

Development and cross-validation of modeling systems for estimating tree aboveground biomass of dry deciduous dipterocarp forests in Viet Nam

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1. SUMMARY OF STUDY CONTENTS

This study evaluated and selected the method of development and cross-validation of biomass models, applying the method of the independent model establishment to develop modeling systems to estimate tree aboveground biomass (AGB) and its components for taxonomic levels; besides, using seemingly unrelated regression (SUR) to develop biomass modeling systems for AGB and its components and compare with models developed independently. The study also cross-evaluated the effects of ecological and forest environmental factors on *AGB* of the dipterocarp forest (DF), comparing the reliability of pantropic biomass models with the model for site-specific models according to taxonomic plants. As a result, it is proposed to estimate biomass and carbon of DF for the REDD + program at national and regional levels and apply for the development and cross-validation of the forest biomass estimation modeling systems.

2. NEW RESULTS OF THE STUDY

i. The modeling systems fit by SUR or the model with combined ecological and forest environment factors through the form: $AGB = AVERAGE \times MODIFIER$ improved reliability in compared to the models developed independently and traditionally.

ii. Establish and provide errors based on the method of cross-validation for modeling systems to estimate simultaneously tree biomass of mixed species, dominant family, genera, and species of dry dipterocarp forest in Viet Nam and shows that the AGB model of the dominant plant genera with a simple predictor of diameter at breast height (D) was more reliable than the mixed-species model with three predictors such as D, tree height (H) and wood density (WD) and pantropic genus-specific modeling systems were generally applicable to the tropics.

3. PRACTICAL APPLICATION / APPLICABILITY, ISSUES NEED TO CONTINUE RESEARCH

i. The results could be used to develop and cross-validate forest tree biomass modeling systems; and the developed modeling systems in this study can estimate biomass, carbon for DF in regional and national REDD+ projects.

ii. To increase the accuracy of estimating tree biomass of the DF in Viet Nam, more studies are needed to increase sample trees for mixed species, dominant family, genera, and species in other localities, such as Gia Lai province, Binh Thuan province. At the same time, it is needed to

additionally cross-validate and develop biomass models under different ecological, environmental factors, and forest stands to increase reliability and reduce errors.