

## Depleting Butterfly Diversity and Conservation in Karimganj Area of Assam in Northeast India

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(Received 10 January 2014; revised 13 March 2014; accepted 23 April 2014)

### ABSTRACT

The present work deals with the butterfly fauna in a remote part of northeast India. This work for the first time describes the butterfly diversity of a disturbed habitat of Karimganj district in Barak Valley of Assam using the method of “Checklist Survey” in the early spring season, from January till March, 2013. A total of 135 individuals were observed in the diversity study which recorded 37 species of butterfly belonging to 27 genera and five families. Nymphalidae was dominant followed by the Pieridae, Papilionidae, Lycaenidae and Hesperidae. Three species viz. *Papilio memnon*, *Castalius rosimon* and *Lethe europa* are listed in the Indian Wildlife Protection Act of 1972 as under Schedule I (Part IV). The biggest threats to butterfly communities in the area are habitat destruction, land reclamation, leveling of forested hillocks, human settlement and crop cultivation.

**Key words:** Butterfly diversity, disturbed habitat, threat, conservation, Karimganj

### INTRODUCTION

In recent years, man driven climate change has been particularly responsible for extinctions of many species especially with low range of tolerance towards fluctuations in weather and temperature variations.

Butterfly population decline in last few decades has been attributed to high adult mortality due to limited adult flight times and restricted female nectar feeding and even high larval mortality with reasons accounting to low host plant quality, premature plant senescence caused by

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drying or frost, stunted larval growth due to low temperatures, among others (Simon *et al.*, 2010). In the humid tropics, due to deforestation of primary forests, secondary forests and plantations are becoming increasingly widespread land-use systems in human dominated areas (Barlow *et al.*, 2007). Despite their quick expansion and potential importance, the biodiversity conservation values of secondary and plantation forests remain poorly understood, especially in relation to butterfly diversity (Hartley, 2002; Dunn, 2004). Along with the availability of larval and adult food plants, habitat quality appeared to be one of the most important parameters that are used to determine butterfly community structure (Barlow *et al.*, 2007).

Several researchers have discussed the potential of butterfly diversity in secondary forests, but diversity and species richness of butterflies across different secondary vegetation gradients remains poorly understood (Bowman *et al.*, 1990; Lawton *et al.*, 1998; Ramos, 2000). Among insects, butterflies are ideal subject for ecological studies of landscapes (Thomas & Malorie, 1985), and their value as indicators of biotope quality is being increasingly recognized because of their sensitivity to minor changes in micro-habitat, in particular, light levels. To a large extent, butterflies being a pollinating agent contribute to the growth,

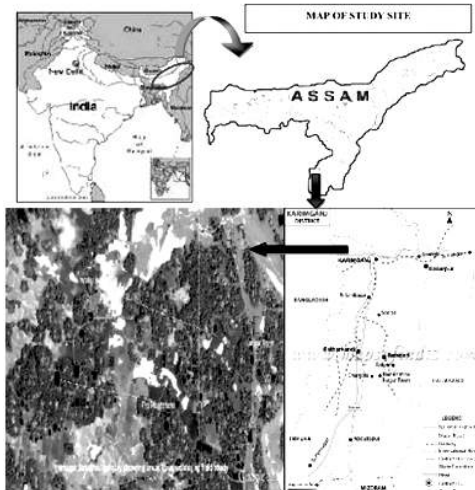
maintenance and expansion of flora in the tropical regions where these insects show high abundance and species diversity (Bonebrake *et al.*, 2010).

The northeastern region of India is home to a rich diversity of butterflies and other insects, due to vegetative richness and it is also globally recognized as one of the biodiversity hotspots (Gogoi, 2012; Ali & Basistha, 2000; Borang, 2008). In the present study, an attempt has been made to estimate the diversity and unique species richness of butterflies inhabiting a secondary habitat type in Ayalabari area of Karimganj District of Barak Valley in Assam.

