

1 **Exploring the Butterfly Fauna of Buxa Tiger Reserve, West Bengal, India:**

2 **A Microhabitat-Specific Assessment**

17

18 **Abstract:**

19 Butterflies serve as vital indicators of ecosystem health, and their diversity is crucial for
20 maintaining ecological balance. The current study was conducted in the Buxa Tiger Reserve,
21 West Bengal, from October 27 to 29, 2024, and recorded 70 butterfly species across six
22 families, highlighting distinct microhabitat preferences among Lepidoptera. The findings
23 revealed that forest microhabitat harbor the highest species richness, with 53 recorded species.
24 Result also showed that riverside microhabitat was more diverse than streamside microhabitat.
25 Notably, approximately 11% of the documented species are legally protected under the
26 Wildlife Protection Act (1972) of India, emphasizing the ecological significance and
27 conservation value of the reserve. Diversity indices, including Simpson's index, Margalef's
28 index, and the Shannon-Wiener index, were used to calculate diversity. This study underscores
29 the importance of microhabitat conservation for maintaining butterfly diversity, emphasizing
30 the need for targeted protection efforts to preserve these ecosystems.

31 **Keywords:** Butterfly diversity, microhabitat conservation, Buxa Tiger Reserve, ecosystem
32 health, Wildlife Protection Act.

33

34 **Introduction:**

35 Butterflies are the integral part of the ecosystem and maintain ecological balance worldwide
36 (Saraf and Vijaykumar 2020). As herbivores, pollinators, and prey, they weave themselves into
37 the intricate web of life, influencing both flora and fauna. Their role in pollination supports
38 plant reproduction, while their presence sustains predator populations, creating a delicate
39 ecological harmony (Ghazanfar et al., 2016).

40 Beyond their ecological functions, butterflies serve as sensitive indicators of environmental
41 health (Thomas, 2005). Their presence or alarming absence signals the shifts in habitat
42 conditions, making them valuable biological markers for conservation efforts (Warren et al.,
43 2021). However, despite their significance, butterfly populations are under increasing threat.
44 Habitat destruction, climate change, and human activities have led to alarming declines, raising
45 concerns about the cascading effects on biodiversity (Chowdhury et al., 2023; Hill et al., 2021).

46 India, with its remarkable diversity of 1434 butterfly species (Kunte, 2025), including 129
47 endemics (Sidhu, 2023), stands as a crucial region for butterfly conservation. Yet, the vast
48 North East remains to be explored and documented (Chandra et al., 2021). As these vibrant
49 insects flutter across diverse landscapes—from scorching deserts to mist-laden forests—
50 understanding their distribution, ecology, and conservation needs becomes ever more vital
51 (Kehimkar, 2016).

52 The Buxa Tiger Reserve, located in the Himalayan foothills of West Bengal, is a biodiversity
53 hotspot that remains understudied. Previous reports suggest the presence of 408 butterfly
54 species in the reserve (Buxa Tiger Conservation Foundation, 2020; Chakraborty et al., 2023;
55 Das et al., 2024). However, a microhabitat specific comprehensive survey of butterfly species
56 is still needed to empower the conservation planning of the reserve.

57 This study aims to a systematic survey and document the butterfly species in the Buxa Tiger
58 Reserve, focusing on their diversity, distribution, and abundance in varied microhabitats. We
59 believe, the study will contribute to our understanding of the butterfly fauna in different
60 microhabitats of the reserve and would provide insights into the conservation status of these
61 species.

