ALLOMETRIC EQUATIONS FOR ESTIMATING FOREST BIOMASS USING THE PREDICTOR VARIABLES MEASURED BY LOCAL COMMUNITY

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Summary

To perform participatory carbon monitoring under United Nation – Reducing Emissions from Deforestation and Forest Degradation (UN-REDD[+]) program, there is an important need to develop biomass equations using the predictor variables measured by local people. These equations need to be accurate and provide quantifiable uncertainty. Using data from 222 destructively sample trees for developing tree biomass models and 323 sample plots for stand biomass equations, a set of models were developed to estimate tree aboveground biomass (AGB), tree belowground biomass (BGB), total AGB (TAGB) and toal BGB (TBGB) in evergreen broadleaf forests (EBLF) of the Central Highlands of Viet Nam. Diameter at breast height (DBH) and basal area (BA) were used as covariates of the tree and stand biomass models respectively. Effect of basal area (BA) and site index (S_i) on AGB and BGB were examined. Best models were selected based on mainly Akaike Information Criterion (AIC) and visual interpretation of model diagnostics. Cross-validation statistics of percent bias, root mean square percentage error (RMSPE), and mean absolute percent error (MAPE) were computed by randomly splitting data 200 times into model development (70%) and validation (30%) datasets and averaging over the 200 realizations. Using the method of power nonlinear weighted Maximum Likelihood and taking into account the effect of stand factors obtained the reliability higher than commonly used method is logarithmic linear least squares. The cross-validation provided quantifiable errors of the developed models. The selected models using the predictor variables measured and monitored by local communties for estimating AGB and BGB were the equation forms $AGB = a_i \times DBH^b$ (a_i are parameters associated with S_i) and $BGB = a \times DBH^b$; for estimating TAGB and TBGB were $TAGB = a \times BA^b$ and $TBGB = a \times BA^b$. Using the stand biomass models reduce the data collection but MAPE increase 9-12% compared to the tree biomass models.

Keywords: *Biomass model, community, participatory, simple predictor variable.*