#### STUDY SITE

The present study was conducted in Ayalabari Tea Estate which is about 5km from Karimganj town. The total area of the tea estate is 522 hectare out of which 121 hectare is under tea plantation. The population is 1090 persons living in around 243 households. The altitude gradient of the place is 40-120 feet above sea level. The tea estate is very close to the Longai river and is surrounded by hillocks. The village Karnamadhu lies to its north, Bedrong and Krishna Nagar villages towards west, Krishna Nagar village in south while the Longai river in the east. Small streams flow through the bamboo forests into the open areas. The area has open scrub deciduous vegetation with secondary forests. The site

is a composite matrix of different variables such as human habitation, agricultural fields, tea plantations, citrus grove, fallow land, bamboo thickets, etc. (Figure 1)



**Figure 1.** Map of the study site

Karimganj district is located in Barak valley in the Southern tip of Assam, situated in the North-eastern corner of India. Together with two other neighbouring districts - Cachar and Hailakandi - it constitutes the Barak valley zone in Assam. Total area of the district is 1809 km<sup>2</sup>, which comprises varied geographical features like agricultural plains, shallow wetlands, hilly terrains and forests. The total forest cover in the district is more than 54000 hectares accounting for about 30% of total geographical area. The geographical location of Karimganj district is between longitudes 92°15' and 92°35' East and latitudes 24°15' and 25°55' North. The altitude of the district varies from

about 50 feet to more than 2000 feet. The district has a tropical climate with summer temperatures ranging between 33°C-36°C and winter temperatures between 12°C-15°C. The climate is characterized by heavy rainfall, average 215 mm and high humidity, average 67% during summer and dry winter (KDP, 2014).

## METHODOLOGY

To determine the butterfly diversity in the present study area “Checklist Survey” (Royer *et al*, 1998) was conducted on sunny days from January till March, 2013. The site was subjected to a comprehensive search aimed at identification and confirmation of all species occurring on the site. In rare instances where identification was impossible without handling, an example was collected with an insect-net and then released after observation and identification. Visual search and photography were conducted on a regular basis during the day. Searches were conducted near water sources, damp patches in the forest, open sunny areas, blossoming flowers and bird droppings. Searches were also conducted on hill tops, especially in the catchment areas of hill streams, as well as from top to bottom of hill streams to record the maximum number of species. Butterflies were photographed from different angles as often as possible to obtain sufficient photographs to enable

positive identification of species. Butterfly species were identified using the identification keys of Evans (1932), Haribal (1992), Kunte (2000) and photographic guides of Kehimkar (2008), Basu Roy *et al.* (2007).

## RESULTS

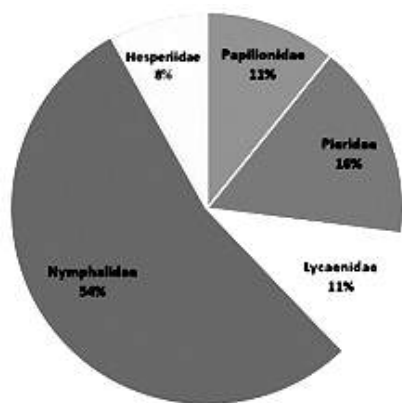
During the systematic survey, a total of 135 individuals comprising 37 species of butterfly belonging to 27 genera and five families were recorded from the habitat (Table 1). Among the families, Nymphalidae was dominant with 20 species followed by the Pieridae (6 species), Papilionidae (4 species), Lycaenidae (4 species) and Hesperidae (3 species) (Figure 2). Members of the Nymphalidae were always dominant in the area. A high proportion of Nymphalid species indicates high host plant richness in the area. However, of the varieties observed, 3 species: viz. *Papilio memnon*, *Castalius*

*rosimon* and *Lethe europa* are listed in the Indian Wildlife Protection Act of 1972 as under Schedule I (Part IV).

## DISCUSSION

The present study has resulted in an annotated checklist of butterflies from Karimganj district, and a preliminary analysis of butterfly diversity of this neglected but notably bio-diverse region. The study showed that the region supports a substantial number of butterfly species including 3 legally protected species, viz. *Papilio memnon*, *Castalius rosimon* and *Lethe europa* and hence the findings underscore the importance of the region as an area of tremendous national and international conservation significance, especially with reference to butterflies. Moreover, the total numbers of butterfly species are likely to increase significantly in more systematic and long-term surveys.

There has always been a lack of well-planned and serious research studies concerning Lepidopterans in the present study region i.e. Barak Valley. The study site falls under one of the three 'Hot-spots' found in India (Karmakar *et al.*, 2010). In Western Ghats, appropriate methodology (Kunte, 2008) has been devised to evaluate conservation values of butterflies. The usefulness of long term butterfly community studies lies in the fact that it acts as a powerful tool in measuring changes in biodiversity in relation to



**Figure 2.** Family-wise representation of butterfly species observed

various unwanted changes and pressure such as anthropogenic pressure, grazing pressure, etc. It also aids in formulating and defining sound conservation and management plans. Thus butterflies act as important indicators of environmental health and changes can be easily detected in a long term study.