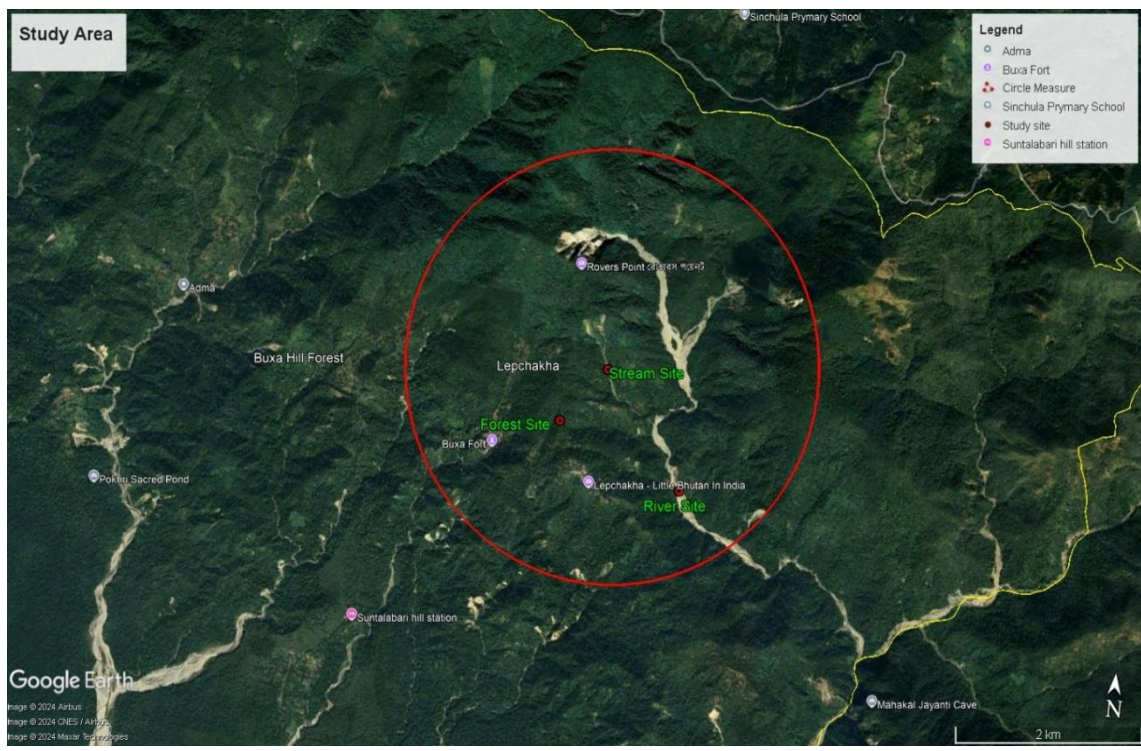
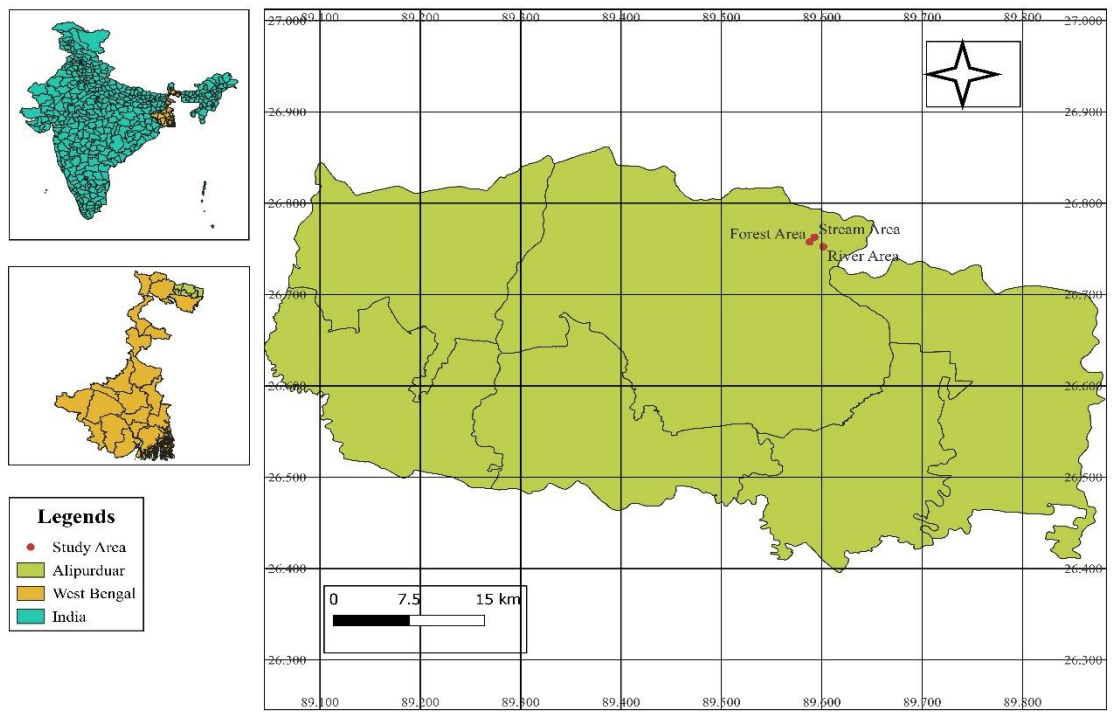
62 Study Area:

63 We selected Buxa Tiger Reserve of West Bengal for the present study, which took place
64 between 27 and 29 October of 2024 (**Figure 1**). In this study, microhabitat specific butterfly
65 monitoring was performed. Three distinct, dominant microhabitats—forest, streamside, and
66 riverside were selected for this butterfly assessment.

67 Our selected forest microhabitat (26.757693, 89.588034) is a unique ecological zone
68 characterized by dense, moist tropical forest interspersed with rare patches of grass cover and
69 bamboo groves. Located at an elevation of around 1000 meters, this microhabitat experiences
70 a subtropical climate with heavy monsoonal rainfall, resulting in a lush, multi-layered canopy.
71 One of the significant features of this microhabitat is the dense undergrowth, composed of
72 various small trees, shrubs, herbs, grasses, and ferns. Notably, there was no water source
73 present beside or adjacent to the transect route fixed within the forest microhabitat.

