

A COMPARATIVE STUDY OF DIVERSITY OF BUTTERFLIES IN SELECTED AREAS OF INDORE

Sneha Nair¹, Dr.V.K.Sharma², Harsh Vishwakarma³

¹Research Scholar, Department of Zoology, Holkar Science College, Indore (M.P.) ²Assistant Professor, Department of Zoology, Student Holkar Science College, Indore (M.P.)

³PG Research Scholar, Department of Zoology, Holkar Science College, Indore (M.P.)

ABSTRACT

A diversity study was conducted in three different sites of Indore that are Butterfly garden of Govt. Holkar Science College, Sirpur Lake (Ramsar Site) and Ralamandal Wildlife Sanctuary. These three sites represent three different habitats. The first one is a manmade ecosystem, the second one is a wetland habitat and the last one is a forest area. A comparative study was done for the period of January 2017 to December 2022 in these selected areas. The occurrence and diversity of butterflies in a habitat is determined by the presence of nectar and larval host plants. On the basis of different vegetation and other abiotic conditions, butterfly diversity prevails in these three different habitats. A total of 68 species of butterflies were identified in Holkar Science College, 58 from Sirpur Lake and 39 from Ralamandal Wildlife Sanctuary.

KEYWORDS

Butterfly diversity, Ramsar Site, Wetland, Habitat, Larval host plants

1. INTRODUCTION

Butterflies hold a special position in ecosystem and their presence and diversity indicates good environmental health of the ecosystem (Kunte 2000; Aluri and Rao 2002; Thomas 2005). Butterflies are considered as one of the best bio-indicators as they are extremely sensitive to any changes in their environment like temperature, light, rainfall, humidity & loss of habitat. They also have short life cycle due to which their response to change is quick and easily visible [1]. A large percentage of butterfly species, like many other insects, are confined to particular microhabitats in comparatively tiny areas of seminatural habitat (Thomas 1991, 1993). At present there are 315 butterfly species in Red Data Book, and many of them are extinct [2]. Therefore survey to evaluate status of butterflies is very important for conservation of butterflies and ecosystem.

2. MATERIALS AND METHOD

2.1 Study Area

1. Butterfly Garden of Holkar Science College

The Govt. Holkar Science College is situated in Indore (22.6954° N, 75.8708° E) The campus covers an area of 34 acres and consist of 14 gardens rich in long trees like Ashok, Mango, Neem, shrubs and grasses making it a suitable place for butterflies [3]. In Holkar Science College a butterfly garden has been set up in year 2014. It is not just a garden instead a living-museum to study various species of birds, butterflies, and other insects [4]. This butterfly garden consists of nectar plants and host plants of butterflies and hence attracts more than 60 species of butterflies throughout the year.

Sirpur Lake- Sirpur Lake is located in Indore-Dharwad (22°42'02"N 78°48'46"E). It is spread in 800 acres with the surrounding protected areas. It is home to many species of native birds and migratory birds. Some of the migratory birds fly from Mongolia and Siberia in winters to the Sirpur Lake. The vegetation surrounding the lake and the microclimate of the area also attracts many species of butterflies

Ralamandal Wildlife Sanctuary-Ralamandal Wildlife Sanctuary is a wild life Sanctuary located in Indore (22.6464° N, 75.9006° E). It was established in year 1989 and covers an area of 234.550 hectare. It is one of the popular Wildlife Reserve of India. Its importance dates back from Holkar dynasty as it was used as hunting ground by royals. Rich vegetation of Ralamandal Wildlife Sanctuary includes tall trees like Teak, Saja, Shisham, Gliricidia, Babool, Bamboo, Eucalyptus and shrubs attracting different species of butterflies.

2.2 Field Survey

The study areas were visited from July 2017 to December 2022. The butterflies were observed by using Pollard walk method in which the survey route was followed by slow and steady walk and recording butterflies within 2.5 meters on the sides and 5 meters in the front [5]. The time of visit was usually between 9 A.M. to 2 A.M. Butterflies were observed, photographed and identified using the field guide. Only in rare cases where butterflies could not be identified, capture and release method was used. In capture and release method an aerial net was used and butterflies were released after identification. The butterflies recorded during the survey are classified as Very Common (VC), Common (C), Rare (R), and Very Rare (VR) [6, 7].

