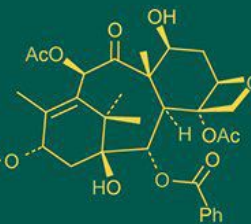
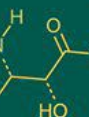
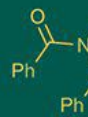
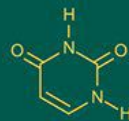


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 NAAS Rating (2025): 5.29
 IJABR 2025; 9(9): 649-652
www.biochemjournal.com
 Received: 16-07-2025
 Accepted: 18-08-2025

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Butterflies of the Kurchiat Range, Wayanad Wildlife Sanctuary, Kerala, India: Diversity, Conservation Status, and Endemism

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DOI: <https://www.doi.org/10.33545/26174693.2025.v9.i9i.5763>

Abstract

Butterflies are among the most charismatic insects in forest ecosystems and serve as bioindicators of ecological health. This study documents the butterfly diversity of the Kurchiat range in Wayanad Wildlife Sanctuary, part of the Western Ghats biodiversity hotspot. Field surveys carried out between February 2023 and March 2024 recorded 59 species of butterflies belonging to 6 families. The checklist includes several threatened and endemic taxa, especially Papilionid swallowtails restricted to the Western Ghats. Families Nymphalidae and Papilionidae were the most species-rich, while Lycaenidae and Riodinidae were represented by fewer taxa. The presence of endangered butterflies like the Malabar Rose (*Pachliopta pandiyana*), Malabar Banded Swallowtail (*Papilio liomedon*), and Malabar Banded Peacock (*Papilio buddha*) underlines the high conservation significance of this range. The study also highlights the importance of maintaining heterogeneous habitats that sustain both widespread and range-restricted species.

Keywords: Butterflies, biodiversity, conservation significance, habitats, endemic species

Introduction

Butterflies occupy a unique ecological and cultural niche within tropical forest ecosystems. They serve a dual role: on one hand, they are admired as aesthetic flagship species that capture public imagination with their vibrant colours and delicate forms; on the other hand, they act as bioindicators, reflecting the subtle ecological shifts occurring within their habitats. Their sensitivity to changes in microclimate, vegetation composition, and anthropogenic disturbances such as deforestation, habitat fragmentation, and pollution, makes them reliable indicators of ecosystem health and stability. Consequently, butterflies are increasingly used in biodiversity monitoring, conservation planning, and environmental impact assessments across tropical and subtropical regions.

Globally, India is recognized as a country rich in butterfly diversity, harbouring nearly 1,800 documented species that represent about 10% of the world's butterfly fauna. Among these, the Western Ghats, designated as a UNESCO World Heritage Site and one of the world's eight "hottest hotspots" of biodiversity, supports over 330 species of butterflies. This includes a significant number of endemics and narrowly distributed taxa, many of which are highly specialized in their ecological requirements. Within the Western Ghats, Kerala retains extensive tracts of tropical moist deciduous and semi-evergreen forests, providing a mosaic of habitats that sustain highly diverse butterfly assemblages. Notably, the region is home to several iconic swallowtail butterflies such as *Troides minos* (Southern Birdwing) and *Pachliopta pandiyana* (Malabar Rose), which hold both ecological and conservation significance.

The Wayanad Wildlife Sanctuary (WWS), an integral part of the Nilgiri Biosphere Reserve (NBR), plays a pivotal role in conserving biodiversity in the Western Ghats. Geographically, it occupies a unique position at the tri-junction of Kerala, Tamil Nadu, and Karnataka, functioning as a critical landscape-level corridor that connects the forests of Coorg, Mudumalai, Nilgiris, and Bandipur. This connectivity makes WWS essential for the long-term survival of wide-ranging species such as elephants, tigers, and other mammals. While the sanctuary is globally renowned for its charismatic megafauna, its rich insect fauna, particularly butterflies, has received comparatively less research attention.

