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Butterfly diversity and seasonal variation in Baramura Eco Park and adjoining area of Tripura, North East India

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Abstract
Butterfly diversity may act as an important indicator of habitat quality and overall ecosystem health as butterflies have coevolved with their nectaring and larval host plants. Butterflies also need a range of weather conditions for their survival and reproduction. Data on butterfly diversity might advocate appropriate conservation measures needed for management of a natural habitat and its biodiversity. In the present study an effort has been made to document butterfly species diversity and seasonal variance of Baramura Eco Park and adjoining area, Tripura, North East India (23.8158° N, 91.5799° E) which is part of Indo-Myanmar biodiversity hotspot. The study area comes under the Baramura hill range where no dedicated study has been conducted so far to assess the butterfly diversity and ecosystem health of the region. Therefore the present study might provide crucial data on butterfly diversity of this region as well as help to design conservation and management plans of this important eco region as a whole.
The study conducted from January 2017 to December 2019 documented 5,418 individuals of butterflies belonging 181 species, 115 genus and 6 families among which 45 species are protected under different schedules of Indian Wildlife (Protection) Act, 1972. Family Nymphalidae represented maximum richness (62 species, 34%) followed by Lycaenidae (45 species, 25%), Hesperiidae (42 species, 23%), Pieridae (19 species, 11%), Papilionidae (12 species, 7%), and Riodinidae (1 species, 0.01%). Shannon-Weiner diversity index (H') was highest in post monsoon (1.775) followed by winter (1.769) and summer (1.744) while it was lowest in monsoon (1.67). Maximum evenness in butterfly community was also recorded during post monsoon season as indicated by Shannon evenness index (J=0.849) followed by monsoon (J=0.84) and winter (J=0.839). Evenness was lowest in summer (J=0.806).
Rich butterfly diversity of the present study area indicates a healthy ecosystem with diverse plant species that could act as nectaring plant as well as larval host plant for such a huge number of butterfly species. Presence of a good number of scheduled (protected) species recorded during the present study strongly underlines the need for enforcement of conservation efforts to save the butterfly species diversity and its habitats from the prevailing threats.

Keywords: Butterfly, species diversity, Baramura Eco Park, Tripura, North East India, Shannon-Weiner diversity index

Introduction
Biodiversity represents the range of life describing the number and variability in relation to ecosystem in which they occur. Monitoring of species diversity of a region enables estimation of the prospective functional roles of the species (Mukherjee *et al*., 2015; Mukherjee & Hossain, 2024; Patra *et al*., 2025) [33, 34, 37]. Being one of the richest in biological values and high in endemism North East India holds a large number of rare species that are now under serious threat. The region is among the 34 Hot Spots of the world which supports a rich faunal diversity including butterfly because of its average annual rainfall that often exceeds 200cm, which is ideal for most flora and fauna (Bora & Meitei, 2014) [8]. The International Union for Conservation of Nature and Natural Resources (IUCN) has nominated Northeastern India as one of the 'swallowtail-rich zones' under the Swallowtail Conservation Action Plan (1984).
Northeastern parts of India, consisting of eight provinces and having an area of 1,61,419 km^2, shares about 65% of butterfly diversity of India (Haribal, 1992; Gupta & Majumder, 2006; Gupta & Maulik, 2007; Gogoi, 2012; Kunte, *et al.*, 2012) [17, 18, 19, 20, 23]. Tripura province of Northeastern India is situated in the western fringe of Indo–Myanmar global hotspot (Mittermeier *et al*., 2005; Tordof *et al*., 2012) [31, 44]. Tripura province is unique due to its location at the confluence of Indo-Myanmar, Indo-Malayan and parts of Indo-China geographical regions with close proximity to Bangladesh.
According to the available published literature, Tripura having an area of 10,491 km^2 have approximately 354 reported species of butterflies so far (Nandi & Varshney, 1988 [36]; Watson, 1891; Majumder *et al*., 2012; Majumder *et al*., 2013; Lodh & Agarwala, 2015; Lodh & Agarwala, 2016; Das, 2017; Nair *et al*., 2018; Agarwala & Majumder, 2019; Bhowmik *et al.*, 2020; Deb & Mandal, 2020; Bhowmik, 2021; Bhowmik & Chowdhury, 2021; Agarwala & Majumder, 2025) [1, 2, 4, 5, 6, 10, 12, 24, 25, 27, 28, 35]. This number is far less in comparison to Sikkim, a smaller province having an area of 7,092 km^2 but with 695 species of known butterflies (Haribal, 1992) [20]. The richness of floral diversity of the province is evident from occurrence of 1,583 plant species belonging to 862 genera in 193 families (Deb, 1981; Deb, 1983 [13, 14]; Majumdar *et al*., 2012). Due

to richness in vegetation and varied ecological habitats the actual butterfly diversity is expected to be higher than the presently reported number. Therefore, more extensive field studies in selected areas may reveal the actual diversity of butterflies along with their abundance and distribution which may help in conservation of these winged beauties. The most extensive study so far on butterfly diversity of Tripura has been carried out by Lodh and Agarwala (2015) [24]. They surveyed altogether 28 locations across Tripura. But their study included only two locations in the Khowai district, Harbang and Tulashikar. Baramura Eco Park located in Teliamura Sub-division of Khowai district, Tripura is snuggled in the lush green forest at the outer boundary of Baramura–Deotamura reserve forest where Baramura hill range meets the plane lands at about 37 km from capital town Agartala on the National Highway-44. No published record is available regarding the biodiversity of this Eco Park. Large number of butterflies of different species observed during the initial field survey acted as the impetus for the present study to document the species diversity and seasonal variation of butterfly community in and around the Park.

Materials & methods

Study area

The present study was conducted in the Baramura Eco Park and adjoining area (23.8158° N, 91.5799° E) of Khowai district, Tripura, North East India (Fig 1). The Eco Park have an area of about 3.5 km^2 most of which is covered with natural vegetations which is an extended part of mixed moist deciduous and evergreen forests with patches of grasslands and shrubs.