2.3 Butterfly Identification

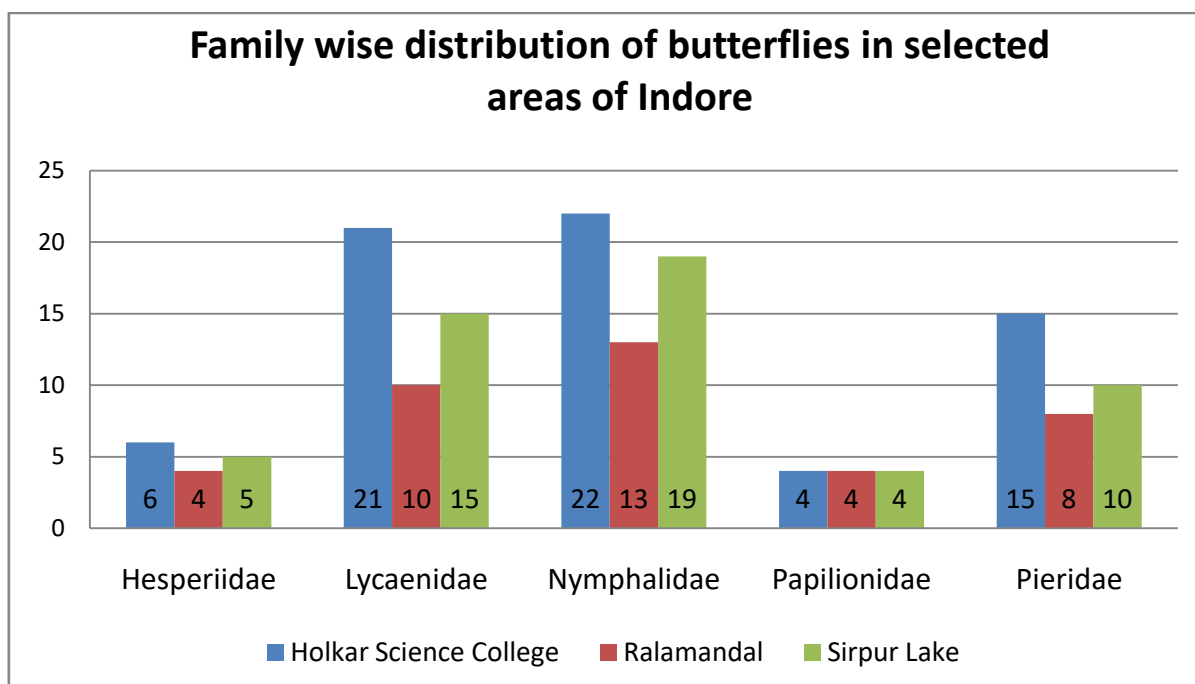
The field guide Butterflies of India (Singh, 2020) [8], Butterflies of India (Smetacek, 2016) [9], Evans (1932) [10] were used for reference.

Table 1. Butterfly species with the family they belong, scientific names and their abundance status recorded during the study in selected areas of Indore.

