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A Preliminary Report on the Diversity of Butterfly Fauna of Paren Eco Resort, Kalimpong and Samsing Eco Tourism Resort, Jalpaiguri, West Bengal, India

Papia Das[1*] and Olivia Das[2]

[1]Assistant Professor, Department of Zoology, Budge Budge College, Kolkata, West Bengal, India
[2]State Aided College Teacher, Department of Zoology, Behala College, Kolkata, West Bengal, India
* Email id: papia8@gmail.com
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ABSTRACT

The present investigation was a short-term survey conducted for 7 days in the vicinity of the foothills of the Eastern Himalayas in two popular Government maintained tourist spots of Paren Eco Resort and Samsing Eco Tourism Resort. The findings reveal a total of 88 butterfly species in the study area with Paren having the highest number with 70 species. Samsing on the other hand holds a good 28 species of butterfly fauna. The family Nymphalidae was found to be the most dominant in both the study areas. In Paren Eco Resort the family Nymphalidae consists of 33 (47.14%) species, 19 (40.43%) genera and 8 (47.05%) subfamilies, followed by Lycaenidae with 21 (30%) species, Pieridae with 8 (11.43%) species, Papilionidae with 6 (8.57%) species and Hesperiidae and Riodinidae with least number of species of 1 (1.43%). Samsing Eco tourism Resort shows only 3 families with Nymphalidae consisting of 12 (42.86%) species, 10 (45.45%) generas and 5 (62.5%) subfamilies. Family Pieridae shows 10 (35.71%) species followed by Papilionidae with 6 (21.43%) species. These study areas also report 1 species belong to schedule I, 8 species under schedule II, and 2 species from schedule IV of the Indian Wild Life (Protection) Amendment Act, 2022. The present work serves as a preliminary study and can serve as a baseline for future ecological research on the butterfly diversity of these regions.

Keywords: Butterfly, diversity, Paren Eco Resort, Samsing Eco Tourism Resort, West Bengal

INTRODUCTION

Butterflies, also known as the jewels of nature consist of highly attractive colourful insects. They belong to the second largest order Lepidoptera of the class Insecta within the phylum Arthropoda. Insects are the most diversified group of animals among all the phylas (Imms, 1964). Butterflies are among the best studied insect groups because they are highly sensitive to the habitat disturbances and climate change. They can identify the environmental quality and are commonly used as bioindicators. (Varshney, 1993; Kremen, 1994; Kocher and Williams, 2000; Koh and Sodhi, 2004). Butterflies have attractive wing colouration and patterns which make them easily identifiable. High species diversity, short life span, choice of host plant and sensitivity to environmental changes make them taxonomically important group (Lee *et al.*, 2016). Butterflies play important role as pollinators in various ecosystem and contribute to the pollination of more than 50 economically important crops (Borges *et al.*, 2003). Scientific reports about their distribution patterns and abundance gives a significant and crucial information about the faunal diversity of any geographic region (Ghazoul, 2002).

The most diverse and butterfly rich areas in the world include North eastern parts of India along the foothills of Eastern Himalayas, starting from Sikkim and extending through Assam. A wide variety of host and nectar plants, suitable habitats, topography and environmental conditions play a vital role to support butterfly distribution, diversity and abundance. Among the total butterfly diversity found in the Indian sub-continent and Myanmar region, fifty eight percent are found in the eastern part of Himalayas and in north-eastern region of India alone (Evans, 1932). In spite of that, there is a lacunae in the study of the butterfly species diversity and their distribution particularly in north eastern region of India and Dooars-Terai plains of Northern parts of West Bengal. Pal *et al*., 2015 however made a faunistic study on few selected regions of the northern part of West Bengal, particularly from the Dooars and Terai plains. More recently, Das *et al*., 2024 provided a systematic list and ecological notes on the butterflies of Buxa Tiger Reserve of the Dooars region. Mondal *et al*., 2024 also provided a preliminary checklist of butterflies of the Rongo forest of eastern Himalayas near Jaldhaka river.

Located near the Indo – Bhutan border and along the western edge of Dooars plain lies the picturesque village of Paren. This area is surrounded by dense alpine forest and green meadows, making it a ;opular destination for wide variety of Himalayan birds and colourful butterflies in particular. Paren is bordered on one side by Rongo forest and Jhalong and Bindu on the other hand. Neora valley National Park and Jaldhaka Dam are nearby to Paren. Samsing, another village situated along the foothills of Himalayas is close to Paren and is known for its lush green tea gardens and lush green trees of deciduous forest. It is around 18km from Neora Valley National Park. There is very few scientific works on the faunal diversity of these areas. To the

best of our knowledge there has been no prior study on butterfly diversity on these regions. The present study was undertaken with the main objective to explore the butterfly fauna in the Paren Nature Resort and Samsing Eco Tourism Resort. We hope the present work will provide baseline information on butterfly diversity and will be useful for the conservation of the rich biodiversity of these regions.