74 The selected streamside microhabitat (26.762804 & 89.592669) was covered with dense
75 vegetation, including shrubs, herbs, long grasses, and creepers. A significant feature of the
76 transect route laid here was the presence of several narrow, slow-flowing streams, with many
77 sections of the route remaining muddy—creating ideal conditions for mud-puddling activities.
78 The area, located at an elevation of around 1000 meters, also contained medium to small-sized
79 boulders, shaped by the strong water flow during the monsoon season. Throughout the transect,
80 shrubs and herbs were dominant at ground level, while a high canopy towered above, providing
81 a rich and diverse microhabitat for various species.

82 In the selected riverside microhabitat (26.752468, 89.601531), the Katlum River flowed
83 through the area. Along the trail, several narrow streams joined the main river. At around 800
84 meters' elevation, the riverside was characterized by tall bamboo-like grasses along the transect
85 route. The trail ran parallel to the river, where the riverside was covered with pebbles and
86 boulders of various sizes. Fine sand was observed only near the river's edge, where the treeline
87 began. Beside the river, slow water flows were seen seeping from mountain cracks, creating
88 wet rock surfaces rich in minerals—ideal conditions for butterfly puddling activities. Very few
89 plants were present directly on the riverbank due to the rocky substrate. However, beyond the
90 riverbank where the sandy area began, diverse vegetation flourished. This zone supported
91 short-height flora, contributing to the microhabitat's varied plant structure.



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93 **Figure 1:** Map of the Study Area.

94 **Study Methods:**

95 We performed a daylong fieldwork between 8:00 am and 3:00 pm, for getting better diversity
 96 of butterflies. In every microhabitat specific, 500 meter transect routes were selected. We spent

97 a full day in every microhabitat, and butterflies were observed haphazardly along the fixed
98 route. In this butterfly study, we tried to document every observed species. But we were unable
99 to photograph some of them due to natural hindrance, and descriptions of those species were
100 written in field notes. Butterflies were identified using authentic literature (Kehimkar, 2016).
101 In this study, no butterflies were collected.

102 **Analysis Methods:**

103 To understand the community structure of butterflies in the study area, we have used and
104 analysed diverse Biodiversity indices. The analysis was performed using Microsoft Excel 2019
105 and PAST software (Hammer and Harper, 2001). The study site was mapped using GPS,
106 employing Google Earth Pro and QGIS software. Species richness, abundance, and evenness
107 were evaluated using different indices.

108 Species richness was analysed using the Shannon index (Shannon and Weaver, 1963), an
109 important information-statistic index that measures species richness in a community. This
110 index takes into account rare species with few individuals, providing a more comprehensive
111 understanding of biodiversity. The Shannon index is calculated using the equation: $HS = -\sum p_i \ln p_i$,
112 where HS is the value of the Shannon index and p_i is the proportion of the i th species in
113 the community.

114 Species abundance was analysed using Simpson's index (Simpson, 1964), which measures the
115 probability that two individuals randomly selected from a community will belong to the same
116 species. Simpson's index was calculated using the equation: $\lambda = \sum p_i^2$, where λ is the value of
117 Simpson's index and p_i is the proportion of the i th species in the community.

118 Species evenness, which denotes how close the species are in a community numerically, was
119 analysed using Pielou's index (Pielou, 1969). This index represents the degree of species
120 diversity and quantifies how equal the community is. Pielou's index is calculated using the
121 equation: $E = HS / H_{max}$, where E is the evenness, HS is the value of the Shannon index, and
122 H_{max} is equal to $\ln(s)$, where S is the number of species in the community.

