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Ecology of a Montane Forest in Sri Lanka

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Montane forests, one of the natural vegetation types, which play an important role in water retention and release in the catchment areas of this country are also the home of 413 endemic plant species. These endemics constitute 50% of all the endemics in Sri Lanka. Despite the importance of montane forests, few ecological studies have been done in them. Most of the work carried out in these areas are related to taxonomic studies. This project was initiated to gather basic ecological information from a natural montane forest in Sri Lanka.

The aims of this project are the following:

(*a*) Phytosociological studies of the forest
(*b*) Elucidation of causal factors responsible for possible species associations
(*c*) Conservation of endemic species

The Hakgala Strict Natural Reserve was selected for this study due to the relatively undisturbed nature of its vegetation, easy access and close proximity to the Botanical Gardens. It has an altitudinal range of 1700m — 2158m, is rather hilly with steep slopes and rocky outcrops. Soils of the area belong to the Red Yellow Podzolic soils with a thick humic A horizon. The mean annual rainfall of the area is 2154mm and its mean temperature is 15.6°C.

Herbarium specimens were collected from plots (each 25m x 25m) demarcated on the North-eastern slope of the forest. The overall height of the vegetation was about 12 — 15m and it was possible to differentiate 3 different strata viz. a canopy layer of 12m and above, sub-canopy layer of 9m — 12m and an understorey of 6m and below. The canopy layer was relatively closed and continuous. Even though little light reached the ground surface of the forest, a dense ground vegetation was present in most plots. A mean density of 3720 individuals per hectare was recorded.

The largest girth size recorded in the area was 270 cm gbh depicted by **Ficus microcarpa.** From the distribution of individuals in different girth size classes 64% of the stems sampled belonged to the 15cm — 29cm girth class; only 1.5% belonged to the 120cm and over girth class. Despite the low density of stems in the highest girth class they represented as many as 16 species. All the individuals over 15cm gbh belonged to 35 families, 62 genera and 90 species including 6 that could not be identified yet. Families with the largest representation of species were found to be Rubiaceae with 15 species, Myrtaceae and Symplocaceae each with 8 species and Lauraceae with 7 species. The distribution of species is highly localized. The minimal area of this forest was concluded as 1 ha.

Dominance: The dominant species and families in different strata of the forest based on density of individuals are given in Table I.

However the dominant species based on height are **Mastixia tetrandra** var. **montana, Calophyllumwalkeri, Syzygium revolutum, Celtis cinnamomea** and **Michelia wilagirica.** The population density of the species recorded revealed that each of 7 species are represented by one individual. They are **Kadsura heteroclita, Lasianthus varians, Micrococa oligandra, Photinia notoniana** and 3 unidentified species. These species may be considered very rare in this forest. It is also interesting that as much as 74% of the species are represented by less than 50 individuals each in the sampled area.

Endemics: Among the 90 species recorded in this study 40% (36 species) are endemic to this country. When individuals are considered it is found that 48% of the individuals enumerated are endemic.

Of the 36 endemic species, 9 may be considered very rare as each of them is only represented by less than 10 individuals in 1.25 ha of the forest sampled. These species are **Lasianthus varians, Micrococa oligandra, Casearia thwaitesii, Eleocarpus glandilifer, Hedyotis lessertiana, Microtropis wallichiana, Pavetta involucrata, Sophora zeylanica** and **Urophyllum zeylanicum.**

Epiphytes: Orchidaceae represented by several species of **Cirropetalum, Eria bichlor, Eria baccata** and **Saccolobium** were very common epiphytes, while others such as **Medinilla fuscioides** and **Peperomia** were also present. **Psilotum** sp., **Lycopodium** spp. and **Vittaria** sp. were some of the epiphytic pteridophytes observed. In addition, a luxuriant growth of epiphytic bryophytes, indicating the high humidity of the forest environment, was quite obvious. Most, if not all, of these bryophytes were epiphytic on the trunks of trees and shrubs, hardly any were present as epiphyllous epiphytes.

Lianas and Creepers: Formed a substantial portion of the forest floor. However, very few lianas or creepers were recorded over 15 cm gbh. **Piper** spp., **Tetrastigma muricatum, Toddalia asiatica, Zanthoxylum tetraspermum, Tyloflora multiflora** and **Morinda umbellata** were among the dominant lianas and creepers in this vegetation.

Among shrubs of the ground layer **Psychotria** spp. and **Lasianthus** spp. predominated in most areas of the forest, but on steep slopes a species of **Indocalamus** replaced them. **Amomum involucratum** and **Rubus** spp. were also present to a lesser extent on these steep areas.

In apparently undisturbed areas of the forest a gregarious cover of **Selaginella** was found. Other herbs recorded were **Pogostemon heynianus, Elatospemon** sp., **Disporum** sp., **Ophiorrhiza** sp., and also orchids like **Phajus wallichi** and **Calanthe veratifolia.**

Strata of Forest	Density Dominant Species & Their Families	Density of Individuals in 1.25 ha	Density Dominant Family
Canopy above 12 m height	i. *Cinnamonum ovalifolium* (Lauraceae).....	137	**LAURACEAE**
	ii. *Neolitsea fuscata* (Lauraceae).....	132	
	iii. *Michelia nilagirica* (Magnoliaceae).....	90	
	Syzygium revolutum (Myrtaceae).....	90	
	iv. *Semecarpus ochracea* (Anacardiaceae).....	70	
	v. *Calophyllum walkeri* (Clusiaceae).....	66	
Sub - Canopy between 9-12 m height	i. *Symplocos Spiceta* (Symplocaceae).....	207	**SYMPLOCACEAE**
	ii. *Eugenia mabaeoides* (Mynaceae).....	259	
	iii. *Symplocos i* (Symplocaceae).....	196	
	iv. *Memecylon parvifolium* (Melastomaceae)....	191	
	v. *Actinodaphne sposiosa* (Lauraceae).....	102	
Understorey below 6 m	i. *Psychotria bisulcata* (Rubiaceae).....	437	**RUBIACEAE**
	ii. *Allophyllus varians* (Sapindaceae).....	355	
	iii. *Psychotria gilandulifer* (Rubiaceae).....	120	
	iv *Saprosnia foetens* (Rubiaceae).....	103	
	v. *Maecia perottetiana* (Myrsinaceae).....	91	

TABLE I – Dominant species and families in different strata of the forest.