

## Study on the Lepidopteran Diversity around Amchang Wildlife Sanctuary With Reference To Its Present Status, Guwahati, Assam, India

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### Abstract

Butterflies are the biological indicators of the ecosystem; these insects tell us the healthier ecosystem. These are natural pollinators; butterflies visit the flower to eat nectar and this is mutually beneficial relationship. Some species of butterflies migrate over long distance; carry pollen to be shared across plants which are far apart from one another. This migration of pollens induces genetic variation in plants species and give a better chance of forest health. These insects also provide food for other group of organisms, for example; birds, reptiles, amphibians and also helps in biological diversity. But the population of these insects decline rapidly due to human activities, habitat destruction, uses of pesticides and unawareness of people about the importance Butterflies.

Amchang Wildlife Sanctuary is situated on the Southern bank of the Brahmaputra River and lies in the district of Kamrup (Metro). Amchang Wildlife Sanctuary lies within 91° 55' E Longitude and 26° 10' N latitude. The sanctuary falls under East Kamrup Forest Division. The total area is 78.64 sq km. of this 7.7 sq km area. The sanctuary comprising of Amchang, South Amchang and Khanapara Reserve Forest is spread over 7,864 hectares. The present study deals with diversity of butterfly found within the study area and to prepare a preliminary checklist of the butterflies in the study site. It is found that Nymphalidae is represented by 16 species followed by Hesperidae 4 species and Pieridae 4 species, Papilionidae 2 species, Lycaenidae 1 species,. The relative abundance of Nymphalidae is highest (63%) followed by Pieridae (16%), Hesperidae (12%) , Papilionidae (5%) and Lycaenidae (4%). Human encroachment to forest land and anthropogenic disturbances from cutting of tree are posing threats for the ecosystem and fauna of the area and thus this survey presents a future work on for conservation of the Amchang Wildlife Sanctuary.

**Keywords** :- Butterflies, Pollinators, Amchang, Diversity, Ecosystem.

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### I. Introduction

The State of Assam, Valley of Blue Hills and a diverse river system is located in the north-eastern part of India between 24° 07' N to 28° 00' N Latitude and 89° 42' E to 96° 02' E Longitude and extends over geographical area of 78,438 sq. km. which constitute 2.39% of the country's total area. The recorded forest area of Assam is 26,832 sq km accounting for 34.21% of its geographical area. According to their legal status, Reserved Forests constitute 66.58% and unclassified Forests 33.42% of the total forest area. Evans (1932) reported 962 species of butterflies belonging to six families from North Eastern States except Sikkim Himalayas. Out of these, 303 species of butterflies were in North East India. These butterflies are well studied by Moore (1890-1903), Bingham (1905, 1907), Evans (1932), Baruah et al., (2004), (Ahmed et al., 2016) and (Modak and Das, 2018). Though a many works has been done for the study of Lepidopteron population in different reserve forest and wild life sanctuary of Assam, there is proper record of study done on butterfly diversity in Amchang wildlife sanctuary, still a proper observation for this group of pollinators are important for conservation of biodiversity. Therefore, in the present study it has been aimed to investigate the diversity of butterfly population and the distribution pattern in an around the periphery of Amchang wildlife sanctuary of Assam. Thus, the study will access the abundance & diversity of butterflies in the Amchang Wildlife Sanctuary.

## II. Materials And Method

### STUDY AREA: -

Methodology has been followed by two methods that is Primary data collection and Secondary data collection.

A. (i) For Primary data collection, the survey was carried out in the Site-I-Bonda, Site-II- Panikhaiti, Site-III-Jorabat, Site-IV-Hatishila, Site-V- Patorkuchi of Amchang Wildlife Sanctuary.

(ii) For recording butterflies “Pollard Walk” method was adopted with a few modifications based mainly on Geographical and Climate consideration 10x10 meter transect were laid in each habitat types such as-crop field, Shrub land, close canopy along the roads and wetlands/streambeds. (Pollard and Yates,1993), (Ahmed et al., 2016).

(iii) Specimens were collected with the help of Aerial netting and released after taking a photograph because of the conservation policy and protection acts.

