# INSECT DIVERSITY IN THE NILGIRI BIOSPHERE RESERVE - AN OVERVIEW

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## Abstract

The current status of insect diversity in the Nilgiri Biosphere Reserve is reviewed. Information so far gathered indicate survival of a rich and varied fauna, but lack of detailed studies have resulted in lacunae in the data pertaining to faunal elements. The need for intensive faunal surveys and strengthening of taxonomic research in the country are highlighted.


## Introduction

Forest is the main centre of species diversity on account of the variety of microhabitats and plant species. So far, about 751,000 species of insects have been recorded from all habitats in the world, of which a major share are from the forests (WRI *et al.*, 1991). Although the tropical forests occupy only 72% of the land surface of the globe, they contain 2/5ths of all known species. Most of these forests are in the developing countries where the pressure on forests is very high. As a result of disturbance, the natural habitats of several species of animals, particularly the lower forms are destroyed threatening their survival (Wells *et al*, 1983).

Loss of species diversity in tropical habitats has profound implications on the development of biological resources as forests, fisheries, wildlife and crops. As the world conservation strategy points out, the genetic material needed to achieve continued improvements in yields, nutritional quality, flavour, pest and disease resistance and adaptations to different soils and climates is found both in the domesticated and cultivated varieties of the species that serve the needs of mankind and in their wild relatives.

The role of insects in the functioning of the ecosystem is well established. Their major role is in the transfer of radiant energy stored in plants and making it available to other organisms in the ecosystem. They also form important links in food webs since many groups of higher animals like birds, reptiles and mammals are partially or fully dependent on insects for food. Many species of insects are currently in use for the biological suppression of noxious insect pests, for monitoring changes in the environment, for recombinant DNA research and for the biosynthesis of new products (Fitter, 1986).

## Forests of India

Sixteen major forest types have been recognized in India, under 4 major categories, viz., tropical, subtropical, temperate and alpine, together covering about 64 million hectares. A summary of the major forest types and areas is given in Table 1; and more details are given in Lal (1989). Tropical forests constitute about 80% of the total forest area with alpine, temperate and sub tropical forests accounting for about 20% (Table 1). The major subdivisions of the tropical forests are moist deciduous, dry deciduous, semi evergreen and evergreen. The wide variety of ecosystems and their transitional stages offer a wide range of habitats and food sources favouring the survival of a large number of organisms.

*Table 1. Basic information on forests of India*

| | (Million ha) |
|---|---|
| Total geographical area | 328.8 |
| Total forests cover | 62.2 |
| Major forest types | |
| Tropical | |
| Wet evergreen | 5.1 (8.0%) |
| Semi-evergreen | 2.6 (4.1%) |
| Moist deciduous | 23.7 (37.0%) |
| Dry deciduous | 18.6 (28.6%) |
| Subtropical | 6.1 (9.5%) |
| Temperate | 4.5 (7.0%) |
| Alpine | 1.8 (2.9%) |
| Plantations | 4.0 |

Source : Lal (1989)

## Insect species diversity in Indian forests

So far, about 67,000 species of insects have been recorded from various ecosystems in India. Out of this, about 16,000 species have been specifically recorded from the forests (Beeson, 1941; Nair & Mathew, 1993). However this estimate may not hold true considering the fact that many species found in other ecosystems may also occur in the forests. Also, India has over 62.2 million ha under forests which range from the snow-clad boreal forests of the Himalayas to the Wet Evergreen forests in the Western Ghats. No comprehensive study has so far been made to enumerate the insects found in the various forest types in India.

## The Nilgiri Biosphere Reserve

The Western Ghats is perhaps the richest biogeographic province of the Indian subcontinent. The Nilgiri Biosphere Reserve embraces the sanctuary complex of Wyanad, Nagarhole, Bandipur and Mudumalai, the entire forested hill slopes of Nilambur and Nilgiris, the upper Nilgiri plateau, the Silent valley and Siruvani hills. It includes substantial unspoilt areas of natural vegetation types ranging from dry scrub, dry and moist deciduous, semi evergreen, wet evergreen and shola forests as well as grassy downs and swamps. The Attapady plateau, Moyar Valley and parts of Wyanad will provide the entire diversity of cultivated plants covering the spectrum from millets very dry tracts to paddy and plantation crops of very humid tracts. The region includes the largest known population of two endangered species namely the Nilgiri tahr and the Lion-tailed macaque and probably the largest southern Indian population of elephant, tiger, gaur, sambar and chital (MAB, 1980).

