Vegetation composition, structure, distribution and growth performance of natural forest patches across agro-ecologies in Northwestern Ethiopia

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Abstract

Natural forest resources in northwestern Ethiopia are currently under threat, requiring immediate conservation measures and a management strategy. These forests are undergoing changes in vegetation distribution and growth performance, but little is known about these dynamics. This information gap emphasizes the importance of investigating the underlying reasons causing these changes and their implications for sustainable forest management and conservation initiatives. Furthermore, only a few site-specific studies on vegetation changes in relation to environmental variations have been done. Consequently, this study aimed to examine the existing state of these resources to apply sustainable forest management practices. To achieve this, transects with 200 square plots measuring 400 m^2 were set up at nine forest patches with 200m spacing between plots and transects. Vegetation and environmental data were collected and analyzed using R version 4.1. Significant variations (p 0.008) were found in vegetation features along the slope, forest patches, and agro-ecology. When compared to other forest patches, highland, and mid-altitude forest patches had the highest species diversity (2.48) and stocking (2578 trees ha-1). The gentle slope has the most species diversity (2.83). The species similarity between highland and mid-altitude forest habitats was found significant (69%). The vegetation cover in the mid-altitude forest patches was also high (abundance: 5-12%). In all of the forest patches examined, tree life forms exceeded shrubs, climbers, and herbs. According to the study's findings, the state of forest resources varies considerably across different environmental variations. Despite the impression of entire forest patches from the outside, the interiors are open, with only huge and mature trees covering the canopy. This state has been triggered by deforestation, degradation, and inappropriate human and grazing operations.

Keywords: floristic diversity, vegetation structure, vegetation distribution, forest patches, environmental patterns