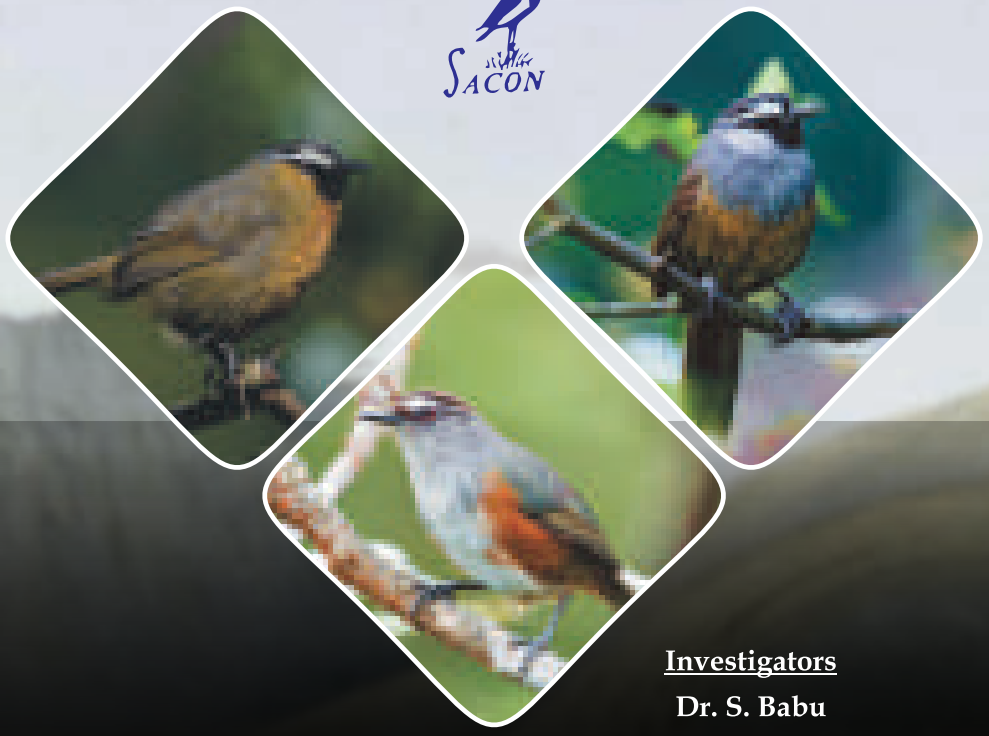
ECOLOGICAL ASSESSMENT OF ENDEMIC AND THREATENED LAUGHINGTHRUSHES OF THE WESTERN GHATS TO DEVELOP CONSERVATION PLAN FOR SECURING THEIR POPULATION AND HABITATS

TECHNICAL REPORT No. PR 279

SUBMITTED TO MINISTRY OF ENVIRONMENT, FOREST, AND CLIMATE CHANGE



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Part- II

1. Preface:

The Western Ghats is known for its rich biological diversity and high degree of vertebrate endemism, making them one of the global biodiversity hotspots. This mountain stretch supports 29 species of endemic birds, and many of them are confined to the tropical montane forests (between 1400 and 2700 m elevation). However, montane forest-associated birds experience severe anthropogenic pressures at both regional (e.g. habitat loss, monoculture plantations, invasive weeds, developmental activities) and global scales (e.g. climate change). These threats further restrict and reduce the species' distribution ranges, increasing the risk of local extinction. Identifying the distribution range and the proximate causes influencing their current range is the first step towards conserving these species.

India is home to 31 species of laughingthrushes, and four of them are endemic to the high elevation areas of the southern Western Ghats. These montane forest-associated laughingthrushes are separated by deep valleys within the region. The Banasura Laughingthrush (*Montecincla jerdoni*) occupies a restricted distribution range of approximately 80 km² across three isolated hill ranges. The Nilgiri Laughingthrush (*Montecincla cachinnans*) is found between the north of Palghat Gap and the south of Chaliyar Valley. The Ashambu Laughingthrush (*Montecincla meridionalis)* is restricted to the high elevations south of the Senkottah Gap. All three species are categorized under one of the threatened categories of IUCN due to their narrow distribution ranges and the anthropogenic threats they face. Despite their higher threat status, there have been limited ecological studies focusing on the habitat preferences, nesting ecology, and conservation issues of the laughingthrushes in the Western Ghats.

