

**PLANT COMMUNITY ECOLOGY OF MONTANE RAIN FORESTS
AT DOTHALUGALA MAB RESERVE IN THE KNUCKLES
MASSIF, SRI LANKA**

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Dothalugala Man and Biosphere (MAB) Reserve which is located at the Southern part of the Knuckles Conservation Area in Sri Lanka abounds a rich biodiversity but the area has not been fully explored so far. Spatial patterns in the vegetation and the abiotic factors that determine the spatial patterns in this montane forest meta community, where the elevation is above 1000 m were examined in thirty nine $10 \times 15 \text{ m}^2$ experimental plots established at randomly chosen points. The study was carried out with the aim of revealing natural plant communities in the site, their ecology and conservation importance, the abiotic factors affecting the spatial heterogeneity of the vegetation and the impacts of disturbances on the soil and the vegetation. All the individuals taller than 1 m were enumerated while the dbh of individuals was measured where it was $>3 \text{ cm}$.

One hundred and forty nine plant species belonging to 105 plant genera and 54 plant families have been identified from this study area, of which 74 (nearly 50%) are endemic to Sri Lanka. Moreover, 50 of these plant species were nationally and 10 plant species were globally threatened species while 7 plant species were threatened in both nationally and globally. Ordination analyses revealed a high spatial heterogeneity of the vegetation in the study area. The elevation, aspect and soil pH were revealed to be the major abiotic factors that affect in the formation of plant assemblages. Three major plant communities were identified as Upper montane forest (UMF), Mid-elevational dry-face forest (MDF) and Mid-elevational wet-face forest (MWF) communities. Among these forests, the forest structure and the physiognomy differed significantly. However, the three forest communities identified were equally diverse in plant taxa and harbour many endemic and threatened species. *Stemonoporus affinis* (Dipterocarpaceae), which is listed as a critically endangered plant species in both national and global Red Lists was found in the UMF community. Furthermore, investigations revealed that edaphic factors such as soil pH, available nitrate, total P, Fe, Zn and K contents vary over space and correlate with the elevational changes. Edaphic features characteristic to the MDF community were the relatively high soil pH and the total P content. In contrast, the UMF and MWF communities, which situated in comparatively wetter areas, appeared to possess a significantly low amount of soil K and Zn, with a low soil pH. Heavy leaching of cations in these wet forest communities may have resulted in to have low soil K, Zn and P contents in these areas. Some endemic and threatened plant species were revealed to be restricted to a given forest community or area indicating their strong affinities to the abiotic factors that prevailed in them.

Disturbances play a key role in determining the patchiness in the area, but these are frequently found in the MDF forests at the dry face of the mountain range which is easily accessed by local people. Minor disturbances in the MDF vegetation appear to be less harmful and this may be attributed to the high resilience of these forests. Minor disturbances result in an increase in the density of individuals per unit area and the species richness however, the density of endemic species or threatened species was not much affected. In contrast, major disturbances such as cardamom cultivation cause a drastic reduction of the plant density and diversity in the MDF community with a significant reduction of endemic and threatened plant species compared to its relatively undisturbed counterpart. Therefore, cardamom cultivation and other means of disturbances within or adjacent to Dothalugala MAB Reserve should be halted for the conservation of plant diversity in this fragile ecosystem and in Sri Lanka as a whole.