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DEVELOPMENT OF PARTICIPATORY FOREST CARBON MONITORING IN VIET NAM

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Abstract

The implementation of forestland allocation, management and protection of existing forests, and development of new forestry programmes that incentivise people based on performance such as Reducing Emissions from Deforestation and Forest Degradation (REDD+) and/or Payment for Ecosystem Services (PES) from forest resources needs a monitoring system to collect, store and analyse forest attributes in general and biomass carbon in particular based on which performance can be evaluated. The system could benefit from direct participation of households and forest owners, local government agencies. Such a participatory approach in monitoring system ensures improved forest conditions and provide greater quality and quantity of information on forests and impacts of management interventions, thereby contributing to the national forest inventory (NFI). For this reason, approach of Participatory Forest Carbon Monitoring developed (PCM) presents simple methods for measuring forest biomass carbon stocks to be applied by local technical staff and local people so that they can measure and monitor forest carbon and ensure reliable information towards claims for REDD+ benefits. Households and communities who have been assigned to or are allocated with forest for management are included as key actors in participatory carbon monitoring. The basic parameters such as tree species, diameter at breast height (DBH), height (H) are measured within sample plots determined/established by NFI. The change in forest area is also monitored as frequently as annually or periodically. The approach of the PCM that was developed and tested in the areas of UN-REDD+ Program Vietnam, involved local households, forest owners, local staffs to ensure that local stakeholders take active participation in forest management and assist in gathering or providing qualitative and quantitative information on the forests allocated to them or managed under the contract with forest owner.

Keywords: Forest carbon, local people, forest monitoring, participatory, stakeholder, Viet Nam

Introduction, scope and main objectives

The implementation of forestland allocation, management and protection of existing forests, and development of new forestry programmes that incentivize people based on performance such as Reducing Emissions from Deforestation and Forest Degradation (REDD+) and/or Payment for Ecosystem Services (PES) from forest resources needs a monitoring system to collect, store and analyze forest attributes in general and biomass carbon in particular based on which performance can be evaluated. The system could benefit from direct participation of households and forest owners, local government agencies. Such a participatory approach in monitoring system ensures improved forest conditions and provide greater quality and quantity of information on forests and impacts of management interventions, thereby contributing to the national forest inventory (NFI).

Developing countries like Vietnam could present evidence of Emission Reduction (ER)/Emission Removal (ER) from land-use change in return for results-based 'positive incentives' from REDD+. A national measurement, reporting and verification (MRV) function serves as evidence of reduced emissions or enhanced removal of GHGs.

The United Nations Framework Convention on Climate Change (UNFCCC) (1992), in addition to many

international donors, requires national REDD+ programme design and implementation to promote and support full and effective participation of all relevant stakeholders, in particular indigenous peoples and local communities. Participatory carbon monitoring (PCM) – where the national REDD+ authority, state forestry agencies, forest managers and local communities collaborate to collect, manage, verify, report and analyse data on the carbon stored in the forest – could be one of the options to demonstrate the engagement of all relevant stakeholders.

During the past to participate in REDD+, many research institutions, organizations have developed methodologies and approaches to attract local people, indigenous communities in monitoring forest carbon pools and forest area change (MacDicken, 1997; Patrick, 2008; Silva *et al*. (Winrock International), 2010; Bhishma *et al.*, 2010; Huy *et al*., 2011 - 2013, Thomas *et al*. 2011).

The approach of PCM is primarily designed for the measurement tools, a simple survey which indigenous people can apply to monitor changes in forest cover, measure the key factors of forest as species, DBH, biomass of litter, dead wood, soil sampling to be converted into biomass and carbon in the forest. The tools and methods of PCM in the world basically quite similar, however, depends on the resources of local, national, as well as technological tools available that support for PCM, these methods are appropriate changes.

For this reason, development and experiment of the Participatory Forest Carbon Monitoring (PCM) has been carried out in UN-REDD Vietnam and REDD project – SNV area of 4 districts Di Linh, Lam Ha, Cat Tien and Bao Lam of Lam Dong Province. The PCM approach presents simple participatory methods for measuring forest biomass carbon stocks to be applied by technical staff, local people and forest owners so that they can measure and monitor forest carbon with the support of staff from State forestry agencies, and ensure reliable information towards claims for REDD+ benefits.

