

CHAPTER-I

INTRODUCTION

Butterflies occur throughout the world, except for the Polar Regions. There are about 18000 species of butterflies in the world (Kehimkar, 2014). Though they are far more numerous and diversified in the tropics, some species survive at the limits of polar vegetation. There are many species in nearby every environment from arid desert and high mountain tops to marshes and tropical rainforest (Kehimkar, 2014). Butterflies play a central role in all terrestrial ecosystems. Their short generation times produce rapid population responses to a wide range of biotic and abiotic environment making them vitally important for ecological study (Lewis *et al.*, 1998).

Butterflies (Lepidoptera)

Butterflies subsist entirely upon the nectar of flowers, juice of over ripe fruits, honey dew and other liquid substances including minerals. They obtain all these from the habitat by visiting flowers, bird droppings, and rotten fruits and from mud puddling in suitable areas. They are mainly diurnal, but some of them are found to fly at night too, like Dark Evening Brown (*Melanities phedima* Cramer) of the family Nymphalidae (Adler and Pearson, 1982).

Butterflies play a key role in nature. They are important component in the food chain of birds, spiders and other predatory insects. They also act as pollinators. Butterflies (Lepidoptera) are the most tantalizing beautiful creatures and one of the most plant dependent groups of insects compared to the other groups of insect. Butterflies are beneficial as they serve as pollinators and indicators of environmental quality and are appreciated for their aesthetic value (Chakravarthy *et al.*, 1997). Lepidopterans, in particular butterflies often serve as a good „flagship“ species for biodiversity inventories (Lawton *et al.*, 1998). They are important pollinators and they serve as food and host for multiple other organisms at higher trophic levels (Summerville and Crist, 2001; Summerville *et al.*, 2004).

The old relationship between the man and butterflies is today going through a period of great stress as human by their activities are directly or indirectly threatening the

existence of butterflies. The presence of butterflies depend upon the variety of factors including climate, suitable foods, suitable areas for flight and courtship and in some instances, the presence of certain symbiotic species, notably ants.

They are also good indicator in terms of anthropogenic disturbance and habitat quality as they are sensitive to changes in the environment (Sparrow *et al.*, 1994; Haribal, 1998 and Kocher *et al.*, 2000).

Butterflies have been able to flourish on land, in tropical forest, deserts and grassy land mass and hundreds of species, representing of almost every family, live in every available ecological niche (Ambrose, 2005).

Butterflies as study materials

The diversity of insects has been emphasized in many studies owing to their dominance in the terrestrial and aquatic ecosystems and provision of ecosystem services such as pollination, pest control, nutrient decomposition, and maintenance of ecosystem species (Losey and Vaughan 2006). The better-known groups of butterflies in particular, have often been advocated as useful indicators of environmental changes (Daily and Ehrlich, 1995; Hill *et al.*, 1995; Hill and Hamer, 1998). However more than 90% of the known species are moths and the majority of them are nocturnal (Scoble, 1992; Young, 1997).

Among insects, butterflies perform prominent roles in pollination (Kunte, 2000; Tiple *et al.*, 2006) bearing a history of long-term co evolution with plants (Ehrlich and Raven, 1964).

Butterflies are considered as good indicators of the health of any specified terrestrial ecosystem (New, 1991; Pollard and Yates, 1993; Kunte, 2000; Aluri and Rao, 2002; Thomas, 2005; Bonebrake *et al.*, 2010) as well as of human disturbance and habitat feature (Kunte *et al.*, 1999; Kocher and Williams, 2000; Kunte, 2000; Summerville and Crist, 2001) with greater sensitivity than many other taxonomic groups (Thomas *et al.*, 2004; Thomas, 2005). Butterflies are therefore treated as an important model group in study of ecology (Watt and Boggs, 2003; Ehrlich and Hanski, 2004). So, the conservation of butterflies is necessary. Consequently as a result of the close links between butterfly diversity and health of their habitats, it has been suggested as

potential bio-indicators of ecological change in tropical regions (Gilbert, 1984; Spitzer *et al.*, 1997).

The diversity of butterflies is linked to their ecosystem by influencing nutrient cycling, plant population dynamics, and predator – prey population dynamics (Hammond and Miller, 1998). They are also very sensitive to changes in temperature, humidity, light levels and other parameters often affected by habitat disturbance (Wood and Gillman, 1998). Seasonal changes faced by different generations may include changes in ambient temperature and day-length, differential availability of secured resting places, nectar rich plants for adults and larval host plants and different set of predators and predation risk.

