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Assessment on butterfly and its diversity in Tegheria (Waterfall), Dimoria development Block, Kamrup (M) district of Assam, India

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Abstract

Butterflies are brilliantly coloured scaly winged insects of order Lepidoptera and one of the most essential indicator species for conservation of biodiversity. A short term survey was conducted for a period of six months in the Tegheria, Khetri in order to study the diversity of butterflies. The major objective of this survey is to develop an organized checklist of butterflies along with adding a preliminary note on their, status and conservation priorities within the study area. During the course of this survey a total of 725 individuals and 65 species of butterflies represented by 48 genera belonging to 6 families were recorded. It was observed that family Nymphalidae is the most dominating family in the study area representing 27 species with 414 individuals during the survey. Hesperidae and Lycaenidae was the second most dominant family with 13 species followed by Papilionidae 6 species, Pieridae 5 species and Riodinidae with 1 species. Out of 65 species reported here Sub species of 11 species were found to be included under Indian Wildlife Protection Act, 1972.

Keywords: Butterfly, indicator species, invertebrates, Tegheria waterfall

Introduction

Butterflies are one of the most colourful and attractive group of insects. Butterflies are grouped under the order Lepidoptera, derived from the Greek word *Lepis* means scales and *pteron* means wings. All butterflies come under Sub order Rhopalocera, due to the antenna of the butterfly ends in a club shaped structure [14]. Due to their unique colour patterns and designs they have enriched aesthetic value [10]. They are proper ecological indicator, natural pollinator and have close relationship with faunal diversity [3, 8, 10]. The Indian subcontinent bearing a diverse Landscape, climate and vegetation which represent 1,504 species of butterflies [19]. The decline in butterfly faunal diversity may be an indicator of non-availability of the specific host plant resource [3]. In India butterfly and its natural habitat protection has been established under the Indian wildlife protection act 1972 [10]. Most of the butterfly remains restricted within their chosen habitat and range for their whole lives [2]. Nevertheless, some pristine areas have remained practically unexplored till today. The present study is focused to assess the abundance and diversity of butterflies in Tegheria, Khetri to pave the way for future research and construction of effective strategy for conservation of this important indicator species.

2. Study Area

The Naturally beautiful Tegheria picnic spot is situated at distance of about 28 km away from Guwahati city and 3.5 Km south of NH 37 with a small but beautiful waterfall, which is becoming very popular picnic place for its scenic beauty of attraction to the tourist (Fig 1). The spot is located in – 26° 05'53.0"N latitude and 92° 01'54.6"E longitudes. The picnic place is at an altitude of 154 m above mean sea level. The tegheria picnic spot is situated in North Easterns regions and comes under the Kamrup Metropolitan district, Assam state. The spot became one of the important and popular picnic and holiday location of Kamrup (M) district. The study area comprises rich in biological diversity of plants with total area of 5.96 acre. The hilly place of this area is covered by green vegetation. The beautiful area is covered with forests, but areas of forests have been cleared for Shifting cultivation. Important farm products of the village Tegheria include- tea, jackfruit, pineapple, Potato, spices. Rice form the staple food mainly for the karbi tribal people who inhabit the hilly area of the surrounding place of Tegheria picnic spot. Local Gaon panchayat in collaboration with Soil conservation department of Assam executing various developmental works for the Tegheria picnic spot to promoting tourism.

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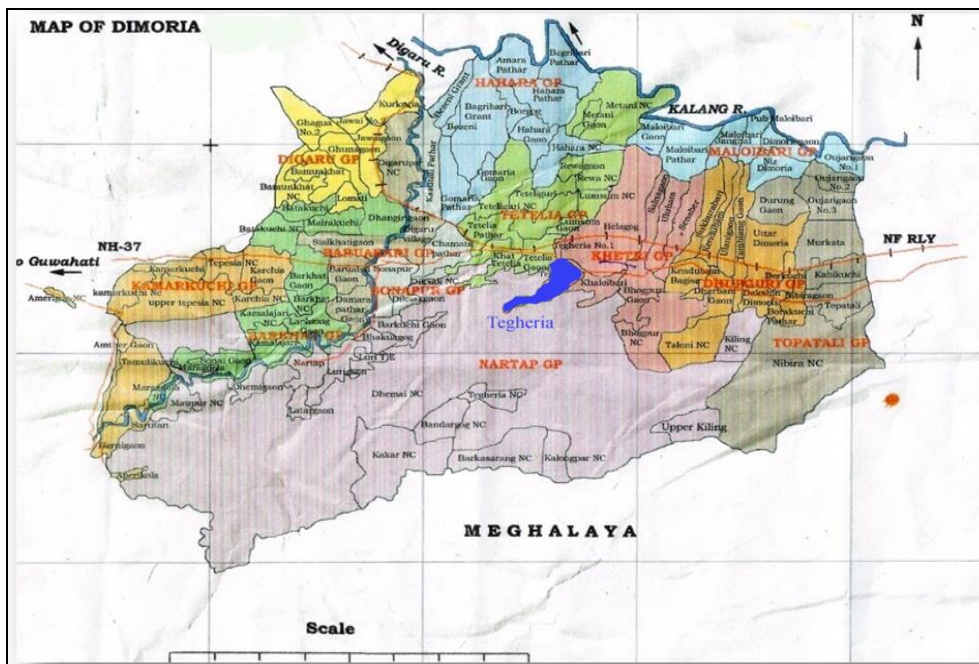