Methodology/approach

Defining and standardizing data collection approach:

In order to measure and monitor forest biomass and carbon in each province and region, the two types of data collection and management approaches are defined and standardized approaches are established. National forest inventory (NFI) provides: i) Stratification map of forest status for each ecological zone. The map should be delineated to administrative boundary of province, district, commune, and forest management unit; ii) Number and location of sample plots on different strata for each ecological zone and boundary demarcation of administrative units such as provinces, districts, communes and forest owners.

Monitoring forest area and forest status changes managed by forest owner/local people :

Communities, forest owners, and households have been guided to use GPS to measure the area of forest loss and forest changes, and to provide this data for professional agencies. Forest owners, individual families, households, and communities monitor forest area change frequently. If the change in forest boundaries of any owners or household are detected, the changed areas are delineated using Track enabled GPS. The delineated boundary is then transferred to map and forest cover change is estimated.

Establish sample plot, measure forest parameters to convert to volume, above biomass/carbon

PCM is focused on measuring forest parameters to estimate volume, biomass, and carbon by forest owners, household, and communities every year through the measurements on sample plots. It also is used in periodic measuring every 5-year in NFI. While temporary plots can also be used in PCM, for simplicity, a permanent sample plots are recommended for periodic measurements. Permanent sample plots are established in the forest at predetermined random locations.

The shape of the plots can be either rectangular, square or circular. In this case, circular sample plots are recommended for use, as they are relatively easy to establish in the field. Additionally, concentric

plot is convenient for household and community in location plots in the field. Within the sample plot, trees of different sizes are measured in different sized sub-plots where larger trees are measured in larger sub-plots and smaller trees are measured in smaller sub-plots (Fig. 1).

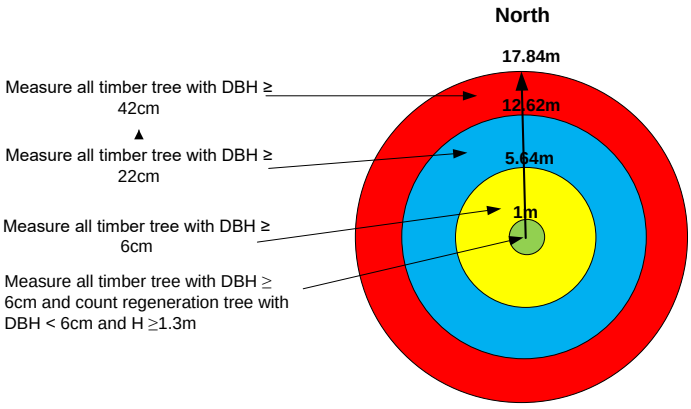

Fig. 1: Measure diameter class according to radius of sample plot.

Measurement within sample plot:

Data of timber, bamboo, and information on forest resources is collected annually on the plots: i) For woody tree, identify species, measure diameter at breast height (DBH) if trees DBH is greater than 6 cm. For trees with DBH < 6 cm and height ≥ 1.3 m, count the number within the sub-plot 1. Use tree tags to mark the trees and paint at 1.3m position; ii) Bamboo is measured in 5.64 m radius plot. Age, individual DBH is measured. In case of certain species of bamboo such as for neohouzeaua, species information must also be recorded.

Synthesis of field data:

The synthesis of data collected through PCM should be conducted by a professional forester or forestry agency, ideally at district or provincial level.

Two types of data synthesized, (i) area change of forest block and ii) estimates of volume, biomass and forest carbon and their changes.

- Forest area change: data of forest cover change collected by GPS is uploaded to the GIS and area of forest block estimated and updated.
- Estimates of volume, biomass and forest carbon by inventory time:

Allometric equations developed by UNREDD Vietnam (2012, 2014) for broad-leaved species and other forest types can be used (Sola et al. 2014; Huy et al. 2014; Sola, Phuong, Huy, Khoa, Hung, Xuan, 2014). For pinus species, allometric equations available for IPCC (2006) can be used.

Results

PCM testing process:

Through testing, the process of applying the PCM with the participation of the communities are formed, including training, monitoring forest area change, measuring in sample plots and calculating data to integrate into NFI; shown in Fig. 2.

