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Assessing Forest Dynamics of Broad-Leaved Forest Ecosystems in the South-Central Part of Bhutan

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Abstract

Mountain forests are rich repositories of biodiversity. They are important for providing various ecosystem services which sustain the rural livelihoods and fuels the national development. However, as observed in other parts of the world, the mountain forests are now increasingly degraded as a result of unsustainable agricultural and forestry practices. A key to maintain these precious resources is to carefully manage them by having management plans based on proper resource assessment and volume increments derived from growth models. Bhutan is also one of the countries located in the mountain Himalayas with very limited scientific information on forest management especially with regard to broad-leaved forests. The purpose of the paper is to: (i) assess the forest dynamics of the broad-leaved forest ecosystems through forest inventory and (ii) understand the forest increment rates through study of growth rates of individual trees. The research was carried out in a watershed in the south-central part of Bhutan. We established 96 inventory points in a systematic grid of 800 m by 800 m covering an area of 6423 hectares of broad-leaved forests. Parameters such as DBH, tree height, horizontal distance from the centre, azimuth were collected for every tree and sapling for understanding the stand information. Increment cores to understand the growth rate of the trees for the last 10 years was collected from every plot. A total of 140 plant species was recorded indicating rich diversity of the watershed. The total mean basal area increment for the 2004–2008 and 2009–2014 were 3.13 $\pm$ 3.34 m^2 and 3.74 $\pm$ 4.06 m^2 respectively. The annual increment for the last 10 years was 0.69 m^2. The understanding of the forest dynamics and the available information of the forest increment rates is expected to further improve the sustainable forest management and avoid overexploitation of the resources. The results and recommendations from this study will be incorporated in to the watershed management plan which is currently being developed. The findings from this study will also be used in calibrating forest increment growth models for the broad-leaved forests of Bhutan.

Keywords: Bhutan, forest dynamics, growth model, increments, watershed

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