

# The Importance of Endangered Species Conservation for Lepidoptera: A Survey of the Research

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## Abstract

*Insects are a vital element of ecology, yet there have been reports that their numbers are dwindling dramatically over the globe. When it comes to protecting Lepidoptera species, moths have traditionally been seen as the "poor cousins" of butterflies, receiving far less attention and funding while being just as crucial to the group. A little over 5,600 of the estimated 11,300 butterfly and butterfly varieties native to India are present in museums and private collections. This deficiency has hindered research into the group and attempts to promote and protect these insects. Assessing the effectiveness of federal programs in this domain. It is recommended that steps be taken to further Lepidoptera study in India.*

**Keywords:** *Macrolepidoptera, insect, invertebrates, endangered, beetles, moths*

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## INTRODUCTION

In terms of colors and structure, the butterfly stands out among terrestrial invertebrates as a true visual masterpiece. Because of their widespread popularity, they have carved themselves a special place in the literary canons of several different civilizations. It is worshipped as a divine messenger by Hindus, and its prayers are sought during a wedding. Everyone, regardless of age, is fascinated by butterflies due to their vivid colors and chaotic, fluttering flight.

The colorful animals have always captivated both experts and newcomers. People born in the West between 1860 and 1910 had a thriving industry researching and collecting insects like butterflies and moths. During this time, members of the English nobility were avid collectors of butterfly species from the Lepidoptera (caterpillar) order. Thus, the development of Lepidoptera research, particularly butterfly research, can be traced back to the Victorian era. Butterflies are often regarded as beautiful by the general public. Butterflies are large in size and beautiful, yet they pose little threat to humans. That is why it seems to sense that interest in butterfly research has been on the rise recently. However, the aesthetic value of many species has become a threat to their own life, particularly those with larger sizes and more vibrant colors.

To the extremes of the Earth's latitudes, insects may be found. They may thrive in various climates, from arid to alpine regions. Even though India has a rich and varied butterfly flora, many of the most vibrant and prolific species are found only in tropical climates. India is home to around 25% of the World's species and subspecies. Most of India's butterfly species live in the Himalayas, while 64

percent of the country's butterflies are found in the northeast. Some butterfly varieties, however, can only be seen in climax forests, and they are all located in Northeastern India.

## **ENCOURAGING ECOLOGICAL CONSIDERATIONS**

Although estimates of the World's biodiversity remain highly contentious and its extent is primarily unknown, it is widely acknowledged that the majority of global variety in regards to the number of varieties is reflected by arthropods living in tropical rainforests. Despite their outsized influence on the animal population (in terms of species diversity, population, and biomass), insects have received very little interest in the research community. Bees serve as pollinators and primary food sources for animals in the tertiary and secondary food webs. Butterflies are crucial in the regeneration and genomic transmission of many flowering plants since they facilitate cross-pollination and aid in shoot proliferation. Particularly during the caterpillar stage of their life cycle, they provide an abundance of food for many other species, including birds and mammals. Caterpillar infestations on a massive scale may even help manage the forest's microclimate by allowing more light to reach the forest floor. Decreases in insect variety have been linked to changes in the mix of plants and other environmental factors.

Numerous indigenous butterflies enrich tropical butterfly populations, often dependent on the confined forest. The development of terrestrial landscapes is essential for biological conservation, and butterfly inventory and observation have been shown to be helpful in this regard.

Due to their extraordinary sensitivity to changes in the composition and structure of plants, butterflies may be utilized to define a variety of ecosystems via their collective butterfly collection. There seem to be strong correlations between forest size and the number of species of butterflies found there. Several variables are linked to the population variations and seasonality of the butterfly population. There is evidence linking butterfly diversity to that of other taxa, including birds and mammals, as well as plants. That is why it has been seen as a proxy for the richness of a region's flora and wildlife.

## **The Protection of Lepidoptera**

Many environments would collapse without the services that insects offer. They are both plant parasites and soil aerators, and they also pollinate flowering plants and help keep insect pests in check by preying on or being parasitized by unwanted insects. The compositional biodiversity of all other species is dominated by insects, save for the driest and coldest areas on Earth. Despite their modest size, they play a significant role in maintaining ecological harmony. One of the most ecologically interrelated groups of organisms is insects, which have a wide range of interactions with both grassland and freshwater environments. Before attempting to conserve a species, it is essential to determine how serious of a danger it faces.

