



A PRELIMINARY ASSESSMENT OF BUTTERFLIES (INSECTA: LEPIDOPTERA) IN SULAIPAT, ODISHA, INDIA

ARJUN M. S. ^{a≡*}, ALBY J. M. ^{a°} AND ARUN P. R. ^{a#}

^a Department of Environmental Impact Assessment, Salim Ali Centre for Ornithology and Natural History (SACON) Anaikatty, Tamil Nadu-641108, India.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The butterfly diversity of Sulaipat, Odisha, India was studied between September 2020 to December 2020 using direct search techniques and opportunistic sighting methods. A period of 29 days was spent for data collection from morning 09.30 to 11.30 and evening 15.30 to 17.30. A total of 46 butterfly species were recorded representing 32 genera belonging to five families with Nymphalidae as the richest with 24 species. The butterfly assemblage of the area was most abundant and diverse in September (n=37 species) whereas comparatively lesser in December (n=27 species). Among the recorded 46 species of butterflies, five species are legally protected under Indian Wildlife (Protection) Act, 1972. Results of this short-term survey report the baseline data on the butterfly diversity in remote and unexplored eco-pockets like Sulaipat village, suggesting further comprehensive investigations to fully document the butterfly diversity of this area.

Keywords: Sulaipat; direct search technique; Lepidoptera; Nymphalidae; butterfly diversity.

1. INTRODUCTION

Odisha is an intersection of four biotic provinces: The Eastern and Chota Nagpur Plateau of the Deccan peninsula biogeographic zone, the lower Gangetic plain of the Gangetic-plain biogeographic zone, and a 480-kilometer-long coastline in the biogeographic zone of Coasts [1]. The Northern Eastern Ghats starts from the hills of Similipal which are situated in Odisha's Mayurbhanj district. Eastern Ghat is one of India's lesser-known natural landscapes having an elevation ranging from almost sea level to 1,690m [2]. The diverse vegetation types of the Eastern Ghats ranging from dry-scrub and dry deciduous to dry-evergreen, moist-deciduous, and semi-evergreen,

sustain a variety of flora and fauna as well. The diversified habitats of Odisha, make it a transitional zone for flora and fauna of Southern India and Northeast India [3]. This habitat complexity is reflected in the studies on herpetofauna by Dutta et al., [4] and birds and butterflies by Nair [5-7].

Butterflies are the most abundant group of insects belonging to the order Lepidoptera of Arthropoda phylum. They are classified into six families: Papilionidae, Pieridae, Lycaenidae, Nymphalidae, Riodinidae, and Hesperidae [8]. India has 1,800 species and subspecies of butterflies [9], with 350 of them endemic to peninsular India, the majority of which are recorded from the Western Ghats [10].

[≡] Senior Research Biologist;

[°] Junior Research Biologist;

[#] Senior Principal Scientist;

*Corresponding author: Email: arjunsuresh75@gmail.com;

Their evolution can be traced back to the Eocene period, about 40-50 million years ago [11]. The visually appealing character with graceful flight makes them popular among the general people and researchers. Butterflies can be seen in any region of the world where flowering plants occur, including extremely high altitudes such as the Arctic and Antarctic ranges which are continuously engulfed in snow and glaciers. Butterflies are one of the well-studied groups in terms of their varieties, sexes, seasonal, and sexual forms in addition to their nomenclature and identification from all over the world [12]. Butterflies are the most effective invertebrate flagship taxon because of their appearance and widespread distribution. Being the most studied taxa among invertebrates plays a vital role in raising awareness, research, and policy support for invertebrates as well as overall environmental protection [13]. Even though several studies on the diversity of butterflies have been conducted in various

parts of India, there is a lack of enough studies in remote locations such as rural areas adjacent to forests. There were many studies carried out in protected areas of Odisha such as the Similipal Tiger Reserve [14,5] and the Nandankanan Wildlife Sanctuary [15]. The present study represents the butterfly diversity in and around Sulaipat village, which is located near the Similipal Tiger Reserve in the Mayurbhanj district of Odisha.

