

## **CHAPTER VI**

### **SUMMARY, FINDINGS AND SUGGESTIONS**

#### **6.1. Summary**

No group of insects is more charismatic than the butterflies. Their size ranges from the tiny jewels like Blues, to the gorgeous Birdwings with a wingspan as great as eight inches. Their glowing colours and delicate flickering movements catch and charm the eye (Isaac kehimkar 2014)

Butterflies (Order: Lepidoptera, Class: Insecta) offer good opportunities for studies on population and community ecology (Pollard, 1991). Today several species of butterflies are used by conservation biologists as indicator species to identify habitats that are critical and need to be protected. Butterflies are also monitored to indicate climate change and environmental degradation. Thus like other animals and birds, butterflies are now studied as living ecological components. The present study was started with a view to examine the diversity and distribution of butterfly population across seasons in chosen three habitats in Amchang Wildlife Sanctuary, Kamrup district, ASSAM. Three different habitats (Ghagua, South Amchang and Bonda) in the vicinity area of the Sanctuary were identified on the basis of their contrasting vegetation types and levels of disturbance and butterfly communities were examined within these natural landscapes to identify factors that influence the diversity and composition of butterfly assemblages. Seasonal patterns in butterfly populations and their correlation with environmental factors were analysed with quantitative data gathered on butterfly populations. This study is the first of its kind of investigation on species richness and relative abundances of butterfly species in Amchang Wildlife Sanctuary.

The field work was done between January 2014 and December 2015. Butterflies in all habitats showed a highly seasonal trend. The populations were low during winter, probably due to cold, low rainfall, low humidity and dry ground covering. In the present study, the relationships between butterflies and climate were complex. Butterflies started appearing commonly from the beginning of March and reached their peak in July, August and September as vegetation and food plants availability are also

increasing during that period. It was observed as an interesting behaviour, that when a butterfly finds a good-source already occupied by another butterfly, it flutters and hovers over the feeder and drives it away. Generally, Papilionids, Pierids, Nymphalids and Lycaenids, all compete for the same flowers. A great deal remains to be discovered to complete our understanding of the behaviour of butterfly fauna, not only in documentation of the species diversity but also their ecology, evolution and population.

The study yielded 47 species of butterfly from the Ghagua site, 47 species from the South Amchang site and 42 species from the Bonda site. The research work indicated that among overall family abundance, the Nymphalidae was preponderant during all the seasons, followed by Pieridae, Papilionidae, Lycaenidae and Satyridae. Population density of the family Nymphalidae remained the same during all seasons except during winter. However Satyridae and Lycaenidae populations fluctuated widely during all the seasons. Pieridae abundance was more during pre-monsoon. A total of 45490 individuals comprising 48 butterfly species from five families were recorded as the total during the present study. In terms of richness, Nymphalidae was the dominant family (25 species) and followed by Pieridae (9 species), Papilionidae (9 species) and Lycaenidae (3 species). Satyridae was represented by only two species in the study area.

### **Findings**

Butterflies contribute one of the best studied groups of animals among the invertebrate fauna. Adult butterflies are popular with people because of their bright coloured wings and their observable daily activities that include feeding on nectar as they visit garden.

More specifically the findings indicate the following:

- In the Amchang Wildlife Sanctuary, around the vicinity area, 68 plant species were observed and identified which were mostly huge and small sized trees, herbs and shrubs.
- Overall, Population density of butterfly in Bonda site was higher than the other two sites, whereas the species diversity was found high in Ghagua and South Amchang site.

- Among the five different families observed the family Nymphalidae was represented by several numbers of individuals. The family Satyridae had the least number of representatives during the entire study period.
- The butterflies *Troides aeacus* (PA9) was observed only in the South Amchang site.
- The *Junonia iphita* (N25) was observed only in the Ghagua.
- Total forty five (45) species were common both South Amchang and Ghagua site.
- Forty two (42) species were common in Ghagua and Bonda and forty two (42) species were common for Bonda and South Amchang.
- The butterfly species viz., *D. chrysippus*, belonging to the family Nymphalidae, *C. pyranthe* belonging to the family Pieridae occurred throughout the study period.
- Fruiting trees, vegetables, flowering plants and other leafy crops served to attract many butterflies. Moreover, their availability throughout the year was another added advantage to the butterflies.
- Butterfly *Junonia iphita* (N25) was observed during the month of June, July, August and September of the entire study period.
- A large number of butterflies were found to use shrubs and herbs as roosting places, especially the *T. septentrionis* preferred tamarind trees. Papilionids such as *Papilio demoleus*, *P. polytes*, *Atrophaneura aristolochiae* and *Papilio memnon* and Pierids like *C.pyranthe*, *Leptosia nina* were observed as predominant species in Amchang Wildlife Sanctuary.
- Butterflies like *Papilio polytes* and *Graphium sarpedon* begins to fly early in the morning and start feeding at the flowers.
- This base line bio-diversity information is highly imperative for better conservation, long term sustainability of natural resources and the human community.
- Despite its limitations, this study attempts the bio-diversity assessment, perhaps for the first time in Amchang Wildlife Sanctuary.

### **Overall conclusion**

Overall, the study revealed the bio-diversity of butterflies in the three sites, the diversity in Ghagua site was extraordinarily high while in South Amchang site, it was moderate and in Bonda site, it was poor. The butterfly species viz., *D. chrysippus*, belonging to the family Nymphalidae and *C. pyranthe* belonging to the family Pieridae occurred throughout the study period. Among the five families studied the family Nymphalidae showed the best representation in almost all seasons than the other families.

The family Satyridae showed least representation during all the seasons. The population density reached its peak during monsoon and showed very poor diversity during the winter season. From this, it is concluded that in the Ghagua site all the climatic conditions are favourable for the butterfly population. The availability of food was present throughout the year, a permanent pond was present inside, fruiting trees and more number of permanent trees were also present here. These were all the factors which enhanced the butterfly population in the Ghagua site.

In South Amchang site due to scarcity of water, dearth of honey leads to moderate population density. In the Bonda site, poor plant diversity, growth of urban area, high wind speed because of the attachment of river Brahmaputra and butterfly diversity was observed low when compared to other two study sites.

**Suggestions**

- There is no doubt that butterflies are potentially a more efficient source of many fascinating facets for mankind. There is a need to link the potential of these bioresources to economic prosperity. Establishment of mass butterfly breeding insectaries with modern artifact such as raising them in artificial diet or through biotechnological intervention could provide a hope for the conservation of them in gardens of butterflies and the golden aspects for income generation too. For instance, butterfly farmers may earn much by harvesting emerging adult of wild butterflies for trading.
- With reference to conservation in Bonda site, vegetation loss may be minimized by planting indigenous trees maintaining the vegetation types of the area rather than planting exotic trees. Controlling grazing and deforestation are the essential factors for conservation of the butterfly species.
- There is a need for more and more analysis of butterfly diversity and population density for the development of butterfly resources in Assam. It is a high time that biodiversity researchers recognize the manifold utilities of butterflies and begin to build on them right now.
- Further research, however, needs to be done in order to determine accurately what are the specific factors that contribute to difference in diversity and density of population in the studied sites.