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Characterizing and Predicting Site Productivity Using Geocentric Approach

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Abstract: Site productivity is a measure of primary productivity potential of a forest ecosystem. It is characterized by an interaction of biotic and abiotic factors such as climate, soil and topography. An accurate site productivity characterization allows for efficient land use allocation, integrated ecosystem planning, and prescribed ecosystem management. Site productivity can be evaluated by using phytocentric, geocentric, and phytogeocentric approaches. Phytocentric approach – site index or the height of dominant or co-dominant trees at a reference age, is an important proxy of site productivity and has traditionally been used in many conceptual and simulation models of ecosystem dynamics; however, it assumed that forest management history has no effects on site productivity. Indeed, forest site productivity is dependent on both site and management related factors. Better management of under-utilized woody biomass from forest such as treetops, branches, twigs, bark, and limbs could be potential sources of feedstock in order to meet the Energy Independence and Security Act's target to significantly increase biofuel production over the next 15 years. We hypothesized that intensive forest management practices will not only reduce the amount of soil nutrients present, but also affect the site productivity of the managed ecosystem. This study aims to develop predictive models using geocentric approach by pairing Forest Inventory and Analysis (FIA) plot data with forest management history, climate, topography, and soil data across the state of Tennessee. It is important to find a balance between forest management practices and maintaining forest productivity in order to meet the increasing demand for woody biomass and ensure it will remain a sustainable resource for the future.

Keywords: Site productivity, geocentric, woody biomass