MATERIALS AND METHODS

Study area

The present observations were carried out in two selected regions of Dooars plains of northern parts of West Bengal. These are the Paren Nature Resort and the Samsing Eco tourism Resort (Figure 1 and 2). The Paren Nature Resort (Latitude 27°3'32"N and longitude 88°51'34"E) is located at an altitude of 6200 feet in the Gorubathan block which is the part of Kalimpong Sadar subdivision of the Kalimpong district, West Bengal, India. It is around 112 km from Siliguri and 10km from Jaldhaka river and is situated along the Indo – Bhutan – Sikkim border on the western part of Dooars plain. It is surrounded by lush green meadows with Dhupi vegetations and green lofty alpine forest. The resort also has many ornamental plants. Paren because of its surreal picturesque beauty is a major tourist spot maintained by the Government of West Bengal. Samsing Eco tourism

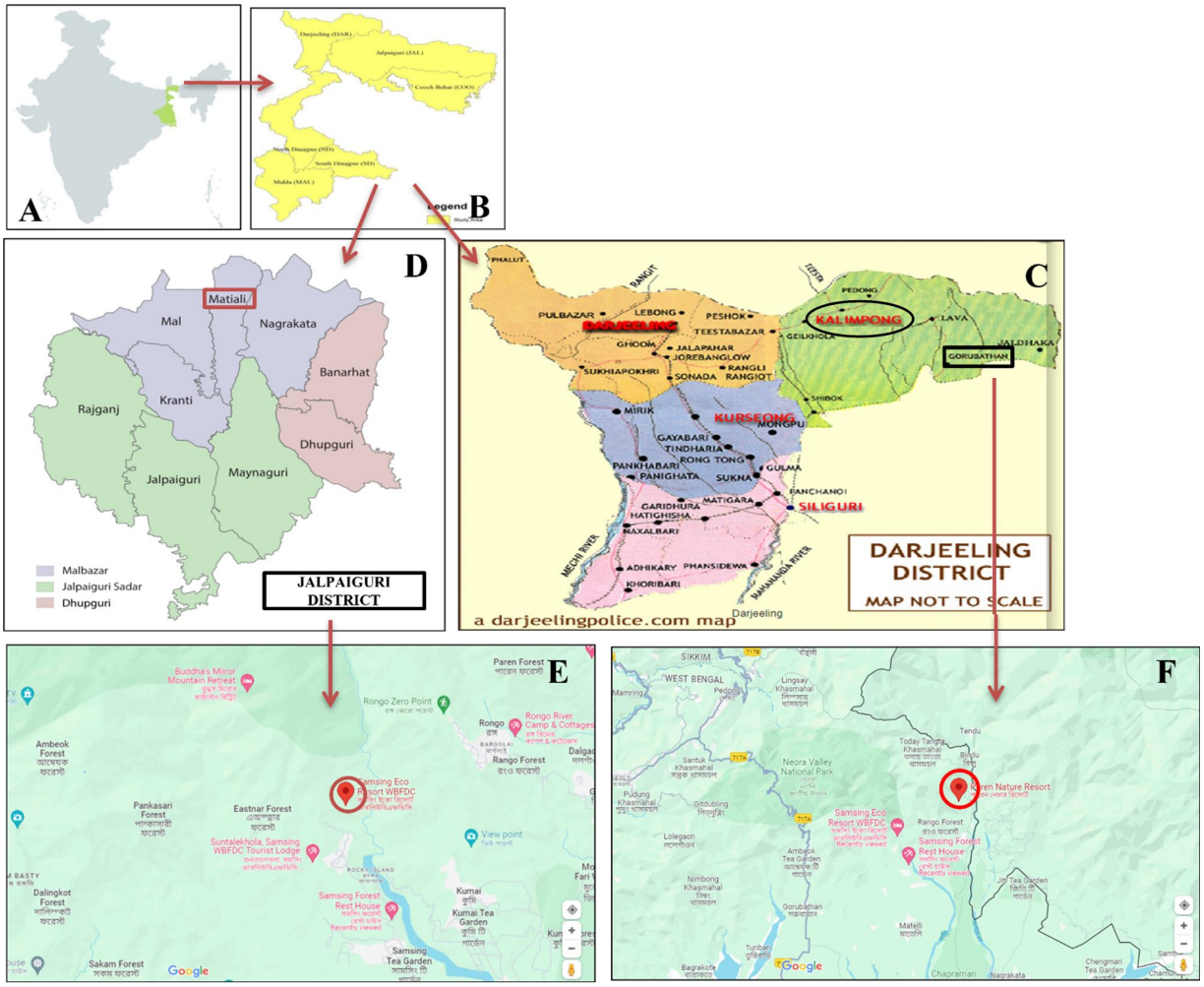

Figure 1: Map showing the locality of the Study areas A: Map of India highlighting West Bengal B: Map of West Bengal C: Map of Darjeeling district showing the Gorubathan block of Kalimpong district D: Map of Jalpaiguri district showing the Matiali block E: Map showing the locality of the Samsing Eco Tourism Resort of Matiali block of Jalpaiguri district F: Map showing the locality of the Paren Nature Resort of Gorubathan block of Kalimpong district. Arrows showing the enlarged images. © Google Map.

Resort (Latitude 26°59′24″N and Longitude 88°48′42″E) is situated at an elevation of 3000 ft in the foothills in between Jalpaiguri and Darjeeling districts border and is a part of the small hill village of Samsing situated in the Matiali block of Malbazar subdivision of Jalpaiguri district of West Bengal. It is a part of Khasmahal of Samsing basti division. It is a very renowned tourist spot with beautiful landscape with green tea gardens, hills and forests. From this place, the snow-covered mountains of Bhutan are visible on a clear day. It is situated at 83 km from Siliguri and about 18 km from the Neora Valley National Park. The resort has a well-maintained garden with flowering plants and outside of it is a dense deciduous forest.