123 **Results:**

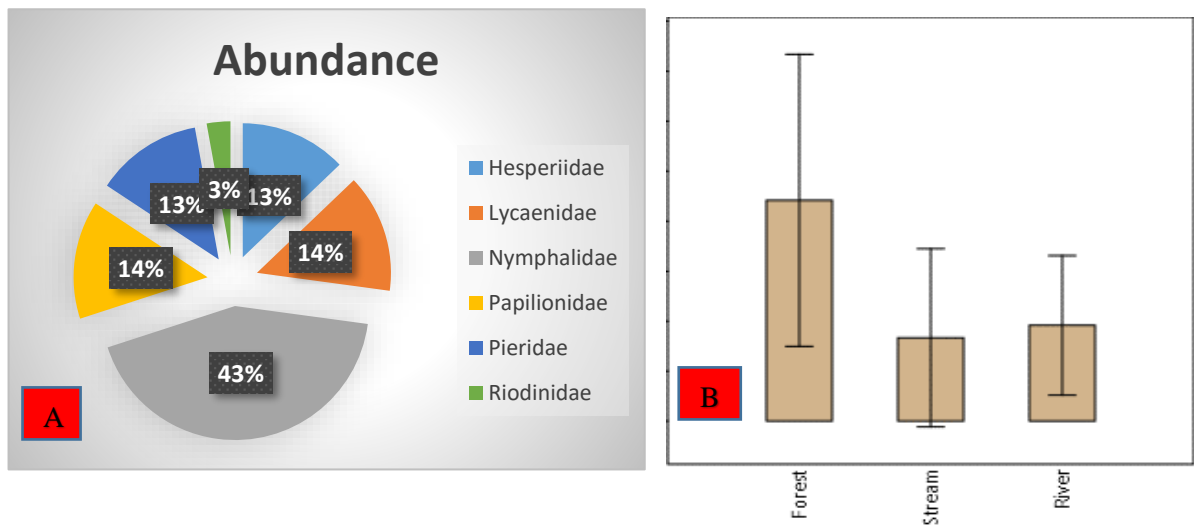
124 This study recorded a total of 70 butterfly species across 6 families in Buxa Tiger Reserve
125 (**Table 1** and **Plate 1-2**). Our study recorded 1 species listed under Schedule I, 6 under Schedule
126 II, and 1 under Schedule IV of the Wildlife Protection Act (**Table 1**). The species composition
127 varied across different microhabitats, with the forest hosting 7 species of Hesperidae, 5 species

128 of Lycaenidae, 23 species of Nymphalidae, 8 species of Papilionidae, 8 species of Pieridae,
129 and 2 species of Riodinidae. Streamside microhabitat had 2 species of Hesperidae, 3 species
130 of Lycaenidae, 12 species of Nymphalidae, and 3 species of Papilionidae. Riverside
131 microhabitat had 6 species of Lycaenidae, 9 species of Nymphalidae, 4 species of Papilionidae,
132 and 4 species of Pieridae. The dominant family was Nymphalidae, accounting for 43% of the
133 total species, followed by Lycaenidae (14%), Papilionidae (14%), Pieridae (13%), Hesperidae
134 (13%), and Riodinidae (3%) (**Figure 2: A**). The majority of species (53) were found in the
135 forest microhabitat, followed by the river microhabitat (23 species) and the stream microhabitat
136 (20 species) (**Figure 2: B**).

137 The species individual rarefaction curve for the study site revealed a steady increase in the
138 number of taxa (S) with the accumulation of specimens (**Figure 3. A**). The Shannon diversity
139 index (H) also showed a steady increase with the accumulation of specimens, indicating a high
140 level of diversity in the butterfly community (**Figure 3. B**). The exponential form of the
141 Shannon index (H') showed a similar trend, further emphasizing the high diversity of the
142 butterfly community (**Figure 3. C**). The Simpson diversity index (1/D) showed a gradual
143 increase with the accumulation of specimens (**Figure 3. D**). Overall, the rarefaction curves
144 suggest that the study site harbours a diverse and complex butterfly community.

145 The alpha diversity of butterfly species was analysed across three microhabitat types including
146 Forest, Stream, and River (**Figure 4**). The Forest microhabitat had the highest number of family
147 taxa (6) and individuals (53), followed by the River microhabitat with 4 family taxa and 23
148 individuals, and the Stream microhabitat with 4 family taxa and 20 individuals. The dominance
149 index (D) was lowest in the Forest microhabitat (0.2617), indicating a more even distribution
150 of species. The Stream microhabitat had the highest dominance index (0.415), suggesting a
151 more uneven distribution of species. The Simpson diversity index (1/D) was highest in the
152 Forest microhabitat (0.7383), indicating a higher diversity of species. The Shannon diversity
153 index (H) was also highest in the Forest microhabitat (1.547), followed by the River
154 microhabitat (1.326) and the Stream microhabitat (1.106). The evenness index ($e^{H/S}$) was
155 highest in the River microhabitat (0.9416), indicating a more even distribution of species. Other
156 diversity indices, such as Brillouin, Menhinick, Margalef, Equitability (J), Fisher-alpha,
157 Berger-Parker, and Chao-1, also showed variations across the three microhabitat types. Overall,
158 the results suggest that the Forest microhabitat has the highest diversity and evenness of
159 butterfly species, followed by the River and Stream microhabitats (**Table 2**).

