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Research Article

CLIMATE CHANGE AND ITS IMPACTS ON BUTTERFLY IN AND AROUND KANCHIPURAM DISTRICT, TAMIL NADU

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ABSTRACT

Species abundance has declined in number as revealed by recent studies. A total of 56 species of butterflies under 7 families and 32 genera were observed and recorded in Kanchipuram are Pieridae (15) and Nymphalidae (14) was recorded as the most dominant families in terms of number of species, followed by Papilionidae (8) Lycaenidae (7) Danaidae (5) Hesperiidae (6) and Acraeidae (1). Due to habitat destruction, climate change, pollution and urbanization there is a serious loss in butterfly population. It affects pollination and also ecological imbalance in the ecosystem. Some of the butterflies in the list are under the verge of extinction and also placed in red list catergory.

INTRODUCTION

Butterflies belonging to the class Insecta are perhaps the most popular and colourful organisms that have enchanted people of all ages and walks of life. Based on fossil records, it is presumed that butterflies came into existence some 130 million years ago during the Cretaceous period along with flowering plants and there is enough evidence to suggest possible co-evolution of plants and butterflies (George Mathew 2011).They are good pollinators and some of their larval forms are agricultural pests. They provide the best rapid indicators of habitat quality and also are sensitive (Ramana 2010). India is described as a paradise of butterfly. Butterflies have been studied systematically since early 18th century. So far 19,238 species are documented worldwide (Heppner 1998). Butterfly fauna of India is rich with 1500 species, which is close to 90 percent of the total butterflies in the world (Kunte 2000). Many butterflies migrate through long distance every year, spending the greater part of year in Southern Europe and flying Northwards in spring Chowdhury *et al.* (2013).

Butterflies have been admired for centuries for their physical beauty and behavioral display. These colourful insects frequent open, sunny wildflower gardens, grassy fields, feeding on nectar from flowering plants. They also react to pressures such as climate change (Corezzola 2011) and capable of supplying information on changes in the ambient features of any ecosystem. The response is observed mostly in the form of change in their morphology which may or may not be associated genetically. The quick response to the change in habitat is possible due to short and rapid life cycle, as compared to many other higher animals. The faster life cycle enables them to generate types more suitable to the changing habitat or the environment. Butterfly population may indicate also the change in the diversity of plants Dubey Sheela *et al.* (2015) and are also economically important. In the present study all attempt has been made to find out the biodiversity of Lepidopteran fauna in Kanchipuram district. As per the records in 1963, butterfly abundance was found to be 70 species. Recent study revealed that there was a decline in species abundance. The duration of the study was for about 8 months from December 2015 to September 2016. After the serious destruction in the ecosystem due to heavy flood complete larval forms were washed off which causes risk for many organisms especially butterflies they are very sensitive to the climate change, pollution, urbanization etc. We are losing our healthy ecosystem in the name of development, technological growth and management strategies. Owing to habitat destruction many organisms like insects, birds and wild life animals are under the verge of extinction. Its time to make this world better to our future generations and also for our animals to survive.

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MATERIALS AND METHODS

The present study was carried out in Kanchipuram district, Tamil Nadu. which serves as a biodiversity rich zone. The ecosystem consists of lush green vegetation having large trees, bushy shrubs and long grasses that provide shelter to the butterflies.

The good source of nectar, food plants suitable for egg laying, open sunny space and reduced use of pesticides has resulted in varied species diversity of butterflies in the area. Kanchipuram district is located between 11 00' to 12 00' North of latitude and 77 28' to 78 50' East of longitude. The total geographical area of Kanchipuram district is 4433Sq. km.

Table 1 List of butterflies recorded from Scrub Jungle with Relative Abundance Table