Fig 1: Map of Dimoria Development Block showing Tegheria

3. Materials and Methods

Butterflies were sited and photographed in their natural habitat with the help of digital SLR camera (Nikon D5200 with 70-300 mm lens and Canon EOS d1300 with 18-55 mm lens). The identification photographs of all the butterflies were taken by using these two cameras. Global Positioning System (GPS Etrex Vista C, Garmin, USA) was used to record the geographic coordinates during the present survey.

3.1 Photographing specimens

The proper time for butterfly photographing is soon after sunrise (i.e. morning) when butterflies come out for their wings flat and align themselves for maximum exposure to sunlight (basking behavior) [13]. The photographing was done throughout the month on every morning. When the temperature was slightly cooler butterflies were easily approachable, photographing butterflies was also easier at those times. As soon as possible the butterflies were photographed for surveying. The butterflies were photographed from different angles as often as possible to obtain sufficient photographs, "As clear the photo" to enable proper identification of species [6, 13]. Photographs were ideally clicked between 7:45 am to 12:15 pm (usually allowable), as between this period butterfly activity drops off rapidly so, late afternoon time was avoided for photographing [13].

3.2 Sampling techniques (Transect line sampling)

Diversity survey recorded from December 2017 to May 2018. Monitoring butterfly populations is an important means of measuring change in the environment as well as the condition of habitats for biodiversity. Butterfly monitoring is helpful to assess the butterfly populations in an area. The transects are a way of monitoring the number and variety of butterflies present at a study area [15]. Butterflies were counted along fixed routes, known as transects, following Pollard walk throughout the butterfly survey season [15]. All transects count are labor intensive and require a commitment to carry out recording, each transect line which comprises about 1000-600 m in length, which takes approximately 4.5 hours to complete all the transect. This study area is highly diversified with butterfly and other flora and fauna. All butterflies seen

along the transect line were listed, counted and photographed. Recording was done once a week from December 1st week, 2017 to the end of May 2018. Transect counts with transect walks were carried out in bright weather.

3.3 Identification

Butterfly species were identified using the identification keys [1, 5, 11, 12, 16, 19, 20]. Identification of photographed specimens was done by comparison with identification keys [1, 5, 11, 15, 18, 20]. The observed species were further checked for the concerned list of IWPA, 1972 for developing suitable conservation strategies [21].

3.4 Data analysis

The diversity indices of the butterfly abundance of each study site were analyzed separately using species diversity was calculated using Shannon diversity index [9]. For this analysis Microsoft Excel 2010 was used. The observed butterflies were categorized in four categories on the basis of their abundance in the study area: Very common (more than 25 sightings) C-common (11-25 sightings), uncommon (6-10 sightings), R-rare (2-5 sightings), VR-very rare (1 sightings) [17].

4. Results

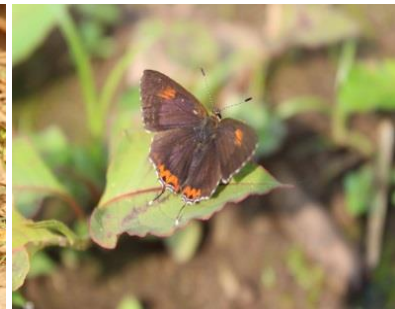
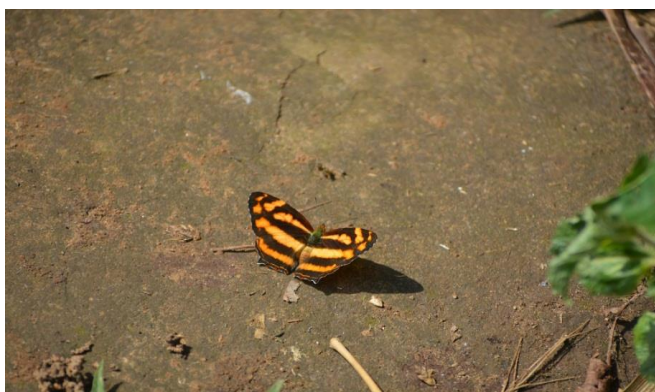
Sixty five species of butterflies representing six families have been recorded during the study (Table 1). The photographs of the observed butterflies are given in (Figure 2). Nymphalidae showed the maximum species, comprising of 27 species, followed by Lycaenidae and Hesperidae (13 species), Papilionidae (6 species), Pieridae (5 species), and Riodinidae (1 species). Among these species, 11 were very rare, 23 were rare, 10 were uncommon, 10 were commonly occurring and were 11 very common. Highest number of species was seen during March. The total of 726 numbers of individuals represented by 48 genera was observed during the survey. Among these 65 recorded species, some species of Pieridae and Nymphalidae, found in high frequencies in the study area. The diversity index of Nymphalidae family shows highest (2.83), the second most diversity index shown by the Hesperidae family (2.11), followed by Lycaenidae family (2.02), Papilionidae (1.37), Pieridae (1.21). Due to the presence of only one species the Riodinidae family shows the

