

# A Study to Discuss Significance EOF Conservation of *Lepidoptera*

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## Abstract

The variety of insects, a crucial part of the ecosystem, is claimed to be rapidly declining worldwide. In terms of Lepidoptera conservation, moths have long been considered to be the "poor relatives" of butterflies and have fallen well behind them in terms of both attractiveness and the attention paid to their conservation requirements and status. Less than half of the estimated 11,300 species of butterflies and moths that are found in India are represented in collections. This lack has hampered the study of this group of insects as well as efforts at popularization and conservation. The efficacy of governmental actions in this area is examined. It is advised to take action to advance Lepidoptera research in India.

**Keywords:** *Insects, Conservation, Moths, Government, Species.*

## 1. INTRODUCTION

One of the most beautiful and colorful terrestrial invertebrates is the butterfly. They have carved out a place for themselves in the prose and poetry of many civilizations as a result of their allure and ubiquity. It is regarded as the divine representative in Hindu culture, and as such, blessings are sought at the start of a marriage. People of all ages, from children to adults, adore butterflies due to their attractively colored wings and erratic, fluttering flying.

Both amateurs and experts have been fascinated by these colorful insects for a very long time. Between 1860 and 1910, during the Victorian era, many people in western countries turned their interest in butterflies and moths into a profession. Members of the English nobility collected, identified, and catalogued Lepidoptera (order of butterflies) from all over the world at this time. As a result, the Victorian era laid the groundwork for the development of interest in and research into Lepidoptera, and more particularly, studies of butterflies. In virtually all cases, people find butterflies to be beautiful and appealing. The favorable perception of butterflies is a result of their size, frequent beauty, and seldom dangerous nature. This may help to explain the growing interest in butterfly studies and related research. However, the aesthetic value of many species, particularly those with larger sizes and more vibrant colors, has become a threat to their very survival.

Butterflies are extensively dispersed over practically the whole earth, from the tropics to the poles. High mountains and even deserts contain them as well. However, those with the most vibrant colors and the most variety of species are generally found in tropical areas. The butterfly flora in India is quite abundant and varied. Indian butterflies make up around one fifth of all butterfly species worldwide. The majority of the diversity of Indian butterflies is found in the Himalayan mountain range, whereas 64% of all Indian butterflies are found in Northeast India. However, there are several species of climax forest butterflies in Northeast India.

## 2. ECOLOGICAL IMPORTANCE

Although the magnitude of biodiversity present on Earth is largely unknown and its estimates remain highly controversial, it is generally accepted that much, if not most, of the global diversity in terms of numbers of species is represented by arthropods inhabiting tropical rainforests. Despite their dominance of the animal community in species richness, abundance and biomass very few studies have been focused on invertebrates. Butterflies are important in the ecosystem as pollinators and also as a major food source for the animals in the secondary and tertiary trophic levels. The role of butterflies in the regeneration of the plants by facilitating the cross-pollination is vital for the regeneration and genetic exchange of many plant species. They are a major source of food to many other animals in the system such as birds and mammals, especially during the caterpillar stage of their life cycle. Large scale infestation of the forest canopies by the caterpillars can even regulate the

micro climate of the forest by facilitating higher light penetration through the canopy. Insects have been shown to be sensitive to changes in vegetation composition and the physical attributes of the environment resulting in a decrease in insect diversity.

Among the insects tropical butterfly communities are highly diverse with many endemic species, most of which are to some extent dependant on closed-canopy forest. Inventory and monitoring of butterflies has proven useful in the evolution of terrestrial landscapes for biological conservation.

As butterflies are extremely sensitive to changes in vegetation composition and structure, butterfly assemblage may be used to characterize different habitats. Butterfly diversity in the forest areas is reported to have significant relations with the forest area and isolation status. The population fluctuations and seasonality of the butterfly community is known to be associated with various factors. The butterfly diversity is known to be related to the diversity of other faunal groups such as birds and mammals, and also of vegetation. Hence it is usually considered as an indicator of the faunal and floral diversity of an area.

### 3. LEPIDOPTERA CONSERVATION

Insects play an essential role in many ecosystems, as they provide several key ecological functions. They aerate the soil, pollinate blooming plants, control insect pests by acting as predators, parasites, and parasitoids, and they are also plant pests. Insects predominate in compositional diversity in all other ecosystems, with the exception of the driest and coldest regions on earth. Despite being small, they are vital to preserving the natural balance. Insects interact with almost every element in the terrestrial and freshwater domains, making them one of the environmentally interconnected species. The threat level of any species should be evaluated before undertaking any conservation efforts.

In addition to being significant herbivores and pollinators, lepidoptera also act as hosts and food for several other creatures at higher trophic levels. With over 160,000 identified species, they are the most diverse order of insects, mostly connected with angiosperm plants. Over 350,000 species are known to exist in the world's fauna. Lepidoptera, as it is often known, includes moths and butterflies (about 20,000 species in two or three superfamilies) (the great majority of species, spread among some 30 superfamilies). There are therefore more species in each of the biggest moth families than there are in the whole butterfly phylum (e.g., Noctuidae: 35,000 species; Geometridae: 21,000 species). The so-called "macrolepidoptera" and "microlepidoptera," another "working division" of the Lepidoptera, are extremely important to conservation. The former, which includes butterflies and bigger moths, has significantly more documentation than the latter category, in large part because it contains the species that have historically drawn the most interest from collectors and amateurs. Despite this, the smaller moths are relatively understudied, make up a sizable portion of most local lepidopteran assemblages, and differ from macrolepidoptera in that only a small number of species have received widespread attention as conservation targets. In general, there is a dearth of data on distribution and decline, and nearly all regional faunas still face significant taxonomic challenges. This division of species based on size often reflects the "bridging role" of moths in practical conservation considerations, from the capacity to concentrate productively on single target species (primarily macrolepidoptera, for which the ecology of many species is reasonably well understood) to the twin topics of assemblage diversity and its changes in relation to patterns of land use or disturbance. Moths are used as environmental indicators and potential stand-ins for broader changes in biodiversity because the latter generally involve either macrolepidoptera or all Lepidoptera. As a result, only macrolepidoptera are included in many studies of moth assemblages. This constraint merely reflects taxonomic practicality in many regions of the world because most microlepidoptera cannot currently be included in surveys where species level classification is required with the same level of assurance due to a lack of knowledge about most of them.