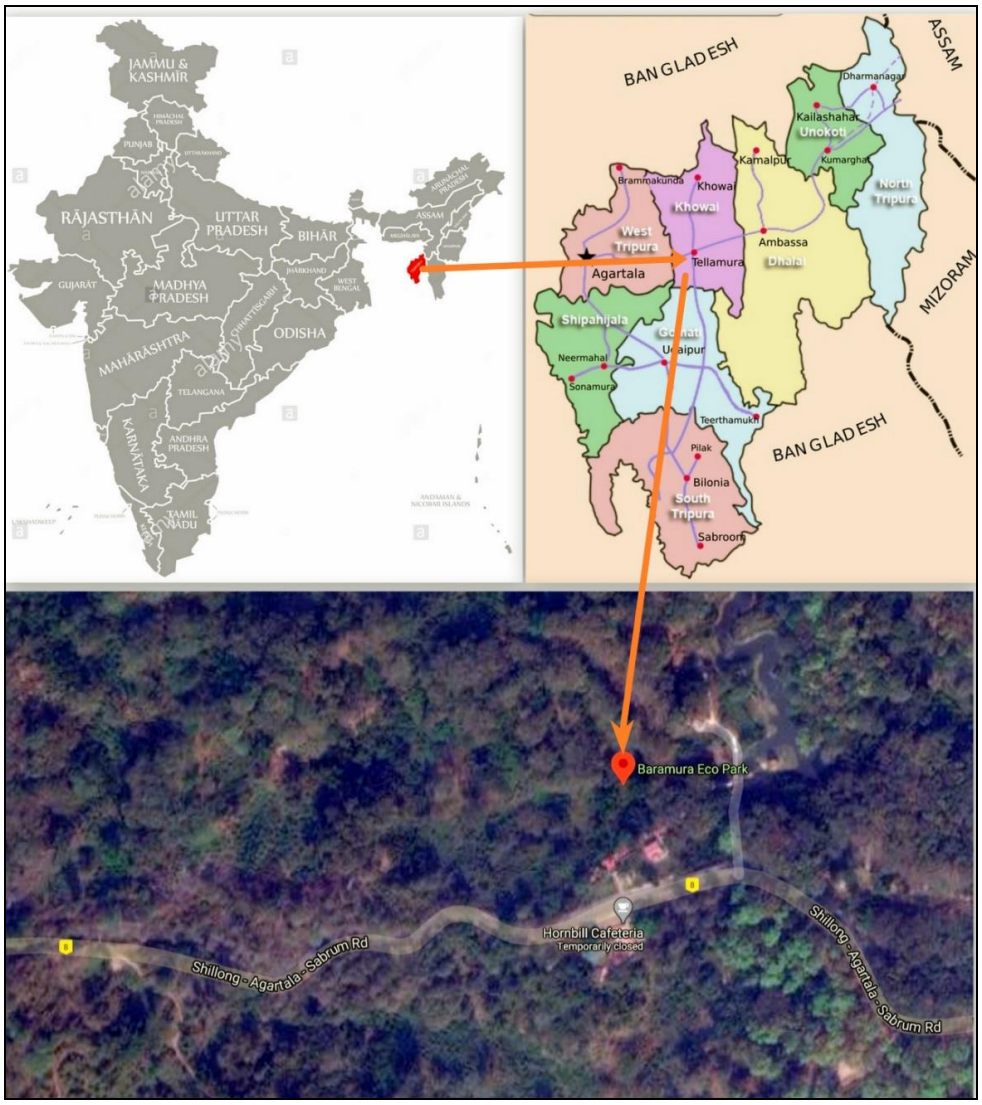

Fig 1: Location and Google map image of study site

Data collection

The butterflies were observed and recorded directly in the field. A combination of direct search technique (Sutherland, 1996) [41] and opportunistic sighting methods (Beharrell & Fanning, 2003) [3] were applied for the present study which were conducted for three consecutive years (January 2017 to December 2019) to record butterfly diversity and abundance. Observations were made at the frequency of twice a month (a total of 72 samples). Sampling was done continuously following a fixed route for each day to avoid repeated counting of the same individual butterfly. Observations were made between 8.30 AM and 4.30 PM during good weather period (no heavy rain or strong winds) during the four seasons—summer (March to May); monsoon (June to August); post-monsoon (September to November) and winter (December to February). This timing was found ideal based on preliminary observations done during different times of the day in the study sites.

Butterflies were photographed using digital camera (Canon Power shot SX50 HS) and identified using suitable keys (Evans, 1932; Wynter-Blyth, 1957; Haribal, 1992; Kunte, 2000; Kehimkar, 2016) [16, 20, 21, 22, 46]. In critical conditions when identification was not possible from the photographs (some species of hesperiidae family) butterflies were captured by hand net following Tiple (2012) [43], identified and released in the same habitat from where they were captured with least disturbance. Appropriate precautions were taken to ensure that the scales present on the wings of the butterflies were minimally affected. Photographs were preserved for taxonomic documentation.

Analysis of diversity indices

The data on the butterfly richness and abundance in the samples were subjected to diversity analysis using Biodiversity Pro software (McAleece *et al*., 1997) [29]. The butterfly species diversity was calculated using Shannon-Weiner diversity index, i.e. $H' = -\Sigma p_i \ln p_i$ and Shannon $H_{max} = Log_{10}(S)$. Measurement of Shannon's evenness was calculated by the following formula $J = H' / H_{max}$ [p_i = proportion of total sample belonging to i^{th} species, where S = total number of species in habitats (species richness)] (Magurran, 2004) [26]. The relationship among species richness (S), information (H- the Shannon-Wiener diversity index), and evenness (J) in the samples was made by SHE analysis (Buzas & Hayek, 1998) [9].

Results

The study conducted for a period of three consecutive years documented 5,418 individual of butterflies belonging 181 species and six families in the Baramura Eco Park and adjoining area, Tripura, Northeast India. List of butterflies with their relative abundance and WPA (Indian Wildlife Protection Act, 1972) status are presented in Table 1. Photographs of butterflies taken during the field study are presented family wise in Figs 2 to 6.

Table 1: List of butterflies documented from Baramura Eco park and adjoining area with their relative abundance and WPA# status

Sl. No.	Common name	Scientific name	Short Form	No. of Individual (N)	Relative abundance (p_i)	WPA Status
Family – Hesperiidae						
1	Brown Awl	*Badamia exclamationis*	*Bex*	4	0.000738	
2	Common Awl	*Hasora badra*	*Hba*	2	0.000369	
3	Chocolate Demon	*Ancistroides nigrita*	*Ani*	5	0.000923	
4	Forest Hopper	*Astictopterus jama*	*Aja*	5	0.000923	
5	Wax Dart	*Cupitha purreea*	*Cpu*	17	0.003138	
6	Bispot Banded Ace	*Halpe porus*	*Hpo*	44	0.008121	
7	Chestnut Bob	*Iambrix salsala*	*Isa*	71	0.013104	
8	Dark Velvet Bob	*Koruthaialos butleri*	*Kbu*	2	0.000369	
9	Changeable Velvet Bob	*Koruthaialos rubecula*	*Kru*	12	0.002215	
10	Shiny Velvet Bob	*Koruthaialos sindu*	*Ksi*	1	0.000185	
11	Common Branded Redeye	*Matapa aria*	*Mar*	6	0.001107	
12	Fringed Branded Redeye	*Matapa cresta*	*Mcr*	4	0.000738	
13	Black-veined Branded Redeye	*Matapa sasivarna*	*Msa*	11	0.00203	
14	Restricted Demon	*Notocrypta curvifascia*	*Ncu*	20	0.003691	
15	Himalayan Green-striped Palmer	*Pirdana major*	*Pma*	1	0.000185	
16	Light Straw Ace	*Pithauria stramineipennis*	*Pst*	1	0.000185	
17	Dusky Partwing	*Psolos fuligo*	*Pfu*	14	0.002584	
18	Grass Bob	*Suada swerga*	*Ssw*	4	0.000738	
19	Oriental Palm Bob	*Suastus gremius*	*Sgr*	13	0.002399	
20	Grass Demon	*Udaspes folus*	*Ufo*	55	0.010151	
21	Small Paint-brush Swift	*Baoris chapmani*	*Bch*	6	0.001107	
22	Complete Paint-brush Swift	*Baoris farri*	*Bfa*	2	0.000369	SC IV
23	Black Paint-brush Swift	*Baoris unicolor*	*Bun*	2	0.000369	SC IV
24	Oriental Straight Swift	*Parnara bada*	*Pba*	3	0.000554	
25	Rare Swift	*Parnara ganga*	*Pga*	1	0.000185	
26	Common Straight Swift	*Parnara guttata*	*Pgu*	3	0.000554	
27	Obscure Branded Swift	*Pelopidas agna*	*Pag*	2	0.000369	
28	Great Swift	*Pelopidas assamensis*	*Pas*	6	0.001107	SC IV
29	Conjoined Swift	*Pelopidas conjuncta*	*Pco*	2	0.000369	
30	Contiguous Swift	*Polytremis lubricans*	*Plu*	5	0.000923	SC IV
31	Common Dartlet	*Oriens gola*	*Ogo*	12	0.002215	
32	Dark Palm-Dart	*Telicota bambusae*	*Tba*	41	0.007567	
33	Indian Grizzled Skipper	*Spialia galba*	*Sga*	2	0.000369	
34	Common Spotted Flat	*Celaenorrhinus leucocera*	*Cle*	1	0.000185	
35	Fulvous Pied Flat	*Pseudocoladenia dan*	*Pda*	34	0.006275	
36	Common Small Flat	*Sarangesa dasahara*	*Sda*	48	0.008859	
37	Common Yellow-breasted Flat	*Gerosis bhagava*	*Gbh*	3	0.000554	
38	Yellow Flat	*Mooreana trichoneura*	*Mtr*	2	0.000369	
39	Chestnut Angle	*Odontoptilum angulata*	*Oan*	8	0.001477	