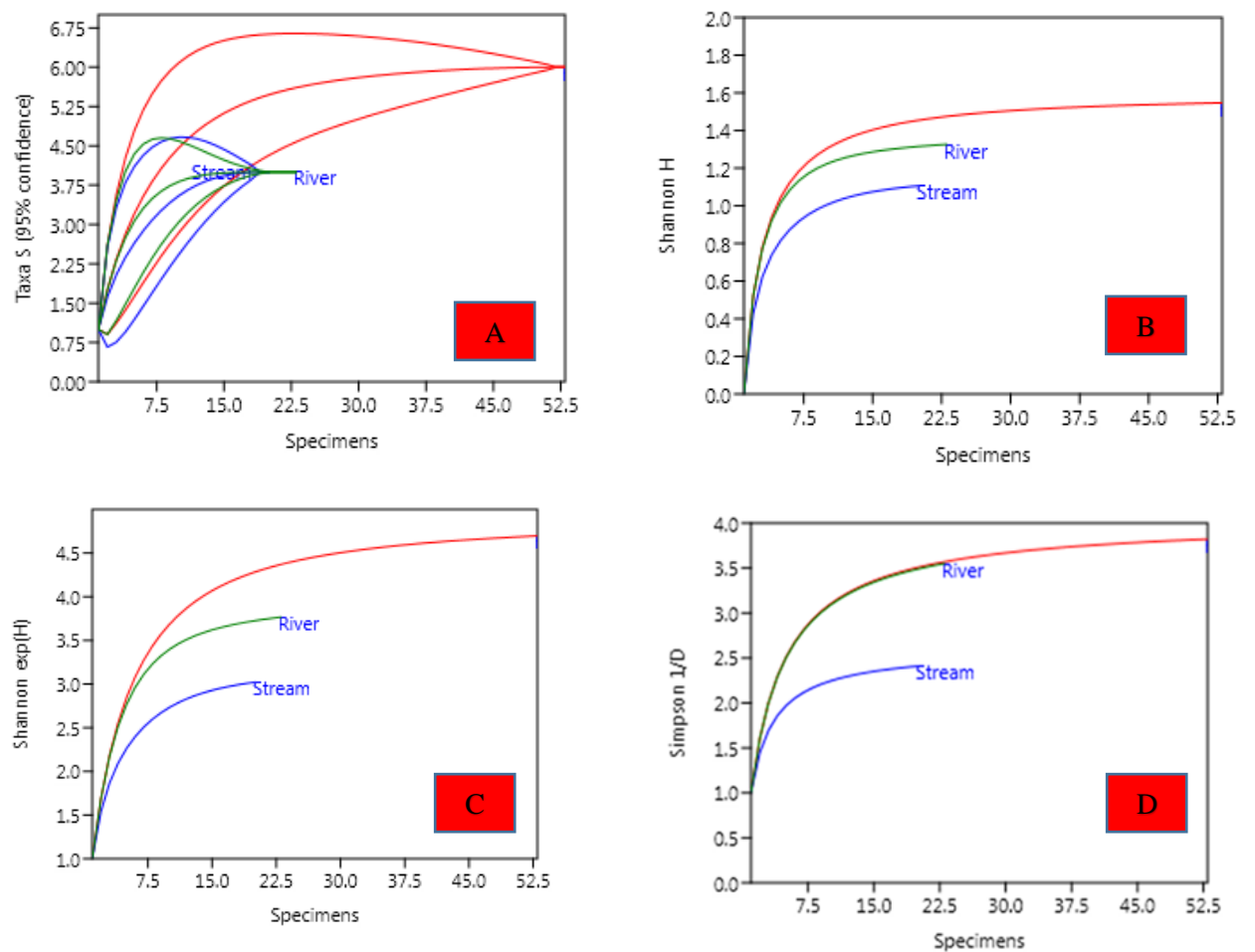
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167 **Figure 2:** A. Abundance of butterfly Families and B. Microhabitat wise abundance of butterfly
168 species in study area.

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177 **Figure 3:** Species individual rarefaction curve for study site: A. Taxa (S) vs specimens, B.
178 Shannon (H) vs specimens, C. Shannon exp (H) vs specimens, D. Simpson (1/D) vs
179 specimens.

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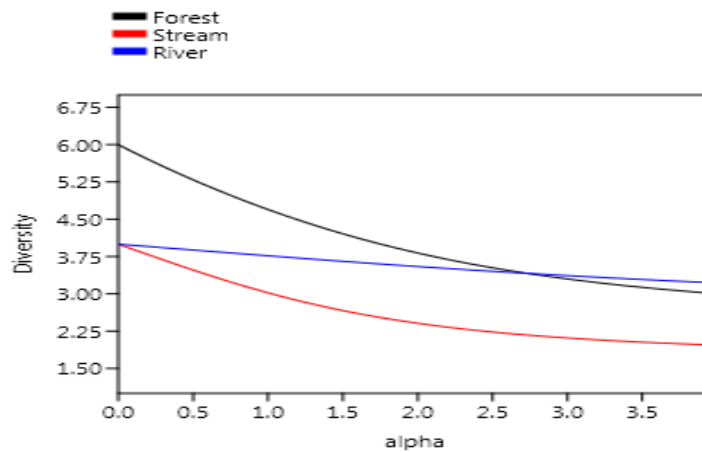
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189 **Figure 4:** Microhabitat types-wise alpha diversity Profile of butterfly species in the study
190 area.

