Estimates of carbon sequestration from national forest inventories

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Initiatives to reduce emissions from deforestation and forest degradation such as REDD+, are designed to mitigate climate change under rigorous measurements, reporting and verification systems in order to receive result-based payments. For its implementation, REDD+ requires the estimation of the amount of carbon accumulated in the ecosystem reservoirs (living biomass, standing dead trees, dead wood, detritus and soil carbon). Currently, national forest inventories are providing information to make these estimations.

Generally these inventories are conducted under a stratified sampling considering the type of ecosystem, and systematically within stratum clusters are selected. Each cluster contains plots with a different number of trees. All mature trees on these plots are measured and the rest is evaluated by means of subsampling. Subsequently the live biomass is estimated using allometric equations, and the amount of carbon is calculated as a fraction. Litter, dead wood and soil carbon content are estimated using different subsampling methods.

With this information, confidence intervals for the amount of carbon per hectare and for the cumulative total in each stratum are constructed. The Intergovernmental Panel on Climate Change (IPCC) says is a good practice to measure and reduce uncertainty in future measurements. We set a limit of 10% uncertainty in 95% confidence intervals for the carbon content estimation.

This paper identifies and systematizes potential sources of error in this process of calculating carbon content in order to reduce uncertainties in their estimation. It starts from database depuration and ends with the calculation of sampling design and size to achieve the required uncertainty.

Keywords: Confidence intervals, uncertainty, sample design.