2. MATERIALS AND METHODS

2.1 Study Area

Sulaipat (Latitude 22°4' 2.0856" N and Longitude 86°7' 21.1008" E) is a small village in the Rairangpur tehsil of the Mayurbhanj district of Odisha, India. The present study was conducted in and around the Sulaipat (Fig. 1). The proximity of Khadakai and

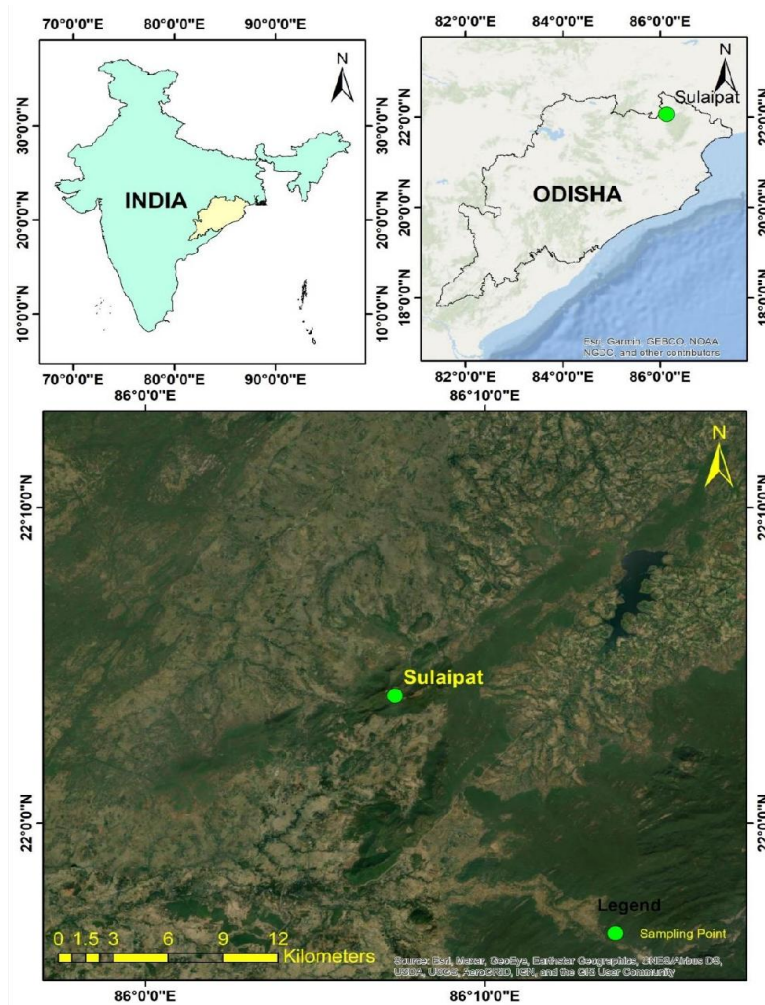


Fig. 1. Map showing Study Area

Bankabal Reservoirs and Similipal Tiger Reserve make this a tourism destination. The area falls in the subtropical climate zone that has a hot summer with high humidity, a well-defined rainy season (June to October), and mild winter (November to February). The average annual rainfall of this area is around 1500 mm. About 70% of the rainfall is obtained between June and September due to the southwest monsoon. Generally, heavy rainfall is observed in August. In the winter, the minimum temperature drops up to 4.5°C whereas in the summer it is quite high at 29.5°C. The average temperature approaches 45°C during peak summer (DSR, 2018). It is a rural area with human settlements and mixed vegetation mainly comprising deciduous species, ornamental shrubs, herbs, grasses, paddy fields, vegetables and flower gardens, and areas predominated by tree species such as Sal (*Shorea robusta*), Imli (*Tamarindus indica*), Kusum (*Schleichera oleosa*), Kendu (*Diospyros melanoxylon*), Asan (*Terminalia alata*), Palasha (*Butea monosperma*) and Simli (*Bombax ceiba*).

3. METHODOLOGY

Intensive butterfly surveys were carried out in and around Sulaipat village during September and December of 2020. The butterflies were observed and documented in the field using a combination of direct search techniques [16] and opportunistic sighting methods. A total of 29 days were spent on data collection. Observations were recorded between 09.30hr to 11.30hr and 15.30hr to 17.30hr. To record

the maximum encounter, both late morning and late afternoon to the evening were surveyed. Species that were difficult to identify in the field were photographed with a digital camera (Nikon P900) and identified using standard reference books [17,18,19,20,21]. Finally, a checklist of the butterflies recorded from this region was prepared.