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192 **Discussion and Conclusions:**

193 Buxa Tiger Reserve (BTR), with its rich ecological diversity and strategic location, plays a
194 crucial role in the conservation landscape of North Bengal. BTR lies in the Himalayan foothills,
195 bordering Bhutan, and is part of the rich Eastern Himalayan biodiversity hotspot. Buxa is
196 known for its diverse landscape, ranging from dense tropical moist forests to hilly terrains. This
197 variety of habitats supports a wide range of flora and fauna. The forest is home to 352 species
198 of trees, 133 shrubs, 189 species of herbs, 108 species of climbers, 144 orchids, 4 species of
199 bamboos, and 46 species of grasses. It also shelters 68 species of mammals, 246 species of
200 birds, 41 reptiles, and around 500 species of insects etc. (NTCA, 2022).

201 The present study provides a preliminary assessment of microhabitat specific butterfly diversity
202 in BTR, West Bengal, India. The study recorded a total of 70 butterfly species across 6 families,
203 highlighting the reserve's significance as a biodiversity hotspot. The dominant family,
204 Nymphalidae, accounted for 44% of the total species, followed by Lycaenidae, Papilionidae,
205 Pieridae, Hesperiiidae, and Riodinidae. The species composition varied across different
206 microhabitats, with the forest hosting the highest number of species.

207 The diverse microhabitats, including forests, rivers, and streams, are characterized by distinct
208 floral communities. Butterflies rely on specific host plants to complete their life cycle, while
209 nectar plants provide essential food (Dennis et al., 2004; Koptur et al., 2005). Plants also
210 provide shelter, and chemical compounds like alkaloids needed for their survival (Nakahama
211 et al., 2022; Honda et al., 2025). This varied vegetation structure ensures the availability of

212 larval host plants and nectar sources, supporting the rich butterfly diversity observed in the
213 reserve. Due to this floral dependency, more butterflies were recorded from the forest
214 microhabitat. The streamside microhabitat was less diverse in flora compared to the riverside.
215 Additionally, rivers distribute more minerals than streams, which likely support richer
216 vegetation and butterfly to puddle. This could be the reason why the riverside microhabitat
217 supports higher butterfly diversity than the streamside.

218 This study underscores the importance of conserving the ecological integrity of the protected
219 hill forest of BTR. It highlights the need to protect the reserve's diverse vegetation, preserve
220 microhabitat diversity, and mitigate the impacts of climate change. Further research is essential
221 to gain a deeper understanding of the seasonality and dynamics of butterfly-microhabitat
222 interactions within BTR. Such studies will help develop effective conservation strategies aimed
223 at protecting these critical microhabitats from anthropogenic pressures and the adverse effects
224 of climate change.

231 **Ethical Approval:**

232 In this study, none of the butterflies were captured, collected or euthanized and no plants were
233 harmed. Only photographic documentation was done.

234 **Consent for Publication:**

235 Not applicable.

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296 **Appendix:**

297 **Table 1:** Checklist of butterfly species recorded during current study from BTR.

298 WPA = Wildlife Protection Act, NA = Not Assigned, R = Recorded, N = Not Recorded.

Sl. No.	Common Name	Scientific Name	WPA Status	Forest	Stream	River
Family: Hesperidae						
1	Branded Orange Awlet	<i>Burara oedipodea</i> (Swainson, 1820)	NA	N	R	N
2	Orange-Striped Awlet	<i>Burara jaina jaina</i> (Moore, 1866)	NA	R	N	N
3	Spotted Snow Flat	<i>Tagiades menaka</i> (Moore, 1866)	NA	R	N	N
4	Common Small Flat	<i>Sarangesa dasahara</i> (Moore, 1866)	NA	R	N	N
5	Chestnut Bob	<i>Iambrix salsala</i> (Moore, 1866)	NA	R	N	N

