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BIODIVERSITY OF BUTTERFLY FROM NASHIK CITY (M.S.) INDIA.

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ABSTRACT-

Nashik district has rich biodiversity of insects in which butterflies are one of the major natural heritage of biodiversity. They are very sensitive to the climatic condition and degradation of environment. Butterflies are the part of food chain also they are the good pollinators. So in this study attempt has been made to examine the biodiversity of butterfly in the Nashik city during April 2018 to Feb.2019. A total of 121 individuals of butterflies belonging to 20 genera and 23 species within five families were recorded. In which Pieridae were dominant consisting 10 species of 8 genera. Whereas Riodinidae and Lycaenidae were recorded less in number i.e. 1 species of 1 genera respectively.

KEYWORDS- Sensitive, Degradation, Butterflies, Pollinators, Food Chain, Ecosystem.

INTRODUCTION-

Nashik is surrounded by the hills, mountains and forests provides huge amount of host, larval food and vegetation which is the most dominant diversity to butterflies and other insects. Adult butterflies are dependent on nectar and pollen as their food while the caterpillars are dependent on specific host plants for foliage (Nimbalkar R.K 2011). Nashik has abundant species of butterflies due to suitable environment to their development and feeding. Among all the insects, butterflies are the most eminent group and they occupy a vital position in ecosystem. Their presence and diversity is considered to be a sign of good condition of any terrestrial biotope (Aluri and Rao,2002). Because of this, they are also considered as an ideal subject for ecological condition of landscape (Thomas and Malorie, 1985). Butterflies, around 18,000 species are estimated to be there in the world and India alone has recorded 1,501 species (Kehimkar 2008) of which 332 species are present in Western Ghat.

Butterflies and their caterpillars are dependent on specific host plants for food, thus the diversity of butterflies indirectly reflects the overall plant diversity especially that of shrubs and herbs in the given area (Padhye et al., 2006). These are also act as pollinators for many native plants and in tropical regions, where there is abundance and great diversity of butterflies; they contribute to growth, expansion and maintenance of flora being a pollinator (Bonebrake et al., 2010).There is a need to study community structure and dynamic group of lepidopterran's with respect to different regions of our country to know the impact of changing natural habitats on diversity and distribution of butterflies. 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 in reflection of human disturbance and habitat feature (Kunte et al 1999; Kocher and Williams 2000; Kunte 2000; Summerville and Crist 2001; Koh 2007) with greater sensitivity than many other taxonomic groups (Thomas et al 2004; Thomas 2005). Butterflies are therefore treated as an important model group in ecology and conservation (Watt and Boggs 2003; Ehrlich and Hanski 2004).

The present study aims to collect a baseline data on butterfly fauna of Nashik and disseminate information and values on the importance and role played by butterfly in maintaining healthy ecosystems and to prepare a checklist of butterflies of this region for the purpose of conservation of indigenous species present in this area.

STUDY AREA-

The present study has been carried out in and around Nashik city. The geographical location of Nashik is 19.9975° N, 73.7898° E. It is situated at an altitude of 584 m above MSL. Nashik is an ancient holy city in Maharashtra, a state in western India. Nashik a district in Maharashtra, India, is noted for the mountains and hills occupying the north and north-east of its territory. It have abundant species diversity

due to its suitable environment. The Godavari river and other water reservoir provides good habitat for many fishes, amphibians, odonates etc., whereas the surrounding forest area is good habitat for birds, reptiles, insects and other animals.

The study is carried out in three different stations of Nashik.

