Old growth mature forest types and their floristic composition along the altitudinal gradient on Silhouette Island (Seychelles) – the telescoping effect on a continental mid-oceanic island

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with 4 figures, 2 tables and 3 photos

Abstract. The granitic Seychelles are the only mid-oceanic islands of continental origin. Botanists have long focused on taxonomy, and plant communities were described in a qualitative way, based on simple observation. Therefore the altitudinal belts, their floristic characteristics and distribution are still poorly understood and conservation efforts focus mainly on species-centred actions. Here we describe a quantitative study of plant communities and indicator species differentiated along the altitudinal gradient on Silhouette, the most pristine and second highest (740 m) island of this archipelago.

Twelve plots were sampled from 80 m to 640 m above sea level. Each plot contains three nested subplots corresponding to three forest strata: 50 x 10 m for all individuals of the tree layer (i.e. trunk diameter > 5 cm), 50 x 4 m for the shrub layer (ligneous > 90 cm height), and 50 x 4 m for estimation of abundance-dominance coefficient in the herbaceous stratum (all herbaceous plants, plus ligneous plants < 90 cm height).

The results are summarized in a two-way table. Both indicator species and vegetation types are discussed in relation to previous studies in Seychelles. Three altitudinal belts are distinguished: lowland, submontane and lower montane rain forests. Most of the best indicator species are found in the understory, especially ferns. The submontane belt develops at about 350 m and turns into a typical lower montane belt at ca. 550 m. Such transition zones occur respectively at about 900 and 1500 m in most of the tropical mountains, illustrating here a perfect example of the “telescoping effect”. Although the flora of Seychelles is relatively species poor, the strong characterisation of these altitudinal belts is unusual compared to younger islands in the Pacific, and may be a result of the longer evolution of its flora.

Keywords: altitudinal zonation, cloud forest, IndVal, Massenerhebung effect, submontane, understory.

Introduction

Our capability to protect species is ultimately dependent on the conservation of representative and functionally sustainable examples of the plant communities, i.e. vegetation types that support these species. Conserving biological diversity at the level of natural communities is an important complementary approach to single-species conservation efforts, not only because they are home for such species but also because natural communities contain important assemblages of both plant and animal species, both known and still undescribed. Why are some rare species limited to small areas? Which are the factors associated with such special habitats and where should we expect to find new populations of these species? Which other species have an important place in the functionality of such ecosystems? Which species can be used as indicators for recognizing and mapping such plant communities?

On the Seychelles islands, botanists have long focused on taxonomy (Baker 1877, Christensen 1912, Friedmann 1994, Robertson 1989), and plant communities have been described in a qualitative way, based on simple observation (Carlström 1996, Gerlach 1993, Jeffrey 1962, Procter 1984b, Vesey-Fitzgerald 1940), or focussing on invasive species (Fleischmann et al. 2003, 2005), or not considering all strata (Gerlach 1997). As far as we know, quantitative studies on plant communities considering all strata and all vascular plant groups (i.e. including the poorly known ferns) have not been carried out in Seychelles (see also Gerlach 1993, p.19). The main forest types distinguished by most authors correspond to the three main classes already described by Vesey-Fitzgerald: the “lowland forest” (0–300 m), the “intermediate forest” (300–550 m) and the “mountain moss forest” (from 550 m to the top, at 905 m). However, the location of these intervals and the definition of vegetation types can vary widely between authors. Such vegetation belts have been reported only for the two higher islands of the Seychelles, i.e. Mahé and Silhouette. During more than two centuries of human presence, both islands have suffered extensive human impact due to forestry, agriculture and cinnamon plantations. The lowland and intermediate levels are the most highly degraded, especially on Mahé where nearly no pristine or even old growth humid forest...