A Study on the Herpetofaunal Communities of the Upper Vaigai Plateau, Western Ghats, India

Funded by the Ministry of Environment and Forests
(Eastern & Western Ghats Programme)

Final Technical Report

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PART – II

1. ABSTRACT

Over the last few centuries, intensive land use has considerably reduced the forest cover and the extent of natural forests continues to decline. Recent estimates show that the species extinction rates are likely to be at least 10,000 times greater than the past. Most of the world's biodiversity seems destined to disappear with an acceleration of habitat destruction caused by population and economic growth. Like any other tropical region, the Western Ghats is undergoing rapid transformation. The deforestation rate is high and the forests are being transformed into agriculture and monoculture Plantations. Indian Herpetofauna are most diverse, but poorly studied with respect to their ecology. Currently, at least 130 species of Amphibians and 165 Reptiles are known from the Western Ghats. Severe habitat loss and patchy distribution of Amphibians and Reptiles would lead them to higher extinction proneness.

Basic information such as species occurrence and richness with respect to Herpetofauna in India including the Western Ghats is scanty. Implementation of species conservation plans without understanding their taxonomy and ecology would be futile. Understanding the distribution patterns of biotic communities is important for planning conservation of biological diversity at local and regional levels. Herpetofauna are highly perocheal, and hence may be considered as indicators of the health of an area. The present study was initiated with the following major objectives.

(1) Determine the distribution pattern of Herpetofaunal communities in various vegetation (forest) types, and altitudinal gradients in and around the Vaigai River Catchments,

(2) Assess the conservation value for Plantations such as Tea, Coffee and Cardamom in the area with respect to the endemic Herpetofauna, and

(3) Propose strategies to conserve rare and little known Herpetofauna inhabiting the Vaigai River Catchments.

In addition, checklists for taxa such as Mammals, Birds, Butterflies and Trees were made to highlight the importance of the area for biodiversity conservation.

The present study was conducted in the Upper Vaigai Plateau and its environs (9° 26'- 9° 49' N & 77° 19'- 77° 32'E) including Highwavy Mountains, Megamalai, Vellimalai, Cumbam Valley, Suruli and Mavadi. The altitude of the general area ranges from 300 to 2016 m. This region has a wide range of vegetation types including the Montane Shola and Grassland, Wet Evergreen, Moist Deciduous, Dry Deciduous Forests. The Theni Forests receive rainfall from both Southwest (May - August) and Northeast (September - November) monsoons. The highest monthly mean maximum and minimum temperature was recorded during May and January respectively.

Considering the aspect, slope, plateau and presence of valleys, Herpetofauna were sampled along three belt transects on seasonal basis (wet season: June-November; dry season: December- May) from December 2006 to November 2008. Time-constrained Visual Encounter Surveys and Quadrats were used for data quantification.

A total of 3600 hours of VES and 12 ha of Quadrat samplings were done during this study. Point Centered Quadrant was used to record the tree species present at every 50 meters along each belt transect, and forest type assigned to the specific area. Anthropogenic disturbances (lopping, presence of cattle dung, grazing signs) were quantified at every 100m.

In all, 21.17 km^2 was sampled in three belt transects namely Mavadi, Suruli and Vellimalai. Sampling intensity in each altitudinal category was based on area availability. A total of 419 quadrants were examined and 276 points had trees. In all, 1104 trees (156 species and 27 endemics) were observed in the quadrants. The following vegetation types were found; Tropical Dry Deciduous, Moist Deciduous, Evergreen, Riverine, Shola and Grassland and Open Rock with Grass.

The VES yielded higher number of species and individuals of Herpetofauna compared to Quadrat sampling. Variation in number of Herpetofauna observed in these methods was significant (Amphibians: U= 88, df = 41, $p<0.001$; Reptiles: U= 646.5, df = 109, $p<0.001$). Higher number of species and individuals were recorded during dry season (December- May) compared to wet season (June-November), but this variation was not statistically significant.

