge base in this area. These field guides could be tailored to the specific area or environment in which the assessment is occurring, to make them more effective for community use. For example, a field guide could highlight the HCV species that exist in a specific local area, such as a flooded forest ecosystem. In addition to the ongoing community-based monitoring recommended, the biodiversity assessment also strongly advised for professional scientific assessments on an annual basis.

Another issue that was experienced during community involvement with biodiversity assessments was the unwillingness of certain community members to share their knowledge on some wildlife species due to concerns that it might reveal their hunting experience. This problem may have been compounded by the presence of FA officers in the biodiversity assessments. Pact staff observed that this was a trend found mostly in young community participants, who are most likely still engaged in hunting activities.

Policy recommendations for supporting CBM in Cambodia's REDD+ strategy

Having reviewed the significant benefits that community based monitoring can achieve and the lessons that have been learned from community based monitoring in the OM CF REDD+ Project, this report will now outline a number of recommendations for the development of national REDD+ policies and governance arrangements in Cambodia. These recommendations focus on ways in which national level policies and activities can support CBM, and the ways in which local, subnational and national MRV systems can be better integrated. The role of different actors in these policy initiatives is also exemplified.

Due to the important role that community based monitoring can play in ensuring the effective and sustainable implementation of REDD+, CBM should be made a priority area for implementation at the subnational and national level. While the REDD+ Roadmap states that 'local communities should be involved in local management decisions, implementation and monitoring,' it lacks clear objectives and activities on how community based monitoring will be actualized in the REDD+ process. There is an important need for the roles and responsibilities of communities in the MRV process to be formally clarified and supported as part of the national strategy on REDD+. For example, standards for participatory carbon monitoring and community carbon accounting will need to be developed and address key issues, such as; the methodologies and incentives for data collection; the processes being used including scale and frequency; the definition of forest classes; reporting and communication structures; the roles of different stakeholders and national authorities; the software and hardware technologies best suited to forest monitoring; data storage procedures; and how data is accessed, managed and quality-assured. The development of CBM standards will also need to be coordinated with and supported by the National Forest Programme and other national frameworks related to the management of forest areas.

National coordinating bodies such as the REDD+ Taskforce will play a key role in implementing CBM policies, by improving the coordination among institutions involved in REDD+ activities, and improving the capacity to link local and national MRV efforts. The REDD+ Consultation Group, and other working groups that are currently being established, will provide an important

conduit for lessons learned at the demonstration level to be transferred to the national policy level through the REDD+ Taskforce. As only a limited number of positions are available for international NGO and civil society representatives, it is important that the individuals selected for these groups are effective at articulating the policies that will be needed at the national level to support participatory MRV. Similarly, these individuals need to be closely connected to activities occurring at the demonstration level to be able to effectively represent the interests of community groups in this process.

NGOs and community based organisations (CBOs) with experience in conducting CBM training can assist with the implementation of training initiatives. As REDD+ funding will flow through national government bodies, the work load may in some cases become greater than these government institutions can handle. Partnerships will play a key role in REDD+ implementation. NGO partners who already have experience working with the community and have gained the trust of local leaders and individuals can play an important role in conducting this training. As REDD+ Readiness activities cannot be implemented everywhere at the same time, REDD+ priority areas for CBM should be identified. Some communities are more ready than others to participate in MRV activities and training; they should be given priority to participate. Furthermore, as it may be some time before the REDD+ financing mechanism is in effect, funding should be provided to assist local communities engaged in REDD+ to implement forest monitoring activities. This support can be part of the current REDD+ Readiness activities, and would help to incentivize and motivate communities to engage in REDD+ monitoring activities.

It is also important to ensure that training and capacity building programs that will be needed are designed in a way that addresses other key development needs and initiatives of the RGC. In this way, REDD+ projects can be used as an effective tool to deliver social and economic benefits to rural communities. For example, ensuring there is a role for youth and women in participatory monitoring training programs can help address some of the challenges these social groups face in participating in forest management and community development initiatives. While significant training and supervision will be needed in the early stages, these investments will free up significant REDD+ income in the future to be allocated to communities rather than external experts. An important window of opportunity to integrate CBM into Cambodia's REDD+ process exists during this early phase of implementation. Below is a list of key recommendations for consideration:

1. **Develop clear guidelines and standards at the national level for community data collection**

For CBM to function effectively within the national MRV system, the REDD+ Taskforce needs to clarify the role that communities will play in MRV, and with the support of REDD+ implementing agencies, develop and disseminate standardized protocols and methodologies for CBM activities. These standards need to based on international standards, with indicators adapted to national and sub-national conditions. The experience of demonstration projects also need to be reflected in these guidelines. Along with allowing decentralised forest governance and monitoring structures to operate within a national framework, uniform standards will help to ensure the quality control of community generated data and that this data is compatible with national data needs. The reporting structure for this community-generated data should also be well defined, with clear communication channels that allow subnational and national accounting systems to be linked, so that the data can be utilized in a national database. It will also be necessary to have clear definitions and guidance on how community-generated information will be used and disseminated. This will require a Code of Ethics stipulating the Terms of Use of data provided by communities. This data must be kept confidential and secure, especially when it is related to land and tenure rights.

