Tree species composition and forest structure in primary and secondary forests along elevation gradient in the Upper Mape Area, Papua New Guinea

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Abstract

Little is known about the potential responses of tree species in Papua New Guinea (PNG) to climate change. The relationship between altitude and tree species serve as proxy for understanding species response to change in temperature therefore providing insights into the potential effects of climate change. In this study, I have investigated the distribution of dominant trees in the Upper Mape forest area on the Huon Peninsula, in Morobe Province, PNG. All trees ≥ 10cm diameter breast height were assessed in 400 m^2 and seedlings and saplings were assessed in quadrats of 1 m^2 and 4 m^2 respectively across an altitudinal gradient ranging from 400 m to 1300 m above sea level.

The assessment recorded a total of 78 different tree genera in 48 families. Average stand density was 621 stems per hectare with 90% of trees less than 40 cm in diameter at breast height. Tree species diversity decreased as altitude increased. An ordination analysis showed clear demarcation between primary and secondary forests and high level dissimilarities in the distribution of tree species in different sites. Trees in the families of Lauraceae and Myristicaceae were dominant in low-altitude forests in both overstorey and regeneration. In-mid altitude forests, *Syzygium*, *Litsea* and *Castanopsis* were the dominant genera and *Syzygium* and *Castanopsis* were also dominant in high-altitude forests. In secondary forests, the introduced species, *Albizia chinesis*, was dominant in overstorey, and saplings of Piper anducum were the dominant. Regeneration of primary forest tree species in some secondary forest sites was observed. The overall pattern indicated that species diversity, tree density and diameter size decreased with increasing altitude in both primary and secondary forests and that species varied with elevation and forest types.

Key words: climate, Papua New Guinea, primary forest, secondary forest, tropical forests