Among the four administrative ranges of WWS -Sultan Bathery, Tholpetty, Muthanga, and Kurchiat - the Kurchiat Range remains one of the least studied in terms of butterfly diversity and distribution. This is despite the fact that Kurchiat harbors a representative spectrum of forest types, edge habitats, riparian stretches, and anthropogenic interfaces, which are known to influence butterfly populations significantly. Documenting butterfly assemblages in this understudied range is not only essential for filling critical knowledge gaps, but also for understanding habitat-specific patterns, seasonal dynamics, and conservation challenges in the broader sanctuary landscape.

Therefore, the present study aims to systematically investigate the species richness, diversity, and conservation status of butterflies in the Kurchiat Range of Wayanad Wildlife Sanctuary. By doing so, it seeks to contribute to the growing body of research on insect biodiversity in the Western Ghats, while simultaneously highlighting the role of butterflies as both ecological indicators and conservation symbols within one of India's most important protected areas.

Materials and Methods

Study Area

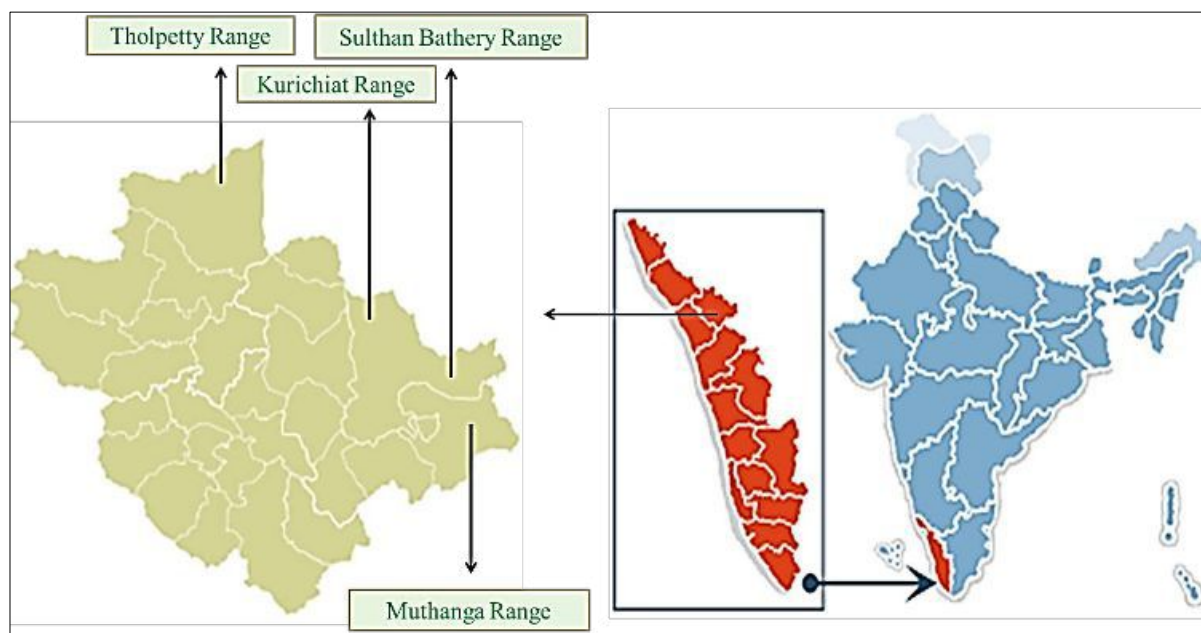


Fig 1: Map of Wayanad wildlife Sanctuary with the Kurchiat Range, Wayanad, Kerala, India

The Kurchiat range (Figure.1) is characterized by a landscape dominated by tropical moist deciduous forests, interspersed with riparian stretches, semi-evergreen patches, teak plantations, paddy fields, and human-modified edges. Elevations in the range vary between 700 and 1200 meters, providing diverse microclimates that influence butterfly distribution. Trails, river banks, and clearings were selected as representative sampling locations.

Field Surveys

Fieldwork was carried out from February 2023 to March 2024, covering both dry and wet seasons. Morning and afternoon walks were conducted along fixed transects of 500 to 1000 meters, at a slow pace (1-2 km/h), to maximize detection. Opportunistic sightings outside the transects were also documented.