Scientific Name	Common Name	Relative Abundance
Family Papilionidae		
Pachliopta aristolochiae Fabricius	(The Common Rose)	Common
Pachliopta hector Linnaeus	(TheCrimson Rose)	Common
Papilio demoleus Linnaeus	(TheLime Butterfly)	Very common
Papiliopolytes Linnaeus	(The Common Mormon)	Common
Graphium doson Felder	(The Common Jay)	Common
Graphium agamemnon Linnaeus	(The Tailed Jay)	Common
Pathysa crino Cramer	(The common banded peacock)	Rare
Papilio polymnestor Cramer	(The Blue Mormon)	Common
Family Pieridae		
Hebononia glaucippe Linnaeus	(The Great Orange Tip)	Common
Delias eucharis Dury	(The Common Jezebel)	Common
Leptosia nina Fabricius,	(The Psyche)	Very Common
Cepora nerissa Fabricius	(The Common Gull)	Common
Appias albina Felder & Felder	(The Common Albatross)	Rare
Eurema brigitta rubella Wallace	(The Small Grass Yellow)	Fairly common.
Eurema hecabe simulata Moore	The Common Grass Yellow)	Very common
Catopsilia pyrantheLinnaeus	(The Mottled Emigrant)	Fairly common
Catopsilia pomona Fabricius	(The Lemon Emigrant)	Very Common
Catopilia florella Fabricius	(The Common Vagrant)	Common
Colotis etrida Boisduval	(The Little Orange Tip)	Common
Pareronia ceylonica Felder	(The Dark Wanderer)	Rare
Ixias Marianne Cramer	(The White Orange Tip)	Common.
Ixis pyrene Linnaeus	(The Orange Tip)	Common
Colotis eucharis	(The Plain Orange Tip)	Common
Family Lycaenidae		
Castalius rosimon rosimon Fabricius	(The Common Pierrot)	Common
Syntarucus plinius Fabricius	(Zebra Blue)	Common
Chilades laius Cramer	(The Lime Blue)	Very common
Chilades parrhasius Fabricius	(The Small Cupid)	Common
Chilades pandava pandava Horsfield	(The Plains Cupid)	Common
Spindasis vulcanus Fabricius	(The Common Silver Line)	Common
Rathinda amorFabricius	(The Monkey Puzzle)	Common
Family Nymphalidae		
Ariadne ariadne indica Moore	(The Angled Castor)	Common
Ariadne merione merione Cramer	(The Common Castor)	Very common
Junonia iphita pluvialis Fruhstorfer	(The Chocolate Pansy)	Common
Junonia orithya swinhoei Butler	(The Blue Pansy)	Very common
Junonia lemonias Linnaeus	(The Lemon Pansy)	Very common
Hypolimnas misippus Linnaeus	(The Common or Danaid Eggfly)	Common
Hyplolimnas bolina jacintha Drury	(The Great Eggfly)	Very common
Neptis hylas varmona Moore	(The Common Sailor)	Very common
Neptis jumbah jumbah Moore	(The Chestnut Streaked) Sailor)	Common
Phalanta phalantha Drury	(The Leopard Butterfly)	Common
Melanitis leda leda Drury	(The Common Evening Brown)	Very common
Melanitis phedima varaha Moore	(The Dark Evening Brown)	Rare
Orostriona medus mandata Moore	(The Nigger)	Fairly common
Euthialia nais Forster	(Baronet)	Common
Family Danaidae		
Danaus chrysippus chrysippus Linnaeus	(The Plain Tiger)	Very common
Tirumala limniace exoticus Gmelin	(The Blue Tiger)	Very common
Euploea core core Cramer	(The Common Crow)	Very common
Euploea sylvester coreta Godart	(The Double Branded Crow)	Rare
Danaus.genutia genutia Cramer	(Common tigers)	Common
Family Acraeidae		
Acraea (=violae) terpsicore Linnaeus	(The Tawny Coster)	Very common
Family Hesperidae		
Borbo bevani bevani Moore	(The Bevan's Swift)	Rare
Suastus gremius gremius Fabricius	(The Indian palm bob)	Common
Pelopidas mathias mathias Fabricus	(The Small branded swift)	Very common
Caltoris canara Moore	(The Kanara Swift)	Rare,(South Indian Endemic)
Borbo cinnara Wallengren	(The Rice Swift)	Rare
Iambrix salsala lutipennis Evans	((Cestnut bob)	Very common

According to 2001 census, the population of the district is 30.38 lakh the main occupation of the people is agriculture. One of the major crop of Kanchipuram district is Paddy. The other main crops are groundnut, sugarcane, cereals and millets and pulses are the other major crops. Kanchipuram is one of the largest industrial district of Tamil Nadu, The pre-monsoon rainfall is almost uniform throughout the district. The coastal regions receive more rainfall than the interior ones. The district is mainly dependent on the monsoon rains. Failure of monsoon leads to distress condition. Northeast and Southwest monsoon are the major donors, with 54% and 36% contribution each to the total annual rainfall. During normal monsoon, the district receives a rainfall of 1200 mm. The Palar river is the most important river running through the district. The total forest area in the district is 23,586 hectares. The findings presented here are based on random surveys carried out from December 2015 to September 2016.

