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Estimation of Aboveground Volume, Carbon Stocks and NPP of Forests in the Amhara Region, Ethiopia Using Terrestrial and Satellite Data

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Abstract

In the last several years, the interest in forest productivity estimation has increased due to its importance for forest management, carbon stock, wood and other ecosystem services. However, no estimates of productivity, stored volume and carbon of different forest cover types exist throughout the Amhara region, Ethiopia. The objectives of this study are to estimate aboveground volume, carbon and net primary productivity (NPP) of the Amhara region. This will be done by (i) inventory, (iii) land cover classification and (iii) extrapolation of terrestrial estimates over the whole region based on the classified map. We collected inventory data from 5 forest regions (Ambober, Gelawdiwos, Katassi, Mahiberesilasse and Taragedam) with 4 natural forests, 2 plantation forests and 1 exclosure. The sites were selected to address the different forest types (natural forest, woodland and shrub land) in different agro-ecological zones of Amhara region. The terrestrial inventory data come from 220 sample plots. Individual tree parameters such as DBH, height, core increment samples, etc were collected to calculate the above ground volume, carbon and NPP for the 5 study regions. We obtained a land cover map from the Amhara Bureau of Agriculture and further regrouped it in to natural forest, shrub land, woodland and agriculture land in order to match with our inventory forest types. In the final step, we extrapolated our terrestrial volume, carbon and NPP over the entire region. The methodology presented here demonstrates the possibility of estimating forest volume, carbon stock and their productivity for the entire Amhara region. It can also be further improved by addressing more land cover types and integrating fine resolution land cover maps.

Keywords: Carbon, Ethiopia, land cover classification, NPP

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