Butterflies were identified in the field using binoculars, digital photography, and standard identification guides (Wynter-Blyth 1957; Kunte 2000) ^[4, 3]. For species with ambiguous field characters, photographs were cross-verified with regional experts.

Conservation Assessment

The threat categories of species were fixed according to the IUCN Red List (2023) ^[2] and relevant regional assessments. Species were grouped into four categories: *Least Concern (LC)*, *Near Threatened (NT)*, *Endangered (EN)*, and *Not Evaluated (NE)*.

Results

Species Richness

A total of 59 butterfly species from 6 families were recorded (Table 1). The butterfly diversity of the Kurchiat range reveals a clear dominance of the family Nymphalidae, which accounts for 32 species representing more than half of the total records (54.2%). This dominance can be attributed to the broad ecological adaptability of nymphalids, which occupy varied habitats ranging from dense forest interiors to disturbed edges, and feed on a wide range of larval host plants. The second most diverse group, Papilionidae, contributes 14 species (23.7%), including several iconic Western Ghats endemics such as the Malabar Banded Swallowtail and Malabar Rose, both endangered. This highlights the conservation significance of the region in supporting vulnerable and specialized swallowtails. Pieridae, represented by six species (10.1%), mainly consists of yellows and whites that are commonly encountered in open habitats and edges, thriving in both disturbed and natural environments. Hesperidae, with four species (6.7%), includes swift-flying awls and skippers, usually associated with shaded forest undergrowth and riparian areas, indicating microhabitat diversity within the range. The Lycaenidae, represented by two delicate blue butterflies (3.3%), underscores the presence of more fragile taxa that are often under-recorded but are essential indicators of habitat microclimates. Lastly, Riodinidae,

represented solely by the Plum Judy (*Abisara echerius*) at 1.7%, reflects the rarity and restricted occurrence of this family in the region, often linked to specific larval host plants. Collectively, this family-level distribution highlights both the habitat heterogeneity of the Kurchiat range and its role in sustaining butterflies ranging from common generalists to threatened endemic specialists.

Threatened and Endemic Species

The Kurchiat range of Wayanad Wildlife Sanctuary is notable for harboring a remarkable assemblage of threatened and endemic butterfly species, reflecting both its ecological richness and conservation significance. Among the species recorded, three are classified as Endangered (EN) the Malabar Rose (*Pachliopta pandiyana*), Malabar Banded Swallowtail (*Papilio liomedon*), and Malabar Banded Peacock (*Papilio buddha*). These iconic swallowtails, confined largely to the Western Ghats, face population pressures due to habitat fragmentation and the decline of their specific larval host plants. The Near Threatened (NT)

butterflies include the Southern Birdwing (*Troides minos*), India's largest butterfly, and the Malabar Tree Nymph (*Idea malabarica*), both of which are highly dependent on undisturbed forest habitats and specialized host plants, making them vulnerable to landscape alterations. Adding to this conservation concern are several endemics (NE), restricted to the Western Ghats bioregion, such as the Malabar Raven (*Papilio dravidarum*), Painted Sawtooth (*Prioneris sita*), Small Leopard (*Phalanta alcippe*), Red Spot Duke (*Dophla evelina*), and South Indian Blue Oak Leaf (*Kallima horsfieldi*). These species not only contribute to the unique biogeographic identity of the Western Ghats but also serve as sensitive indicators of ecosystem integrity. The presence of these threatened and endemic butterflies underscores the urgent need for strict habitat protection, ecological monitoring, and conservation awareness within the sanctuary to safeguard their long-term survival.

These findings emphasize the sanctuary's role as a refuge for butterflies that are both globally significant and locally restricted.

