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PATTERNS OF DISTRIBUTION OF SELECTED FAUNAL GROUPS IN AGASTHYAMALAI HILLS, WESTERN GHATS, KERALA, INDIA

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Background: Agasthyamalai Landscape. © Jins V.J.

Birds: Nilgiri Flycatcher © Vijesh Vallikunnu; Kerala Rock Pipit © Madhumita Panigrahi
Reptiles: *Otocryptis beddomii; Xylophis captaini* © Jins V.J.

IN MEMORY OF

DR. S. BHUPATHY

1962-2013

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SUMMARY

Understanding species distribution patterns and the factors influencing them is always a challenge for ecologists, which indeed important in conservation prioritization. The latitudinal patterns in species richness have been well-studied in the past and later these patterns were also explored along elevational gradients. The factors including area availability, productivity, phylogeny and historical events have been proposed by various researchers to explain these patterns. Species distribution patterns are also studied using modern tools such as Ecological Niche Modeling (ENM), which in fact predicts their potential distributions. These prediction maps are often used in future explorations and conservation planning. We studied the reptile and bird distributions along an elevational gradient (50-1860m ASL) in Agasthyamalai Hills, southern Western Ghats. The study report includes seven chapters as given below.

Chapter one gives an overview of this study by discussing the background and the importance of the present research work. As a long term study on ecological patterns in the western slope of Agasthyamalai Biosphere Reserve (ABR), this is a unique study addressing various aspects of ecology. The second chapter gives the details of the study area by describing its biodiversity, geographical features and cultural specialties. Being a pilgrim spot having a huge pressure on its rich biodiversity, Agasthyamalai Hills is in immediate need of attention for conservation. In chapter three, we discussed about the methods used for sampling and analyzing data. Visual encounter surveys and point counts were used for sampling reptiles and birds respectively. Habitat variables were quantified using 10x10m plots and climatic data were obtained from WorldClim database. Stepwise multiple regression analysis was performed to understand contributing factors for observed patterns. Ecological Niche Modeling for selected reptile species was done using MaxEnt tool to predict their potential distribution in the Western Ghats.

Chapter four is about the elevational patterns in reptile and bird species richness. Both reptile and bird species richness declined with elevation in parallel to the area availability. We did not find any evidence for mid-domain effect (MDE) nor Rapoport's elevational rule in species richness, implying the role of climatic or historical factors in the observed elevational patterns. When lizards, snakes and endemics were analyzed separately, all snakes and endemic reptiles showed a weak fit for mid-domain effect. Endemic birds also showed a weak fit for the mid-domain null model. However, when all bird species were included, it showed the least support for MDE.

In chapter five, we discussed about the underlying factors for the elevational diversity patterns. In case of reptile richness, area availability and temperature made significant contribution to the explanatory models. Temperature alone explained 61.7% of variation in reptile richness. For endemics, precipitation and MDE richness together contributed significantly. In case of birds, environmental factors were shown to be good predictors of bird species richness than the MDE predicted richness. Annual mean temperature alone explained 78.4 % of variation in bird species richness. MDE predicted richness, mean litter cover and area together explained 89.9 % of the variation in endemic richness pattern.

The chapter six is about the status of reptiles and birds found in Agasthyamalai Hills. The IUCN status, endemism and the abundance of each species are discussed. Out of 69 species of reptiles recorded, five are in threatened category, of which three are endangered and two are vulnerable. In case of birds out of 197 species, nine near-threatened; two vulnerable and one endangered species were found. Endemism was higher in reptiles compared to birds. Among reptiles *Eutropis macularia* (0.35), *Sphenomorphus dussumieri* (0.12) and *Otocryptis beddomii* (0.068) were the most abundant species. Whereas in birds, in lower elevation (100-700 m), Yellow-browed Bulbul had the highest relative abundance (0.08). In the middle elevation (701-1200 m), the highest relative density was of Square-tailed Bulbul (0.123), followed by Yellow-browed Bulbul (0.12). In higher elevation (Above 1201 m), Square-tailed Bulbul again dominated with a relative density of 0.18 and followed by Kerala Laughingthrush (0.16) and Greenish leaf Warbler (0.1). Density estimates of 18 bird species were attempted in which the highest density of 276.57 individuals/ km^2 was of Square-tailed Bulbul, followed by Yellow-browed Bulbul 189.6 individuals/ km^2 and Crimson-backed Sunbird 175.6 individuals/ km^2.

The last, chapter discuss about the Ecological Niche Modeling (ENM) of selected endemic reptiles of Agasthyamalai Hills. The ENM was applied for two endemic species such as the Indian kangaroo lizard, *Otocryptis beddomii* and Captains's wood snake, *Xylophis captaini*. Predicted distribution of both the species showed narrow distribution (<2000 sq.km) mostly within the ranges of southern Western Ghats. Distribution of *Xylophis captaini* included a lot of unprotected areas. Being a habitat specialist, the endangered kangaroo lizard needs an immediate attention for conservation.