Figure 2: Site A: Paren Nature Eco Resort**; Site B:** Samsing Eco Tourism Resort

Sampling period and time

The study was conducted in the month of May for a duration of 7 days in a bright sunny weather and favourable climatic conditions with occasional rainfall in the daytime during later part of the study period. The study covered the entire region of the resort and about 2km of the adjoining area. Average daytime temperature was around 25 - 30°C and the night-time temperature was as 23-25°C. The month of May was appropriate for tourist visit since the temperature did not fluctuate much and there were occasionally showers of rain, and the availability of butterflies was much more after rainfall.

Sampling techniques

The field surveys conducted during the present study are based on a random sampling technique. Each survey comprised of direct observation, opportunistic sightings and random walks in the field (Murugesan *et al*., 2013). The documentation was done by observing butterflies in areas with high probability of sighting such as, mud-puddling spots, nectar rich plants, host plants, sunny areas used for basking. Paths used by locals leading to the forest and nearby village were also observed extensively to study butterflies. Each observation was noted in a field note-book along with the common names (scientific name if possible), date of record, behaviour and the associated plant (if any) for detailed study and analysis. Each butterfly was photographed using digital cameras for future references. All the photographs taken on the field were used for identification from field guides (Kehimkar, 2008). Latest taxonomic literatures were used to prepare the checklist of the areas (Toussaint *et al*., 2015). All the subspecies listed in this paper are based on the distribution of subspecies in Indian literature (Van Gasse, 2013); (Varshney and Smetacek, 2015).

RESULTS

The observed list of butterflies recorded from the two study sites were presented in a tabular form in Table 1 & 2. This study documented a total of 70 butterfly species belonging to 6 families, 17 subfamilies, and 47 genera from Paren and a total of 28 butterfly species belonging to 3 families, 8 subfamilies and 22 genera from Samsing.

In Paren out of the total number of butterfly species recorded, 21 species belong to Family Lycaenidae, 33 species from Nymphalidae, 6 species from Papilionidae, 8 species from Pieridae and 1 species from the family Riodinidae and Hesperiidae. The family Nymphalidae is the most species-rich family which consists of 47.14% of the total number of species observed. Family Riodinidae and Hesperiidae came out to be the least-species rich family with only 1 species (1.43% of total species) (Table 3).

Similarly, in Samsing out of the total number of butterfly species recorded, 12 species are from Nymphalidae, 6 species from Papilionidae, 10 species from Pieridae. With 12 species the family Nymphalidae is the most species-rich family which consists of 42.86% of the total number of species observed. Family Papilionidae came out to be the least-species rich family with only 6 species (21.43% of total species) (Table 4).

Of 98 species of butterflies found in the entire study, 1 species belong to schedule I, 8 species under schedule II, and 2 species from schedule IV of the Indian Wild Life (Protection) Amendment Act, 2022 were recorded. 10 species are common to both the study areas.

The family wise distribution of the butterfly species recorded shows Nymphalidae to be the most species – rich family from both the study areas (Figure 3). The distribution of the subfamilies of the butterfly species recorded shows the subfamily Polyommatinae of family Lycaenidae with the greatest number of genera and species of butterfly in Paren (Figure 4). Whereas in Samsing, the subfamily Coliadinae of the family Peridae bears the greatest number of genera and species of butterfly (Figure 5). In Paren, the genus *Junonia* consist of the largest number of species (7 species) and in Samsing the genera *Ypthima* and *Graphium* contains the greatest number of species (3 species) (Figure 6).

Table 1: Family wise observed list of butterflies found in Paren, Dooars, West Bengal, India containing common names and scientific names along with WPA Schedule.

Sl. No.	Common name	Species	WPA, 2022
Family: Hesperiidae, Subfamily: Hesperiinae			
1.	Purple and Gold flitter	*Zographetus satwa* (de Niceville, [1884])	
Family: Lycaenidae, Subfamily: Curetinae			
2.	Bright Sunbeam	*Curetis bulis bulis* (Westwood, [1851])	
3.	Indian Sunbeam	*Curetis thetis thetis* (Drury, 1773)	
Family: Lycaenidae, Subfamily: Lycaeninae			
4.	Purple Sapphire	*Heliophorus epicles latilimbata* (Fruhstorfer, 1908)	
5.	Golden Sapphire	*Heliophorus brahma brahma* (Moore, [1858])	
Family: Lycaenidae, Subfamily: Polyommatinae			
6.	Red pierrot	*Talicada nyseus khasiana* Swinhoe,1893	
7.	Transparent 6 – lineblue	*Nacaduba kurava euplea* Fruhstorfer, 1916	
8.	Common lineblue	*Prosotas nora nora* (C. Felder, 1860)	
9.	Tailless lineblue	*Prosotas dubiosa indica* (Evans, [1925])	Sch II
10.	Common Cerulean	*Jamides celeno celeno* (Cramer, [1775])	
11.	Common ciliate blue	*Anthene emolus emolus* (Godart, [1824])	
12.	Common hedge blue	*Acytolepis puspa gisca* (Fruhstorfer, 1910)	
13.	Dark cerulean	*Jamides bochus bochus* (Stoll, [1782])	
14.	Dark grass blue	*Zizeeria karsandra* (Moore, 1865)	
15.	Lime blue	*Chilades lajus lajus* (Stoll, [1780])	
16.	Metallic Cerulean	*Jamides alecto alocina* Swinhoe, 1915	
17.	Pea blue	*Lampides boeticus* (Linnaeus, 1767)	
18.	Forget – me – not	*Catochrysops strabo strabo* (Fabricius, 1793)	
19.	Pointed line blue	*Ionolyce helicon merguiana* (Moore, 1884)	Sch II
20.	Lesser grass blue	*Zizina otis sangra* (Moore,[1866])	
Family: Lycaenidae, Subfamily: Theclinae			
21.	Green Oakblue	*Arhopala eumolphus eumolphus* (Cramer, [1780])	
22.	Large Oakblue	*Arhopala amantes apella* (Swinhoe, 1887)	
Family: Riodinidae, Subfamily: Nemeobiinae			
23.	Himalayan puncheinello	*Zemeros flegyas indicus* Fruhstorfer, 1898	
Family:Nymphalidae, Subfamily : Apaturinae			
24.	Black prince	*Rohana parisatis parisatis* (Westwood, [1851])	
25.	Eastern Courtier	*Sephisa chandra chandra* (Moore, [1858])	
Family:Nymphalidae, Subfamily : Cyrestinae			
26.	Common Maplet	*Cyrestis risa risa* (Doubleday, [1848])	
Family:Nymphalidae, Subfamily : Danainae			