1. **Someshwar:**
2. **KanetakarGarden:**
3. **Chambhar Leni:**

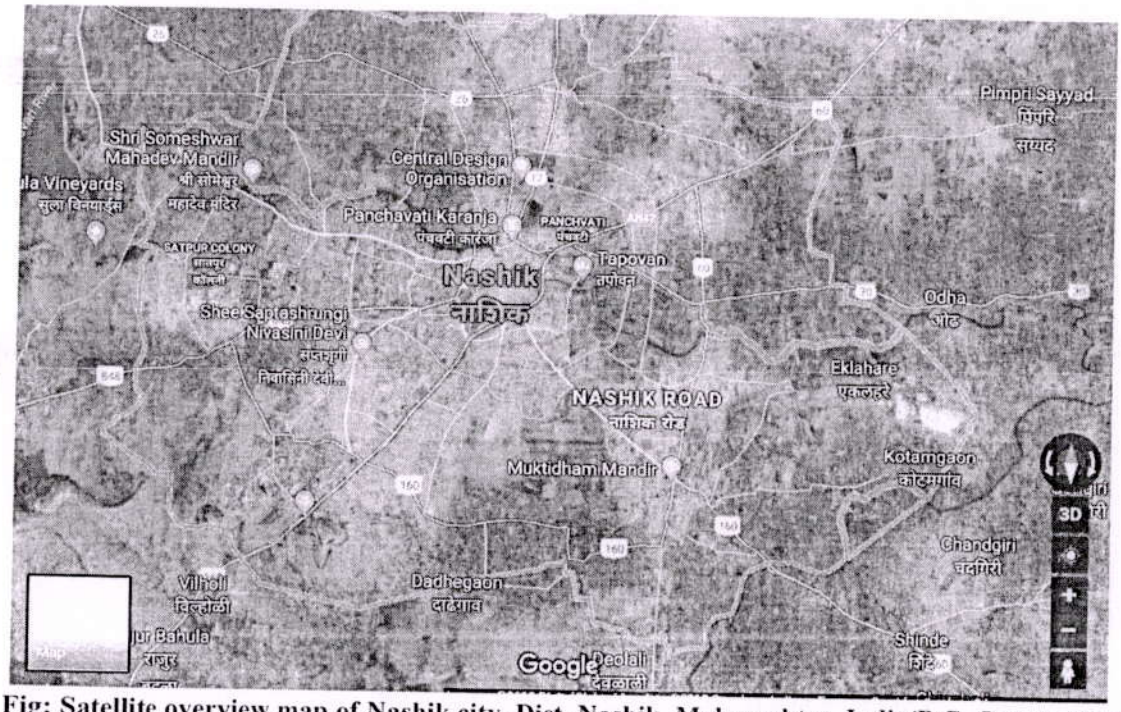


Fig: Satellite overview map of Nashik city, Dist. Nashik, Maharashtra, India(P.C. Google Maps)

MATERIALS AND METHOD-

The findings presented here are based on random surveys carried out from April-2018 to Feb. 2019 in Nashik city. For species identification, the adult butterflies were carefully collected, killed, preserved and stored in insect storage boxes using naphthalene as repellent. In subsequent observations, the repeated collection of same specimen was avoided to the extent possible and photographic documentations were done. Butterflies were photographed from different angles as often as possible to obtain sufficient photographs to enable positive identification of species.

Photographs were taken with a DSLR camera (Sony A68). Butterflies were primarily identified directly in the field with the help of field guides followed by photography, and rarely by capture. Adult butterflies were collected by insect collecting net and were fixed by placing them in 'killing jars' containing ethyl acetate and after that they were carried to the laboratory for identification with the help of an entomologist, and also by referring to various field guides and other available literatures like Evans (1932) and Kunte (1997). After the primary identification all the specimens were send to Zoological Survey of India, Pune for the final identification.

DATA ANALYSIS:

(A)Shannon Index (H'):

Diversity indices are statistics used to summarize the diversity of a population in which each member belongs to a unique group. For example, in ecology the groups are typically species. Species diversity was calculated using the Shannon Index

$$H' = -\Sigma pi \ln pi.$$

Here,

pi is the proportion of the ith species in the total sample. The number of species (species richness) in the community and their evenness in abundance (or equitability) are the two parameters that define *H'*.

(B) Simpson's Index (D):

Simpson's Diversity Index is a measure of diversity. In ecology, it is often used to quantify the biodiversity of a habitat. It takes into account the number of species present, as well as the abundance of each species.

$$D = \frac{\Sigma\, n(n-1)}{N(N-1)}$$

Here,
n = the total number of organisms of a particular species
N = the total number of organisms of all species

RESULT AND DISCUSSION-

Attempt has been made to examine the biodiversity of butterfly in the Nashik city during April 2018 to Feb.2019. A total of 121 individuals of butterflies belonging to 20 genera and 23 species within five families were recorded during the study period. Nymphalidae, Pieridae, Papilionidae, Riodinidae, Lycaenidae these five families were recorded in collection. Among these families, Pieridae consist of maximum number of species i.e. 10 species of 8 genera. Just below, Nymphalidae shows second maximum number of species with 10 species and 9 genera. The minimum number of species were recorded in Riodinidae and Lycaenidae.

