



Butterfly Diversity of Bangalore Urban District

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Abstract– The butterfly diversity has been studied at several green patches including gardens, lakes and parks in Bangalore Urban District. The study area is situated in the southeast of the South Indian state of Karnataka. It is in the heart of the Mysore Plateau (a region of the larger Precambrian Deccan Plateau). The dominant vegetation types in cities are grass land, mixed plantation, gardens in the middle of busy roads, parks and urban forest areas with mixed deciduous and non-deciduous trees and scrubland serving as ideal habitats for various types of insects, especially butterflies. A total number of 116 species from 18 subfamilies belonging to six major families and were recorded in eight selected sites. Among which Blues were the most dominant families representing 35 species, followed by Brush-footed 34 species. The objective of the present survey is to determine the presence of butterflies and seasonal abundance of Bangalore Urban District. Maximum numbers of species of butterflies were recorded during the rainy season, followed by summer and winter. (Table 1). During my study R K Mission Campus showed the maximum number of butterfly species (Table 3).

Keywords– *Butterflies, habitat, diversity, Bangalore Urban District.*

INTRODUCTION:

Out of 1.5 million known species of animals, plants and microbes on earth, over 800,000 species are insects. Perhaps butterflies are the most beautiful and colorful creatures on the earth and are called as the flying jewels or winged jewels of nature. They act as biodiversity indicators as well as nature's gardeners. Amongst all the insect groups, they are the best and most taxonomically studied and well observed not only by the lepidopterists, entomologists but also by laymen. Their caterpillars can be reared at home and the transformation from caterpillar to butterfly can easily be observed. Therefore, they make excellent subjects for natural history observations and scientific studies.

Based on their morphology, the order Lepidoptera is divided into six major families. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1504 species of butterflies of which peninsular India hosts 351 and the Western Ghats 334 species. Bangalore alone hosts about 140 species (Yates, J.A. 1933). Butterflies and moths

(order Lepidoptera) offer good opportunities for studies on population and community ecology (Pollard, 1991).

STUDY AREA:

Bangalore is positioned at 12.97° N 77.56° E and covers an area of 2,190 square kilometres. In the aspect of nurturing flora and fauna, the situation in Bangalore is quite complex. With prominent green spaces like Lalbagh and Cubbon Park almost at the city centre and a few water bodies, such as Ulsoor, Sankey, Lalbagh, Yediyur and Madiwala, scattered across city's landscape, the remaining green spaces in the periphery harbour a great number of species. The rich diversity speaks for the volume of life still persisting inspite of rapid urban growth.

Site 1: Yediyur Lake: Lakes in the Hi Tech city enhance the beauty of the place. Yediyur Lake is one such lake which is located at the Silicon Valley. The lake shores are an ideal destination for morning walkers as it has well decorated paths and are specially designed for morning walkers and joggers. In fact this place is also a favourite hot spot for the local residents who often visit the lake for bird watching.

Site 2: Lalbagh Botanical Garden: Lalbagh is a popular botanical garden situated in Bangalore. This garden is a home to a variety of flora and fauna which is spread over 240 acres. The botanical garden is enriched with numerous native and exotic flora of wide ranging diversity, use and interest. Nearly 673 genera and 1,854 species of plants are found in Lalbagh. The collection of the plants has made it as a veritable treasure house of plants. Lalbagh Botanical Garden also has a lake that adds to the already existing beauty of the garden.

Site 3: Cubbon Park: It was basically designed as a public park in an area of about 100 acres and expanded over the years. The park has a predominant green area with a few concrete buildings, housing government and other organizations' offices. The landscaping in the park creatively integrates natural rock outcrops with thickets of trees, massive bamboos, with grassy expanse and flowerbeds, rich in plant wealth, many indigenous and exotic botanical species are found here.

Site 4: IISc Campus: The Indian Institute of Science campus is a green patch of 170 hectares in the North of Bangalore. It was probably open scrub and farmland. A major change has been an increase in tree cover and a decrease in area under scrub and open land. Avenue trees of May Flower (*Delonix regia*), Rain Tree (*Samanea saman*), Mahogany (*Swietenia mahogani*), several species of *Cassia*, *Tabebuia* and groves of *Ficus benjamina* dominate the scenery. Dense thickets of *Lantana*, Grasslands and open ground are found in and around.