27.	Blue Spotted Crow	*Euploea midamus rogenhoferi* (C. & R. Felder, [1865])	Sch II
28.	Bengal Striped Blue Crow	*Euploea mulciber mulciber* (Cramer, [1777])	Sch IV
29.	Glassy tiger	*Parantica aglea melanoides* Moore, 1883	
30.	Striped Tiger	*Danaus genutia genutia* (Cramer, [1779])	
31.	Common crow	*Euploea core core* (Cramer, [1780])	
Family: Nymphalidae, Subfamily: Heliconiinae			
32.	Common Yeoman	*Cirrochroa tyche mithila* Moore, 1872	
33.	Large Yeoman	*Cirrochroa aoris aoris* Doubleday, [1847]	
34.	Yellow coster	*Acraea issoria issoria* (Huebner, [1819])	
35.	Leopard Lacewing	*Cethosia cyane cyane* (Drury, [1773])	
Family:Nymphalidae, Subfamily : Limenitidinae			
36.	Clear Sailer	*Neptis clinia susruta* Moore, 1872	
37.	Common Lascar	*Pantoporia hordonia hordonia* (Stoll, [1790])	
38.	Small yellow Sailer	*Neptis miah miah* Moore, 1857	
39.	Common Sailer	*Neptis hylas kamarupa* Moore, [1875]	
Family:Nymphalidae, Subfamily : Nymphalinae			
40.	Chocolate pansy	*Junonia iphita iphita* (Cramer, [1779])	
41.	Lemon Pansy	*Junonia lemonias lemonias* (Linnaeus, 1758)	
42.	Autumn Leaf	*Doleschallia bisaltide indica* Moore, 1899	Sch I
43.	Himalayan Jester	*Symbrenthia brabira brabira* Moore, 1872	
44.	Peacock pansy	*Junonia almana almana* (Linnaeus, 1758)	
45.	Yellow pansy	*Junonia hierta hierta* (Fabricius, 1798)	
46.	Grey Pansy	*Junonia atlites atlites* (Linnaeus, 1763)	
47.	Orange Oakleaf	*Kallima inachus inachus* (Doyere, [1840])	
48.	Danaid Eggfly	*Hypolimnas misippus*	Sch II
49.	Great Eggfly	*Hypolimnas bolina jacintha* (Drury, 1773)	
Family:Nymphalidae, Subfamily : Pseudergolinae			
50.	Tabby	*Pseudergolis wedah wedah* (Kollar, [1844])	
Family:Nymphalidae, Subfamily : Satyrinae			
51.	Common bushbrown	*Mycalesis perseus blasius* (Fabricius, 1798)	
52.	Common five ring	*Ypthima baldus baldus* (Fabricius, 1775)	
53.	Common four ring	*Ypthima huebneri* Kirby, 1871	
54.	Eastern five ring	*Ypthima similis similis* Elwes & Edwards, 1893	Sch II
55.	Large three ring	*Ypthima nareda* (Kollar, [1844])	
56.	Long brand bushbrown	*Mycalesis visala visala* Moore, [1858]	
Family: Papilionidae, Subfamily: Papilioninae			
57.	Yellow Helen	*Papilio nephelus chaon* Westwood, 1845	

58.	Great Mormon	*Papilio memnon agenor* Linnaeus, 175	
59.	Common Mormon	*Papilio polytes romulus* Cramer, [1775]	
60.	Common Jay	*Graphium doson eleius* (Fruhstorfer, 1907)	
61.	Great Windmill	*Byasa dasarada dasarada* (Moore, 1858)	
62.	Common Birdwing	*Troides helena cerberus* (C. and R. Felder, 1865)	
Family: Pieridae, Subfamily: Coliadinae			
63.	Common Grass Yellow	*Eurema hecabe hecabe* (Linnaeus, 1758)	
64.	Small Grass Yellow	*Eurema brigitta rubella* (Wallace, 1867)	
Family: Pieridae, Subfamily: Pierinae			
65.	Plain Orange tip	*Colotis aurora* (Cramer, [1780])	
66.	Yellow Orange tip	*Ixias pyrene sesia* (Fabricius, 1777)	
67.	Indian cabbage white	*Pieris canidia indica* Evans, 1926	
68.	Striped Albatross	*Appias olferna* Swinhoe, 1890	Sch IV
69.	Psyche	*Leptosia nina nina* (Fabricius, 1793)	
70.	Lesser Gull	*Cepora nadina nadina* (Lucas, 1852)	Sch II

Table 2: Family wise observed list of butterflies found in Samsing, Dooars, West Bengal, India containing common names and scientific names along with WPA Schedule.