Table 1: Checklist of Butterflies of Kurchiat Range

S. No	Common name	Scientific name	Order	Family	Status
1.	Southern Birdwing	<i>Troides minos</i>	Lepidoptera	Papilionidae	NT
2.	Malabar Rose	<i>Pachliopta pandiyana</i>	Lepidoptera	Papilionidae	EN
3.	Common Rose	<i>Pachliopta aristolochiae</i>	Lepidoptera	Papilionidae	LC
4.	Crimson Rose	<i>Pachliopta hector</i>	Lepidoptera	Papilionidae	LC
5.	Malabar Banded Swallowtail	<i>Papilio liomedon</i>	Lepidoptera	Papilionidae	EN
6.	Malabar Raven	<i>Papilio dravidarum</i>	Lepidoptera	Papilionidae	NE
7.	Malabar Banded Peacock	<i>Papilio buddha</i>	Lepidoptera	Papilionidae	EN
8.	Common Mormon	<i>Papilio polytes</i>	Lepidoptera	Papilionidae	LC
9.	Blue Mormon	<i>Papilio polymnestor</i>	Lepidoptera	Papilionidae	LC
10.	Lime Butterfly	<i>Papilio demoleus</i>	Lepidoptera	Papilionidae	LC
11.	Common Blue Bottle	<i>Graphium sarpedon</i>	Lepidoptera	Papilionidae	LC
12.	Tailed Jay	<i>Graphium Agamemnon</i>	Lepidoptera	Papilionidae	LC
13.	Common Jay	<i>Graphium doson</i>	Lepidoptera	Papilionidae	LC
14.	Five-bar Swordtail	<i>Graphium antiphates</i>	Lepidoptera	Papilionidae	LC
15.	Painted Sawtooth	<i>Prioneris sita</i>	Lepidoptera	Pieridae	NE
16.	Common Jezebel	<i>Delias eucharis</i>	Lepidoptera	Pieridae	LC
17.	Psyche	<i>Leptosia nina</i>	Lepidoptera	Pieridae	LC
18.	Common Grass Yellow	<i>Eurema hecabe</i>	Lepidoptera	Pieridae	LC
19.	Common Emigrant	<i>Catopsilia Pomona</i>	Lepidoptera	Pieridae	LC
20.	Mottled Emigrant	<i>Catopsilia pyranthe</i>	Lepidoptera	Pieridae	LC
21.	Common Evening Brown	<i>Melanitis leda</i>	Lepidoptera	Nymphalidae	LC
22.	Common Palmfly	<i>Elymnias hypermnestra</i>	Lepidoptera	Nymphalidae	LC
23.	Common Bushbrown	<i>Mycalasis perseus</i>	Lepidoptera	Nymphalidae	LC
24.	Nigger	<i>Orsotriaena medus</i>	Lepidoptera	Nymphalidae	LC
25.	Common Fourring	<i>Ypthima huebneri</i>	Lepidoptera	Nymphalidae	LC
26.	Common Nawab	<i>Polyura athamas</i>	Lepidoptera	Nymphalidae	LC
27.	Tawny Rajah	<i>Charaxes bernardus</i>	Lepidoptera	Nymphalidae	LC
28.	Tawny Coster	<i>Acraea violae</i>	Lepidoptera	Nymphalidae	LC
29.	Common Leopard	<i>Phalanta phalantha</i>	Lepidoptera	Nymphalidae	LC
30.	Small Leopard	<i>Phalanta alcippe</i>	Lepidoptera	Nymphalidae	NE
31.	Common Sailer	<i>Neptis hylas</i>	Lepidoptera	Nymphalidae	LC
32.	Common Baron	<i>Euthalia aconthea</i>	Lepidoptera	Nymphalidae	LC
33.	Red Spot Duke	<i>Dophla evelina</i>	Lepidoptera	Nymphalidae	NE
34.	Common Castor	<i>Ariadne merione</i>	Lepidoptera	Nymphalidae	LC
35.	Angled Castor	<i>Ariadne ariadne</i>	Lepidoptera	Nymphalidae	LC
36.	Common Beak	<i>Libythea lepita</i>	Lepidoptera	Nymphalidae	LC
37.	Lemon Pansy	<i>Junonia lemonias</i>	Lepidoptera	Nymphalidae	LC
38.	Peacock Pansy	<i>Junonia almana</i>	Lepidoptera	Nymphalidae	LC
39.	Chocolate Pansy	<i>Junonia iphita</i>	Lepidoptera	Nymphalidae	LC
40.	Painted Lady	<i>Vanessa cardui</i>	Lepidoptera	Nymphalidae	LC
41.	Blue Admiral	<i>Kaniska canace</i>	Lepidoptera	Nymphalidae	LC
42.	Great Eggfly	<i>Hypolimnas bolina</i>	Lepidoptera	Nymphalidae	LC
43.	Danaid Eggfly	<i>Hypolimnas misippus</i>	Lepidoptera	Nymphalidae	LC

