PREDICTIVE MAPPING OF TREES PER ACRE (TPA) USING A NON-PARAMETRIC APPROACH

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Stand level forest attributes such as trees per acre (TPA), biomass, volume and basal area are increasingly important for a large-scale forest management planning. Traditional field-based timber cruising is costly and time consuming, and requires high sampling intensity to capture the spatial heterogeneity in sample population. We hypothesized that variables derived from remote sensing data could be important predictors while estimating stand level attributes from pixel to landscape level. Landsat TM satellite imageries and their derivatives, national land cover dataset (NLCD), and digital elevation model were paired with Forest Inventory and Analysis (FIA) data from 2007 to 2011. We evaluated the use of non-parametric approach—random forests to build a predictive model of TPA for each 68 U.S. Geological Survey zones in R statistical computing environment to generate a continuous gridded raster map across the conterminous United States. The models explained over 30 percent variability, with RMSE <110 TPA. Among many other variables, NLCD canopy cover percent was the most important predictor variable while predicting TPA. This approach can be replicated for mapping various goods and services that forests provide to the society.