In present report, out of 23 species, (43.47%) are common, 09(39.13%) Occasional and 1(4.34%) species is rare. The reduction of rare species may be due to unsuitable climatic condition or may loss of habitat for butterflies. The abundance of butterflies was observed in dense forest area and where man made activities are less. Hence so, increased human activities may leads to affects the numbers of butterflies in selected study area.

Table 1:Species richness, composition and status of butterflies in Nashiik city, Maharashtra, India

Sr. No.	Genera	Species	Family
1	*Danaus*	*Danaus genutia*(Crammer,1779)	Nymphalidae
2	*Phalanta*	*Phalanta phalantha*(Dury,1773)	Nymphalidae
3	*Junonia*	*Junonia lemonias*(Linnaeus,1758)	Nymphalidae
4	*Danaus*	*Danaus chrysippus*(Linnaeus,1758)	Nymphalidae
5	*Euploea*	*Euploea core*(Crammer,1780)	Nymphalidae
6	*Tirumala*	*Tirumala limniace*(Crammer,1775)	Nymphalidae
7	*Ariadne*	*Ariadne merione*(Crammer,1777)	Nymphalidae
8	*Hypolimnas*	*Hypolimnas bolina*(Linnaeus,1758)	Nymphalidae
9	*Parantica*	*Parantica aglea*(Stoll,1781)	Nymphalidae
10	*Delias*	*Delias eucharis*(Dury,1773)	Pieridae
11	*Pareronia*	*Pareronia hippia*(Fabricius,1787)	Pieridae
12	*Ixias*	*Ixias mariaanne*(Crammer,1779)	Pieridae
13	*Ixias*	*Ixias pyrene*(Linnaeus,1764)	Pieridae
14	*Eurema*	*Eurema hecabe*(Linnaeus,1758)	Pieridae
15	*Appias*	*Appias albina*(Boisduval,1836)	Pieridae
16	*Leptosia*	*Leptosia nina*(Fabricius,1793)	Pieridae

17	*Belonois*	*Belonois aurota*(Fabricius,1793)	Pieridae
18	*Cepora*	*Cepora nerissa*(Fabrocius,1775)	Pieridae
19	*Pachliopta*	*Pachliopta aristolochiae*(Fabricius,1775)	Papilionidae
20	*Papilio*	*Papilio polytes*(Linnaeus,1758)	Papilionidae
21	*Papilio*	*Papilio demoleus*(Linnaeus,1758)	Papilionidae
22	*Jamides*	*Jamides celeno*(Crammer,1775)	Lycaenidae
23	*Apodemia*	*Apodemia mormo* (Crammer,1780)	Riodinidae

Chart: Species Composition, abundance & status of butterflies in Nashik city, Maharashtra, India