Sl. No.	**Common name**	**Species**	**WPA 2022 Schedule**
Family :Nymphalidae, Subfamily : Danainae			
1.	Striped Tiger	*Danaus genutia genutia* (Cramer, [1779])	
2.	Blue Tiger	*Tirumala limniace exoticus* (Gmelin, 1790)	
3.	Glassy Tiger	*Parantica aglea melanoides* Moore, 1883	
4.	Bengal Striped blue crow	*Euploea mulciber mulciber* (Cramer, [1777])	
Family :Nymphalidae, Subfamily : Limenitidinae			
5.	Common Earl	*Tanaecia julii appiades* (Menetries, 1857)	
6.	White Edged Blue Baron	*Euthalia phemius phemius* (Doubleday, [1848])	
Family :Nymphalidae, Subfamily : Nymphalinae			
7.	Lemon pansy	*Junonia lemonias lemonias* (Linnaeus, 1758)	
8.	Great Eggfly	*Hypolimnas bolina jacintha* (Drury, 1773)	
Family :Nymphalidae, Subfamily : Satyrinae			
9.	Common four ring	*Ypthima huebneri* Kirby, 1871	
10.	Common five ring	*Ypthima baldus baldus* (Fabricius, 1775)	

11.	Large three ring	*Ypthima nareda* (Kollar, [1844])	
Family :Nymphalidae, Subfamily : Cyrestinae			
12.	Common Map	*Cyrestis thyodamas thyodamas* Boisduval, 1846	
Family : Papilionidae, Subfamily : Papilioninae			
13.	Himalayan Five – bar Sowrdtail	*Graphium antiphates nebulosus* (Butler, 1881)	
14.	Crimson Rose	*Pachliopta hector* (Linnaeus, 1758)	Sch II
15.	Common raven	*Papilio castor polias* Jordan, 1909	
16.	Blue Mormon	*Papilio polymnestor polymnestor* Cramer, [1775]	
17.	Tailed Jay	*Graphium agamemnon agamemnon* (Linnaeus, 1758)	
18.	Common Jay	*Graphium doson eleius* (Fruhstorfer, 1907)	
Family : Pieridae, Subfamily : Coliadinae			
19.	Common Grass Yellow	*Eurema hecabe hecabe* (Linnaeus, 1758)	
20.	Mottled emigrant	*Catopsilia pyranthe pyranthe* (Linnaeus, 1758)	
21.	Common Emigrant	*Catopsilia pomona pomona* (Fabricius, 1775)	
22.	Tree Yellow	*Gandaca harina assamica* Moore, 1906	
23.	One spot grass yellow	*Eurema andersonii jordani* Corbet and Pendlebury, 1932	Sch II
Family : Pieridae, Subfamily : Pierinae			
24.	Yellow orange tip	*Ixias pyrene sesia* (Fabricius, 1777)	
25.	Plain orange tip	*Colotis aurora* (Cramer, [1780])	
26.	Indian Cabbage white	*Pieris canidia indica* Evans, 1926	
27.	Yellow jezebel	*Delias agostina agostina* (Hewitson,1852)	
28.	White orange tip	*Ixias pyrene sesia* (Fabricius, 1777)	

Table 3: Detailed taxonomic overview of butterflies of Paren

Family	Number of subfamilies	Number of genera	Number of species
Hesperiidae	1 (5.88%)	1 (2.13%)	1 (1.43%)
Lycaenidae	4 (23.53%)	15 (31.91%)	21 (30%)
Riodinidae	1 (5.88%)	1 (2.13%)	1 (1.43%)
Nymphalidae	8 (47.05%)	19 (40.43%)	33 (47.14%)

Papilionidae	1 (5.88%)	4 (8.51%)	6 (8.57%)
Pieridae	2 (11.76%)	7 (14.89%)	8 (11.43%)
Total : 6	**17**	**47**	**70**

Table 4: Detailed taxonomic overview of butterflies of Samsing

Family	Number of subfamilies	Number of genera	Number of species
Nymphalidae	5 (62.5%)	10 (45.45%)	12 (42.86%)
Papilionidae	1 (12.5%)	4 (18.18%)	6 (21.43%)
Pieridae	2 (25%)	8 (36.36%)	10 (35.71%)
Total : 3	**8**	**22**	**28**