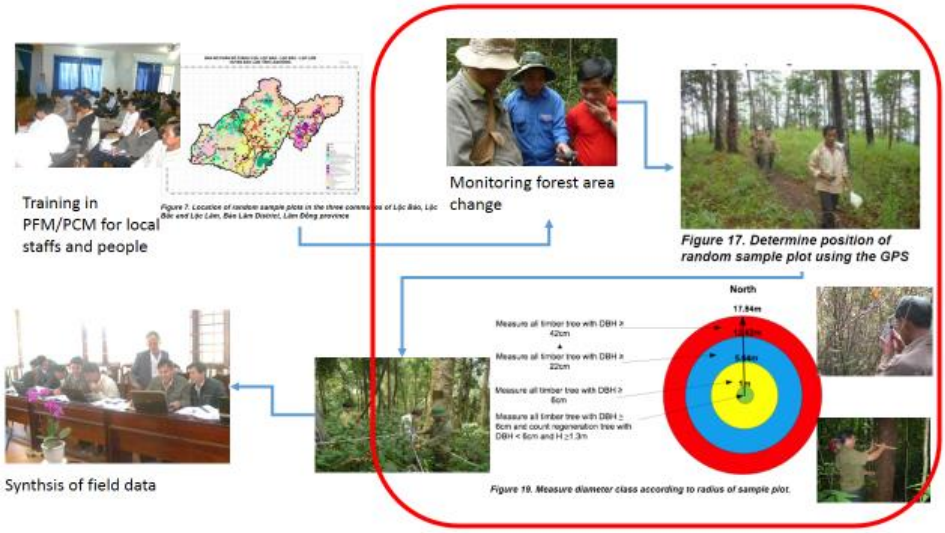

Fig. 2: Procces of PCM tested in the UNREDD Vietnam area

Organization of measurement techniques in the field:

The monitoring of forest area and measurements in the field are carried out in participation of household, communities, and forest owners. Until the full capacity of local stakeholders are developed, it is recommended that forestry technician leads the local participation and continue to provide onsite support. It is recommended that field team or crew includes one local forestry staff, with a minimum of intermediate proficiency and four local people representing households, underrepresented groups such as women etc. Depending on terrain, and distance to forest in the project pilot areas, one team can set up and measure 2-3 sample plots per day.

Integrated in PCM and the national system:

It is anticipated that data collected from PCM will be integrated in the NFI in Vietnam following a simple framework as shown in Fig. 3.