The total area of NBR is about 5670 km² of which 2020

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km² is proposed to be consituted as a core area and 2290 km² as manipulation zone (forestry), around 1330 km2 as manipulation zone (agriculture) and 30 km² as restoration zone (Fig. 1).

## Insect fauna in the Nilgiri Biosphere Reserve

Several agencies like ZSI, KFRI, IISc, as well as various Universities are involved in studies pertaining to different insect groups from this region. Specific studies so far carried out in this region are summarised below.

Most of the studies were made in the Nilgiris and the Silent Valley areas. Much of the early work on the Indian insect fauna were made by the personnel attached to the East India Company, Nilgiris being a hill station, formed one of the earliest settlements of the Britishers who made several explorations in to the forests. The studies of earlier workers like Hampson, Jacoby, Fletcher etc. have yielded valuable information on the faunal elements of this region which are contained in the Fauna of British India series. Several studies were made even after the publication of the Fauna of British India series but no attempt has so far been made to compile the information generated from this region.

With the establishment of the Nilgiri Biosphere Reserve, specific studies were made from different regions of this reserve. In a recent study on the insect fauna of Silent Valley, ZSI reported 242 species (ZSI, 1988) which included 128 species of Coleoptera (10 new), 15 species of of diptera (1 new), 39 species of Hemiptera (6 new), 2 species of Homoptera (both new), 27 species of Lepidoptera and 33 species of Orthoptera (1 new). The study concluded that the collections made constituted only a small proportion of the faunal wealth of this region. It is noteworthy that in spite of the incompleteness of the study, 8.2% of the insects collected were new to science.

Larsen (1987, 1988) made a detailed study of butterflies in the Nilgiri mountains of Western Ghats. In his 7-months' observations, he recorded 299 species of butterflies. A total of 314 species of butterflies had been recorded earlier from the Western Ghats region, and Larsen concluded that the Nilgiri fauna of butterflies with 300 species is rich, varied and interesting, and that probably no other area of similar size in India has that many species of butterflies. He found many rare species surviving in this area and observed that no significant depletion of the genetic resources of butterflies has occurred in this region over the past 100 years.

Mathew (1990) studied the Lepidoptera of Silent valley, based on collections from 4 sites - 2 disturbed and 2 comparatively undisturbed. Over a period of 2 years, collections were made from selected sites using light traps and net sweeps during 5 days per month over the 5 summer months each year. The collection sites represented about 20 km² of the 8C km² Silent Valley National Park. He collected about 500 species of Lepidoptera of which 95 species were butterflies the remaining moths. Among the butterflies, 5 were protected species and 13 were very rare (The Wildlife (Protection) Act, 1972). Most of the unidentified moths were microlepidopterans and it is likely that many of these unidentified species may turn out to be new species. It has been estimated that the Oriental region has 146,277 described species of Lepidoptera (Heppener, 1991). Considering this, the 500 species collected from Silent Valley is a small number, but the study was not exhaustive, and many more species await discovery. The study has also revealed that many species collected from Silent Valley were common to the Malaysian fauna and significant differences have been noted between specimens collected from Silent Valley and other areas in Kerala suggesting endemism due to geographical isolation.

Gadagkar *et al.*, (1990) in a study in Uttara Kannada in Karnataka, assessed insect species diversity in reserve forests, disturbed forests, forest plantations and other similar habitats. Collections were made from 36 Plots (3 replicates) of 1 ha each in 12 localities, using low intensity light traps. The study aimed at assessing the taxonomic diversity of different habitats, without identifying the species. Altogether 1789 species were distinguished in 219 families in 19 orders. In addition to suggesting simple methods for comparing the insect diversity of different habitats, the study found that the diversity was high at intermediate levels of canopy cover. As the canopy opened up, more and more insects were found in the forest understorey.

## Conclusions

The insects so far reported from Nilgiri Biosphere Reserve represent only a small fraction, as the faunal surveys were by far incomplete. Studies so far made, indicate survival of many rare and endemic species. Due to deforestation, conversion of natural forests to plantations as well as due to increased human interactions, the species and genetic diversity of insects is apparently being continuously eroded but we have no record of these changes. Several forest insects have been sought to be protected through legislation, but we do not have sufficient information on their status.