diversity index zero.

Table 1: List of butterflies recorded from study area together with status

Family: Hesperidae		
Common name	Scientific name	N
1. Suffused snow flat	<i>Tagiades gana</i> (Moore)	1
2. Spotted snow flat	<i>Tagiades menaka</i> (Moore)	1
3. Grass demon	<i>Udaspes folus</i> (Cramer)	2
4. Chocolate demon	<i>Ancistroides nigrita</i> (Moore)	3
5. Banded ace	<i>Halpe zeema</i> (Hewitson)	1
6. Indian ace	<i>Halpe homolea</i> (Hewitson)	2
7. Light straw ace	<i>Pithauria stramineipensis</i> (Wood-Mason&de Niceville)	3
8. Paint brush swift	<i>Baoris penicillata</i> (Moore)	2
9. Straight swift	<i>Paranara spp.</i>	1
10. Small banded swift	<i>Pelopidas mathias</i> (Fabricius)	2
11. Khasi Forest bob	<i>Scobura isota</i> (Swinhoe)	2
12. Fulvous pied flat	<i>Pseudocoladenia dan</i> (Fabricius)	2
13. Dart spp.	<i>Telicota spp.</i>	15
	Total	37
Family: Lycaenidae		
14. Dark grass blue	<i>Zizeeria karsandra</i> (Moore)	1
15. Common imperial	<i>Cheritra freja</i> (Fabricius)	1
16. Purple sapphire	<i>Heliophorus epicles</i> (Godart)	28
17. Common tit	<i>Hypolycaena erylus</i> (Godart)	3
18. Orchid tit	<i>Hypolycaena othona</i> (Hewitson)	1
19. Pointed ciliate blue	<i>Anthene lycaenina</i> (C.Felder)	3
20. Common ciliate blue	<i>Anthene emolus</i> (Godart)	6
21. Forget me not	<i>Catochrysops Strabo</i> (Fabricius)	3
22. Common acacia blue	<i>Surendra quercetorum</i> (Moore)	2
23. Common cerulean	<i>Jamides celeno</i> (Cramer)	12
24. Zebra blue	<i>Leptotes plinius</i> (Fabricius)	3
25. Long banded Silverline	<i>Spindasis lohita</i> (Horsfield)	3
26. Common pierrot	<i>Castalius rosimon</i> (Fabricius)	7
	Total	73
Family: Papilionidae		
27. Lime butterfly	<i>Papilio demoleus</i> (Linnaeus)	16
28. Common mimi	<i>papilio clytia</i> (Linnaeus)	1
29. Red helen	<i>Papilio helenus</i> (Linnaeus)	8
30. Common mormon	<i>Papilio polytes</i> (Linnaeus)	1
31. Common rose	<i>Pachliopta aristolochiae</i> (Fabricius)	26
32. Lesser batwing	<i>Atrophaneura aidoneus</i> (Doubleday)	7
	Total	59
Family: Pieridae		
33. Cabbage white	<i>Pieis rapae</i> (Linnaeus)	26
34. Three spot grass yellow	<i>Eurema blanda</i> (Boisduval)	68
35. Lemon emigrant	<i>Catopsilia Pomona</i> (Fabricius)	39
36. Mottled emigrant	<i>Catopsilia pyranthe</i> (Linnaeus)	2
37. Chocolate albatross	<i>Appias lyncida</i> (Cramer)	6
	Total	141
Family: Nymphalidae		
38. Grey pansy	<i>Junonia atlites</i> (Linnaeus)	53
39. Peacock pansy	<i>Junonia almanac</i> (Linnaeus)	51
40. Lemon pansy	<i>Junonia lemonias</i> (Linnaeus)	39
41. Chocolate pansy	<i>Junonia iphita</i> (Cramer)	32
42. Yellow pansy	<i>Junonia hierta</i> (Fabricius)	16
43. Common nawab	<i>Polyura athamas</i> (Drury)	2
44. Leopard lacewing	<i>Cethosia cyane</i> (Drury)	2
45. Powdered baron	<i>Euthalia monia</i> (Fabricius)	9
46. Himalayan red spot duke	<i>Dophla evelina</i> (Derma)	1
47. Autumn leaf	<i>Doleschallia bisaltide</i> (Cramer)	3
48. Common earl	<i>Tanaecia juli</i> (Menetries)	7
49. Grey count	<i>Tanaecia lepidea</i> (Butler)	21
50. Commander	<i>Moduza procris</i> (Cramer)	7
51. Colour segrent	<i>Athyma inara</i> (Westwood)	7
52. Common palmfly	<i>Elymnias hypermnestra</i> (Linnaeus)	18
53. Spotted palmfly	<i>Elymnias malelas</i> (Hewitson)	8
54. Common crow	<i>Euploea core</i> (Cramer)	14
55. Striped blue crow	<i>Euploea mulciber</i> (Cramer)	14
56. Common leopard	<i>Phalanta phalantha</i> (Drury)	4
57. Common lascar	<i>Pantoporia hurdonia</i> (Stoll)	28