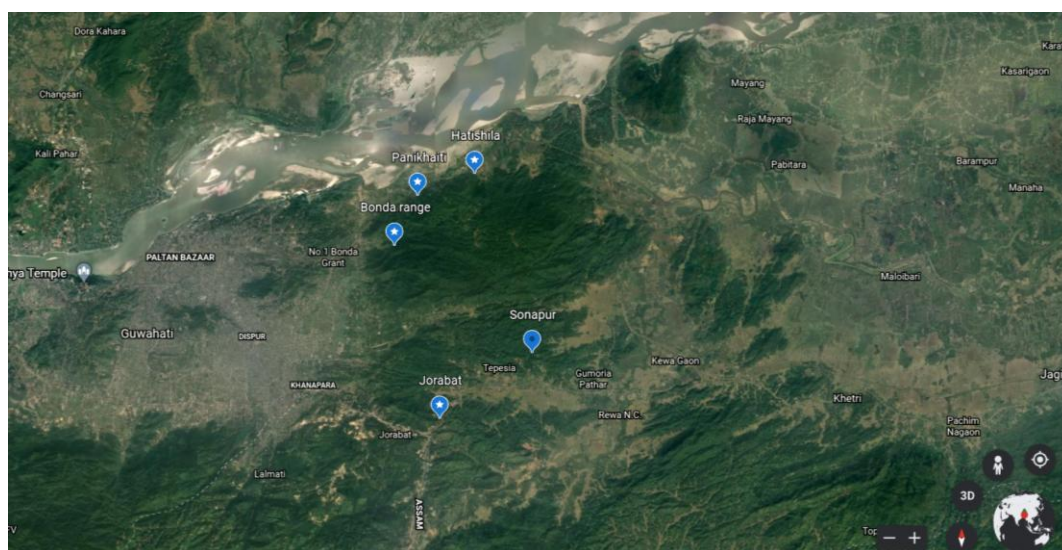
The study was conducted from 2017-2019 from January to December months: All surveys and sampling were limited to sunny days. The following hours of the day were selected for observations and study 7.00 AM – 12.00 NOON, 1.30 PM – 4.30 PM. The butterflies were identified by observing their morphology as well as their particular behaviour. Identification of butterfly had been carried out with the help of following books and website Bingham (1905), Kehimkar (2008), Kunte (2000), (Ahmed et al., 2016).

B. For secondary data collection- International Journals, Papers and Website was followed to identifying the butterfly species.

### LOCATION ON MAP

**Table 1: Location of Amchang Wildlife Sanctuary and its different sites.**

Site (s)	NAME OF THE SITE(S)	ELEVATION (in Meter ASL)	GPS COORDINATES
1	BONDA	94.4	N 26°11.214' E 91°51.420'
2	PANIKHAITI	222.9	N 26°12.145' E 91°51.385'
3	JORABAT	504.3	N 26°06.393' E 91°53.118'
4	HATISHILA	224.9	N 26°13.037' E 91°53.479'
5	PATORKUCHI	253.1	N 26°07.216' E 91°52.786'



**Fig. 1:** Map of Amchang wildlife Sanctuary showing the study area of the five sites.

**Survey method: -**

The study was carried out from January' 2017, December' 2019. Survey was conducted in the adjoining area of Amchang Wildlife Sanctuary by using Digital camera: Nikon 5300, Nikon D810 FX) and observation of butterfly were taken during the day light hours. 10 x 10m Quadrat area taken for survey.

During the study, butterflies were recorded by walking on fixed transects (Pollard & Yates,1993) in different habitats. Butterfly species density and relative abundance were assessed quantitatively across the different habitats.

**Data analysis: -**

The butterflies were identified by observing their morphology as well as their particular behaviour. The identification was made with the help of references to Evans(1932), Bingham (1905), Kehimker(2008), Kunte(2000). The host specific plants were also recorded. An effort has been made to use the latest nomenclature and common names as far as possible as per Evan (1932). Microsoft excel used to analyses the data.