Site 5: Puttenahalli Lake- Yelahanka: Puttenahalli Lake has a recorded area of 13 acres 25 guntas with a perimeter of 1.1 km (measured walking track perimeter 920 m). It is rain-fed with no other water source. This Puttenahalli Lake is sometimes confused with the significantly bigger Jarganahalli Lake (that is also called as Sarakki Lake or Puttenahalli Lake). The lake was almost 'LOST', on the brink of extinction. Now it is home to several species of water and land birds, butterflies and many other insects and creatures. Over 200 trees have been planted around the periphery of the lake which teems with fish, crabs, water snakes, etc. In short, the lake is a natural world in microcosm, a bird sanctuary in the middle of a concrete urban jungle.

Site 6: Hebbal Lake: Hebbal Lake is one of the oldest and most popular lakes in Bangalore. It is well known as a habitat for numerous exotic local and migratory birds. The lake is situated in the northern part of Bangalore, along the Bellary Road. The huge lake covers an area of around 150 acres. The lake also possesses a beautiful garden adjacent to it. Two artificial islands were created on the lake. The islands

were developed in order to enhance the beauty of the lake and to attract more birds. Today these two vegetated islands have turned into the roosting sites for several species of water-birds. The Hebbal Lake is one of the few existing water bodies in Bangalore Urban District. In the fast evolving concrete maze of urban structures, the lake stands as a serene place for natural beauty.

Site 7: Madiwala Lake: The Madiwala Lake is located in the southern part of Bangalore in the Indian State of Karnataka. It comes under the Karnataka Forest Department. There is a garden in the vicinity of the lake which has big trees. This is the very reason for the lake being called as the Lake Garden. The park provides joggers, local residents and children a peaceful atmosphere and the pleasant sounds of birds. There is also a rose garden and a nursery for plants. An island is there in the central portion of the lake which has plenty of bamboos. Variety of bird species fly to this place in the winter season as per their migratory seasonal patterns.

Site 8: R K Mission, Shivanahalli: Shivanahalli near south of Bangalore City, Jigani Hobli, Anekal Taluk, Karnataka State consists of dry deciduous forests and thorny scrub, with patches of moist deciduous forests along the streams. It is also termed as eastern fringe of the Western Ghats since it is all the way connected to Western Ghats. Rama Krishna Mission Shivanahalli along with the Karnataka Forest Department proposes to bring all interested individuals and organizations to a common platform for the conservation and preservation of nature and wildlife of Bannerghatta National Park for the future progeny.

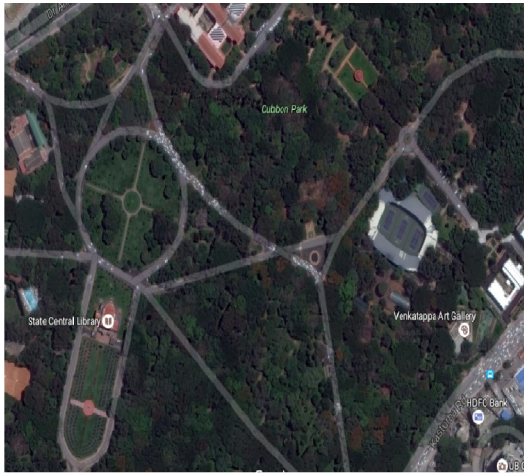
Fig 1: Study sites in the Bangalore Urban District:



Site 1: Yedyur Lake



Site 2: Lalbagh Botanical Garden



Site 3: Cubbon Park



Site 4: IISc Campus



Site 5: Puttenahalli Lake, Yelahanka



Site 6: Hebbal Lake



Site 7: Madivala Lake



Site 8: R K Mission, Shivanahalli

MATERIALS AND METHODS

Selected eight locations (figure 1) were visited every month from September 2014 to September 2016. Observations were made through a round walk, 30 minutes count and all-out search methods. The butterflies were identified in the field itself mainly by observing their wing colour and patterns and also with the help of field guides. Each study site possessed more than one vegetation type i.e. Dense, Open, Scrub, Bamboo clumps, Grassland and Fields.