4. RESULTS

A total of 46 butterfly species belonging to 32 genera under five families (Papilionidae, Pieridae, Nymphalidae, Lycaenidae, and Hesperidae) were recorded during the survey. Among all the families, Nymphalidae (24.52%) was found to be the most dominant followed by Pieridae (8.17%), Papilionidae (7.15%), Lycaenidae (4.9%), and Hesperidae (3.7%) (Fig. 2). Among the 46 species, five species are protected under The Wildlife (Protection) Act, 1972. This includes Common Hedge Blue and Common Pierrot which are protected under Schedule I (Part IV), Common Wanderer under Schedule II (Part II), Common Crow and Painted Sawtooth under Schedule IV (Part IV). A detailed systematic checklist containing common and scientific names of all the recorded species is presented in Appendix 1. The most abundant butterfly species recorded during September were Common Grass Yellow, Common Emigrant, Common Mormon, Common Pierrot, and Small Grass Yellow whereas, species like Common cerulean, Common Jezebel, Angled Castor, Common leopard, and Peacock Pansy were abundant in December.

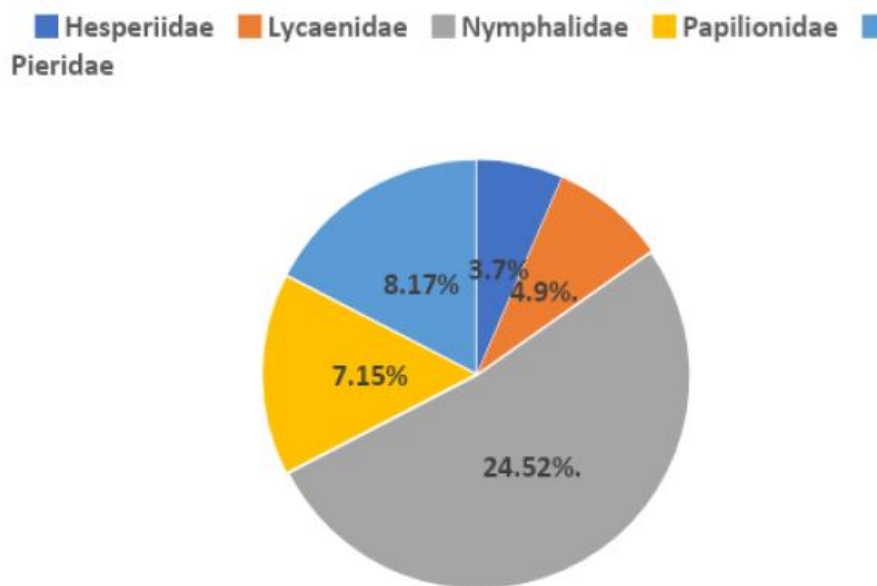


Fig. 2. Family wise distributions of butterflies in the study area

5. DISCUSSION

The present study depicted the composition of butterfly diversity in and around Sulaipat village during two different months. The abundance of butterflies was higher in September (37 species) whereas comparatively lesser in December (27 species). Nymphalidae (24.52%) and Pieridae (8.17%) were found to be the most abundant butterfly families in the study area. Their adaptations allow them to maintain a wide variety of species even in disturbed environments, making them good indicators of habitat disturbance and biodiversity [22]. Hesperidae registered the least number of species like the members of this family are highly cryptic, site-specific, shade-loving, and prefer specific host plants. The species belonging to Lycaenidae were found to be closely associated with plant families such as Fabaceae, Rubiaceae, Caesalpiniaceae, Mimosaceae, and Rutaceae. Since the habitat relationship of butterflies is closely linked to the abundance of larval host plants, vegetation cover of herbs, shrubs, and trees for nectaring [10], the dominant occurrence of Nymphalidae and Pieridae butterflies in the study area may be attributed to the availability of host plants and nectaring plants (Mimosaceae, Acanthaceae, Poaceae, Malvaceae, Fabaceae). The floral gardens in the study area showed a higher abundance of species from Nymphalidae family whereas the number of species from Hesperidae family (3.17%) was found to be very low. In the vegetable gardens, species belonging to Pieridae and Nymphalidae were found to be very high in number. The present study supports the theory as the distribution of Lepidoptera is linked to the floral diversity of that region [23]. Among the recorded butterfly species, Common Nawab (*Charaxes bhārata*), Yellow Pansy (*Junonia hierta*), Medus Brown (*Orsotriaena medus*), Tailed Jay (*Graphium agamemnon*), Common Jezebel (*Delias eucharis*), Common Wanderer (*Pareronia hippia*), and Painted Sawtooth (*Prioneris sita*) were the rarest species recorded in the study area.