**III. Results: -**

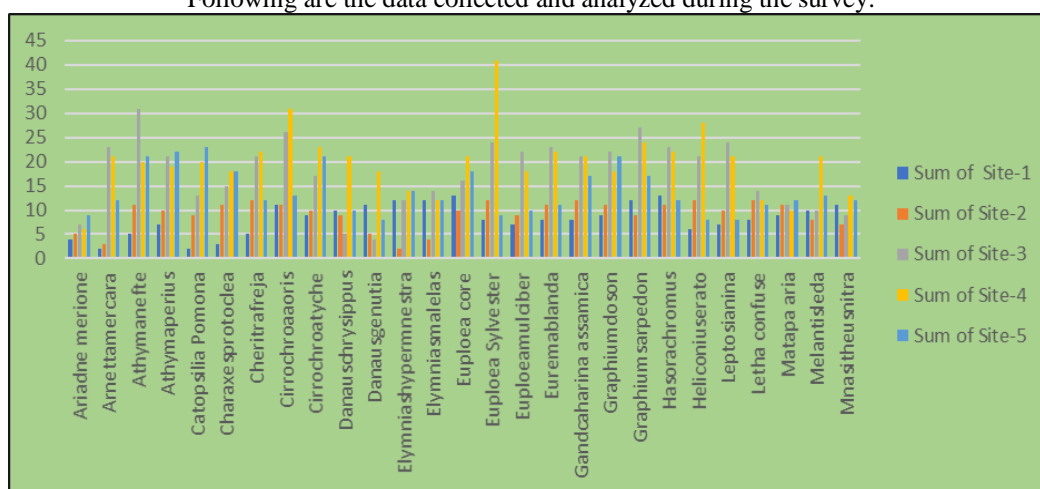
**Table 2: List of butterfly species found in different habitat**

Sl. No.	Scientific name	Common name	Site-1	Site-2	Site-3	Site-4	Site-5
1	<i>Ariadne merione</i>	Common castor	4±0.3	5±0.4	7±0.9	6±0.2	9±0.4
2	<i>Arnetta mercara</i>	Coorg forest hooper	2±0.8	3±0.6	23±0.4	21±0.4	12±0.7
3	<i>Athyma nefte</i>	Color sergeant	5±0.3	11±2	31±0.5	20±0.4	21±0.6
4	<i>Athyma perius</i>	Common sergeant	7±0.2	10±1	21±0.6	19±0.5	22±0.2
5	<i>Catopsilia pomona</i>	Common emigrant	2±0.1	9±0.4	13±0.4	20±0.6	23±0.6
6	<i>Charaxes protoclea</i>	Flame-bordered emperor	3±0.4	11±0.7	15±2	18±0.6	18±0.9
7	<i>Cheritra freja</i>	Common imperial	5±0.9	12±0.8	21±0.4	22±0.7	12±0.2
8	<i>Cirrochroa aoris</i>	Large yeomen	11±1	11±0.8	26±3	31±0.4	13±2
9	<i>Cirrochroa tyche</i>	Common yeomen	9±2	10±0.6	17±2	23±0.9	21±3
10	<i>Danaus chrysippus</i>	Plain tiger	10±2.2	9±0.8	5±0.4	21±0.5	10±0.2
11	<i>Danaus genutia</i>	Common tiger	11±1.8	5±0.6	4±0.4	18±0.6	8±0.8
12	<i>Elymnias hypermnestra</i>	Common palmfly	12±0.8	2±0.7	12±0.6	14±0.4	14±3
13	<i>Elymnias malelas</i>	Spotted palmfly	12±0.7	4±0.8	14±2	12±0.6	12±1
14	<i>Euploea core</i>	Common crow	13±0.5	10±2	16±0.6	21±0.4	18±2
15	<i>Euploea mulciber</i>	Striped blue crow	7±2	9±2	22±1	18±0.6	10±0.5
16	<i>Euploea sylvester</i>	Double branded crow	8±1	12±1	24±0.4	41±5	9±0.4
17	<i>Eurema blanda</i>	Three spot grass yellow	8±3	11±1	23±0.8	22±0.6	11±2
18	<i>Gandcaharina assamica</i>	Tree yellow	8±0.4	12±0.8	21±0.4	21±2	17±0.6
19	<i>Graphium doson</i>	Common jay	9±0.5	11±0.3	22±0.6	18±4	21±0.6
20	<i>Graphium sarpedon</i>	Common bluebottle	12±0.6	9±0.5	27±0.3	24±1	17±0.8
21	<i>Hasora chromus</i>	Common banded awl	13±2	11±0.5	23±0.4	22±0.6	12±0.4
22	<i>Heliconius erato</i>	Red postman	6±0.9	12±0.7	21±0.6	28±2	8±0.8
23	<i>Leptosia nina</i>	Psyche	7±0.5	10±0.9	24±2	21±0.5	8±0.4
24	<i>Letha confuse</i>	Banded tree brown	8±0.4	12±0.8	14±2	12±2	11±0.4
25	<i>Matapa aria</i>	Common red eye	9±0.5	11±0.3	11±3	10±0.4	12±0.4
26	<i>Melanitis leda</i>	Common evening brown	10±0.5	8±0.3	10±0.6	21±0.5	13±0.6
27	<i>Mnasitheus nitra</i>	Nitra skipper	11±0.2	7±0.4	9±0.3	13±0.6	12±2