44.	South Indian Blue Oak Leaf	<i>Kallima horsfieldi</i>	Lepidoptera	Nymphalidae	NE
45.	Common Map	<i>Cyrestis thyodamas</i>	Lepidoptera	Nymphalidae	LC
46.	Glassy Blue Tiger	<i>Parantica aglea</i>	Lepidoptera	Nymphalidae	LC
47.	Blue Tiger	<i>Tirumala limniace</i>	Lepidoptera	Nymphalidae	LC
48.	Dark Blue Tiger	<i>Tirumala septentrionis</i>	Lepidoptera	Nymphalidae	LC
49.	Plain Tiger	<i>Danaus chrysippus</i>	Lepidoptera	Nymphalidae	LC
50.	Striped Tiger	<i>Danaus genutia</i>	Lepidoptera	Nymphalidae	LC
51.	Common Crow	<i>Euploea core</i>	Lepidoptera	Nymphalidae	LC
52.	Malabar Tree Nymph	<i>Idea malabarica</i>	Lepidoptera	Nymphalidae	NT
53.	Plum Judy	<i>Abisara echerius</i>	Lepidoptera	Riodinidae	LC
54.	Common Pierrot	<i>Castalius rosimon</i>	Lepidoptera	Lycaenidae	LC
55.	Common Ciliate Blue	<i>Anthene emolus</i>	Lepidoptera	Lycaenidae	LC
56.	Indian Awlking	<i>Choaspes benjaminii</i>	Lepidoptera	Hesperiidae	LC
57.	Common Awl	<i>Hasora badra</i>	Lepidoptera	Hesperiidae	LC
58.	Common Banded Awl	<i>Hasora chromus</i>	Lepidoptera	Hesperiidae	LC
59.	Brown Awl	<i>Badamia exclamationis</i>	Lepidoptera	Hesperiidae	LC

Discussion

The high butterfly diversity in the Kurchiat range showcases the ecological heterogeneity of the landscape. Nymphalidae, with 32 species, thrives due to their ability to occupy a wide variety of ecological niches—from dense forest canopies to open, disturbed habitats. Their adaptability explains their dominance in this checklist.

On the other hand, Papilionidae deserves special conservation attention. Many swallowtails are specialized to particular larval host plants, making them vulnerable to forest degradation. The records of Malabar Rose, Malabar Banded Peacock, and Malabar Banded Swallowtail—all listed as *Endangered*—highlights the Kurchiat range as a vital conservation stronghold for these Western Ghats endemics.

Interestingly, the study also observed a balance between common generalist butterflies (such as Common Mormon, Common Crow, and Common Grass Yellow) and narrowly endemic specialists. This indicates that the Kurchiat range contains both disturbed habitats that sustain widespread species and intact niches where endemic taxa survive.

The presence of Malabar Tree Nymph (*Idea malabarica*), known for its slow, gliding flight, was restricted to undisturbed moist deciduous forests. Similarly, the Southern Birdwing, India's largest butterfly, was more frequent along riparian zones and near flowering shrubs, showing its dependence on certain plant resources.

Such findings underline the intimate link between butterflies and their habitats, reminding us that conservation of the butterfly fauna cannot be isolated from broader landscape and vegetation management.

Conclusion

This study presents a comprehensive butterfly checklist for the Kurchiat range of Wayanad Wildlife Sanctuary, documenting 59 species across 6 families. The region harbors an impressive assemblage of common, endemic, and globally threatened species, emphasizing its conservation significance.

The detection of multiple endangered swallowtails, along with endemics restricted to the Western Ghats, highlights the need for long-term monitoring, habitat preservation, and community conservation strategies. Wayanad Wildlife Sanctuary, being an ecological bridge in the Nilgiri Biosphere Reserve, should be prioritized for butterfly conservation as part of integrated landscape management in the Western Ghats.

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