Including opportunistic observations, a total of 34 species of Amphibians and 72 Reptiles were observed during this study. This is 26.15% (n= 130,) and 43.63% (n= 165) of Amphibians and Reptiles reported so far from the entire Western Ghats respectively. This indicates the importance of Vaigai Plateau for the conservation of Herpetofauna in the Western Ghats. Two range extensions have been recorded during this period; Anamalai Spiny Lizard, *Salea anamallayana* and Malabar False Tree Frog, *Rhacophorus pseudomalabaricus*.

A total of 21 species of Amphibians (3166 individuals) and 55 species of Reptiles (3374) were recorded in VES and Quadrat sampling. Density of 27.91 Amphibians/ ha and 0.88 Amphibians/ man hour was found. Similarly, density of 30.83 Reptiles/ ha and 0.83 Reptiles/ man hour was obtained during this study.

Amphibians showed increasing trend with respect to species richness along the altitudes. The highest of 14 species was found in 1400-1600m and the lowest in 400-600m. Reptiles showed monotonic decline in species richness (number) with altitude. The highest of 30 species of Reptiles were observed in 600-800 m altitude followed by 400-600m. Higher proportion of endemic species of both Amphibians and Reptiles were found in higher altitudes. Medium and high hills are important for the conservation of endemic Herpetofauna.

The highest of 15 and lowest of five species of Amphibians were found in Evergreen and Riverine Forests respectively. The highest of 37 species of Reptiles was observed in Dry Deciduous Forest and the lowest of only five species in Shola and Grassland. However, the Shola and Grassland had higher number of endemic Herpetofauna. The Herpetofaunal richness and endemicity were high in Natural Forests compared to Plantations and Reclaimed Forests.

The species richness of Amphibians had no significant direct correlation with environmental variables such as herb, shrub, canopy and litter cover, boulder, rock and fallen log density, vicinity of water, soil temperature and soil humidity. However, soil humidity and temperature had higher R^2 values for polynomial regression indicating influence of them at some level. Soil temperature had significant positive correlation with Reptile species richness ($r = 0.887$, $n = 7$, $p < 0.01$), but had negative relation with soil humidity ($r = - 0.909$, $n=7$, $p <0.005$) and shrub cover ($r = 0.844$, $n = 7$, $p<0.01$). Canopy, herb, leaf litter and boulder cover had moderate relation with Reptile species richness. A combination of several factors is responsible for the observed distribution pattern of the Herpetofauna.

Amphibian Families such as Bufonidae, Petropedetidae and Dicroglossidae were found across in all altitudinal categories and the Nyctibatrachidae was restricted to 800-1600 m. In the case of Reptiles, Agamidae, Scincidae and Colubridae were found across in all altitudinal categories. Abundance of lizards was high compared to snakes in all altitude categories.

The highest of eight Amphibian Families were observed in Evergreen and lowest in Riverine Forests. Bufonidae, Petropedetidae and Dicroglossidae were found across all forest types. Agamidae, Scincidae and Colubridae contributed higher number of species in all vegetation types. Snakes dominated the community with respect to number of species compared to lizards in all vegetation types, but their abundance was low compared to lizards.

The present study area falls under the Reserve Forest Category. Considering the strategic location connecting important wildlife habitats, rich biodiversity with several regional (Western Ghats) and local endemics, variety of vegetation types and altitudinal categories in the Vaigai Catchment Area (Megamalai, Highwavy, Vellimalai, Cumbam Valley) deserves a Protected Area status such as Wildlife Sanctuary or Biosphere Reserve. Biosphere model may work well as the area falls in two states (Tamil Nadu and Kerala), several Plantation estates, intact forests and a few tourism spots are involved. This would help conserving the area for wildlife and

improve the livelihood of the people as well. Suggestions with respect to nature awareness, alternative livelihood and further research are also to be considered while planning wildlife conservation in the area.