Forest Carbon Inventory

It is widely accepted that global warming is a reality. Increased concentration of Greenhouse Gases (GHGs) in the atmosphere is widely accepted as a single cause of global warming and the associated changes in other climate variables.

Forests act as both sink and source for carbon emissions. It has been reported that forest and land use change contribute about 17% of global anthropogenic GHG emissions. Most of these emissions are caused by deforestation and forest degradation. To reduce emissions from the forestry sector, Reducing Emission from Deforestation and Forest Degradation Plus (REDD+) mechanism has been proposed as a promising climate change mitigation option in the international policy arena. To operationlize REDD+, periodic forest carbon inventory is a crucial first step for obtaining benefits through carbon trading.

For forest carbon inventory, the Intergovernmental Panel on Climate Change (IPCC) has identified five carbon pools that need to be monitored for deforestation and forest degradation: above-ground biomass, below-ground biomass, litter, deadwood and soil organic carbon. Of these five carbon pools, carbon stored in the above-ground living biomass of trees is the largest and is most directly affected by deforestation and forest degradation.

Further, the IPCC has produced a set of guidelines for estimating greenhouse gas inventories at the national level. At the most basic level, measurements of tree diameter at breast height alone or in combination with tree height can be converted to estimates of forest carbon stocks using allometric relationships. Ground-based forest inventory data must be collected using standardized sampling schemes appropriate for a forest type or a country.

The ground-based and remote-sensing approaches could help refine forest carbon stock estimates for REDD mechanisms for larger spatial scales. Stratification using broad forest types and forest conditions can be developed. Once the forest strata have been identified, the layout and number of plots needed to achieve a desired level of precision can be determined, based on standards of acceptable sampling error. There are established methods and guidelines for determining the number, size, and distribution of sample plots.

Consistency in the methodology of carbon inventory is one of the major issues in Nepal as is the case around the globe. In Nepal, various organizations and researchers are testing pilot methodologies for assessing forest carbon. In this connection, the Asia Network for Sustainable

Agriculture and Bioresources (ANSAB), the International Centre for Integrated Mountain Development (ICIMOD), and the Federation of Community Forest Users Nepal (FECOFUN), with financial support from the Norwegian Agency for Development Co-operation (NORAD) have developed forest carbon stock measurement guidelines for measuring carbon stocks in community-managed forests of Nepal. Similarly, guidelines for forest carbon measurement have also been developed by the Terai Arc Landscape (TAL) Project, WWF Nepal and Winrock International with financial support from the Government of Finland.

In this process, the REDD-Forestry and Climate Change Cell under the Ministry of Forests and Soil Conservation has been taking the lead to develop the most appropriate method for estimating forest carbon stock. Overcoming the methodological challenges in this way facilitates country-specific forest carbon inventory guidelines which could be consistent, comparable, complete and accurate. In addition, developing a common methodology to estimate carbon content of the Trees Outside Forest (TOF) is also equally important.

The Department of Forest Research and Survey in collaboration with the Government of Finland, is now implementing the Forest Resource Assessment Nepal (FRA-Nepal) Project. This project has been designed in such a way that national forest inventory and forest carbon inventory will go hand in hand. Carbon inventory will be carried out in all the carbon pools of forest land described earlier. All the sample plots measured throughout the nation will be considered as permanent sample plots from where the variables used for carbon estimation can be periodically measured in the future. This will facilitate in the monitoring, reporting and verification (MRV) of forest carbon stock that is necessary for operationalizing carbon trade through the REDD+ mechanism.