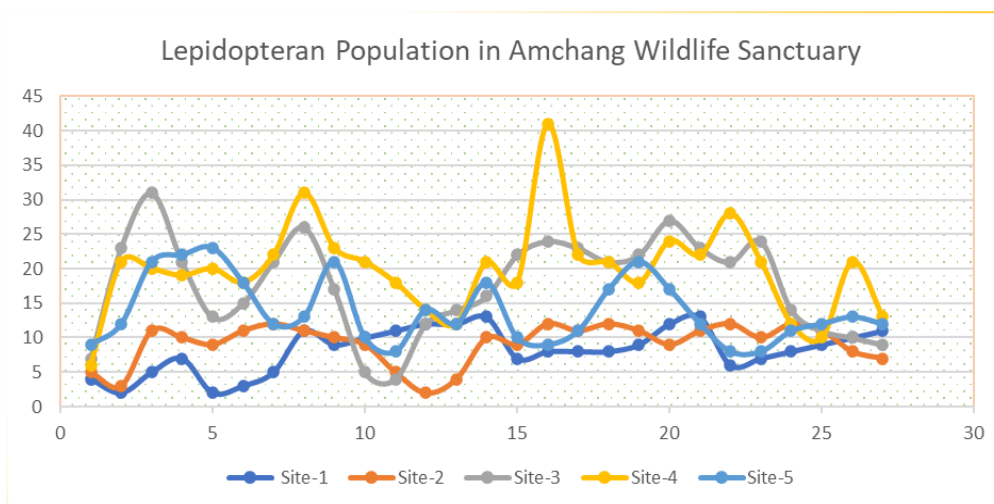
**Table 3: Showing relative abundance of butterflies found in the study sites.**

Sl. No.	Scientific name	Family	Relative abundance
1	<i>Graphium doson</i>	Papilionidae	Frequent
2	<i>Graphium sarpedon</i>	Papilionidae	Very common
3	<i>Catopsilia Pomona</i>	Pieridae	Very common
4	<i>Euremablanda</i>	Pieridae	Frequent
5	<i>Gandacaharina assamica</i>	Pieridae	Very common
6	<i>Leptosia nina</i>	Pieridae	Very common
7	<i>Cheritra freja</i>	Lycaenidae	Rare
8	<i>Ariadne merione</i>	Nymphalidae	Very common
9	<i>Athymanefta</i>	Nymphalidae	Very common
10	<i>Athymaperius</i>	Nymphalidae	Very common
11	<i>Charaxes protoclea</i>	Nymphalidae	Common
12	<i>Cirrochroa aoris</i>	Nymphalidae	Frequent
13	<i>Cirrochroa tyche</i>	Nymphalidae	Frequent
14	<i>Danaus chrysippus</i>	Nymphalidae	Very common
15	<i>Danaus genutia</i>	Nymphalidae	Very common
16	<i>Elymnias hypermnestra</i>	Nymphalidae	Very common
17	<i>Elymnias malelas</i>	Nymphalidae	Uncommon
18	<i>Euploea core</i>	Nymphalidae	Very common
19	<i>Euploea mulciber</i>	Nymphalidae	Occasional
20	<i>Euploea Sylvester</i>	Nymphalidae	Frequent
21	<i>Heliconius erato</i>	Nymphalidae	Common
22	<i>Melanitis leda</i>	Nymphalidae	Frequent
23	<i>Letha confuse</i>	Nymphalidae	Very rare
24	<i>Arnetta mercara</i>	Hesparidae	Common
25	<i>Hasora chromus</i>	Hesparidae	Occasional
26	<i>Matapa aria</i>	Hesparidae	Frequent
27	<i>Mnasitheus nitra</i>	Hesparidae	Frequent

