Analysis of Structure, Composition and Single Tree Selection Systems in Broad Leaved Forests of West Central Bhutan

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Abstract

In the current study broadleaved forests in west central Bhutan were analyzed with regard to structure and composition and the response of regeneration to light and lateral competition. Furthermore, equilibrium diameter distribution models as means to analyse the implications of single stem selection harvesting regimes were developed and two alternative harvesting scenarios were compared. All together 52 tree species from 29 families were present in the tree layer. The DBH distribution in all three large plots was of the inverse-J type mimicking uneven aged “plenter” forests. The regeneration inventory in the exploratory plots indicated a remarkable density in seedlings (<130cm height) and saplings (>130cm height, <5cm DBH) ranging from about 6020 (Plot B) to 17467 (Plot C) seedlings and 1000 (Plot B) to 3400 (Plot C) saplings. More than 50% of the species present in the tree layer were also present in the regeneration layer. The ordination of the plant species (both trees and others) with multivariate redundancy analysis (RDA) techniques showed partitioning of species along the altitudinal and light gradients. Other recorded microsite attributes were not correlated with regeneration status. Results of the biomass allocation study in saplings of four selected species showed partly strong contrasting partitioning of biomass compartments between these species. However, no clear results could be obtained from the analysis of relationships between morphological attributes and biomass allocation and indices of light environment and lateral competition. The steady state diameter distribution models (EDDM) established for the Rimchu plots were the first attempt to utilize this technique for broadleaved forests in Bhutan. Based on the findings of the exploratory plots as well as the analysis of alternative harvesting regimes with the EDDM it is concluded that a single tree selection regime may be an option to maintain the species pool as well as the timber harvest potential in the study area. However, due to the many species involved further research is required to shed light on the role of different species and their niche requirements.