

## **The Diversity and Distribution of Trees and Vascular Epiphytes in Forests in Western Uganda**

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Tropical rainforests (TRFs) are generally characterised by high species diversity and endemism compared with most other ecosystems. In Africa, TRFs are concentrated along the equatorial belt, a region corresponding with high precipitation. Over 50% of the world's biodiversity is believed to live in the tropics, and while the destruction of flora is a worldwide problem, it is most prevalent in the tropics. Vascular epiphytes are a group of vascular plants that are relatively understudied in Uganda. About 24,000 of all vascular plant species are epiphytic and they constitute about 50% of the vascular plants in very wet tropical forests, making their research and conservation vital.

This PhD study aimed to document and evaluate the diversity of the vascular epiphyte species and the trees on which they grow in four medium altitude moist evergreen forest ecosystems in the Albertine Rift of Western Uganda, including Bwindi Impenetrable Forest National Park (BINP), Kasyoha-Kitomi Forest Reserve (KKFR), Kibale Forest National Park (KFNP) and Budongo Forest Reserve (BFR). The resultant information can then be used to formulate management and conservation plans.

Sampling was conducted in 3 plots per forest, mainly in intact forest, where trees larger than 10cm DBH (diameter at breast height) were identified and examined for the presence of epiphytes. Epiphyte specimens were collected for identification, and other information, including attachment height, was noted. Interviews were also conducted with local resource users to assess threats to epiphytes. Factors such as species richness and soil nutrient composition in the plots were used to describe the vegetation and habitat characteristic of the forests.

A total of 5747 trees, representing 212 species, were recorded, of which 35.4% supported epiphytes. Overall, 189,027 epiphytes of 253 species were documented, with the majority found on very old trees, at medium heights, on branches and tree trunks. Each forest was very different and had its own characteristic species: Bwindi ranked highest in terms of tree diversity, followed by Kibale, Budongo, then Kasyoha-Kitomi. Bwindi also had the highest density and diversity of epiphytes, while Kibale had the lowest diversity and Budongo the lowest density. One tree in Bwindi carried a staggering 5057 epiphytes, of 26 species.

Analyses showed that pH, altitude, rainfall and available phosphorous appeared to be some of the most important factors influencing the distribution of trees and epiphytes. Factors affecting species richness and distribution are complex, more complex than just proximity to the late Pleistocene forest refugium (a common explanation for species diversity in tropical forests) and cannot be fully explained by the variables investigated. There is therefore a need for further research to uncover the full extent of variables that influence species diversity and distribution patterns.

What is described as medium altitude moist evergreen forest can be very diverse. The forest studied exhibited high levels of uniqueness, each having its own restricted range species, but forests closer to each other tended to be more similar in species composition, suggesting satellite refugia of forests during the late Pleistocene. The dominance of epiphytes on older trees stresses the need to leave some areas undisturbed in managed forest to serve as a refuge and environmental conditions need to be investigated further to determine optimum levels for the long term survival of epiphytes.

*Summary written by Lucy Sangster*