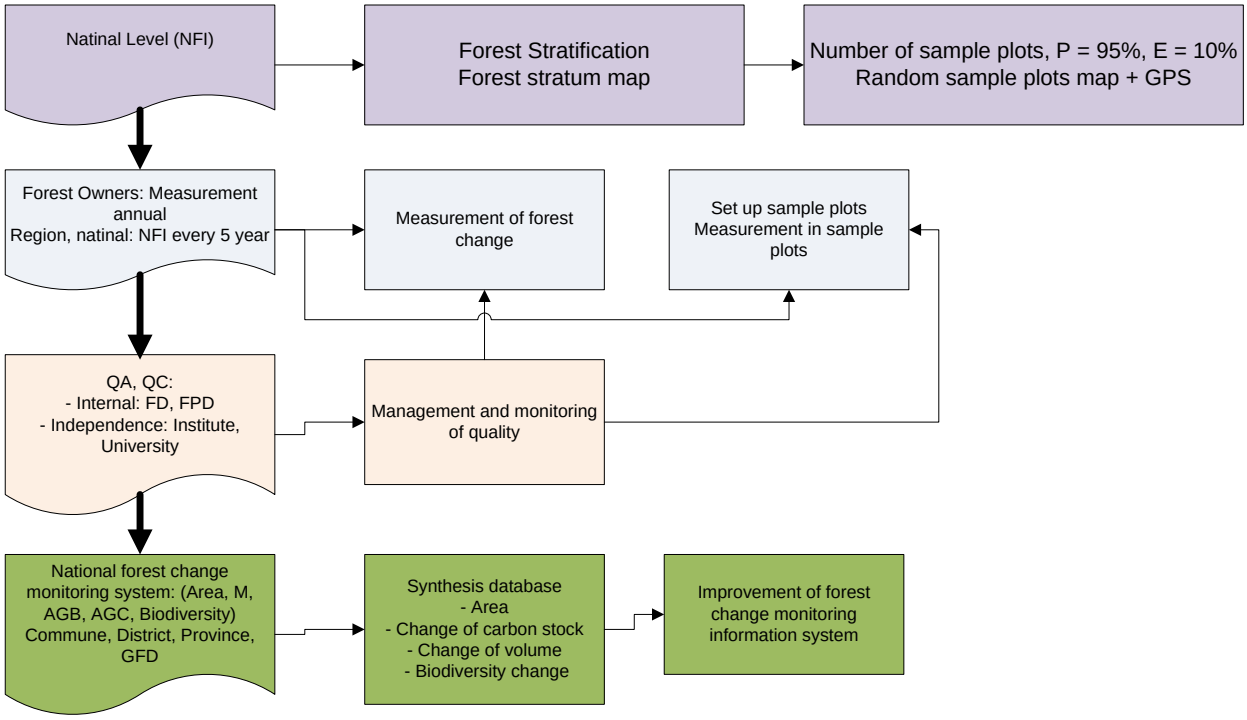

Fig. 3: System of measuring, monitoring, and reporting forest resources, biomass and carbon (integrated in PCM and the national system)

In the framework described in fig. 3, National forest inventory (NFI) provides forest stratification maps interpreted from remote sensing and Geographic Information System (GIS) technology. The NFI information can be used in determining the required number and location of sample plots as well as preparing maps of sample plots. These maps will be provided to forest owners and communities and are periodically measured such as every five years.

Households and communities who have been assigned to or are allocated with forest for management, and forest management organizations (forestry companies, management Board of the special-use forest, management board of protection forest) are included actors in participatory carbon monitoring. The basic parameters such as tree species, diameter at breast height (DBH), height (H), animal and plant information are measured within sample plots determined/established by NFI or NFI administrating institutions within administrative boundary (province, district each sub-ecoregion, and forest type). The change in forest area is also monitored as frequently as annually or periodically.

Quality assurance and quality control of the measurement within plot and monitoring of forest area change are decentralized into provincial level. The quality assurance activities are conducted by internal agencies such as Forestry Department or Forest Ranger; and by independent consultant, university, and research institute.

Monitoring changes in forest resources, and forest biomass carbon: There may already been a monitoring system for forest area change. For REDD+ programme, other parameters such as biomass and carbon can be added into existing monitoring system. The synthesis of data and update in the monitoring system follows a participatory approach involving stakeholders from household, commune, district, province and to national level in which district and communal levels gather original data, while the provincial level synthesize them to estimate changes in forest area, biomass, carbon, volume and other fauna and flora before transferring them to the national system.

Discussion

PCM is the measurement and monitoring forest carbon stocks with the participation of local communities, which indicates that the local community have the ability to participate effectively in REDD+. Like conclusion of Skutsch *et al.* (2009), the experimental results showed PCM first attracted the participation of communities in forest management and protection, supported for their awareness of forest environmental values, based on their participation, results-payment will be done for their efforts; if communities are trained they will participate in providing data for forest carbon changes in REDD+; also results found that only communities living near forests can monitor forest carbon regularly with low cost.

Skutsch *et al*. (2009) have demonstrated the effectiveness of community participation in Tanzania in the measurement of forest carbon, biomass average error of the calculation of the community compared with professional bodies from only 1-4 %; while the cost only 30% of the specialized agencies, the cost of the first year of PCM has higher due to the training. This test results also calculated the maximum error of 5 % when compared to professional forest agency and costs up by 40 % compared with the professional bodies.

The process of developing and testing PCM have been implemented in Vietnam from 2010 to present, with the technical assistance of FAO, SNV. The result is quite satisfactory, attracted the participation of local communities and stakeholders at the local level; collected data is considered reliable.

However, to put PCM into national forest monitoring system and MRV there are also the challenge follows:

- Forest resources measurement and monitoring in Vietnam traditionally mainly done by professional bodies, lack of participation of the community and stakeholders. Requires the setting and regulatory changes to attract participation.
- Bias agianst the reliability of the data collected, monitored by the local people .
- Has not been established system updates and data management of forest resources from the grass root level.
- Responsibilities and rights of the community to participate in the monitoring of forest resources has not been established.

Conclusions/outlook

PCM attracted the active participation and responsibility of all stakeholders, especially local people when implementing REDD+.

Tools and methods of PCM should be simple PCM and appropriate with national resources and community capacity.

The suitable collection data of PCM is monitoring forest cover change, monitoring change information forest attribute to determine changes of forest carbon. It can be seen as part of monitoring of forest resources in the national MRV system.

The reliability of PCM is secured (< 5%) and its costs was lower (40%) compared to the use of professional forest institutions.

Acknowledgements

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