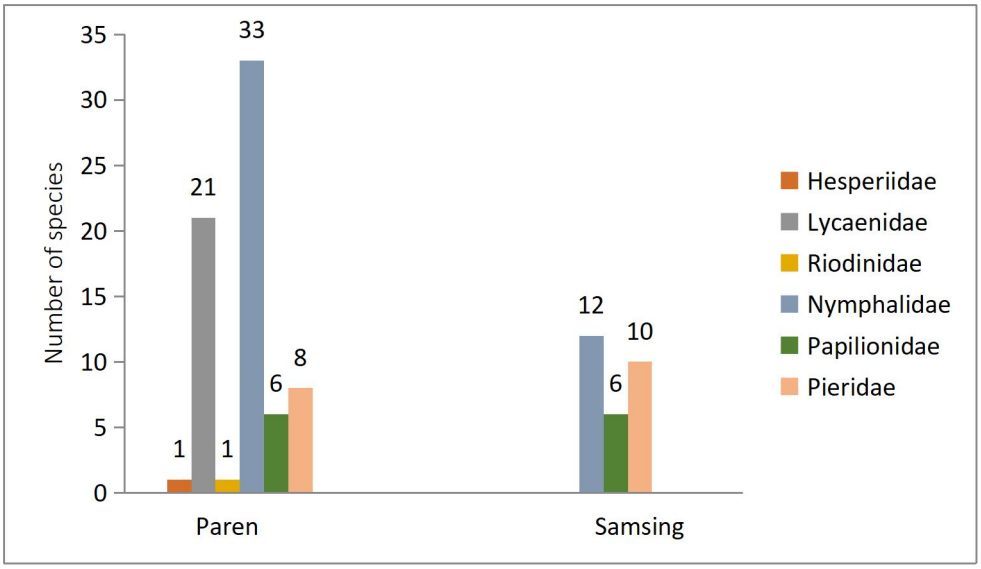

Figure 3: The family-wise distribution of butterflies of Paren Eco Resort and Samsing Eco Tourism Resort

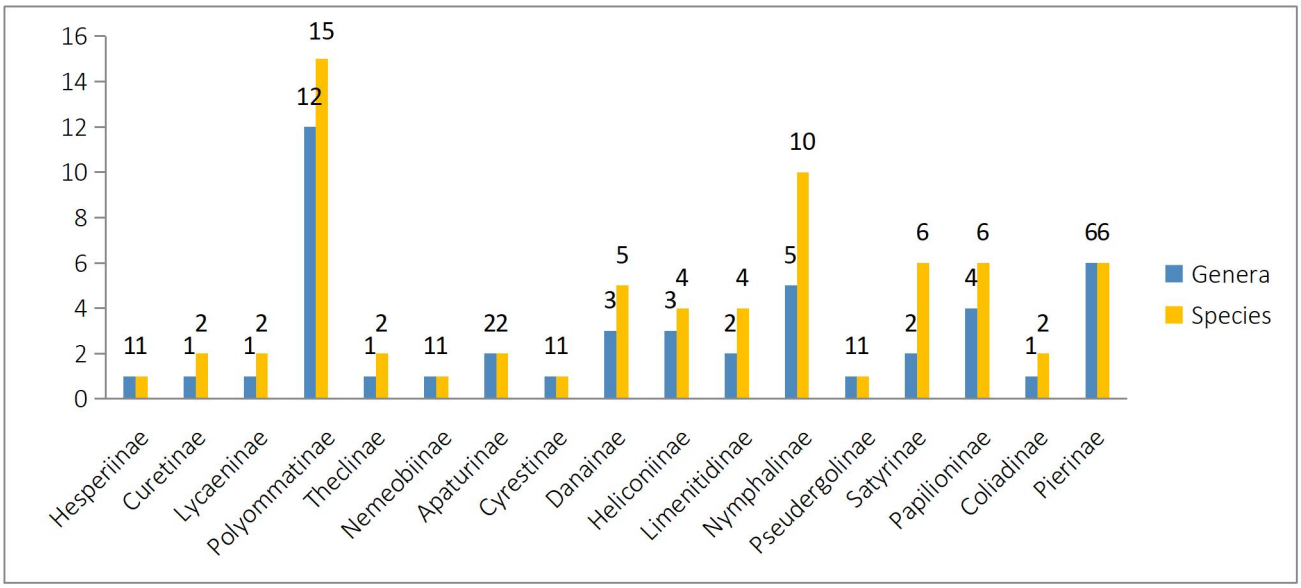

Figure 4: Sub – family wise distribution of diversity of butterflies in the Paren Eco Resort

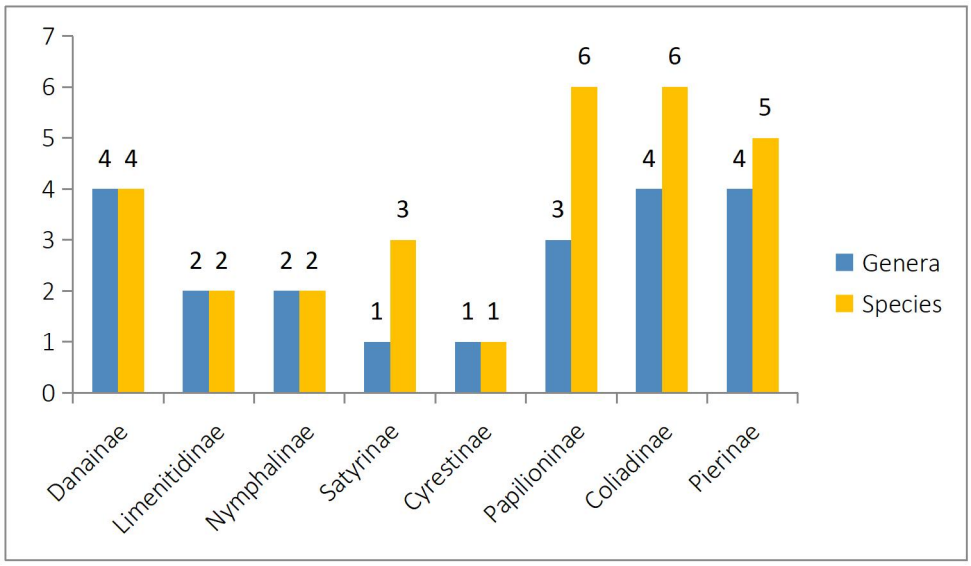

Figure 5: Subfamily wise distribution of diversity of butterflies in Samsing Eco Tourism Resort