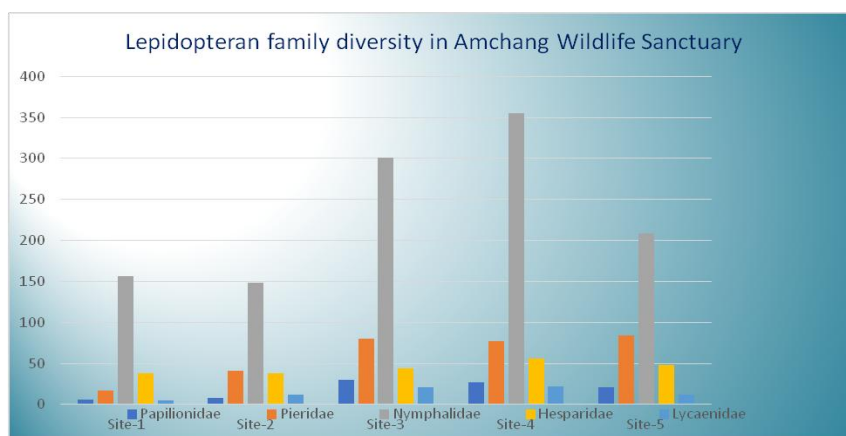
Following are the data collected and analyzed during the survey:



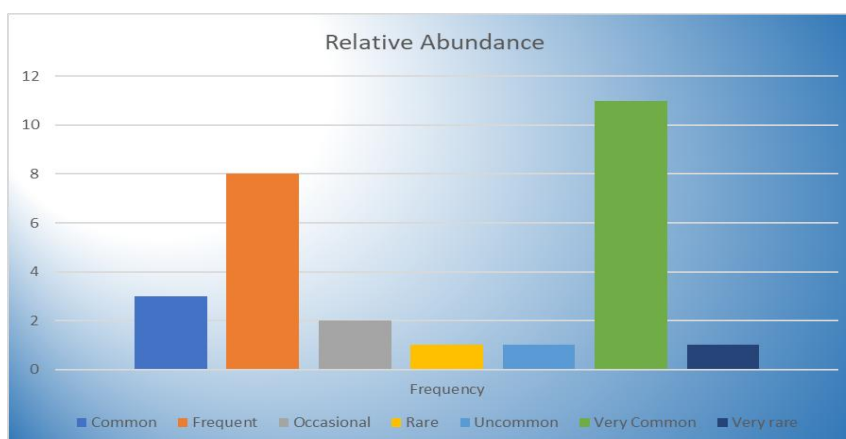
**Fig. 2:** Species diversity of butterfly species from study areas (1, 2, 3, 4 & 5) in and around Amchang W.S.



Graph 1:- Showing population diversity of butterfly species around study area.



Graph 2:- Showing the species richness of butterfly families found in the study sites.



Graph 3:- Relative abundance of butterfly according to their status in the study sites.