Collection of butterflies was carried out using the Hand picking method; net sweeping method and tree beating method Arora *et al.* (1995). Net sweeping were carried out to collect the butterflies. The total area was surveyed at regular intervals between 9a.m. to 5p.m. Butterflies were photographed from different angles as often as possible to obtain sufficient photographs to enable positive identification of species. Butterflies were primarily identified directly in the field with the help of field guides followed by photography, and rarely by capture. Collection was restricted to those specimens that could not be identified directly. In such cases, specimens were collected with hand held aerial sweep nets and carried to the laboratory for further identification. With the help of a field guides all individual species were identified in the field Gunathilagaraj *et al.* (1998); (Kunte 2000).

RESULTS

A total of 56 species of butterflies under 7 families and 32genera were observed and recorded. Pieridae (15) and Nymphalidae (14) were recorded as the most dominant families in terms of number of species, followed by Papilionidae (8) Lycaenidae (7) Danaidae (5) Hesperiidae (6) and Acraeidae (1) collected during the study period was presented with family and common names. The observed butterflies were categorized in four categories on the basis of their abundance. C-common (48%), VC-very common (31%), R–rare (16%), FC-fairly common(5%). During this study we were able to document six more species *Colotis etrida, Borbo bevani bevani, Suastus gremius, Borbo cinnara, Caltoris canaraica, Orostriona medus mandata and Iambrix salsala lutipennis* which were nonexistent in the former checklist done in 1963.

Pachliopta hector was the largest butterfly with a wingspan of 138 mm and *Castalius rosimon rosimon* was smallest with 29mm. *Pachliopta hector, Castalius rosimon rosimon* and *Delias eucharis* found in this region are endemic to South India and Sri Lanka *Spindasis vulcanus vulcanus* is endemic to Indian subcontinent. About 95 species of butterflies are recorded under the Indian Wild life Protection Act, 1972. *Hypolimnas misippus, Castalius rosimon rosimon* and *Pachliopta hector* were included in Schedule I, *Cepora nerissa nerissa,* and *Appias albina darada* were included in Schedule II while *Euploea core core* was included in Schedule IV eventhough, the family Pieridae and Nymphalidae exhibited the maximum species diversity compared to other families. The dominance of the host plants belonging to the genus Capparis, Cassia, Bauhinia and Albizia in the study area which are the food plants of pierid butterflies. One species, Common gull (Cepora nerissa) makes all the difference in diversity patterns for Pieridae Balasubramanian *et al.* (2001). According to earlier reports the family Nymphalidae was most predominant in the moist deciduous and evergreen forest. The reason for this extraordinary abundance of Pieridae and Nymphalidae butterflies in the study area can be ascribed to the dominance of their larval food plants in the region (Mathew and Rahamathulla 1993). Similarly, butterfly species richness was low due to lack of vegetation or monoculture plantation and high-level disturbance. High influence of human interferences which was relatively reduced the butterfly diversity (Kunte 2000).

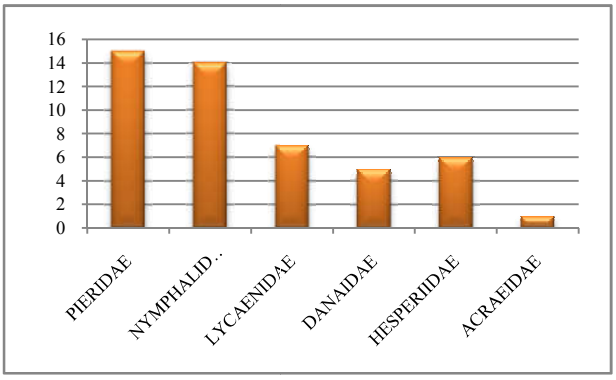

Fig 1 Family-wise composition of butterfly species

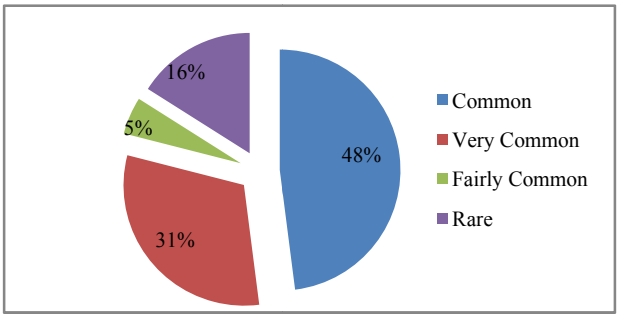

Fig 2 Status of butterfly species in study area

DISCUSSION

Butterflies are looked upon as organisms of great aesthetic value. They also have considerable ecological significance. The immature stages of butterflies or caterpillars are largely herbivorous in habit and thus form the primary consumers in the ecosystem. Climate change can also affect flight times in butterflies. Warmer temperatures will result in more generations of multiple-brooded species, but how this affects the egg-laying periods and other life traits that are determined by photoperiod (which is unchanged by climate change) is unknown (Astrid Caldas 2012).