There were no globally endangered butterfly species recorded from the study area. However, five of the 46 butterfly species recorded were scheduled under The Wildlife (Protection) Act of 1972 [24,10].

Although similar studies have been done in other parts of Odisha, this is the first attempt to record Lepidopteran diversity in areas such as Sulaipat village which is very remote and in close vicinity to forested habitats. The study indicates the significance of such remote, unexplored eco-pockets, as well as the need for further research in this region. Since the study was conducted over a short period and only a small region around the Sulaipat was considered,

more species can likely be recorded if further studies are undertaken.

Moreover, the causes of the decline of butterflies are thought to be similar worldwide, mainly habitat loss and degradation as well as chemical pollution [25]. The butterfly diversity in these areas requires urgent insight in terms of conservation, research, and policy level management as with any other ecologically significant taxa [15]. The various anthropogenic activities such as tourism, picnic, waste dumping, disposal of plastic without proper management in these remote areas are playing an important role in the degradation of microhabitats for these sensitive species that assist in vital ecosystem services such as pollination [26].

6. CONCLUSION

The present study is a preliminary assessment of butterfly species in and around Sulaipat village. Conservation of these important pollinators is essential for sustainable development. The presence of Khadakai Reservoir, followed by Bankabal Reservoir and Similipal Tiger Reserve nearby makes Sulaipat a tourist destination. Due to anthropogenic activities such as tourism, the dumping of plastics, and other non-degradable materials, the microhabitats of butterflies are being degraded. The butterfly population is greatly affected by habitat destruction and fragmentation almost everywhere. Studies like this around these eco-pockets could help in their preservation of habitat which will lead to the conservation of butterflies. Deforestation is also a major disturbance for butterflies' habitat as it enhances the scarcity of host plants. Therefore, public awareness is required to conserve and protect these butterflies and their habitats within the area. Moreover, the presence of five scheduled (IWPA) butterfly species indicates the conservation significance of the study area. The present study is an attempt to prepare a baseline checklist of butterfly species from the study area. Further investigations are required to establish the lepidopteran composition of this region covering all seasons which can generate more information and awareness among the local people and government authorities to conserve butterflies and their habitats.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Appendix I

