

# Abstract

A central goal of ecology is to understand the influence of biodiversity on ecosystem functioning and the processes that determine the composition and diversity of biological assemblages. In this thesis, I investigate the regional and global context of the bryophytes of Madagascar, an ecologically important but poorly studied group, and the factors affecting epiphytic bryophyte diversity, distribution and assemblage of communities along an elevational gradient in Marojejy National Park, north-eastern Madagascar.

Firstly, based on literature reviews and available herbarium data, I examined the bryophytes of Madagascar through a historical, floristic and phytogeographic synthesis. Secondly, the ecological survey of bryophytes from a range of diversity and functional perspectives provided insight on: (1) the pattern of species richness and range-size distribution of epiphytic bryophytes and the factors affecting the distribution patterns. (2) The variations in species composition between sites. I documented how the two components of beta-diversity (turnover and nestedness) are influenced by elevational variation. (3) The relationship between bryophyte species functional diversity and community assembly based on a morphological trait-based approach. I tested how bryophyte species functionally interact with their abiotic and biotic environments and how habitat filtering and niche differentiation influence bryophyte assemblages along an elevational gradient.

The bryoflora of Madagascar, with its 1188 species and infraspecific taxa is relatively rich and highly diversified. Along the Marojejy elevational gradient, 254 epiphytic bryophytes species including 157 liverworts and 97 mosses were reported. Species richness distribution has a hump-shaped pattern along the elevational gradient, with a richness peaking at mid-elevation, 1250 m. My results suggest that mid-domain-effect was the most effective in predicting species richness, but environmental variables such as mean temperature, relative humidity, vapour deficit pressure and canopy height also play important roles in shaping richness pattern. Throughout the gradient, species dissimilarity due to replacement (species turnover) contribute the most to variation in species composition between sites. Both habitat filtering and niche differentiation were found to be involved in structuring species abundances within the studied communities.

This combination of biogeographic, taxic, and community ecology approaches, is the first detailed study on the bryoflora of Madagascar and contributes to the direct application of bryological data to conservation planning for Madagascar's unique ecosystems.



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