2. **Conduct capacity building activities to strengthen the capacity of civil society and NGO groups, including forest-dependent communities, to engage in CBM**

In order to highlight the important benefits of community based monitoring in Cambodia's REDD+ strategy, a series of workshops should be held at both the national and subnational level. These workshops should invite a wide variety of REDD+ stakeholders and community representatives, including women, to disseminate knowledge on the role that communities can play in MRV. The information generated from these workshops could help to develop a needs assessment of CBM in Cambodia. This would assist REDD+ policymakers assess the existing and required capacities at the community level to fulfill MRV objectives. These findings should be integrated into the REDD+ Readiness process and shared with REDD+ implementing agencies. In conducting these assessments, efforts should be made to develop ways to streamline and simplify MRV to make it more accessible to local communities, while maintaining accountability. This process should be democratic, and should ensure that communities have a chance to share what they believe they are capable of and what is too complicated.

3. **Provide CBM training at the local and subnational level**

In order for local communities to be able to play a role in strengthening and enriching national carbon data systems, there is an important need to expand and enhance capacity at the local level. Providing training and coaching to local stakeholders on topics related to CBM can play an important role in improving MRV capacity. Training could be facilitated by the REDD+ Technical Teams who would work closely with the government agencies and report lessons learned to the REDD+ Taskforce Secretariat. To make capacity building programs sustainable and efficient, local FA staff and community members should be involved, in a Training of Trainer (TOT) approach. As has occurred with participatory carbon monitoring elsewhere, training should be focused on monitoring teams made up of 10 to 15 people selected from communities engaged in REDD+ projects. Training could be focused on: mapping boundaries; measuring tree DBH and height; inserting this data into databases for calculation of carbon stock; estimating displaced emissions and measuring non-carbon impacts of REDD+. Follow-up for these training activities will be necessary.

4. **Support the development of training materials, equipment and technology to assist with CBM**

The Oddar Meanchey and other REDD+ Projects have found the use of training materials and equipment can play an important role in supporting CBM. Rather than starting from scratch in developing new CBM manuals, it would be sensible to use the existing manuals and adapt them as need be. Developing CBM manuals in Khmer that clearly and visually outline the key requirements for various monitoring activities could be very useful in enabling communities to play a greater role in the monitoring process of REDD+ projects. Providing communities with specific tools and equipment for data collection is also a key step in initiatives to support CBM. For example, cameras enable community members to document their patrolling activities and local biodiversity. Where possible, technologies such as mobile phone based data collection should be supported and scaled up.

5. **Include an advisor on community-based MRV in the national REDD+ management structure**

In order to ensure that CBM is supported in the national REDD+ strategy and remains a priority policy issue in national MRV policy, resources should be allocated to support an advisor. This advisor could work on the MRV/REL Technical Team and provide important support to the Taskforce Secretariat and REDD+ Taskforce on developing strategies to enhance community

based monitoring throughout the REDD+ implementation process, from capacity development at the local level to linking community generated data to national MRV systems.

6. Ensure that gender is mainstreamed in national CBM policies

The implementation of national policies towards CBM need to take gender balances into account and ensure that there is a role for women in REDD+ monitoring activities. This could, for example, require a specific gender balance to be mandated in capacity building activities for CBM, and a database established to track this participation.

7. Hold consultations and workshops on CBM of social and environmental safeguards

As the legal framework for REDD+ safeguards in Cambodia is still evolving, ensuring that local communities have input into the safeguards selected and how they will be monitored is crucially important. In order for safeguards to be effective, it is important that indicators and the methods chosen to assess them reflect local values and priorities (Fry 2011). Developing an inclusive and participatory process to achieve this, that includes strategies on how local communities and indigenous groups will monitor these safeguards, is key to the long-term sustainability and effectiveness of the REDD+ mechanism. This should involve training and consultations with local-level government officials and community members on social safeguards for REDD+, what they mean in practice and how to monitor and evaluate performance against safeguards. The necessary institutional frameworks will also need to be developed to assist the documentation of safeguards. For example, a grievances institution may need to be established which would work to address land conflicts and other issues that arise with REDD+ implementation. The REDD+ Advisory Group, working with the Consultation and Safeguards Technical Team, will play a key role in developing these institutions and arrangements.

8. Document and use the lessons learned from REDD+ demonstration pilots in integrating CBM activities at the local level

Demonstration REDD+ projects can play a key role in establishing best practices and standards for CBM throughout the country. It is important that the lesson's learned from subnational pilot projects are shared with REDD+ stakeholders. An important component of this would be to compile the lessons from pilot projects and demonstration activities into an accessible national database, to help improve subsequent implementation of these activities.

Cambodia's national REDD+ strategy currently has few concrete strategies or actions planned to ensure the integration of CBM into the national REDD+ process, despite claims that community involvement is an important component of this strategy. With a concerted effort and cooperation among key stakeholders, Cambodia has the chance to be a leader in ensuring communities play a vital role in REDD+ MRV, and thereby raise the standard for inclusiveness, efficiency and sustainability under REDD+ frameworks.

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