RESULTS AND DISCUSSION

A total of 116 species of butterflies belonging to six families and 18 subfamilies were counted from the eight selected study sites. Of these, family

Lycaenidae was the largest represented by 35 species (30.17%) followed by Nymphalidae with 34 species (29.31), Pieridae with 19 species (16.38%), Hesperidae with 17 species (14.66%) and Papilionidae with 10 species (8.62%) and Riodinidae was the lowest with 1 species (0.86), (Figure 2).

Out of 116 species, 10 butterfly species comes under the protection category of the Indian Wildlife Protection Act 1972, out of which 6 falls under Scheduled I, 3 under Schedule II and 1 under Schedule IV. A total checklist of butterflies (family wise) collected during the study period is presented with common names and scientific names in Table 2.

Figure 2: total count of butterflies' Family wise

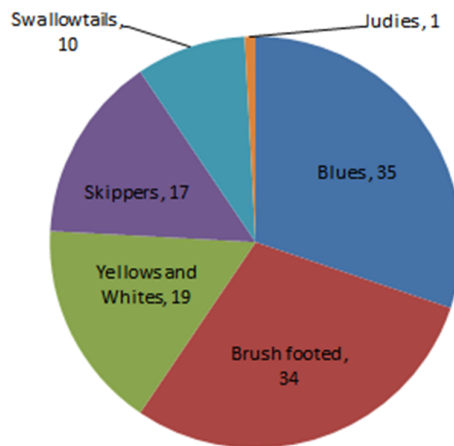


Table 1: the species of butterflies' Season wise

SL No	Seasons	Species
1	Summer	72
2	Winter	66
3	Rainy	76

Table 2: Checklist of Butterflies documented at Bangalore Urban District

No	Common name	Scientific name	Family	Remarks
1	Common Banded Awl	<i>Hasora chromus</i>	Skippers	
2	Karwar Swift	<i>Caltoris canaraica</i>	Skippers	
3	Giant Redeye	<i>Gangara thyrsis</i>	Skippers	
4	Dark Palm Dart	<i>Telicota bambusae</i>	Skippers	
5	Bush Hopper	<i>Ampittia dioscorides</i>	Skippers	
6	Indian Grizzled Skipper	<i>Spialia galba</i>	Skippers	
7	Grass Demon	<i>Udaspes folus</i>	Skippers	



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8	Chestnut Bob	<i>Iambrix salsala</i>	Skippers	
9	Oriental Grass Dart	<i>Taractrocera maevius</i>	Skippers	
10	Indian Palm Bob	<i>Suastus gremius</i>	Skippers	
11	Common Snow Flat	<i>Tagiades japetus</i>	Skippers	
12	Brown Awl	<i>Badamia exclamationis</i>	Skippers	
13	Common Branded Redeye	<i>Matapa aria</i>	Skippers	
14	Rice Swift	<i>Borbo cinnara</i>	Skippers	
15	Parnara Swift	<i>Parnara Spp</i>	Skippers	
16	Conjoined Swift	<i>Pelopidas conjuncta</i>	Skippers	
17	Dakhan Spotted Small Flat	<i>Sarangesa purendra hopkinsi</i>	Skippers	
18	Narrow Banded Blue-bottle	<i>Graphium teredon</i>	Swallowtails	
19	Common Jay	<i>Graphium doson</i>	Swallowtails	
20	Tailed Jay	<i>Graphium agamemnon</i>	Swallowtails	
21	Common Cormon	<i>Papilio polytes</i>	Swallowtails	
22	Blue Mormon	<i>Papilio polymnestor</i>	Swallowtails	
23	Lime Butterfly	<i>Papilio demoleus</i>	Swallowtails	
24	Common Rose	<i>Atrophaneura aristolochiae</i>	Swallowtails	
25	Crimson Rose	<i>Atrophaneura hector</i>	Swallowtails	Schedule I
26	Common Banded Peacock	<i>Papilio crino</i>	Swallowtails	
27	Spot Swordtail	<i>Graphium nomius</i>	Swallowtails	
28	Three Spot Grass yellow	<i>Eurema blanda</i>	Yellows and Whites	
29	Common Grass yellow	<i>Eurema hecabe</i>	Yellows and Whites	
30	Spotless Grass yellow	<i>Eurema laeta</i>	Yellows and Whites	
31	Small Grass Yellow	<i>Eurema brigitta</i>	Yellows and Whites	
32	Common Emigrant	<i>Catopsilia pomona</i>	Yellows and Whites	
33	Mottled Emigrant	<i>Catopsilia pyranthe</i>	Yellows and Whites	
34	Yellow Orange Tip	<i>Ixias pyrene</i>	Yellows and Whites	
35	White Orange Tip	<i>Ixias marianne</i>	Yellows and Whites	
36	Great Orange Tip	<i>Hebomoia glaucippe</i>	Yellows and Whites	
37	Little Orange Tip	<i>Colotis etrida</i>	Yellows and Whites	
38	Crimson Tip	<i>Colotis danae</i>	Yellows and Whites	
39	Plain Orange Tip	<i>Colotis aurora</i>	Yellows and Whites	
40	Common Wanderer	<i>Pareronia valeria</i>	Yellows and Whites	
41	Common Albatross	<i>Appias albina</i>	Yellows and Whites	Schedule II