Table 1. Checklist of Butterfly species recorded from the study area

No.	Scientific name	Common Name	Family
1.	<i>Acraea terpsicore</i> (Linnaeus, 1758)	Tawny Coster	Nymphalidae
2.	<i>Ariadne ariadne</i> (Linnaeus, 1763)	Angled Castor	Nymphalidae
3.	<i>Ariadne merione</i> (Cramer, 1777)	Common Castor	Nymphalidae
4.	<i>Charaxes bharata</i> (Felder & Felder, 1867)	Common Nawab	Nymphalidae
5.	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger	Nymphalidae
6.	<i>Danaus genutia</i> (Cramer 1779)	Striped Tiger	Nymphalidae
7.	<i>Euploea core</i> (Cramer,1780)	Common Crow*	Nymphalidae
8.	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great eggfly	Nymphalidae
9.	<i>Junonia almana</i> (Linnaeus, 1758)	Peacock Pansy	Nymphalidae
10.	<i>Junonia atlites</i> (Linnaeus, 1763)	Grey Pansy	Nymphalidae
11.	<i>Junonia hierta</i> (Fabricius, 1798)	Yellow Pansy	Nymphalidae
12.	<i>Junonia iphita</i> (Cramer, 1779)	Chocolate Pansy	Nymphalidae
13.	<i>Junonia lemonias</i> (Linnaeus, 1758)	Lemon Pansy	Nymphalidae
14.	<i>Melanitis leda</i> (Linnaeus, 1758)	Common Evening Brown	Nymphalidae
15.	<i>Moduza procris procris</i> (Cramer, 1777)	Commander	Nymphalidae
16.	<i>Mycalesis perseus</i> (Fabricius, 1775)	Common Bushbrown	Nymphalidae
17.	<i>Neptis hylas</i> (Linnaeus, 1758)	Common Sailer	Nymphalidae
18.	<i>Orsotriaena medus</i> (Fabricius, 1775)	Nigger	Nymphalidae
19.	<i>Parantica aglea</i> (Stoll, 1782)	Glassy Tiger	Nymphalidae
20.	<i>Phalanta phalantha</i> (Drury,1773)	Common leopard	Nymphalidae
21.	<i>Symphhaedra nais</i> (Forster, 1771)	Baronet	Nymphalidae
22.	<i>Tirumala limniace</i> (Cramer, 1775)	Blue Tiger	Nymphalidae
23.	<i>Ypthima baldus</i> (Fabricius, 1775)	Common Fivering	Nymphalidae
24.	<i>Ypthima huebneri</i> (Kirby, 1871)	Common Furring	Nymphalidae
25.	<i>Graphium agamemnon</i> (Linnaeus, 1758)	Tailed Jay	Papilionidae
26.	<i>Graphium doson</i> (Felder & Felder, 1864)	Common Jay	Papilionidae
27.	<i>Graphium sarpedon</i> (Linnaeus, 1758)	Common Blue Bottle	Papilionidae
28.	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)	Common Rose	Papilionidae
29.	<i>Papilio polymnestor</i> (Cramer, 1775)	Blue Mormon	Papilionidae
30.	<i>Papilio polytes</i> (Linnaeus, 1758)	Common Mormon	Papilionidae
31.	<i>Papilio crino</i> (Fabricius, 1793)	Common Banded Peacock	Papilionidae
32.	<i>Catopsilia pomona</i> (Fabricius, 1775)	Common Emigrant	Pieridae
33.	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant	Pieridae
34.	<i>Delias eucharis</i> (Drury, 1773)	Common Jezebel	Pieridae
35.	<i>Eurema blanda</i> (Boisduval, 1836)	Three Spot Grass Yellow	Pieridae
36.	<i>Eurema brigitta</i> (Stoll, 1780)	Small Grass Yellow	Pieridae
37.	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	Pieridae
38.	<i>Pareronia hippia</i> (Fabricius, 1787)	Common Wanderer*	Pieridae
39.	<i>Prioneris sita</i> (Felder & Felder, 1865)	Painted Sawtooth*	Pieridae
40.	<i>Hasora chromus</i> (Cramer, 1780)	Common Banded Awl	Hesperiidae
41.	<i>Spialia galba</i> (Fabricius, 1793)	Indian Skipper	Hesperiidae
42.	<i>Taractrocera maevius</i> (Fabricius, 1793)	Common Grass Dart	Hesperiidae
43.	<i>Jamides celeno</i> (Cramer,1775)	Common cerulean	Lycaenidae
44.	<i>Acytolepis puspa</i> (Horsfield, 1828)	Common Hedge Blue*	Lycaenidae
45.	<i>Castalius rosimon</i> (Fabricius, 1775)	Common Pierrot*	Lycaenidae
46.	<i>Everes lacturnus</i> (Godart, 1824)	Indian Cupid	Lycaenidae

* WLPA Scheduled species

Appendix II



A. Angled Castor



B. Baronet



C. Common Banded Peacock



D. Common Cerulean



E. Common leopard



F. Common Nawab

Plate 1. Butterfly species recorded from the study area

Appendix II



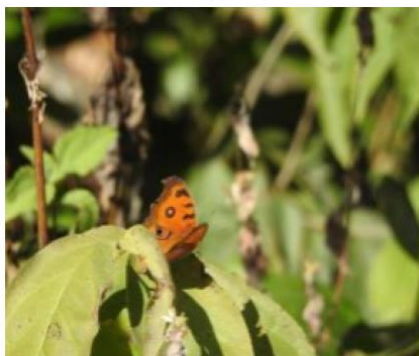
G. Great Eggfly



H. Grey-pansy



I. Painted Sawtooth



J. Peacock Pansy



K. Plain Tiger



L. Common Fourring

Plate 2. Butterfly species recorded from the study area

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