Butterflies will respond to climate change differently depending on species, and even the same species may have a different response to climate change depending on the specific location where it is found. Population characteristics and constraints, as well as interactions with biotic and abiotic factors, are expected to be localized and in many instances unique. Butterflies visit flowers for nectar leading to

pollination of phanerogamic plants and thereby assisting in the succession of plant communities. Butterflies thus constitute important elements in the functioning of natural ecosystems and food webs. The present study was conducted soon after the floods in Kanchipuram district which could also be a cause for the sudden decline in butterfly population. Buterflies will respond to climatic change differently depending on species and even the same species may have different response to climate change. Due to heavy rains Chennai and neighbouring district Kanchipuram were inundated. According to statistics, Kancheepuram district, is likely to be the wettest station in TN recording an astonishing 2,300 mm (approx) of rain during this northeast monsoon period starting October 1 to December 31.which was almost three times more than the normal rainfall. It has also broken the record of the last ten years. Climatic changes leads to the destruction in biodiversity. If there is any decline in population of butterflies we can assume that particular area has been got disturbed due to some climatic effects. If climatic destruction continues the number will be decreased and that leads to loss of biodiversity. Another major cause is human activities like afforestation, urbanization, pollution etc., which can also lead to the loss of biodiversity

CONCLUSION

Due to the very complex ecological conditions produced as a result of interaction between the rainfall patterns, temperature and topographical features, the butterfly fauna of the Kanchipuram area is rich, varied and diversified. Recent study reveals that there is a species decline in number. Of the 56 species recorded in this study, Pieridae (15) and Nymphalidae (14) was recorded as the most dominant families in terms of number of species, followed by Papilionidae (8) Lycaenidae (7) Danaidae (5) Hesperiidae (6) and Acraeidae (1). Some species are rare, endemic, and protected species, indicating the ecological significance of this region. The survival of a large number of rare, endemic and endangered species in this area is mainly due to the protection of forest tracts of this area. However, considering the rapid pace of urbanization, pollution and climate change leading to total destruction of butterflies.

Reference

Arora GS Ghosh SK Chaudhary M (1995) Fauna of Western Himalaya (Lepidopteran: Rhopalocera) Himalaya Ecosystem Series: Fauna of Western Himalaya Part I (Z.S.I.) Uttar Pradesh pp: 61-73.

Astrid Caldas Spring (2012) Butterflies and Climate Change, American Butterflies.

Balasubramanian P Mahendramani P and Padmapriya K: (2001) Comparison of plant biodiversity pat tern of various dis turbed habitats Of Moongilpallam area in the Western ghats. Report, Salim Ali Center for Ornithology and Natural History, Coimbatore. pp: 56-70.

Corezzola, S (2011) Investigating butterfly communities for biodiversity Monitoring National Forest Service-CNBFVR Italy.

Chowdhury SH and Hossain M (2013) Butterflies of Bangladesh: A Pictorial Handbook pp: 1-9 Revised and Enlarged Version 1. Dhaka, Bangladesh.

Dubey Sheela, Agarwal R.K and Sunil Mondal New records of butterflies (Lepidoptera: Hespiriidae) in baster District (C.G), India *An International Quarterly Journal Of Biology & Life Sciences* 3(2):528-532.

Gunathilagaraj K Perumal TNA Jayaram K and Ganesh Kumar M (1998) Some South Indian Butterflies Published under Project Lifescape Indian Academy of Sciences, Bangalore pp: 270.

George Mathew (July 2011) A Handbook On The Butterflies of Nilgiri Biosphere Reserve.

Heppner, J (1998) Classification of Lepidoptera. Part I, Introduction, Holarctic Lepid 5:148.

Kunte K (1997) Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in northern Western Ghats *J. of Bioscience* 22 (5) pp: 593–603.

Kunte K (2000), India - A Lifescape Butterflies of Peninsular India, Published under Project Lifescape, *Indian Academy of Sciences*, Bangalore pp: 270.

Mathew G and Rahamathulla VK (1993) Studies on the butterflies of silent valley national park, *Entomol*, 18(3&4) pp: 185-192.

Ramana SPV (2010) Biodiversity and conservation of Butterflies in the Eastern Ghats, The Ecoscan, 4: 59-67.

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