40	Suffused Snow Flat	*Tagiades gana*	*Tga*	3	0.000554	
41	Common Snow Flat	*Tagiades japetus*	*Tja*	46	0.00849	SC II
42	Water Snow Flat	*Tagiades litigiosa*	*Tli*	10	0.001846	
Family- Lycaenidae						
43	Purple Sapphire	*Heliophorus epicles*	*Hei*	19	0.003507	
44	Apefly	*Spalgis epeus*	*Sep*	2	0.000369	
45	Common Ciliate Blue	*Anthene emolus*	*Aem*	53	0.009782	
46	Pointed Ciliate Blue	*Anthene lycaenina*	*Aly*	1	0.000185	SC II
47	Angled Pierrot	*Caleta decidia*	*Cde*	10	0.001846	
48	Common Pierrot	*Castalius rosimon*	*Cro*	34	0.006275	SC I
49	Forget-me-not	*Catochrysops strabo*	*Cst*	14	0.002584	
50	Lime Blue	*Chilades lajus*	*Cla*	193	0.035622	
51	Banded Blue Pierrot	*Discolampa ethion*	*Det*	41	0.007567	
52	Gram Blue	*Euchrysops cnejus*	*Ecn*	1	0.000185	SC II
53	Metallic Cerulean	*Jamides alecto*	*Jal*	2	0.000369	SC II
54	Dark Cerulean	*Jamides bochus*	*Jbo*	29	0.005353	
55	Common Cerulean	*Jamides celeno*	*Jce*	80	0.014766	
56	Glistening Cerulean	*Jamides elpis*	*Jel*	2	0.000369	
57	Pea Blue	*Lampides boeticus*	*Lbo*	2	0.000369	SC II
58	Zebra Blue	*Leptotes plinius*	*Lpl*	2	0.000369	
59	Malayan	*Megisba malaya*	*Mma*	16	0.002953	SC II
60	Common Quaker	*Neopithecops zalmora*	*Nza*	10	0.001846	
61	Tailless Lineblue	*Prosotas dubiosa*	*Pdu*	3	0.000554	SC II
62	Brown Lineblue	*Prosotas lutea*	*Plu*	2	0.000369	
63	Common Lineblue	*Prosotas nora*	*Pno*	87	0.016058	SC II
64	Pale Grass Blue	*Pseudozizeeria maha*	*Pma*	36	0.006645	
65	Striped Pierrot	*Tarucus nara*	*Tna*	1	0.000185	
66	Dark Grass Blue	*Zizeeria karsandra*	*Zka*	90	0.016611	
67	Lesser Grass Blue	*Zizina otis*	*Zot*	15	0.002769	
68	Tiny Grass Blue	*Zizula hylax*	*Zhy*	2	0.000369	
69	Common Gem	*Poritia hewitsoni*	*Phe*	8	0.001477	SC II
70	Long-banded Silverline	*Spindasis lohita*	*Slo*	7	0.001292	SC II
71	Centaur Oakblue	*Arhopala centaurus*	*Ace*	11	0.00203	SC II
72	Yellowdisc Tailless Oakblue	*Arhopala perimuta*	*Ape*	9	0.001661	
73	Falcate Oakblue	*Mahathala ameria*	*Mae*	2	0.000369	SC II
74	Common Acacia Blue	*Surendra quercetorum*	*Squ*	5	0.000923	
75	Common Tinsel	*Catapaecilma major*	*Cma*	2	0.000369	
76	Common Imperial	*Cheritra freja*	*Cfr*	3	0.000554	
77	Cornelian	*Deudorix epijarbas*	*Dep*	3	0.000554	SC I
78	Common Red Flash	*Rapala iarbus*	*Ria*	22	0.004061	
79	Slate Flash	*Rapala manea*	*Rma*	8	0.001477	
80	Copper Flash	*Rapala pheretima*	*Rph*	2	0.000369	
81	Indigo Flash	*Rapala varuna*	*Rva*	28	0.005168	SC II
82	Common Tit	*Hypolycaena erylus*	*Her*	4	0.000738	
83	Fluffy Tit	*Zeltus amasa*	*Zam*	5	0.000923	
84	Mandarin Blue	*Charana mandarinus*	*Cma*	1	0.000185	
85	Peacock Royal	*Tajuria cippus*	*Tci*	26	0.004799	SC II
86	Yamfly	*Loxura atymnus*	*Lat*	2	0.000369	
87	Chocolate Royal	*Remelana jangala*	*Rja*	2	0.000369	SC II
Family- Nymphalidae						
88	Courtesan	*Euripus nyctelius*	*Gag*	2	0.000369	SC II
89	Black Prince	*Rohana parisatis*	*Gdo*	3	0.000554	
90	Angled Castor	*Ariadne ariadne*	*Gsa*	1	0.000185	
91	Common Castor	*Ariadne merione*	*Lcu*	1	0.000185	
92	Tawny Rajah	*Charaxes bernardus*	*Pcl*	7	0.001292	SC II
93	Indian Nawab	*Charaxes bharata*	*Pde*	95	0.017534	
94	Jewelled Nawab	*Charaxes delphis*	*Phe*	5	0.000923	SC II
95	Common Maplet	*Chersonesia risa*	*Pme*	42	0.007752	
96	Map Butterfly	*Cyrestis thyodamas*	*Pne*	38	0.007014	
97	Plain Tiger	*Danaus chrysippus*	*Ppo*	226	0.041713	
98	Striped Tiger	*Danaus genutia*	*Par*	25	0.004614	
99	Common Crow	*Euploea core*	*The*	17	0.003138	SC IV
100	King Crow	*Euploea klugii*	*Cpo*	645	0.119048	SC IV
101	Glassy Tiger	*Parantica aglea*	*Cpy*	55	0.010151	
102	Common Yeoman	*Cirrochroa tyche*	*Ead*	6	0.001107	
103	Rustic	*Cupha erymanthis*	*Ebl*	46	0.00849	
104	Common Leopard	*Phalanta phalantha*	*Ehe*	110	0.020303	