The major forest ranges of North-Eastern India have faced enormous habitat destruction in the past years due to extensive logging, coal mining and agriculture expansion. As a result, forests of this region have been jeopardized. But, due to the remoteness of the study site, it remains as a stronghold of biodiversity in the Indian part of the Indo-Myanmar Biodiversity Hotspot. Unfortunately,

anthropogenic pressure in the form of monoculture plantations, rampant deforestation, soil mining, hunting and poaching leading to habitat destruction and faunal depletion now threaten the flora and fauna of the Karimganj district on a large scale.

The local populace is completely naive on the concept of biodiversity and conservation due to lack of basic education and poverty. Mass awareness programmes in the region can generate a holistic and positive approach towards butterflies and environment. Therefore, it is important to undertake intensive, long-term butterfly surveys in Karimganj district in order to record the butterfly fauna while forests still exist in large tracts.

**Table 1.** Annotated list of butterfly species recorded

Family	Scientific Name	Common Name	Habitat
<b>Papilionidae</b>	<i>Papilio clytia</i>	Common Mime	Open and Wooded Areas
	<i>Papilio polytes</i>	Common Mormon	Flowers, open places
	<i>Papilio demoleus</i>	Lime Butterfly	Open places and flowers
	<i>Papilio memnon</i>	Great Mormon	Flowers, open places
<b>Pieridae</b>	<i>Catopsilia pomona</i>	Common Emigrant	Wetland, bright open places
	<i>Pieris brassicae</i>	Large Cabbage White	Open, sunny and flowers
	<i>Delias descombesi</i>	Red Spot Jezebel	Open places, wetland
	<i>Leptosia nina</i>	Psyche	Grassland and wetland
	<i>Pareronia avatar</i>	Pale Wanderer	Bright open places
<b>Lycaenidae</b>	<i>Eurema hecabe</i>	Common Grass Yellow	
	<i>Castalius rosimon</i>	Common Pierrot	Open areas
	<i>Tarucus wasterstarti</i>	Assam Pierrot	Grassy areas
	<i>Arhopala centaurus</i>	Centaur Oakblue	Near water and open places
<b>Nymphalidae</b>	<i>Nacaduba hermus</i>	Pale Four-line Blue	Wooded areas
	<i>Euploea sylvester</i>	Double Branded Crow	Open places
	<i>Lethe europa</i>	Bamboo Tree Brown	Wooded Areas
	<i>Elymnias pealii</i>	Peal's Palmfly	Shady and dark places
	<i>Mycalasis perseus</i>	Common Bushbrown	Shady forest
	<i>Orsotrioena medus</i>	Nigger	Open and forested areas
	<i>Ypthima asterope</i>	Common Threering	Near water, sunny forest

	<i>Ypthima huebneri</i>	Common Fourring	Open areas
	<i>Ypthima baldus</i>	Common Fivering	Open areas
	<i>Cethosia cyane</i>	Leopard Lacewing	Shady Places
	<i>Athyma asura</i>	Studded Sergeant	Flowery places
	<i>Tanaecia lepidea</i>	Grey Count	Near water, sunny forest
	<i>Labadea martha</i>	Thai Knight	Shady and dark places
	<i>Neptis hylas</i>	Common Sailer	Open and forest areas
	<i>Neptis clinia</i>	Sullied Sailer	Open forest areas
	<i>Symbrenthia lilaea</i>	Common Jester	Shady forest
	<i>Junonia iphita</i>	Chocolate Pansy	Open grassy places
	<i>Junonia atlites</i>	Grey Pansy	Open places
	<i>Junonia almana</i>	Peacock Pansy	Open places
	<i>Junonia lemonias</i>	Lemon Pansy	Flowery and open place
	<i>Junonia hierta</i>	Yellow Pansy	Sunny grasslands
<b>Hesperiidae</b>	<i>Potanthus zatilla</i>	Common Dart	Sunny grassland
	<i>Taractrocera maevius</i>	Common Grass Dart	Open areas, near water
	<i>Sancus fuligo</i>	Coon	Open and sunny places



**Figure 3.** Some of the observed butterflies (top-left: *Potanthus zatilla*, top-right: *Papilio clytia*, middle-left: *Neptis hylas*, middle-right: *Labadea martha*, bottom-left: *Cethosia cyane*, bottom-right: *Athyma asura*)

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