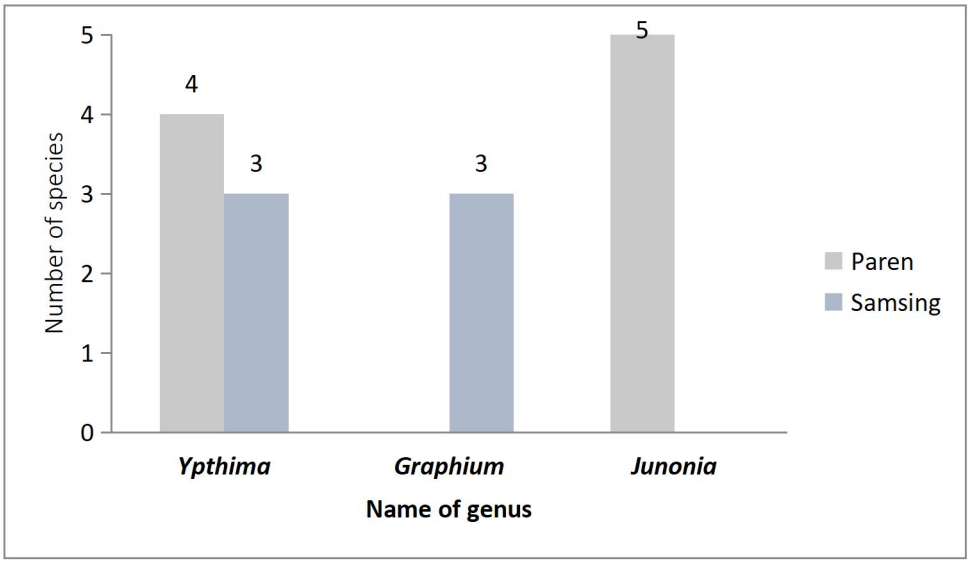

Figure 6: Most species rich genera recorded in Paren Eco Resort and Samsing Eco Tourism Resort

DISCUSSION

The few literatures available on the study of butterflies on Terai – Dooars region suggested that the diversity of the butterfly is directly related to the floristic regime of this region (Pal *et.al*, 2015). Large areas which are potential habitats present throughout the Dooars region of the Northern West Bengal remains poorly excavated. In this context, the present study was an attempt to throw light on one such potential region. Documentation of a total number of 98 butterfly species, from such a small study area justifies that the region is full of host and nectaring plants of butterflies. Among documented butterflies, a maximum number of species belongs to the Nymphalidae family from both the study areas, a common trend that can be observed in the northeastern region and most other parts of India (Kumar *et al*., 2007; Verma, 2009; Sing, 2010; Kunte *et al*., 2012; Sengupta *et al*., 2014; Bora and Meitei,2014; Samanta *et al*., 2017; Bhowmick and Chowdhury, 2021). It is also in accordance with the earlier reports from north-eastern region of West Bengal (Das *et al*., 2012; Roy *et al*., 2012; Pal *et al*., 2015; Datta and Ghosh, 2016; Bhutia and Sharma, 2020; Chakraborty *et al*., 2023; Das et.al,2024) A good species to genera ratio of 1.48 in Paren and 1.27 in Samsing was observed and also from a very small area suggest the good health and distribution of several host plants and nectaring plants in the study area (Kunte, 2000; Öckinger et al., 2006; Mukherjee and Ghosh, 2018; Mukherjee *et.al*, 2023). Although the study area is in human inhabited region a good proportion of butterflies have been recorded (Bhowmick and Chowdhury, 2021).

Tourism is an ecologically important factor for a study area but pollution occurs due to unplanned tourism and garbage is produced from tourism (Mukherjee et.al, 2023). The two study areas are a very popular tourist spots but however manage to hold a good occurrence of butterfly species. It is

may be because of the encroachment of forest near the tourist spots. Paren Eco Resort holds a large butterfly diversity as it is in the middle of the forest in respect to Samsing Eco tourism Resort which is by the side of a busy road.

The present study was conducted within a very short period of time, however as much species as possible have been recorded. However, to determine the diversity status of the butterfly community of Paren and Samsing, further long-term surveys of the butterfly fauna of these regions are required.

CONCLUSION

The present study is a humble effort to preliminary study on the butterfly species diversity of the totally unrecognised sites of Paren Eco Resort, Kalimpong and Samsing Eco Tourism Resort, Jalpaiguri, West Bengal. The findings show significant butterfly diversity at this study areas within a minimal time period. Although Paren Eco Resort is a small area it holds a very good diversity of butterfly as it is in the middle of the forest which throws light on the presence of a wide variety of host and nectaring plants and low anthropogenic disturbance at the area. Samsing Eco Tourism Resort on the other hand is more of an urban patch which also holds a good number of butterfly species. As these areas are already maintained by Government as tourist spots it can form a hub for future research on butterfly diversity. But low anthropogenic disturbance and minimal pollution is required for such research work. The current study will ensure a baseline for future ecological and taxonomical work from the study areas.

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Fig: 7. Butterflies of family Papilionidae 1. Common Mormon 2. Yellow Raven 3. Himalayan five – bar swordtail 4. Common jay 5. Tailed jay 6. Blue Mormon 7. Crimson Rose; **Butterflies of family Pieridae** 8. Common Grass yellow 9. Small Grass yellow 10. Common emigrant 11. Eastern Striped Albatross 12. Lesser Gull 13. Great orange tip 14. One – spot grass yellow 15. Indian cabbage white.