105	Vagrant	*vagrans egista*	*Gha*	6	0.001107	
106	Cruiser	*Vindula erota*	*Hga*	2	0.000369	
107	Redspot Duke	*Dophla evelina*	*Lni*	15	0.002769	SC II
108	Common Baron	*Euthalia aconthea*	*Aab*	2	0.000369	SC II
109	Powdered Baron	*Euthalia monina*	*Ala*	3	0.000554	
110	Common Earl	*Tanaecia julii*	*Aly*	8	0.001477	
111	Grey Count	*Tanaecia lepidea*	*Aol*	38	0.007014	SC II
112	Studded Sergeant	*Athyma asura*	*Can*	1	0.000185	SC II
113	Colour Sergeant	*Athyma inara*	*Cne*	4	0.000738	
114	Common Sergeant	*Athyma perius*	*Dag*	4	0.000738	
115	Dot-dash Sergeant	*Athyma kanwa*	*Dae*	80	0.014766	SC II
116	Blackvein Sergeant	*Athyma ranga*	*Dhy*	3	0.000554	SC II
117	Knight	*Lebadea martha*	*Dpa*	7	0.001292	
118	Commander	*Moduza procris*	*Pca*	11	0.00203	
119	Sullied Sailer	*Neptis clinia*	*Zfl*	51	0.009413	
120	Dingiest Sailer	*Neptis harita*	*Eny*	3	0.000554	
121	Common Sailer	*Neptis hylas*	*Rpa*	24	0.00443	
122	Chestnut-streaked Sailer	*Neptis jumbah*	*Aar*	13	0.002399	SC I
123	Clear Sailer	*Neptis nata*	*Ame*	2	0.000369	SC II
124	Broad-banded Sailer	*Neptis sankara*	*Cbe*	9	0.001661	SC I
125	Common Lascar	*Pantoporia hordonia*	*Cbh*	11	0.00203	
126	Short-banded Sailer	*Phaedyma columella*	*Cde*	1	0.000185	
127	Clipper	*Parthenos sylvia*	*Cri*	10	0.001846	SC II
128	Great Eggfly	*Hypolimnas bolina*	*Cth*	103	0.019011	
129	Peacock Pansy	*Junonia almana*	*Dch*	94	0.01735	
130	Grey Pansy	*Junonia atlites*	*Dge*	8	0.001477	
131	Yellow Pansy	*Junonia hierta*	*Eco*	5	0.000923	
132	Chocolate Pansy	*Junonia iphita*	*Ekl*	2	0.000369	
133	Lemon Pansy	*Junonia lemonias*	*Pag*	2	0.000369	
134	Spotted Jester	*Symbrenthia hypselis*	*Cty*	9	0.001661	
135	Common Jester	*Symbrenthia lilaea*	*Cer*	2	0.000369	
136	Popinjay	*Stibochiona nicea*	*Pph*	45	0.008306	
137	Common Duffer	*Discophora sondaica*	*Veg*	6	0.001107	SC I
138	Common Palmfly	*Elymnias hypermnestra*	*Ver*	1	0.000185	
139	Spotted Palmfly	*Elymnias malelas*	*Dev*	96	0.017719	SC I
140	Common Evening Brown	*Melanitis leda*	*Eac*	34	0.006275	
141	Angled Red Forester	*Lethe chandica*	*Emo*	15	0.002769	
142	Bamboo Treebrown	*Lethe europa*	*Tju*	3	0.000554	SC I
143	Common Red Forester	*Lethe mekara*	*Tle*	59	0.01089	
144	Dark-branded Bushbrown	*Mycalesis mineus*	*Aas*	29	0.005353	
145	Common Bushbrown	*Mycalesis perseus*	*Ain*	5	0.000923	
146	Long-branded Bushbrown	*Mycalesis visala*	*Ape*	1	0.000185	
147	Medus Brown	*Orsotriaena medus*	*Aka*	107	0.019749	
148	Common Five-ring	*Ypthima baldus*	*Ara*	6	0.001107	
149	Common Four-ring	*Ypthima huebneri*	*Lma*	9	0.001661	
Family- Papilionidae						
150	Tailed Jay	*Graphium agamemnon*	*Mpr*	1	0.000185	
151	Common Jay	*Graphium doson*	*Ncl*	26	0.004799	
152	Common Bluebottle	*Graphium sarpedon*	*Nha*	1	0.000185	
153	White Dragontail	*Lamproptera curius*	*Nhl*	3	0.000554	
154	Common Mime	*Papilio clytia*	*Nju*	37	0.006829	SC I
155	Lime Swallowtail	*Papilio demoleus*	*nna*	45	0.008306	
156	Red Helen	*Papilio helenus*	*Nsa*	68	0.012551	
157	Great Mormon	*Papilio memnon*	*Pho*	60	0.011074	
158	Yellow Helen	*Papilio nephelus*	*Pco*	160	0.029531	
159	Common Mormon	*Papilio polytes*	*Psy*	150	0.027685	
160	Common Rose	*Pachliopta aristolochiae*	*Hbo*	2	0.000369	
161	Common Birdwing	*Troides helena*	*Jal*	124	0.022887	
Family- Pieridae						
162	Lemon Emigrant	*Catopsilia pomona*	*Jat*	41	0.007567	
163	Mottled Emigrant	*Catopsilia pyranthe*	*Jhi*	30	0.005537	
164	One-spot Grass Yellow	*Eurema andersonii*	*Jip*	46	0.00849	SC II
165	Three-spot Grass Yellow	*Eurema blanda*	*Jle*	6	0.001107	
166	Common Grass Yellow	*Eurema hecabe*	*Shy*	83	0.015319	
167	Tree Yellow	*Gandaca harina*	*Sli*	14	0.002584	
168	Great Orange-tip	*Hebomoia glaucippe*	*Sni*	16	0.002953	
169	Psyche	*Leptosia nina*	*Dso*	5	0.000923	
170	Common Albatross	*Appias albina*	*Ehy*	82	0.015135	SC II

171	Spot Puffin	*Appias lalage*	*Ema*	18	0.003322	
172	Chocolate Albatross	*Appias lyncida*	*Mle*	99	0.018272	SC II
173	Eastern Striped Albatross	*Appias olferna*	*Lch*	38	0.007014	
174	Lesser Gull	*Cepora nadina*	*Leu*	153	0.028239	SC II
175	Common Gull	*Cepora nerissa*	*Lme*	8	0.001477	SC II
176	Yellow Jezebel	*Delias agostina*	*Mmi*	82	0.015135	
177	Red-spot Jezebel	*Delias descombesi*	*Mpe*	18	0.003322	
178	Painted Jezebel	*Delias hyparete*	*Mvi*	99	0.018272	
179	Red-base Jezebel	*Delias pasithoe*	*Ome*	38	0.007014	
180	Asian Cabbage White	*Pieris canidia*	*Yba*	153	0.028239	
Family- Riodinidae						
181	Punchinello	*Zemeros flegyas*	*Yhu*	8	0.001477	

[#]WPA-Indian Wildlife (Protection) Act, 1972; Species with no WPA status are either not evaluated or not protected under WPA.