Previous studies on these species have addressed the taxonomic status, acoustics, home range, and phylogenetics of Montecincla laughingthrushes. However, there is a need for detailed ecological studies assessing the occupancy, abundance, and breeding ecology of these species to understand their current status and suggest conservation measures. This project aims to fill this gap through this work.

2. Abstract of the project:

The Western Ghats has been recognized as one of the ten hottest biodiversity hotspots for its remarkable biological diversity and high degree of vertebrate endemism. This mountain chain encompasses nearly 40% of India's bird diversity, including 27 endemic bird species, many of which are confined to tropical montane zones (1400 – 2700 m). Birds associated with montane forests face several regional (such as habitat loss, monoculture plantations, invasive species, and developmental activities) and global threats (like climate change). The effect of both regional and global threats on the endemic species of Western Ghats has not been fully assessed. The first step towards conserving endemic and threatened species is identifying their distribution range and the proximate causes influencing their current distribution (Crosby *et.al.*, 1994; Bibby, 1994). Unfortunately, there is a lack of baseline data on species distribution range, breeding seasonality, and distribution patterns with respect to habitats, which is essential for assessing range shifts in high-elevation endemics in response to climate change. In this context, we assessed the habitat quality, area of occupancy, abundance, and breeding ecology of three endemic and threatened laughingthrushes (Banasura, Nilgiri, and Ashambu LT) of the southern Western Ghats and developed a conservation plan to secure their habitats.

The structure and floristics of primary habitats for laughingthrushes were evaluated using standard vegetation sampling and quantification methods. Four major habitats were identified, and plant composition was quantified across three strata: tree, shrub, and herb. To elucidate factors influencing occupancy of laughingthrushes, single-season single-species occupancy framework (sampling unit – 2 & 4 km^2 spatial grids) was employed for all three species within their distribution range (i.e., above 1200 to 1400 m elevation). Within each grid, four spatial replicates of 500 m were sampled, and both sample and site covariates were measured to understand the factors influencing detection probability and occupancy. To identify the factors influencing nest site selection by laughingthrushes, nest site characteristics were compared with randomly selected sites in the same landscape at two scales—micro and macro scales. To develop a conservation plan, major threats to these species and the necessary mitigative

measures were identified during the study. Based on the collected information, a comprehensive conservation plan was developed, describing the conservation challenges these species face and providing prescriptions to address these challenges.

Montane forests are characterized by dense canopy cover (between 63% and 94%) and moderate to tall trees (2.5 to 12 meters). The dominant tree species of montane forest are *Symplocos cochinchinensis*, *Myrsine wightiana*, *Mahonia leshnaltii* and *Litsea decanensis*. Among the shrubs, *Cestrum aurantiacum*, *Psychotria neelgheriensis*, *Mahonia leshnaltii* and *Solanum erianthum* are the dominant species. Evergreen forests exhibited greater variability in canopy cover (2% to 85%) with an average value of 65.5%. A total of 24 species of trees were recorded with *Ligustrum perrottetii*, *Magnolia nilagirica* and *Mallotus philippensis* are dominant. In the shrub layer, a total of 21 species were recorded with *Cestrum aurantiacum* showing the highest IVI followed by *Ageratum houstonianum*, *Stenosiphonium wightii* and *Strobilanthes wightii*. Exotic plantations considered in the study are eucalyptus, wattle and pine. These plantations exhibited high variability in both canopy cover (2% to 72%) and tree height. Tree layers are dominated by exotic trees such as *Eucalyptus* and *Acacia mearnsii*. *Ageratum houstorianum*, *Cestrum aurantiacum* and *Acacia mearnsii* are dominating shrub layer in exotic plantations. Canopy cover in grassland was ranging from 0% to 3%, with most plots 0% canopy cover. Tree heights ranged from 3 to 28 meters.