While butterfly and moth numbers have decreased, lepidoptera conservation research and practise have advanced, and our understanding of species life cycles and ecological concerns has increased immensely. In many nations, coordinated conservation efforts have been made over the same time period, and large areas have been set aside as national parks or nature reserves. Worldwide, the number of lepidoptera is still falling at an alarming rate.

In areas where there are reliable comparison data, there is indication that moths and butterflies may be falling more quickly than other well-known species. One such class is Lepidoptera, which includes moths and butterflies. Since Lepidoptera exhibits a significant link with the vegetation, their depletion, and subsequent regeneration, it has acquired importance as an indicator taxon.

#### 4. METHODS

Lepidoptera collections from all around India are analyzed going back 25 years. The National Collection at the Zoological Survey of India, as well as the smaller collections at other agricultural universities across the nation, the Patna Museum, the Madras Museum, etc., could not be examined. However, after talking to people who have seen these collections, it became clear that while the larger collection is held by the Zoological Survey of India, it is huge but in pretty bad shape due to its age and environment. Except for the two Smetacek Collections and the Punjabi University Collection, which are part of the four significant national level collections described above, there are almost no other reference collections of moths.

#### 5. RESULTS AND DISCUSSION

Less than half of the Indian Lepidoptera, according to a very approximate estimate, are found in Indian collections. It is believed that 40% of the estimated 10,000 species of moths and around 70% of the approximately 1300 species of Indian butterflies are each represented. The National Forest Insect Collection, which includes almost 3800 species of Lepidoptera, accounts for a substantial portion of the very high number of butterflies represented, whereas the National Agricultural Insect Collection comprises 3302 species, mostly moths. Half of the 1500 Lepidoptera species in the Bombay Natural History Society Collection are butterflies.

It should be noted that reference collections need to have roughly eight pairs of each taxon in order to effectively capture the spectrum of variation. Most species, especially the rarer ones, are only represented by a single pair in the National Forest Insect Collection. Therefore, despite the fact that there are more butterfly species than in other Indian collections, it is unlikely that this collection will be of taxonomic utility for comparing potential new taxa given the lack of specimens.

Butterflies, moths, and other insects are now considered to be "wildlife," putting them on par with vertebrates, and the focus is placed on protecting the adult individual due to the severe lack of information about insects among policy makers. But butterflies only have a fortnight to live, and they spend most of that time in the egg, larval, and pupal phases. There is no provision for the early phases' protection. This would mean safeguarding the insect's habitats rather than the adult bug itself. Since we don't currently know the habitats of many lesser-known species, who perhaps require protection the most, if at all, this is not now achievable.

While collectors are regarded with suspicion, habitat destruction is encouraged by various government ministries and departments through loans for cattle to small farmers and efforts to improve the genetic makeup and population of domesticated animals like sheep, goats, and buffaloes, with very little emphasis on reducing the dependence of this unjustifiably large cattle population on Indian forests and common lands.

The actual challenges of insect conservation have been disregarded and, in fact, gravely sidetracked as a result of the inclusion of many butterflies and certain beetles in the schedules of the Wildlife (Protection) Act of 1972 and the imposition of collection restrictions under the Biodiversity Act. Since 1986, hardly any research has been published on such species of butterflies as a result of their inclusion in the schedules of the Wildlife (Protection) Act.

No comprehensive, taxonomically current collection, no comprehensive literature on the subject, no plan to address potential emergencies, no formal group of authorities to take new developments into account and formulate appropriate policies, no empowered committee on Lepidoptera or even insects to take up legal and legislative issues—in fact, the only thing that has been done is collected data. Although this legislation has made it illegal for individuals to gather insects, it doesn't seem to have had much of an impact on the export of Indian butterflies as many of the species that are covered by this laws are readily available online. Thus, the inclusion of butterflies in the schedules of the Wildlife (Protection) Act 1972 ultimately seems to have hampered Indian study on the topic and left a 20-year information vacuum about the relevant insects.

It is clear from the aforementioned that government initiatives in the area of Lepidoptera study and conservation have been a miserable failure. Concerned authorities' passionate and/or unfounded personal convictions appear to have more of an influence on the activities than the interests of our country or Lepidoptera as a whole. The danger perception for many groups of lepidopteran has multiplied due to the growing human population and the increasing scale of resource exploitation known as development. Although there is still time to strengthen what we already have, it is running short, and escapist measures and broad restrictions are ineffective. An informed strategy is required for the long-term preservation and growth of Indian insects.

## 6. CONCLUSION

A number of comprehensive collections of Indian Lepidoptera must be created immediately. There are some initiatives underway to strengthen Indian taxonomy in the area of lepidoptera, but they don't appear to be making much of an impact overall. It is requested that the norms and legislation that grant the government the exclusive authority to carry out research in this area be changed to offer the Indian people the same access to bug study as they had before to 1986. Lepidoptera commerce cannot be used as justification for a virtual restriction on this area. In no court of justice would it be acceptable for the police to impose a similar curfew on the whole people in order to stop a few thieves from functioning.

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