FAMILY	COMMON NAME	SCIENTIFIC NAME	HSC	SL	RWS
Family I: HESPERIIDAE	Small Branded Swift	<i>Pelopidas mathias</i>	VR	VR	R
	Rice Swift	<i>Borbo cinnara</i>	VR	VR	R
	Indian Palm Bob	<i>Suastus gremius</i>	VR	VR	R
	Indian Grizzled Skipper*	<i>Spialia galba</i>	VR	-	-
	Common Banded Awl	<i>Hasora chromus</i>	R	R	-
	Brown Awl	<i>Badamia exclamationis</i>	VR	VR	VR
Family II: LYCAENIDAE	Red Pierrot	<i>Talicerca nyseus</i>	VC	VC	VC
	Common Pierrot	<i>Castalius rosimon</i>	VC	VC	VC
	Angled Pierrot*	<i>Caleta decidia</i>	VR	-	-
	Rounded Pierrot	<i>Tarucus extricates</i>	VR	VR	-
	Zebra Blue	<i>Tarucus plinius</i>	VC	VC	VC
	Gram Blue	<i>Euchrysops cnejus</i>	VC	VC	VC
	Pale Grass Blue	<i>Pseudozizeeria maha</i>	VC	VC	VC
	Dark Grass Blue	<i>Zizeeria karsandra</i>	C	-	-
	Tiny Grass Blue	<i>Zizula hylax</i>	VC	VC	-
	Lesser Grass Blue	<i>Zizina otis</i>	C	C	C
	Plains Cupid	<i>Luthrodes pandava</i>		VR	VR
	Small Cupid	<i>Chilades parrhasius</i>		VR	-
	Forget-Me-Not	<i>Catochrysops Strabo</i>		VR	VR
	Common Cerulean	<i>Jamides celeno</i>	C	C	C
	Pea Blue	<i>Lampides boeticus</i>		VR	VR
	Lime Blue	<i>Chilades lajus</i>		VR	-
	Large Oakblue	<i>Arhopala amantes</i>		-	-
	Common Lineblue	<i>Prosotas nora</i>	C	-	-
	Tailless Lineblue	<i>Prosotas dubiosa</i>	C	C	-
	Common Red Flash*	<i>Rapala airbus</i>		-	-
Peacock Royal	<i>Tajuria cippus</i>		-	-	
Family III: NYMPHALIDAE	Common Castor	<i>Ariadne merione</i>	VC	VC	VC
	Tawny Coster	<i>Acraea terpsicore</i>	C	C	C
	Common Leopard	<i>Phalanta phalantha</i>	-	VR	VR
	Peacock Pansy	<i>Junonia almanac</i>	R	R	-
	Lemon Pansy	<i>Junonia lemonias</i>	VC	VC	VC
	Chocolate Pansy	<i>Junonia iphita</i>	C	C	C
	Grey Pansy	<i>Junonia atlites</i>	R	C	R
	Yellow Pansy	<i>Junonia hierta</i>	R	R	-
	Blue Pansy	<i>Junonia orithya</i>	R	C	-
	Baronet	<i>Euthalia nais</i>	VR	R	VR
	Great Eggfly	<i>Hypolimnas bolina</i>	VC	VC	VC
	Danaid Eggfly	<i>Hypolimnas misippus</i>	VC	VC	VC
	Common Sailor	<i>Neptis hylas</i>	C	R	C
	Common Baron	<i>Euthalia aconthea</i>	C	-	-
	Blue Tiger	<i>Tirumala limniace</i>	C	C	-
	Plain Tiger	<i>Danaus chrysippus</i>	C	VC	VC
	Striped Tiger	<i>Danaus genutia</i>	R	R	R
	Common Evening Brown	<i>Melanitis leda</i>	R	C	-
	Dark Evening Brown	<i>Melanitis phedima</i>	R	C	-
	Common Crow	<i>Euploea core</i>	VC	VC	VC
	Lesser Three-ring	<i>Ypthima inica</i>	R	-	-
	Common Three-ring	<i>Ypthima asterope</i>	R	-	-
		Common Joker	<i>Byblia ilithyia</i>	-	-
Family IV: PAPILIONIDAE	Common Mormon	<i>Papilio polytes Cr</i>	VC	VC	VC
	Common Lime Swallowtail	<i>Papilio demoleus L.</i>	C	C	C
	Tailed Jay	<i>Graphium Agamemnon L.</i>	C	C	C
	Common Jay	<i>Graphium sarpedon</i>	C	C	C
Family V: Pieridae	Common Grass Yellow	<i>Eurema hecabe</i>	VC	VC	VC
	Small Grass Yellow	<i>Eurema brigitta</i>	C	-	-
	One Spot Grass Yellow	<i>Eurema andersonii</i>	VC	-	-