6	Purple & Gold Flitter	<i>Zographetus satwa</i> (de Nicéville, 1884)	NA	N	R	N
7	Hoary Palmer	<i>Unkana ambasa</i> (Moore, 1858)	NA	R	N	N
8	Figure-of-8 Swift	<i>Baoris pagana</i> (de Nicéville, 1887)	NA	R	N	N
9	Indian Dartlet	<i>Oriens goloides</i> (Moore, 1881)	NA	R	N	N
Family: Lycaenidae						
10	Long-Banded Silverline	<i>Spindasis lohita</i> (Horsfield, 1829)	Schedule II	R	N	N
11	Common Ciliate Blue	<i>Anthene emolus</i> (Godart, 1824)	NA	R	N	R
12	Common Lineblue	<i>Prosotas nora</i> (Felder, 1860)	Schedule II	N	N	R
13	White-Banded Hedge Blue	<i>Lestranicus transpectus</i> (Moore, 1879)	NA	N	N	R
14	Purple Sapphire	<i>Heliophorus epicles</i> (Godart, 1824)	NA	R	N	N
15	Common Tit	<i>Hypolycaena erylus</i> (Godart, 1824)	NA	R	R	N
16	Orchid Tit	<i>Chliaria othona</i> (Hewitson, 1865)	Schedule I	N	N	R
17	Fluffy Tit	<i>Zeltus amasa</i> (Hewitson, 1865)	NA	N	R	R
18	Yamfly	<i>Loxura atymnus</i> (Stoll, 1780)	NA	R	N	N
19	Common Imperial	<i>Cheritra freja</i> (Fabricius, 1793)	NA	N	R	R
Family: Nymphalidae						
20	Glassy Tiger	<i>Parantica aglea</i> (Stoll, 1782)	NA	R	N	N
21	Dark Blue Tiger	<i>Tirumala septentrionis</i> (Butler, 1874)	NA	R	N	N
22	Striped Tiger	<i>Danaus genutia</i> (Cramer, 1779)	NA	R	N	N
23	Striped Blue Crow	<i>Euploea mulciber</i> (Cramer, 1777)	Schedule IV	R	N	R
24	Common Nawab	<i>Polyura athamas</i> (Drury, 1770)	NA	R	N	R
25	Spotted Palmfly	<i>Elymnias malelas</i> (Hewitson, 1863)	Schedule II	R	N	N
26	Banded Treebrown	<i>Lethe confusa</i> (Aurivillius, 1898)	NA	R	N	N
27	Common Five-Ring	<i>Ypthima baldus</i> (Fabricius, 1775)	NA	R	N	N
28	Red Lacewing	<i>Cethosia biblis</i> (Drury, 1773)	NA	R	N	N
29	Leopard Lacewing	<i>Cethosia cyane</i> (Drury, 1773)	NA	R	N	N
30	Cruiser	<i>Vindula erota</i> (Fabricius, 1793)	NA	N	N	R
31	Large Yeoman	<i>Cirrochroa aoris</i> (Doubleday, 1847)	NA	R	R	R
32	Commander	<i>Moduza procris</i> (Cramer, 1777)	NA	N	N	R
33	Staff Sergeant	<i>Athyma selenophora</i> (Kollar, 1844)	NA	R	N	N
34	Common Lascar	<i>Pantoporia hordonia</i> (Stoll, 1790)	NA	R	R	N
35	Clear Sailer	<i>Neptis clinia susruta</i> (Moore, 1872)	NA	R	R	R
36	Small Yellow Sailer	<i>Neptis miah</i> (Moore, 1858)	NA	N	R	N
37	Common Baron	<i>Euthalia aconthea</i> (Cramer, 1777)	NA	N	R	N
38	Grey Count	<i>Tanaecia lepidea</i> (Butler, 1868)	Schedule II	R	N	N
39	Common Earl	<i>Tanaecia julii</i> (Lesson, 1837)	NA	R	N	N
40	Popinjay	<i>Stibochiona nicea</i> (Gray, 1846)	NA	R	R	N
41	Black Prince	<i>Rohana parisatis</i> (Westwood, 1851)	NA	N	R	R
42	Spotted Jester	<i>Symbrenthia hypselis</i> (Godart, 1824)	NA	N	R	N
43	Common Jester	<i>Symbrenthia lilaea</i> (Hewitson, 1864)	NA	N	R	R
44	Indian Red Admiral	<i>Vanessa indica</i> (Herbst, 1794)	NA	R	N	N
45	Painted Lady	<i>Vanessa cardui</i> (Linnaeus, 1758)	NA	R	N	N