Figure 8. Butterfly of family Hesperiidae 1. Purple and gold flitter; **Butterflies of Lycaenidae** 2. Purple sapphire 3. Golden sapphire 4. Red pierrot 5. Transparent 6 – line blue 6. Common lineblue 7. Tailless lineblue 8. Common cerulean 9. Common ciliate blue 10. Common hedge blue 11. Green Oakblue 12. Dark Cerulean 13. Dark grass blue 14. Lime blue 15. Metallic cerulean 16. Pea blue 17. Forget – me – not; **Butterfly of family Riodinidae** 18. Himalayan Puncheinello

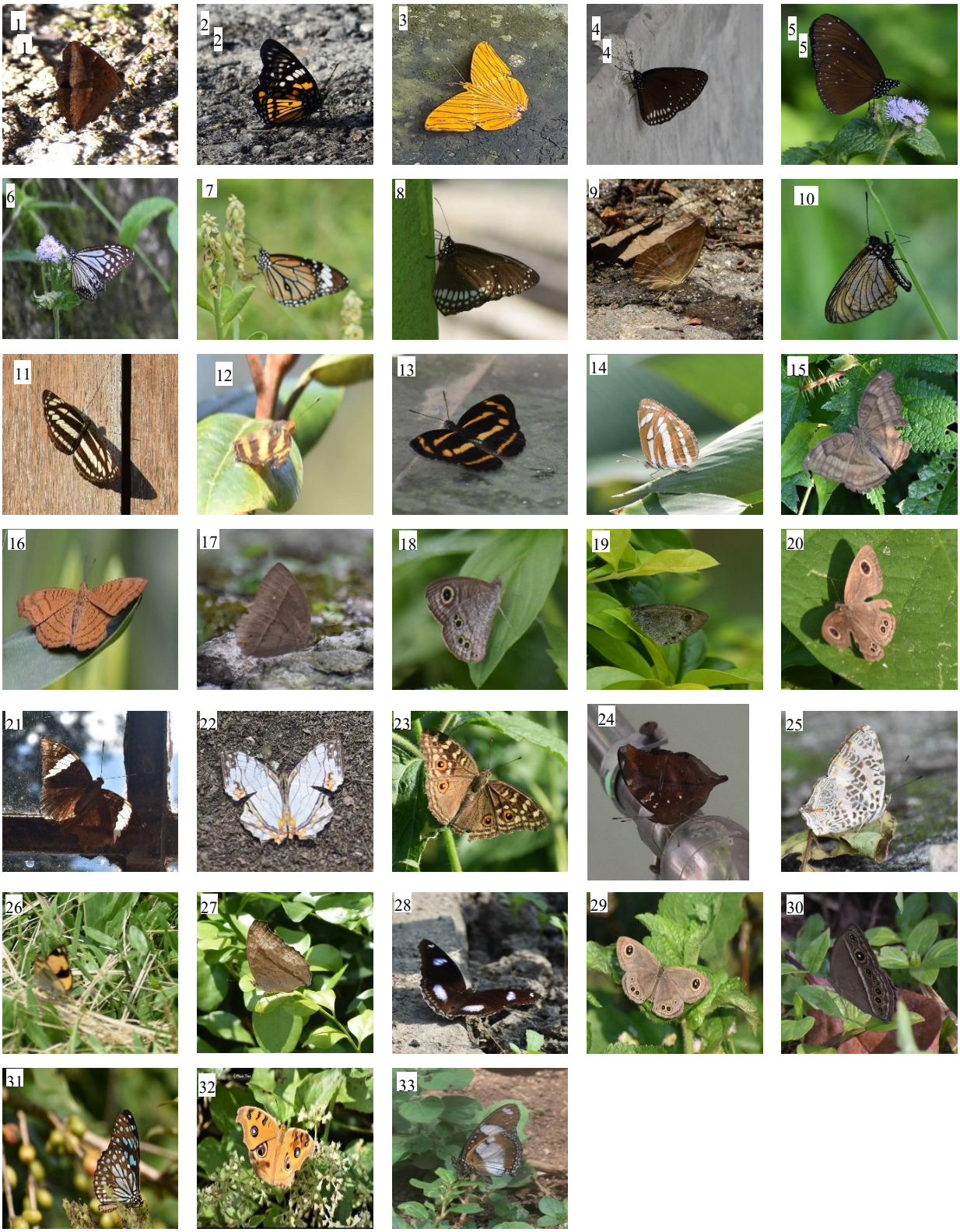

Figure 9. Butterflies of family Nymphalidae 1. Black prince 2. Eastern courtier 3. Common Maplet 4. Blue spotted crow 5. Bengal striped blue crow 6. Glassy tiger 7. Striped tiger 8. Common crow 9. Common Yeoman 10. Yellow coster 11. Clear sailer 12. Common lascar 13. Small yellow sailer 14. Common sailer 15. Chocolate pansy 16. Tabby 17. Common Bushbrown 18. Common five ring 19. Common four ring 20. Large three ring 21. White edged blue baron 22. Common Map 23. Lemon pansy 24. Autumn Leaf 25. Himalayan jester 26. Yellow pansy 27. Grey Pansy 28. Great eggfly 29. Eastern five ring 30. Long brand bushbrown 31. Blue tiger 32. Peacock pansy 33. Danaid eggfly