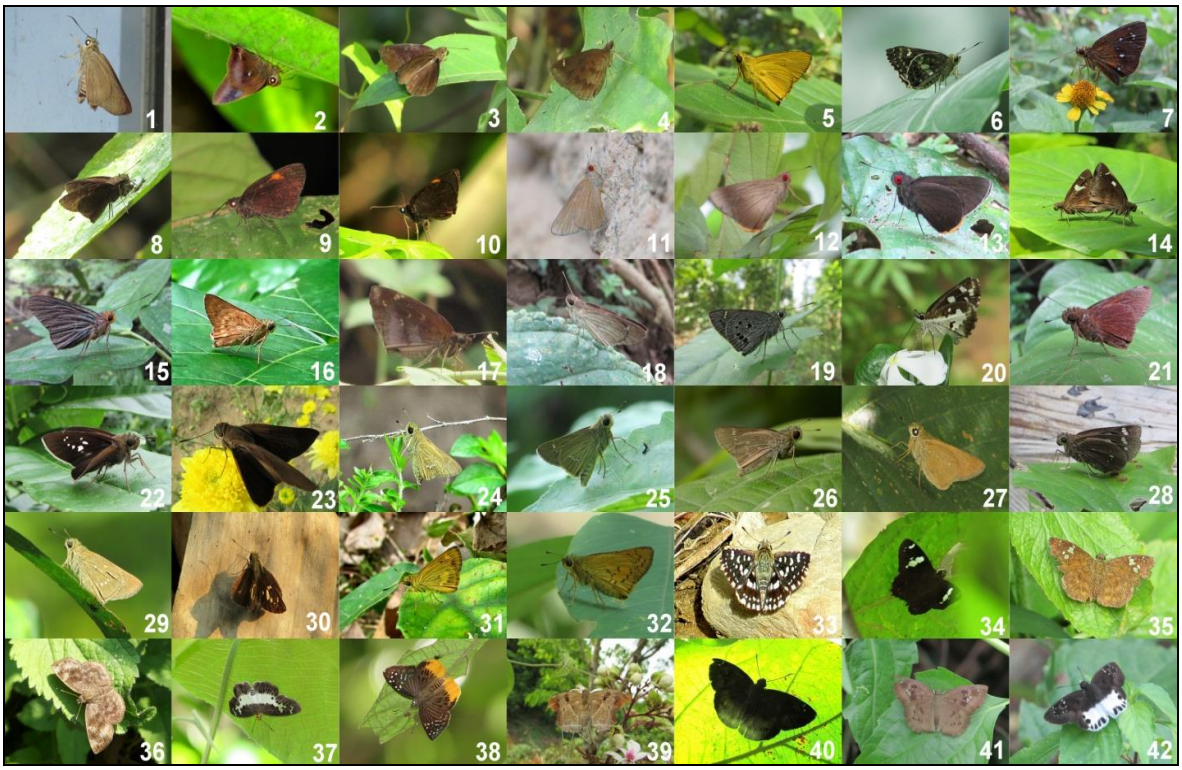

Fig 2: Photographs of the butterfly representing family Hesperiidae taken during the field study.

Fig 3: Photographs of the butterfly representing family Lycaenidae taken during the field study.

Fig 4A: Photographs of the butterfly representing family Nymphalidae taken during the field study.

Fig 4B: Photographs of the butterfly representing family Nymphalidae taken during the field study.

Fig 5: Photographs of the butterfly representing family Papilionidae taken during the field study.

Fig 6: Photographs of the butterfly representing family Pieridae and Riodinidae taken during the field study.

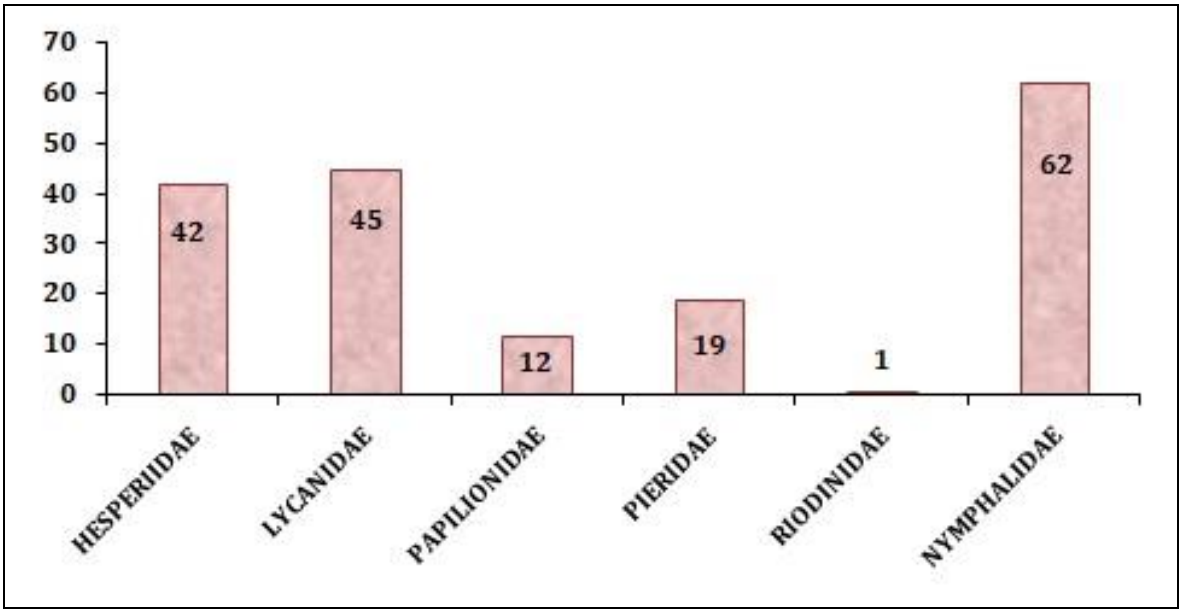

Fig 7: Family wise abundance of butterflies recorded during the study period.

Family Nymphalidae represented maximum abundance (62 species, 34%) followed by Lycaenidae (45 species, 25%). Moderate number of species were recorded in case of family Hesperiidae (42 species, 23%) and Pieridae (19 species, 11%). Papilionidae (12 species, 7%) and Riodinidae (1 species, 0.01%) were the families with least number of species. Fig 7 represents family wise abundance of butterflies recorded during the study period.

The ratio of species to genus in the present study was 1.57. The genus *Neptis* and *Papilio* represented six species each while genus *Athyma* and *Junonia* contained five species each. Relative abundance of the different butterfly species are presented in Table 1 and Fig 8. King crow (*Euploea core*) was the dominant species with 645 individuals (p_i=0.119) followed by Plain tiger (*Danaus chrysippus*) with 226 individuals (p_i=0.042). Among the 181 species of butterflies recorded in the present study 45 species are included in different schedules of Indian Wildlife (Protection) Act, 1972.