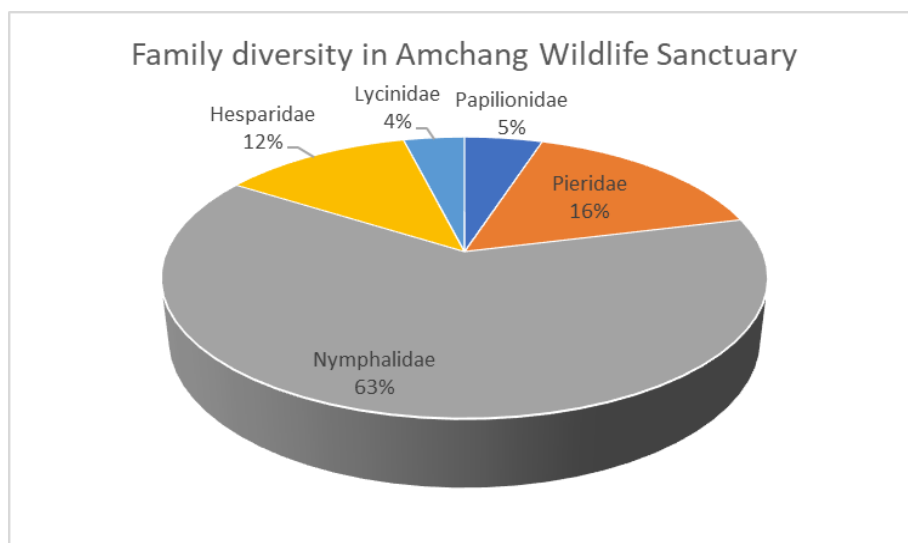


Fig.3:- Diversity of butterfly according to their family in the study sites.

#### IV. Discussions

The present study provides a checklist of butterfly diversity of Garbhanga reserve forest, Basistha area. In the present study it is found that Nymphalidae is represented by 16 species followed by Hesperidae 4 species and Pieridae 4 species, Papilionidae 2 species, Lycaenidae 1 species,. The relative abundance of Nymphalidae is highest (63%) followed by Pieridae (16%), Hesperidae (12%) , Papilionidae (5%) and Lycaenidae (4%) (Fig.3). It has been found that 1169 individuals belong to Nymphalidae family, which is most found species in the study sites followed by Pieridae family with 299, Hesperidae with 224 then 92 individuals of Papilionidae family, and Lycaenidae 72 individuals. This findings is in conformity with various studies conducted in Guwahati city (Ali and Basistha, 2000) & (Modak & Das, 2018).

Table 2 shows the list of butterfly abundance in the different sites 27 number of lepidopteran species in the study area found frequently. Graph 3 and Table 3 presents the most common family to very rare family found in the Amchang wildlife sanctuary shows variation of population of different species in Amchang Wildlife Sanctuary. The species diversity of butterfly in Amchang wildlife sanctuary is highest in site-4 (537 nos.) followed by site-3 (476 nos.) (Fig.2). Graph 1 also presents the site-4 with highest lepidopteran diversity. Thus , this study clearly reveals that Amchang Wildlife Sanctuary is richer for butterfly species diversity mostly in the site-4. The site-3 and site-4 presents the highest number of species belongs to five families of butterfly (Graph 2). The climatic condition together with good vegetation cover and water bodies might harbours a good diversity of butterfly in the Amchang wildlife sanctuary.

The vegetation that were recorded in the study area are- *Agertum conyzoides*, *Cantharanthus roseus*, *Rosa damascene*, *Helianthus annuus*, *Heliconia latispatha*, *Hibiscus rosa*, *Ixora macrophylla*, *Mussaendra froudosa*, *Solanum indicum*, one of the other reason for richness of butterfly is due to the presence of flowering food plants. Most studies of butterfly, response to climate change have focused on the effect of temperature changes, but changes in precipitation patterns can be of important. Butterfly diversity varies with seasons. They are abundant only a few months and rare or absent during other months of the year. The abundance of diverse species was positively affected by approaching summer, high relative humidity and more rainfall. The diversity of butterfly community is controlled by various ecological determinants and is known for their value as an important ecological indicator group.

#### V. Conclusions

The present study reveals that the Amchang wildlife sanctuary is very rich in butterfly diversity as it counts 27 species belonging to different families of which some butterflies are protected under various Schedule of Wildlife (Protection) Act,1972 and IUCN Red List. 4 unidentified butterflies were found from the study sites during survey. Maximum butterflies were recorded during the sunny season. The present study states that the diversity of Nymphalidae family was the largest with more number of species, Lycaenidae was having the less number of species. This study might assume great taxonomic significance and might initiates conservation strategies in due course of time for preservation of various butterflies groups in an around present study area nearby Guwahati city which affecting the Amchang wildife sanctuary. Anthropogenic disturbances from cutting of tree, encroaching of forest land etc. are posing threats for the ecosystem and fauna of the area.

This study certainly may help to understand the present condition of environment, it has some significance as it can be used in monitoring ecosystem health, stability and functioning from the present study area. Conservation of these important pollinators is essential for sustainable development.

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