Three Spot Grass Yellow	<i>Eurema blanda</i>	R	-	-
Spotless Grass Yellow	<i>Eurema laeta</i>	C	C	C
Common Emigrant	<i>Catopsilia crocale pomona</i> F.	VC	VC	VC
Mottled Emigrant	<i>Catopsilia pyranthe</i> L.	C	C	C
Common Gull	<i>Cepora nerissa</i> F.	C	C	C
Lesser Gull	<i>Cepora nadina</i>	C	C	-
Common Jezebel	<i>Delias eucharis</i>	VC	VC	VC
Common Wanderer	<i>Pareronia valeria</i>	C	-	-
Psyche	<i>Leptosia nina</i>	VR	VR	-
Pioneer	<i>Belenois aurota</i>	R	-	-
Plain Orange Tip	<i>Colotis aurora</i>	R	VR	C
White Orange Tip	<i>Ixias Marianne</i>	R	VR	C

Where, VC = Very Common, C = Common, R = Rare and VR = Very Rare* = First reporting from Indore district. HSC-Holkar Science College, SL-Sirpur Lake, RWS- Ralamandal Wildlife Sanctuary.



RESULT OF DATA ANALYSIS

STUDY AREA	SHANON INDEX	SIMPSON INDEX	PIELOU'S EVENESS INDEX
HOLKAR SCIENCE COLLEGE	3.93	0.978	0.933
RALAMANDAL WLS	3.54	0.969	0.967
SIRPUR LAKE	3.77	0.975	0.954

RESULT

Total 68 species of butterflies from 5 different families were found in Holkar Science College during the study. 6 butterflies from Hesperiiidae family, 21 from Lycaenidae family, 22 from Nymphalidae family, 4 from Papilionidae, and 15 from Pieridae family.

In Sirpur Lake total 53 species of butterflies from 5 different families were found during the study. 5 butterflies from Hesperiididae family, 15 from Lycaenidae family, 19 from Nymphalidae family, 4 from Papilionidae, and 10 from Pieridae family.

In Ralamandal Wildlife Sanctuary 39 species of butterflies from 5 different families were found. 4 butterflies from Hesperidae family, 10 from Lycaenidae family, 13 from Nymphalidae family, 4 from Papilionidae, and 8 from Pieridae family.

DISCUSSION

The highest diversity of butterflies were found in Holkar science college with a Shannon Index of 3.93 and Simpson Index of 0.978 followed by Sirpur and Ralamandal. The Evenness Index was found to be maximum for Ralamandal.

These results can be attributed by the presence of nectar and Larval host plant species, whose occurrence impacts distribution of butterflies in any habitat [10]. High diversity of butterflies in butterfly gardens of Holkar Science College can be explained by the fact that the gardens are man-made ecosystem that is well maintained and rich in nectar and larval host plants. Sirpur lake is a wet land that consist of some forest area with varieties of trees and bushes surrounding the lake that support fairly good diversity of butterflies but the area is home to many predators of butterflies. Birds feed their young ones with caterpillars mainly so their breeding season is in accordance with the maximum availability of caterpillars. Ralamandal is a nature habitat of dry deciduous type with scarce vegetation in summers. It is not very diverse in nectar and larval host plants.

Butterfly diversity serves as a surrogate for biodiversity because these insects are highly dependent on plant diversity (Ferrer-Paris et al. 2013; Janz et al. 2006). Butterflies are indicators of a healthy environment. Their abundance indicates healthy ecosystem whereas decrease in their number shows disturbance in ecosystem [11]. Change in Habitat & climate coupled with the loss of habitat are the biggest threat to butterflies [12]. At present there are 315 butterfly species in Red Data Book, and many of them are extinct.

A report by the Food and Agriculture organization of United Nations states that 75% of world's food crops depend on pollination to some extent. The report also mentioned that 35% of invertebrate pollinators particularly bees and butterflies are facing extinction globally. There is worrisome decline in their number. Hence serious measures should be taken in order to conserve these magnificent organisms.

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