Besides their essential roles as herbivores and pollinators, lepidoptera also serve as hosts and food for many organisms in higher trophic levels. They are the most numerous insect order, with over 3 million described species, and are closely related to the angiosperms. The estimated number of plant and animal species globally is around 350,000. Lepidoptera is the common name in the invertebrate order that contains moths and butterflies (about 20,000 varieties in two or three gene families) (the great majority of species, spread among some 30 superfamilies). Consequently, the most prominent families of moths include more varieties than the whole kingdom of butterflies (e.g., Noctuidae: 39,000 species; Geometridae: 22,000 species). Conservation efforts rely heavily on the so-called "macrolepidoptera" and "microlepidoptera," another "functioning division" of the Lepidoptera. This is because the former group—which includes butterflies and more giant moths—has traditionally attracted the most fantastic attention from collectors and amateurs, leading to more excellent

documentation. Despite this, tiny moths represent a significant component of most local lepidopterous ecosystems, but unlike macrolepidoptera, only a few species have gained broad attention as conservation efforts. Thus, they remain little understood. Almost all regional faunas continue to confront substantial taxonomic problems, and there is a widespread lack of data on distribution and decline. The ability to focus productively on single target species (primarily macrolepidoptera, for which the ecosystems of many organisms are reasonably well recognized) and the twin subjects of assemblage diversification and its shifts in connection to patterns of agricultural use or disturbance are both reflected in this categorization of species based on size. As macrolepidoptera or Lepidoptera, in particular, are affected by ecological changes, moths are sometimes employed as proxies for these more significant shifts in biodiversity. This is why many studies of moth communities exclude microlepidoptera in favor of macrolepidoptera. Due to a lack of information, most microlepidoptera are unable to participate in surveys where species-level categorization is needed with the same degree of confidence at this time.

Although there has been a decline in butterfly and moth populations, there has been progressing in lepidoptera conservation study and practice, and our knowledge of the life cycles of different species and ecological problems has expanded significantly. Large swaths of land have been protected as national parks or nature reserves in numerous countries due to concerted conservation efforts throughout the same period. The number of lepidoptera is continuing to decline rapidly over the World.

There is evidence that moths and butterflies may be declining faster than other well-known insects in regions with adequate comparative data. Dragonflies and butterflies are both members of the order Lepidoptera. Butterfly has emerged as a critical indicator taxon due to its strong correlation with plant life, its depletion, and subsequent restoration.

## **Methodologies**

More than two decades' worth of Lepidoptera specimens from around India are studied here. Smaller collections in agronomic colleges around India, the Patna Gallery, the Madras National gallery, etc., were not accessible for study, nor was the Government Collection at the Zoology Census of India. However, after speaking with others who have seen these archives, it became evident that the Zoological Census of India houses the most extensive collection and is big but in a relatively horrible form owing to its age and habitat. Almost no appropriate reference collections of moths exist outside the four major national level collections indicated above, including the Smetacek Collections and the Punjabi University Collection.

## **The Outcome and the Discussion**

A rough estimate suggests that less than half of the Indian Lepidoptera are represented in Indian collections. It is estimated that over 1,300 new species of Indian butterflies and 65% of the World's 10,000 known species of moths are found in India. The vast majority of the enormous number of wildlife species represented may be traced back to the National Forest Insect Collection, which houses about 3800 species of Lepidoptera. In comparison, the Agriculture Development Insect Collection has 3302 species, the vast majority of which are moths. The Maharashtra Natural History Society Collection has around 1600 species of Lepidoptera, with butterflies providing half of that total.

It is important to remember that to reflect the range of variation adequately; reference samples need to comprise around eight pairs of each taxon. For the vast majority part, the National Forest Insect

Museum only has a single pair of each species, even the more unusual ones. Due to the scarcity of organisms, this collection is not likely to be of biological use for comparing possible new taxa, even if it contains more butterfly species than comparable Indian collections.

The dearth of awareness of insects among policymakers has resulted in the classification of insects like butterflies, caterpillars, and others as "wildlife," elevating them to the same status as mammals and the subsequent shift in priority to safeguarding the adult individual. However, butterflies only survive for about two weeks; most of that time is spent in the stages of development known as the egg, larva, and pupa. Currently, there is no safeguard in place to ensure the safety of the first stages. To do so would entail protecting the insect's ecosystems rather than the insects directly. Unfortunately, this is now unachievable due to our lack of knowledge of the habitats of many less well-known species, which may be the ones most in need of conservation.