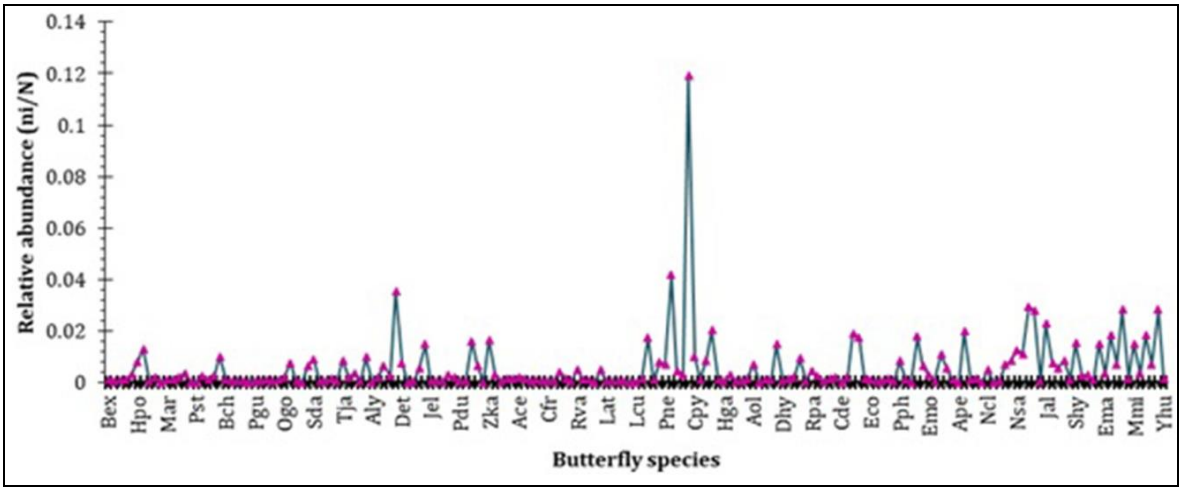

Fig 8: Relative abundance of different butterfly species recorded during the study period.

The species richness of the butterflies varied seasonally, it was highest in summer with 148 species followed by winter (131 species) and post-monsoon (124 species). Lowest species richness value was observed in monsoon with 98 species. Species richness of butterflies in different seasons is presented in Fig 9.

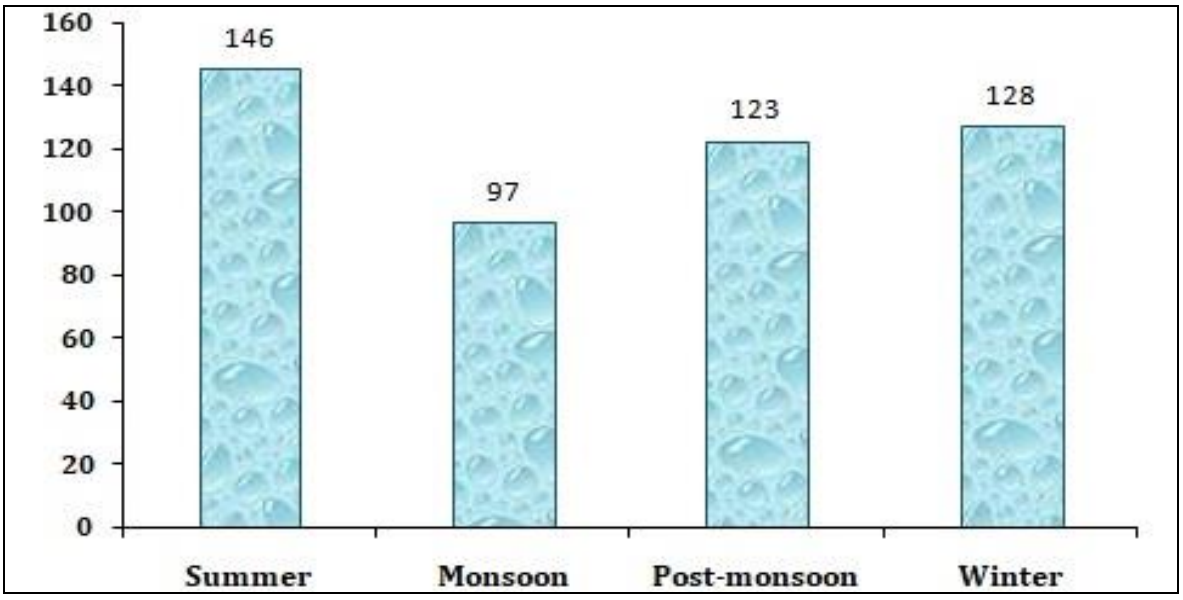

Fig 9: Species richness of butterflies in different seasons

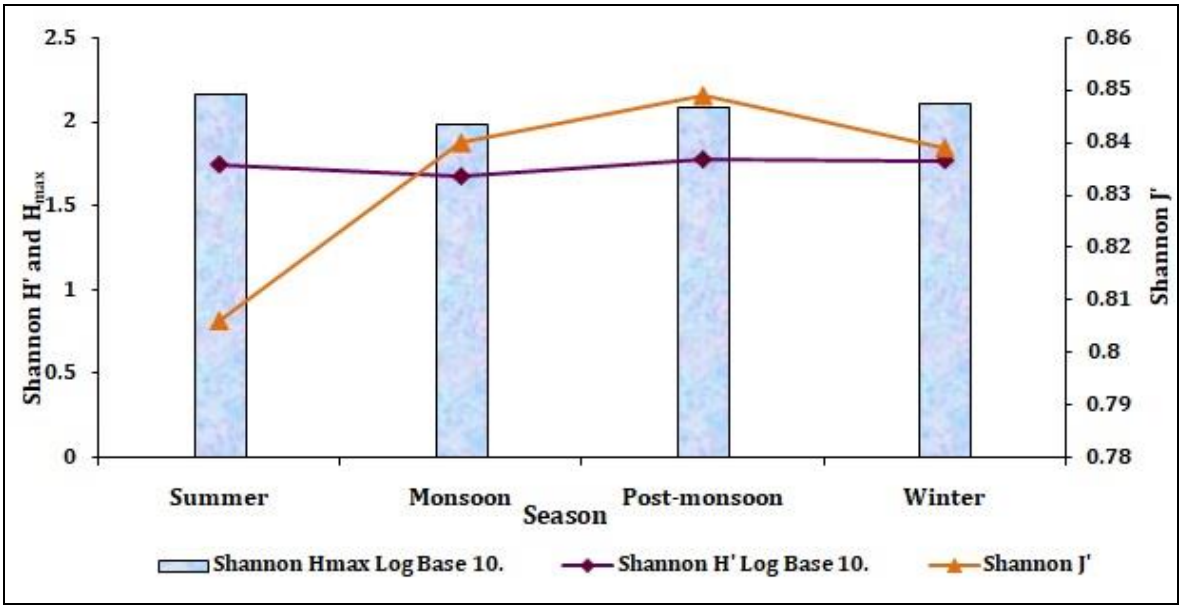

Fig 10: Diversity indices calculated during different seasons.

Shannon-Weiner diversity index (H') was highest in post monsoon (1.775) followed by winter (1.769) and summer (1.744). Butterfly diversity was lowest in monsoon (1.67). Maximum evenness in butterfly community was also recorded during post monsoon season as indicated by Shannon evenness index (J=0.849) followed by monsoon (J=0.84) and winter (J=0.839). Evenness was lowest in summer (J=0.806) (Fig 10).

The association among S (species richness), H (information—Shannon–Weiner diversity index), and E (evenness) in the 72 samples can be well inferred from the output of SHE analysis (Fig 11). As the number of individuals (N) increased with successive sampling events the species richness (S) also increased. In the observed butterfly community diversity (H) increased with increase in species richness (lnS) and decrease in lnE as more sampling efforts was incorporated. This data indicates a diversified butterfly community in the region of study.