Indian butterflies – a brief record

The number of Indian butterflies amount to one fifth of the world of butterfly species (Kunte, 2000). India has 1,504 species belongs to five families, of which 321 are skippers, 107 swallowtails, 109 whites and yellows and 521 Brush footed butterflies and 443 Blues, which constitute 65% of total Indian fauna (Gaonkar, 1996; Smetacek, 1992). Indian subcontinent host about 1,504 species of butterflies (Tiple 2011) of which peninsular India and Western Ghats host 351 and 334 species respectively. The ecology and diversity of many butterfly species have been intensively studied over recent decades and thus there exist quite detailed knowledge about the habitat needs of many butterfly species. The results of these studies are summarized in quite comprehensive books about butterflies such as that at Emmet and Heath (1990) and Asher *et al.*, (2001). Many researchers have significantly contributed to the understanding of butterfly diversity and abundance in diversified ecosystems (Kunte *et al.*, 1999; Arun and Azeez, 2003; Eswarn and Pramod, 2005) on aspects such as habitat association, effect of disturbance and area clearance (Soubadra Devy and Priya, 2001; Dolia *et al.*, 2008); on seasonal abundance and migration patterns (Kunte, 1997; Arun, 2002; Kunte, 2005) and on conservation (Kunte, 2008) from the Western Ghats. On the whole, butterfly communities vary significantly among different habitats even in a small study area. In heterogeneous ecosystems vegetation type played a major role in diversity and density pattern of butterfly communities (Ramesh *et al.*, 2010).

Butterfly and North east India: -

The northeastern region of India is home to a rich diversity of butterflies and other insects due to vegetative richness (Alfred *et al.*, 2002; Majumder *et al.*, 2011) and it is also globally recognized as a biodiversity hotspots.

North-Eastern region of India is a hotspot of butterfly diversity (Evans, 1932). Large scale habitat deforestation and fragmentation has led to the decline of several butterfly population in the state. Very scanty works have been done on butterfly species diversity, species composition and its distribution patterns in North Eastern Region. Still surveys conducted by experts time to time in this region to explore the butterfly diversity (Talbot, 1939, 1947; Wynter-Blyth, 1957; Saharia, 1967; Varhney & Chanda, 1971). Talbot (1939, 1947) and Evans (1932) have studied the taxonomy and identification of butterflies in the North Eastern Region and its adjoining areas during the early parts of the twentieth century. Bhattacharjee (1985) also studied the taxonomy and distribution of Nymphalidae, Pieridae and Lycaenidae butterflies in the North Eastern region of India and its adjoining areas during the early parts of 20th century. Varshney and Chanda (1971) has compiled a report on butterflies of North Eastern India from the museum specimen collected during 1959-1969 covering the area of (1) Kameng Frontier Division, Tirap Frontier Division and Siang Frontier Division of Arunachal Pradesh; (2) Golaghat, Kaziranga, Garampani, Guwahati, and Phulbari of Assam; (3) Tura, Shillong, Cherrapungi and Kolosib of Meghalaya; (4) Aizawl of Mizoram state. In Assam different variety of butterflies are seen during monsoon period as in this season large number of flowering plants become available, which provide food to the growing population (Kakati, 2002). Humidity is another important factor, which affects both larval as well as adult survival rate. High temperature coupled with high humidity increases larval mortality rate (Chapman, 1973). The study of biological activities and behaviour can provide essential information regarding suitable climate and food resources (Kakoti and Kalita, 2002c). Srray report on butterflies from some habitat in Assam are available (Saikia, 2011, 2012, 2014); Saikia and Saikia (2014); Saikia *et al.*, (2010a); Saikia *et al.*, (2010b); Saikia *et al.*, (2009); Saikia *et al.*, (2007); Saikia and Saikia (2006) and Saikia *et al.*,

(2005) etc. A total of 962 species of butterflies have been reported from Northeast India, that indicates the actual number could be above 1,000 species. Although Northeast represents only 7.7% of Indian landmass, it has 66.85% of butterfly diversity of Indian region (www.arunachaltimemes.in IIIrd Northeast Butterfly MEET-2016). In Assam, 343 butterfly species recorded from Barail Wildlife Sanctuary, Cachar, Assam (online Journal at www.entomojournal.com). Quantification of butterfly diversity and species richness is of prime importance for evaluating the status of protected areas (Majumder *et al.*,2012) reported 59 species of butterflies under 48 genera belonging to five families from Trishna Wildlife Sanctuary, Tripura, northeast India. Similarly 113 species belonging to 5 families and 73 genera of order Lepidoptera were recorded during 2008-2009 at Namdapha Tiger Reserve (Sethy *et al.*,2011). In Assam University campus and its vicinity, Cachar district, Assam, 96 species of butterflies belonging to 68 genera and five families were recorded during 2013-2014 (Bora *et al.*,). In Garbhanga Reserve Forest of Assam has also a rich diversity of swallowtail butterflies with 29 species and subspecies belonging to eight genera been recorded during 2004 (Barua *et al.*2004).

Presently due to deforestation, urbanization, industrialization, agriculture and commercial collection, several species have become endangered (Kakoti, 2002). Large scale deforestation has resulted from illegal felling of trees for multipurpose use, uncontrolled domestic cattle grazing, stone quarrying activities, soil cutting, improper forest clearing etc. Unless the local people are made aware on the importance of biodiversity, the existing forest cover will disappear very soon with irreversible loss.

It appears from the records that there is no record of study that has been carried out on butterfly diversity in Amchang Wildlife Sanctuary .Therefore, in the present study it has been aimed to investigate the diversity of butterfly in the Amchang Wildlife Sanctuary of Assam with the following objectives.

Objective of the work: -

- 1) To study the species diversity of butterfly in Amchang Wildlife Sanctuary.
- 2) To study the vegetation of the study area.
- 3) To study anthropogenic pressure in the study area if any.