The Nilgiri Laughingthrush (NLT) was found in 182 out of 337 grids surveyed, with naïve occupancy and detection probability (p) of 0.540 and 0.298, respectively. Among the ten sampling covariates considered, fog/mist cover positively influenced detection probability. Five covariates—elevation, inter-tree distance, canopy cover, herb cover, and invasive cover—influenced occupancy of NLT. The estimated occupancy of NLT is 0.573, which is 6.1% higher than the naïve estimate. The Banasura Laughingthrush was recorded in 35 out of 61 grids with a naïve occupancy of 0.5738 and a detection probability of 0.4540. None of the sampling covariates influenced detection probability, while elevation and Rubus cover influenced occupancy. We detected the Ashambu Laughingthrush in 30 out of 76 grids, with a naïve occupancy and detection probability of 0.3947 and 0.1843,

respectively. Temperature influenced detection probability, while elevation, shrub height, and litter cover influenced occupancy. For all three species of Laughingthrushes, elevation, litter cover, Rubus cover, and shrub cover were significantly influencing the occupancy.

Over two years, we located 42 nests of NLT in Mukurthi National Park and Parson's Valley. Most nests contained two eggs and were placed on shrubs in montane shola forests. NLT constructed nest on 17 species of trees/ shrubs, with a preference for *Arundinaria* sp. and *Vaccinium neilgherrense*. Nest site characteristics were explained by nest concealment (canopy cover), nest microclimate (distance to water), and nest substrate characteristics (nest height and nest plant GBH). Nest site selection by the species was influenced by tree height, leaf litter, canopy cover, and shrub cover at a micro-scale, while at a macro-scale, it was influenced by canopy cover, litter cover, and shrub cover.

The effects of anthropogenic pressures on understory high-elevation endemic birds have been documented, and appropriate mitigation measures have been suggested for their conservation in this landscape.

3. Highlight of the findings achieved in the project

We assessed the vegetation structure and floristic composition in all major laughingthrush habitats. This assessment will facilitate the implementation of restoration activities that are conducive to the needs of endemic birds in altered or disturbed shola patches and abandoned exotic plantations in the upper Nilgiris.

We assessed the abundance and encounter rate of laughingthrushes across various habitats. The Nilgiri Laughingthrush was highly abundant in montane shola forests and high-elevation evergreen forests, while its abundance was lower in tea and exotic plantations, and agricultural fields. The study necessitates the significance of preserving isolated shola patches amid agricultural and human dominated landscapes of upper Nilgiris.

The encounter rate and abundance of Banasura Laughingthrush were highest in montane shola forests, followed by montane shola with Strobilanthes cover, and lowest in shola with reed cover.

We estimated the area of occupancy (AOO) for select laughingthrush species. The Nilgiri Laughingthrush occupied approximately 57.3% of the surveyed grids, equating to 772 km². Whereas, the Banasura Laughingthrush is estimated to occupy about 35 grids, equating to 70 km². These estimations are providing a relatively accurate representation of their distribution range in the southern Western Ghats. These two species need to be retained in the endangered category considering their small distribution range and threats they face.

The Nilgiri Laughingthrush occupied high-elevation grids (above 1400 meters), characterized by dense tree assemblages, thick canopy cover, dense herbaceous cover, and minimal invasive species cover. The Banasura Laughingthrush preferred high-elevation sites with significant Rubus cover, moderately tall trees, and minimal shrub cover. The Ashambu Laughingthrush occupied grids in high-elevation areas showing moderately tall shrub layers. This findings necessitate the importance of natural understory vegetations in the high elevation of southern Western Ghats.

The Nilgiri Laughingthrush showed a nesting preference for 17 species of shrubs and trees with dominantly preferring shrubs. Arundinaria species and Vaccinium neilgherrense were the most preferred plants across all years. This bird constructs cup-shaped nests, typically containing two eggs, with rare instances of up to four eggs. The majority of nests were placed towards the northeast direction.

Nest site characteristics of Nilgiri Laughingthrush is explained by nest microclimatic conditions, nest substrate characteristics and forest edge characteristics. The results emphasize the importance of preserving the microclimate of shola forests and adjacent high-elevation evergreen forests to protect against increasing temperature (as a result of climate change).

At micro-scale, laughingthrush selected sites characterised by shorter trees with dense canopy cover (this maintains favourable micro-climatic condition around the nests and save the nests from extreme temperature in grasslands during summer) and high leaf litter cover (provides immediate foraging substratum for the NLT) and low shrub density. At macro-scale, laughingthrushes selected nest-sites that had high litter cover and dense trees in areas with minimal shrub cover.

We have developed a conservation plan by outlining the ecological aspects of the laughingthrushes, identifying the major threats they face within their landscape, and prescribing appropriate measures to mitigate these threats for selected species of laughingthrushes.

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