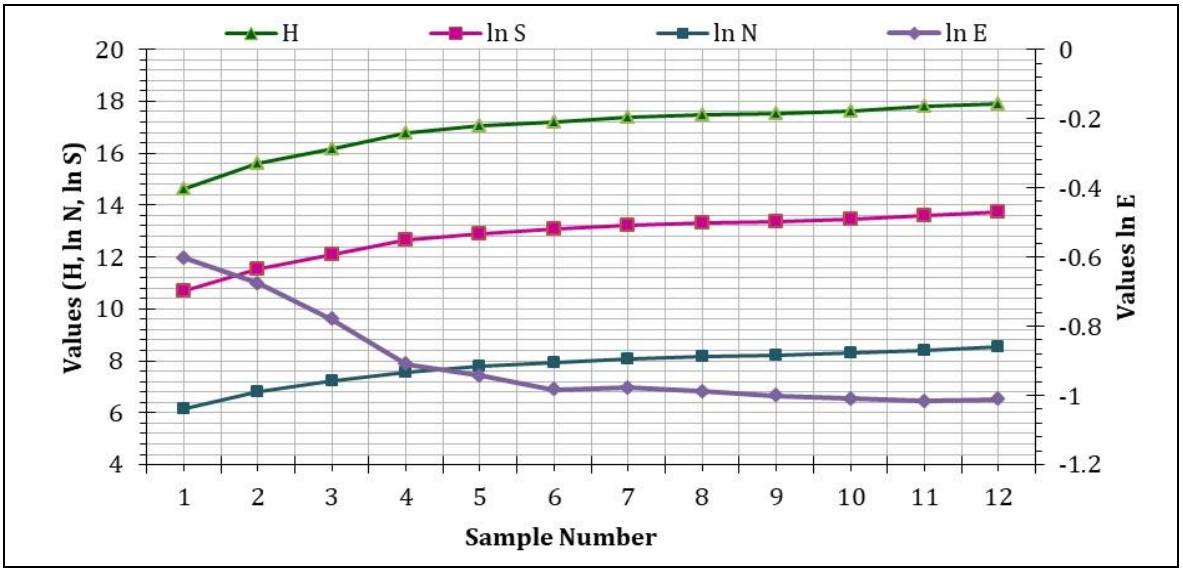

Fig 11: Plot of SHE analysis calculated on three years data of 72 samples recorded during the study. Each point in x-axis represents sample number

Discussion

The present study reflects rich butterfly diversity in the Baramura Eco Park and adjoining areas of Tripura, North East India. This is probably the first report of butterfly diversity from this Eco Park which is located in an important eco region with potential to support high biodiversity. There are few recent reports available on the butterfly diversity from different regions of Tripura. Nair *et al.* (2018) [35] reported 118 species of butterflies from Lembucherra, West Tipura. Another study conducted in different parts of north Tripura by Bhowmik and Chowdhury (2021) [6] found 216 species of butterflies. Agarwala and Majumder (2019) [1] assessed butterfly diversity in different protected areas of Tripura and documented 151 species. The presence of 181 species of butterflies documented in the present study within a small area of Baramura Eco Park indicates that the Park and its adjoining area might support rich butterfly diversity.

Family Nymphalidae dominated among the six families with respect to species richness which is in accordance with previous studies from similar climate, topography and vegetation types from Tripura and other parts of the globe. (Bhowmik & Chowdhury, 2021; Agarwala & Majumder, 2019; Das, 2018; Samanta *et al*., 2017; Sudheendrakumar *et al*., 2000; Patra *et al*., 2025) [1, 6, 11, 37, 38, 40].

Abundance of Nymphalids compared to other butterfly families may be due to their polyphagous nature and active flying habits which enable them to utilize varied habitats and resources, they can cover a broad dispersal area and sustain large population sizes (Mollah & Mondal, 2022; Agarwala & Majumder, 2019; Tiple *et al*., 2011) [1, 32, 42].

Low species to genus ratio (1.57) noticed in the current study may indicate strong intra-generic competition (Samanta *et al*., 2017; Elton, 1946) [15, 38].

Like many previous studies in different landscapes and eco regions, seasonal variation was noticed in butterfly diversity in the present study also. Diversity was highest in summer (pre-monsoon) and lowest in monsoon. These variations may be influenced by factors such as availability of larval host plants, nectar plants, suitable place for mudpuddling, or in response to extreme environments like flood or cold (Bhowmik & Chowdhury, 2021; Mollah & Mondal, 2022) [6, 32].

Conclusion

As the present study documented good number of butterfly species in the Baramura Eco Park and its adjoining area, the habitat of the park along with its vegetation should be protected from anthropogenic disturbances. In the present study plant butterfly interactions were not studied due to some constraints. Further studies should be carried out to identify host plants and nectaring plants of individual species which are crucial information for conservation of butterflies and may also provide important ecological inputs.