58. Common jester	<i>Symbrenthia lilaea</i> (Hewitson)	8
59. Common five ring	<i>Ypthima baldus</i> (Fabricius)	12
60. Common four ring	<i>Ypthima huebneri</i> (Kirby)	3
61. Nigger	<i>Orsotriana medus</i> (Fabricius)	2
62. Bush brown(Dark brand)	<i>Mycalesis mineus</i> (Linnaeus)	5
63. Sailor(Common)	<i>Neptis hylas</i> (Linnaeus)	47
64. Knight	<i>Lebadea Martha</i> (Fabricius)	1
	Total	414
Family: Riodinidae		
65. Punchhinello	<i>Zemeros flegyas</i> (Guerin)	2
	Total	2
*N is the total no of individual Species. *Sub species of 11 species were included in WPA 1972 [21].		

*Tanaecia lepida**Pseudocoladenia dan**Ypthima baldus**Appias lyancida**Moduza procris**Heliophorus epicles***Fig 2:** Photograph of some Butterflies captured during survey time**Fig 3:** Basking behavior shown by the Common jester (*Symbrenthia lilaea*) in the study area

5. Discussion

Local status of species is based largely on the quantitative data gathered during the survey during survey (December 2017-May 2018) and was determined as follows: very rare: single individual sighted; rare: 2–5 individuals sighted; uncommon: 6–10 individuals sighted; common: 11–25 individuals sighted; very common: more than 25 individuals sighted. This is the guidelines used for determining local status of species [17]. Six type of butterfly families were reported in the study area which include-Nymphalidae- Brush footed

butterflies, Lycaenidae-Blues and Hesperidae – Skippers Papilionidae- swallowtail, Pieridae-white and yellows and Riodinidae. *Eurema blanda*, *Junonia atlites*, *Junonia almanac*, *Neptis hylas*, *Junonia lemonias* and *Catopsilia pomona* were found to be the most commonly occurring butterflies in the observed area. It was observed that the most of the species belong to family Nymphalidae. Family Hesperidae and Lycaenidae documents second most number of species described. Nymphalidae is was also the most diverse family in some another survey of butterfly in another part of North East India region [4]. Which show similarity with this study. In the tropical region Nymphalidae is the most dominant group of butterflies among all the families [4]. A few of the butterflies in some part of Assam show interesting biogeographic pattern due to the barrier effect of the Brahmaputra River Basin (BRB). Some of the butterflies' lies on the South Bank of BRB were not known from the north bank of the Brahmaputra River Basin as it acts as a barrier of species distribution [7]. *Potanthus spp.* (Dart spp.): Potanthus species seen in the study area, but Species level identities could not be possible in the absence of specimens and these could well be multiple species [17]. *Parnara spp.* (Swift spp.): Numerous skipper species records from the study area. Belonging to the genus Parnara, their specific identities could not be confirmed in the absence of specimens and information of genitalia [18]. The diversity index of this study indicates the

study area is highly specific.

6. Conclusion

The study area provides a rich biodiversity of butterflies due to the presence of a water-fall, which provide them a healthy habitat. The waterfall of this landscape has given birth to one community-based ecotourism and a picnic spot. The Karbi tribe supports ecotourism in the waterfall area. We hope that the results from this study will also promote butterfly tourism in the landscape, providing an additional financial incentive to the local communities to conserve their landscape.

Despite the wealth of information generated about the butterfly species in this poorly studied area, the numerous species recorded in the survey in this landscape mean that surveys need to continue. As butterflies are specific to different season and this survey is done for only six month it is not possible to photograph and identify all species in the study area. From the survey it can be estimated that there may be more than 90 butterfly species in the landscape of the study area. The population data accumulated in this survey will provide a baseline for future studies and impacts of habitat destruction, which is ever present threats in this landscape.

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