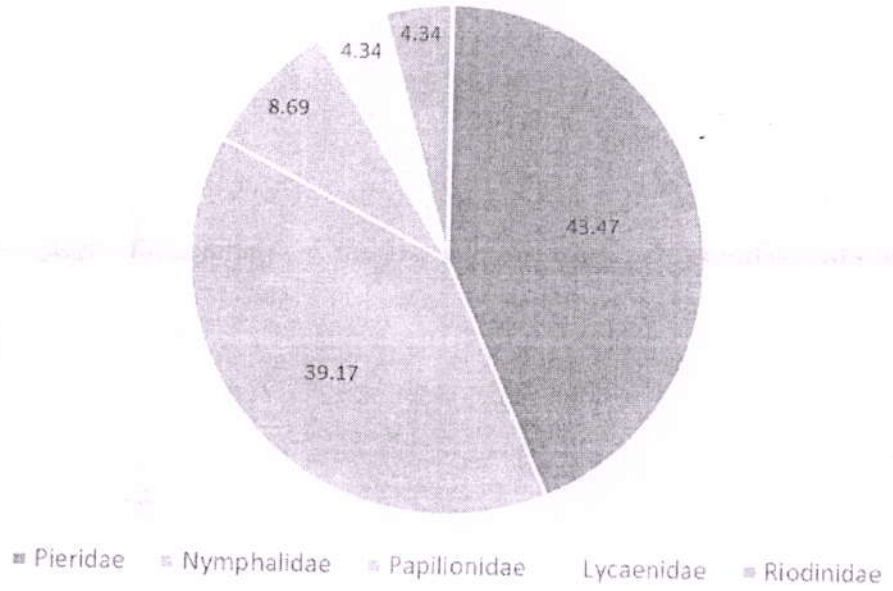
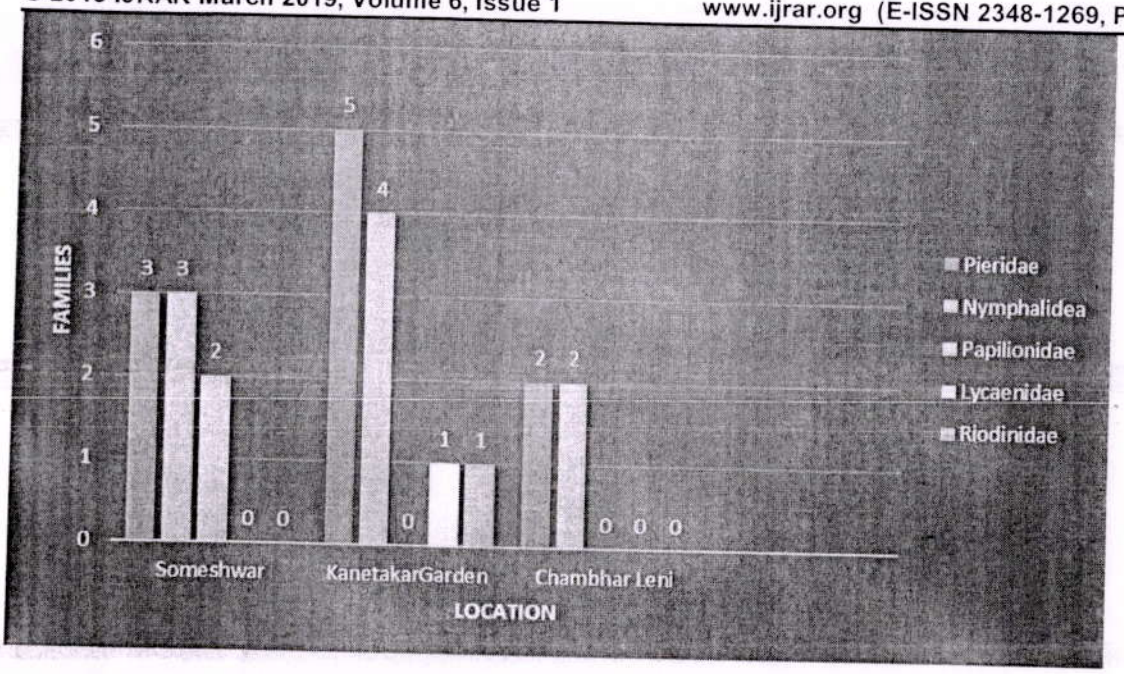


Table 2: Species Composition, abundance & status of butterflies in Nashik city, Maharashtra, India

Sr. no.	Family	No. of Genera	No. of Species	Percent (%)
1	Pieridae	8	10	43.47
2	Nymphalidae	8	9	39.17
3	Papilionidae	2	2	8.69
4	Lycaenidae	1	1	4.34
5	Riodinidae	1	1	4.34
Total	**5**	**20**	**23**	**100%**

Table:3. Family wise distribution of butterfly species in three sacred groves of Nashik

Sr. No.	Location	Pieridae	Nymphalidae	Papilionidae	Lycaenidae	Riodinidae
1	Someshwar	3	3	2	0	0
2	Kanetakar Garden	5	4	0	1	1
3	Chambhar Leni	2	2	0	0	0



Family wise distribution of butterfly species in three sacred groves of Nashik.

DIVERSITY INDICES OF BUTTERFLIES:

The calculated values of different diversity indices are in Table 4. The first index used in the present study is Shannon - Wiener Diversity index (H) & Simpson Index(D).

Table. 4. Calculated values of diversity indices for the year 2018-19.

Sr. No.	Location	Shannon-Wiener Index	Simpson Index
1	Someshwar	1.080	0.25
2	Kanetakar Garden	0.728	0.31
3	Chambhar Leni	0.69	0.33

Species diversity is found highest in Kanetakar Garden(1.080) while as it was lowest in Chambhar Leni (0.69) as Shannon index.

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