As stated earlier, forest is the main centre for insect diversity because of the variety of micro habitats and plant species. Recent studies in the forest canopy in the rain forests of Panama, Brazil and Peru using canopy fogging methods have put the world estimate of insect species closer to 30 million. This will be the situation in other tropical forests as well.

Obviously, the existing infrastructure for research on insect taxonomy is insufficient to meet the challenges for understanding and conserving biodiversity. The neglect shown by applied biologists and funding agencies towards taxonomic research is highly deplorable. With the current awareness and spirit on conservation of biodiversity, all encouragement must be given to systematic biologists to perform their task with perfection.

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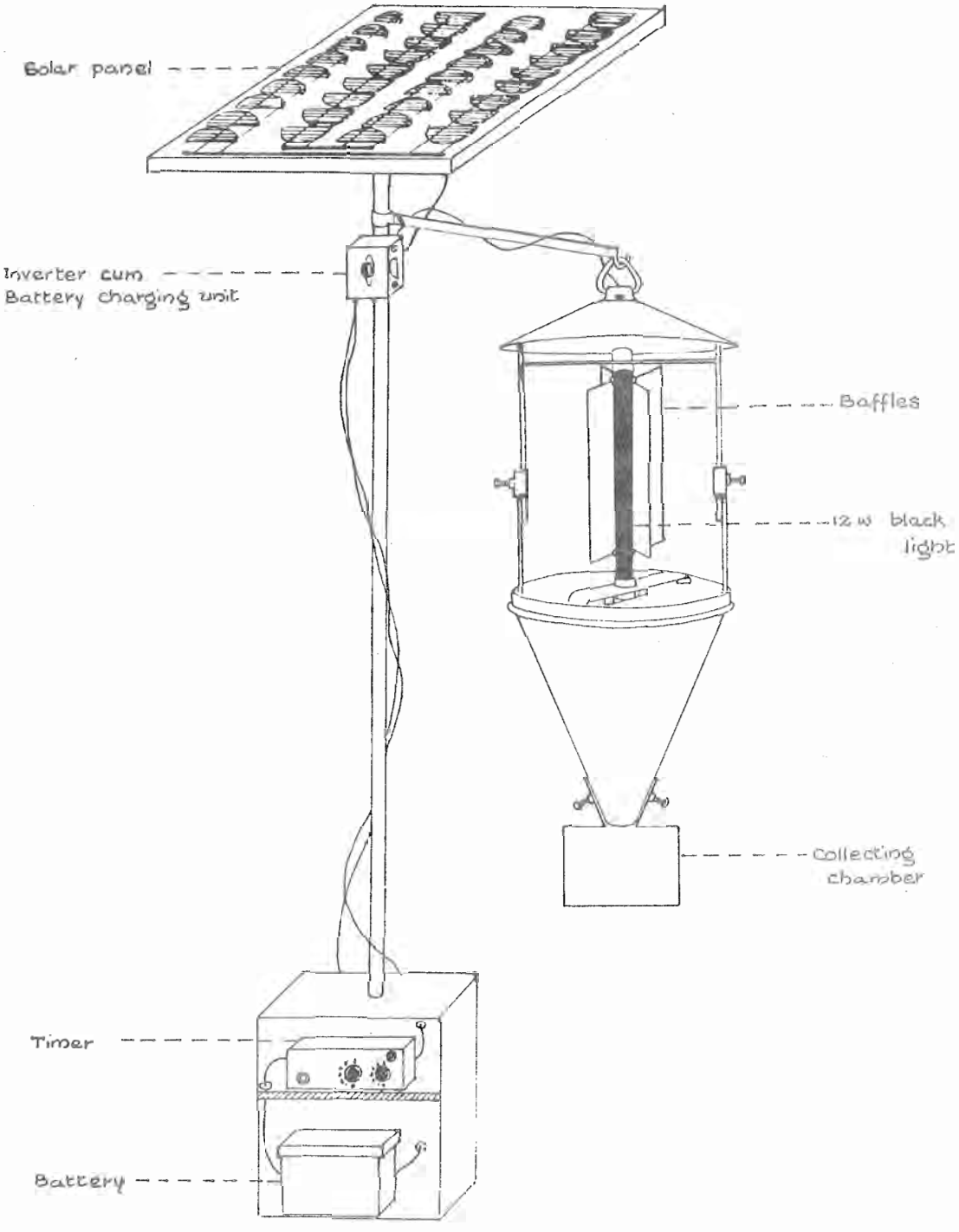


***Mathew's model light trap***