46	Chocolate Pansy	<i>Junonia iphita</i> (Cramer, 1779)	NA	R	R	N
47	Lemon Pansy	<i>Junonia lemonias</i> (Linnaeus, 1758)	NA	R	N	N
48	Orange Oakleaf	<i>Kallima inachus</i> (Boisduval, 1836)	NA	R	R	R
49	Autumn Leaf	<i>Doleschallia bisaltide indica</i> (Moore, 1899)	NA	R	R	N
Family: Papilionidae						
50	Common Bluebottle	<i>Graphium sarpedon</i> (Linnaeus, 1758)	NA	N	N	R
51	Tailed Jay	<i>Graphium agamemnon</i> (Linnaeus, 1758)	NA	R	N	N
52	Common Rose	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)	NA	R	N	N
53	Common Birdwing	<i>Troides helena</i> (Linnaeus, 1758)	NA	R	N	R
54	Common Mormon	<i>Papilio polytes</i> (Linnaeus, 1758)	NA	R	N	N
55	Red Helen	<i>Papilio helenus</i> (Linnaeus, 1758)	NA	R	R	N
56	Great Mormon	<i>Papilio agenor</i> (Linnaeus, 1758)	NA	N	R	N
57	Spangle	<i>Papilio protenor</i> (Cramer, 1775)	NA	R	N	R
58	Lime Butterfly	<i>Papilio demoleus</i> (Linnaeus, 1758)	NA	R	N	N
59	Paris Peacock	<i>Papilio paris paris</i> (Linnaeus, 1758)	NA	R	R	R
Family: Pieridae						
60	Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus, 1758)	NA	R	N	N
61	Three-Spot Grass Yellow	<i>Eurema blanda</i> (Boisduval, 1836)	NA	R	N	N
62	Yellow Orange Tip	<i>Ixias pyrene</i> (Linnaeus, 1764)	NA	R	N	R
63	Great Orange Tip	<i>Hebomoia glaucippe</i> (Linnaeus, 1758)	NA	R	N	N
64	Black-Veined Albatross	<i>Appias olferna</i> (Swinhoe, 1890)	NA	R	N	N
65	Indian Cabbage White	<i>Pieris canidia</i> (Linnaeus, 1768)	NA	R	N	N
66	Common Gull	<i>Cepora nerissa</i> (Fabricius, 1775)	Schedule II	R	N	R
67	Lesser Gull	<i>Cepora nadina nadina</i> (Lucas, 1852)	Schedule II	R	N	R
68	Red-Breast Jezebel	<i>Delias acalis</i> (Godart, 1819)	NA	N	N	R
Family: Riodinidae						
69	Dark Judy	<i>Abisara fylla</i> (Westwood, 1851)	NA	R	N	N
70	Punchinello	<i>Zemeros flegyas</i> (Cramer, 1780)	NA	R	N	N

299

300 **Table 2:** Diversity indices for butterfly species from Study Area.

301

	Forest	Stream	River
Taxa_S	6	4	4
Individuals	53	20	23
Dominance_D	0.2617	0.415	0.2817
Simpson_1-D	0.7383	0.585	0.7183
Shannon_H	1.547	1.106	1.326
Evenness_e^H/S	0.7828	0.7555	0.9416
Brillouin	1.387	0.9036	1.125
Menhinick	0.8242	0.8944	0.8341
Margalef	1.259	1.001	0.9568
Equitability_J	0.8633	0.7977	0.9566
Fisher_alpha	1.74	1.504	1.399

Berger-Parker	0.434	0.6	0.3913
Chao-1	6	4	4

302



303

304 **Plate 1:** Butterflies recorded in study site. 1. *Burara oedipodea*, 2. *Burara jaina jaina*, 3. *Tagiades menaka*, 4. *Sarangesa*
 305 *dasahara*, 5. *Iambrix salsala*, 6. *Zographetus satwa*, 7. *Unkana ambasa*, 8. *Baoris pagana*, 9. *Oriens goloides*, 10. *Spindasis*
 306 *lohita*, 11. *Anthene emolus*, 12. *Lestranicus transpectus*, 13. *Heliophorus epicles*, 14. *Hypolycaena erylus*, 15. *Zeltus amasa*,
 307 16. *Loxura atymnus*, 17. *Cheritra freja*, 18. *Parantica aglea*, 19. *Tirumala septentrionis*, 20. *Euploea mulciber*, 21. *Polyura*

308 *athamas*, 22. *Elymnias malelas*, 23. *Lethe confuse*, 24. *Ypthima baldus*, 25. *Cethosia biblis*, 26. *Cethosia cyane*, 27. *Vindula*
 309 *erota*, 28. *Cirrochroa aoris*.

310



311

312 **Plate 2:** Butterflies recorded in study site (continue). 29. *Athyma selenophora*, 30. *Pantoporia hordonia*, 31. *Neptis clinia*
 313 *susruta*, 32. *Neptis miah*, 33. *Tanaecia lepidea*, 34. *Tanaecia julii*, 35. *Stibochiona nicea*, 36. *Rohana parisatis*, 37.
 314 *Symbrenthia lilaea*, 38. *Vanessa indica*, 39. *Junonia iphita*, 40. *Junonia lemonias*, 41. *Kallima inachus*, 42. *Doleschallia*

- 315 *bisaltide indica*, 43. *Graphium sarpedon*, 44. *Pachliopta aristolochiae*, 45. *Papilio polytes*, 46. *Papilio helenus*, 47. *Papilio*
316 *paris paris*, 48. *Eurema hecabe*, 49. *Eurema blanda*, 50. *Ixias pyrene*, 51. *Hebomoia glaucippe*, 52. *Pieris canidia*, 53.
317 *Cepora nerissa*, 54. *Cepora nadina nadina*, 55. *Abisara fylla*, 56. *Zemeros flegyas*.