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References

1. Agarwala BK, Majumder J. Butterfly Diversity Assessment in Protected Areas in Tripura, North Eastern India. Proceedings of the Zoological Society, 2019:73(1):68-81. doi:10.1007/s12595-019-00300-x.
2. Agarwala BK, Majumder J. Human-Induced Fragmented Patch in Tropical Asia: A Case Study of the Edge Effect on Butterfly Diversity in Tripura, NE India. Proceedings of the Zoological Society, 2025:78:93-105. doi:10.1007/s12595-025-00567-3.
3. Beharrell NK, Fanning EWL. Forest Biodiversity Methodology Manual. Frontier Cambodia Environmental Research Report 2. Society for Environmental Exploration, UK, 2003.
4. Bhowmik S, Malakar S, Bora A. Rediscovery of *Ypthima watsoni* Moore, 1893 (Lepidoptera: Nymphalidae: Satyrinae) to India and new record to Tripura, North East, India. Journal of Entomology and Zoology Studies, 2020:8(3):2037-2040.
5. Bhowmik S. Fifty-one new additions to the butterfly (Lepidoptera: Rhopalocera) fauna of Tripura, North-east India. Revista Chilena de Entomología, 2021:47(1):35-60. doi:10.35249/rche.47.1.21.04.
6. Bhowmik S, Chowdhury SD. Butterflies (Lepidoptera: Rhopalocera) in and around the Unakoti Archaeological Site with 59 new additions to the Butterfly Fauna of Tripura, North-eastern India. Asian Journal of Conservation Biology, 2021:10(1):68-95. doi:10.53562/ajcb.NDZF2600.
7. Bora A, Meitei LR. Diversity of butterflies (Order: Lepidoptera) in Assam university campus and its vicinity, Cachar district, Assam, India. Journal of Biodiversity and Environmental Sciences, 2014:5(3):328-339.
8. Bora A, Meitei LR. Butterfly Fauna (Order: Lepidoptera) in Five Major Tea Gardens of Sivasagar District, Assam, India. Biological Forum - An International Journal, 2014:6(2):7-15.
9. Buzas MA, Hayek LC. SHE analysis for biofacies identification. Journal of Foraminiferal Research, 1998:28(3):233-239.
10. Das D. New distribution record of peacock royal butterfly *Tajuria cippus cippus* (Fabricius, 1798) (Lepidoptera: Lycaenidae) From Tripura, North East India. Journal of Entomology and Zoology Studies, 2017:5(4):53-56.
11. Das D. Butterfly (Lepidoptera: Rhopalocera) diversity in relation to habitat utilization at Jagannath Kishore College, Purulia, West Bengal (India). Journal of Insect Biodiversity, 2018:7(1):1-16. doi:10.12976/jib/2018.07.1.1.
12. Deb NC, Mandal S. First record of red imperial butterfly *Suasa lisides* (Insecta: Lepidoptera: Lycaenidae) from Tripura, North-east India. Bionotes, 2020:22(3):110-111.
13. Deb DB. The flora of the Tripura State. Vol (I). New Delhi, India: Today & Tomorrow Printers & Publishers, 1981. p. 509.
14. Deb DB. The flora of Tripura State. Volume (II). New Delhi, India: Today & Tomorrow Printers & Publishers, 1983. p. 601.
15. Elton C. Competition and the structure of ecological communities. Journal of Animal Ecology, 1946:15(1):54-68. doi:10.2307/1625.
16. Evans JH. Identification of Indian Butterflies. 2nd Eds revised. Mumbai, India: Bombay Natural History Society, The Diocesan Press, 1932. p. 454.
17. Gogoi MJ. Butterlies (Lepidoptera) of Dibang Valley, Mishmi Hills, Arunachal Pradesh, India. Journal of Threatened Taxa, 2012:4(12):3137-3160. doi:10.11609/JoTT.o2975.3137-60.
18. Gupta IJ, Majumder M. State Fauna Series 12: Fauna of Nagaland, (Insecta: Lepidoptera). Zoological Survey of India, 2006:12:291-350.
19. Gupta IJ, Maulik DR. State Fauna Series 14: Fauna of Mizoram, (Insecta: Lepidoptera). Zoological Survey of India, 2007:14:413-426.
20. Haribal M. The Butterflies of Sikkim Himalaya and Their Natural History, Sikkim. Sikkim Natural Conservation Foundation, 1992. p. 217.
21. Kehimkar I. Butterflies of India. Mumbai, India: Bombay Natural History Society and Oxford University Press, 2016. p. 528.
22. Kunte K. Butterflies of Peninsular India. Hyderabad: Universities Press Limited, 2000. p. 272.
23. Kunte K, Sondhi S, Sangma BM, Lovalekar R, Tokekar K, Agavekar G. Butterflies of the Garo Hills of Meghalaya, North-eastern India: their diversity and conservation. Journal of Threatened Taxa, 2012:4(10):2933-2992. doi:10.11609/jott.3169.10.6.11780-11799.
24. Lodh R, Agarwala BK. Inventory of butterfly fauna (Lepidoptera: Rhopalocera) of Tripura, India, in the Indo-Myanmar biogeographical zone, with records of threatened taxa. CheckList: Journal of species list and distribution, 2015:11(2):1-37. doi:10.15560/11.2.1591.
25. Lodh R, Agarwala BK. Rapid assessment of diversity and conservation of butterflies in Rowa Wildlife Sanctuary: An Indo-Burmese hotspot - Tripura, N.E. India. Tropical Ecology, 2016:57(2):231-242.
26. Magurran AE. Measuring Biological Diversity. Blackwell Publishing Company, 2004. p. 256.
27. Majumder J, Lodh R, Agarwala BK. Variation in butterfly diversity and unique species richness along different habitats in Trishna Wildlife Sanctuary, Tripura, Northeast India. CheckList: Journal of species list and distribution, 2012:8(3):432-436. doi:10.15560/8.3.432.
28. Majumder J, Lodh R, Agarwala BK. Butterfly species richness and diversity in the Trishna Wildlife Sanctuary in South Asia. Journal of Insect Science, 2013:13(79):1-13. doi:10.1673/031.013.7901.
29. McAleece N, Gage JDG, Lambshead PJD, Paterson GLJ. Biodiversity Professional statistics analysis software. Jointly developed by the Scottish Association for Marine Science and the Natural History Museum London, 1997.
30. McAleece N, Gage JD, Lambshead J, Patterson GLJ. Biodiversity professional software version 2.0. The Natural History Museum and the Scottish Association for Marine Science, UK, 2016.
31. Mittermeier RA, Gill PR, Hofman M, Pilgrim J, Brooks T, Mittermeier CG, *et al*. Hotspots Revisited: Earth's Biologically Richest and most Endangered Terrestrial Ecoregions. Mexico: CEMEX, 2005. p. 392.
32. Mollah KB, Mandal S. Butterfly Diversity in Relation to Human-Impact Gradient in Outskirts of Kolkata,

West Bengal, India. Research in Ecology, 2022:4(4):1-12. doi:10.30564/re.v4i4.5242.
33. Mukherjee S, Banerjee S, Saha GK, Basu P, Aditya G. Butterfly diversity in Kolkata, India: An appraisal for conservation management. Journal of Asia-Pacific Biodiversity, 2015:8(2015):210-221. doi:10.1016/j.japb.2015.08.001.
34. Mukherjee SH, Hossain A. Alteration in butterfly community structure along urban–rural gradient: with insights to conservation management. The Journal of Basic and Applied Zoology, 2024:85:40. doi:10.1186/s41936-024-00391-9.
35. Nair N, Giri U, Debnath MR, Shah SK. Butterfly fauna (Lepidoptera: Rhopalocera) of Lembucherra, West Tripura, Tripura, India. Journal of Entomology and Zoology Studies, 2018:6(2):975-981.
36. Nandi B, Varshney RK. Butterflies from Tripura State, India (Lepidoptera: Rhopalocera). Records in Zoological Survey of India, 1988:85(1):119-130. doi:10.26515/rzsi/v85/i1/1988/161073.
37. Patra A, Patra A, Mandal B, Ghosh A. Diversity and abundance of butterflies in urban areas of Bankura district, Bankura, West Bengal, India. The Journal of Basic and Applied Zoology, 2025:86:10. doi:10.1186/s41936-025-00426-9.
38. Samanta S, Das D, Mandal S. Butterfly fauna of Baghmundi, Purulia, West Bengal, India: a preliminary checklist. Journal of Threatened Taxa, 2017:9(5):10198-10207. doi:10.11609/jott.2841.9.5.10198-10207.
39. Shannon CE. A mathematical theory of communication. Bell System Technical Journal, 1948:27:379-423. doi:10.1002/j.1538-7305.1948.tb01338.x.
40. Sudheendrakumar VV, Binoy CF, Suresh PV, Mathew G. Habitat association of butterflies in the Parambikulam Wildlife Sanctuary, Kerala, India. Journal of Bombay Natural History Society, 2000:97(2):193-201.
41. Sutherland WJ. Ecological Census Techniques. Cambridge: University Press, 1996. p. 200.
42. Tiple AD. Butterflies of Vidarbha region, Maharashtra State, central India. Journal of Threatened Taxa, 2011:3(1):1469-1477. doi:10.11609/JoTT.o2397.1469-77.
43. Tiple AD. Butterfly species diversity, relative abundance and status in Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, central India. Journal of Threatened Taxa, 2012:4(7):2713-2717. doi:10.11609/JoTT.o2656.2713-7.
44. Tordof AW, Baltzer MC, Fellowes JR, Pilgrim JD, Langhammer PF. Key Biodiversity Areas in the Indo-Myanmar Hotspot: Process, Progress and Future Directions. Journal of threatened Taxa, 2012:4(8):2779-2787. doi:10.11609/JoTT.o3000.2779-87.
45. Watson EY. Hesperiidae Indicae: Being a reprint of the Hesperiidae of India, Burma and Ceylon. Madras: Vest, 1891. doi:10.5962/bhl.title.23166.
46. Wynter-Blyth MA. Butterflies of the Indian Region. Bombay Natural History Society, 1957. p. 523.