Allometric Models for Biomass Estimation in Savanna Woodland Area, Niger State, Nigeria

Authors : Abdullahi Jibrin, Aishetu Abdulkadir

Abstract : The development of allometric models is crucial to accurate forest biomass/carbon stock assessment. The aim of this study was to develop a set of biomass prediction models that will enable the determination of total tree aboveground biomass for savannah woodland area in Niger State, Nigeria. Based on the data collected through biometric measurements of 1816 trees and destructive sampling of 36 trees, five species specific and one site specific models were developed. The sample size was distributed equally between the five most dominant species in the study site (Vitellaria paradoxa, Irvingia gabonensis, Parkia biglobosa, Anogeissus leiocarpus, Pterocarpus erinaceous). Firstly, the equations were developed for five individual species. Secondly these five species were mixed and were used to develop an allometric equation of mixed species. Overall, there was a strong positive relationship between total tree biomass and the stem diameter. The coefficient of determination (R^2 values) ranging from 0.93 to 0.99 $P < 0.001$ were realised for the models; with considerable low standard error of the estimates (SEE) which confirms that the total tree above ground biomass has a significant relationship with the dbh. The F-test value for the biomass prediction models were also significant at $p < 0.001$ which indicates that the biomass prediction models are valid. This study recommends that for improved biomass estimates in the study site, the site specific biomass models should preferably be used instead of using generic models.

Keywords : allometriy, biomass, carbon stock , model, regression equation, woodland, inventory
Conference Title : ICGG 2015 : International Conference on Geography and Geosciences
Conference Location : Istanbul, Türkiye
Conference Dates : April 21-22, 2015