While collectors are generally looked down upon, the government is actively encouraging habitat destruction by providing loans for cattle to small farmers and working to improve the genetic structure and demography of farm animals like sheep, lambs, and bison.

However, the inclusion of numerous butterflies and some beetles in the categories of the Biodiversity (Prevention) Act of 1972 and the application of collection limitations under the Biodiversity Act have entirely distracted attention from the genuine issues of insect protection. Since 1986, when such butterfly species were first included in the Wildlife (Prevention) Act's schedules, very little academic work has been published.

The only thing which has been done is intelligence gathering; there is no comprehensive, taxonomic group current collection, neither comprehensive literary criticism on the subject, no plan for adoption and application emergencies, no official group of authorities to take recent innovations into account and implement suitable policies, no energetic committee on Lepidoptera or even insects to take up legislative and regulatory issues. Despite the fact that this law has made it unlawful for people to collect insects, it does not seem to have had much of an effect on the export of Indian butterflies, as many of the species that are covered by this rule are freely accessible online. Therefore, it seems that the inclusion of butterflies in the schedules of the Wildlife (Protection) Act 1972 has eventually inhibited research into the issue in India, resulting in a 20-year knowledge gap regarding the relevant insects.

All of this points to the dismal failure of government efforts to research and protect Lepidoptera. The efforts seem to be driven more by the concerned officials' intense and unfounded personal beliefs than by the interests of our nation or Lepidoptera as a group. Since the human population increase and widespread resource exploitation, often known as development, many species of lepidopterans today see themselves as being in greater danger than ever before. Time is running out, but it can still be used to bolster what we have, and quick fixes and blanket bans will not help. Protecting and expanding the diversity of India's insects over time would need a well-thought-out plan.

## CONCLUSION

It is imperative that many in-depth archives of Indian Lepidoptera be created immediately. However, it does not seem that the efforts made to enhance the Indian taxonomic classification of lepidoptera are having much of an impact so far. The Indian people are requesting that their access to vulnerability research be restored to the level it was before 1986 when the government got exclusive rights to carry out such research. In 1986, the government received exclusive rights to undertake such research. The commercialization of lepidoptera cannot be used as a justification for essentially shutting down this territory. The government cannot justify placing a similar limitation on the whole community in order to stop a small number of criminals from functioning.

## REFERENCES

1. Samways, M. J., Insect conservation for the twenty-first century. In *Insect Science-Diversity, Conservation and Nutrition*, Intech Open, London, 2018, p. 98.
2. Habel, J. C., Segerer, A., Ulrich, W., Torchyk, O., Weisser, W. W. and Schmitt, T., Butterfly community shifts over two centuries. *Conserv. Biol.*, 2016, 30(4), 754–762.
3. Forister, M. L. et al., Increasing neonicotinoid use and the declining butterfly fauna of lowland California. *Biol. Lett.*, 2016, 12(8), p. 20160475.
4. Fox, R. et al., The state of the UK's butterflies 2015. *Butterfly Conservation and the Centre for Ecology and Hydrology*, Wareham, Dorset, UK, 2015. p. 27.
5. Choudhury, K., H. Singha & H. K. Sahu (2012). Swallowtail butterflies of Northeast India- A pictorial Guide, Aaranyak, Guwahati, India. 102 Pp.
6. Kunte, K., S. Sondhi, B. M. Sangma, R. Lovalekar, K. Tokekar & G. Agavekar (2012). Butterflies of the Garo Hills of Meghalaya, northeastern India: their diversity and conservation. *Journal of Threatened Taxa*.4(10): 2933–2992.
7. Brereton T, Roy DB, Middlebrook I, Botham M, Warren M (2010) The development of butterfly indicators in the United Kingdom and assessments in 2010. *J Insect Conserv.* doi:10.1007/s10841-010-9333-z
8. Dennis RLH (2010) A resourced based habitat view for conservation: butterflies in the British landscape. Wiley, Oxford
9. Choudhury, K. & S. Ghosh (2009). Butterflies of Chakrashila Wildlife Sanctuary, Assam. *The Indian Forester*. 135(5): 714–720.
10. Saikia, M. K., J. Kalita & P. K. Saikia (2009). Ecology and conservation needs of nymphalid butterflies in disturbed tropical forest of Eastern Himalayan biodiversity hotspot, Assam, India. *International Journal of Biodiversity and Conservation*. 1(7): 231–250.