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42	Pioneer	<i>Belenois aurota</i>	Yellows and Whites	
43	Indian Jezebel	<i>Delias eucharis</i>	Yellows and Whites	
44	Psyche	<i>Leptosia nina</i>	Yellows and Whites	
45	Common Gull	<i>Cepora nerissa phryne</i>	Yellows and Whites	Schedule II
46	Small Salmon Arab	<i>Colotis amata</i>	Yellows and Whites	
47	Large Oakblue	<i>Arhopala amantes</i>	Blues	
48	Indian Sunbeam	<i>Curetis thetis</i>	Blues	
49	Common Guava Blue	<i>Virachola isocrates</i>	Blues	
50	Apefly	<i>Spalgis epeus</i>	Blues	
51	Monkey Puzzle	<i>Rathinda amor</i>	Blues	
52	Common Pierrot	<i>Castalius rosimon</i>	Blues	Schedule I
53	Banded Blue Pierrot	<i>Discolampa ethion</i>	Blues	
54	Common Silverline	<i>Spindasis vulcanus</i>	Blues	
55	Slate Flash	<i>Rapala manea</i>	Blues	
56	Red Pierrot	<i>Telicada nyseus</i>	Blues	
57	Zebra Blue	<i>Leptotes plinius</i>	Blues	
58	Forget me Not	<i>Catochrysops strabo</i>	Blues	
59	Common Lineblue	<i>Prosotas nora</i>	Blues	
60	Tailless Lineblue	<i>Prosotas dubiosa</i>	Blues	
61	Dingy Lineblue	<i>Petrelaea dana</i>	Blues	
62	Common Cerulean	<i>Jamides celeno</i>	Blues	
63	Dark Cerulean	<i>Jamides bochus</i>	Blues	
64	Pea Blue	<i>Lampides boeticus</i>	Blues	Schedule II
65	Lime Blue	<i>Chilades lajus</i>	Blues	
66	Gram Blue	<i>Euchrysops cnejus</i>	Blues	
67	Common Hedge Blue	<i>Acytolepis puspa</i>	Blues	Schedule I
68	Pale Grass Blue	<i>Pseudozizeeria maha</i>	Blues	
69	Lesser Grass Blue	<i>Zizina otis</i>	Blues	
70	Tiny Grass Blue	<i>Zizula hylax</i>	Blues	
71	Dark Grass Blue	<i>Zizeeria karsandra</i>	Blues	
72	Grass Jewel	<i>Freyeria trochylus</i>	Blues	
73	Plains Cupid	<i>Chilades pandava</i>	Blues	
74	Small Cupid	<i>Chilades parrhasius</i>	Blues	
75	African Babul Blue	<i>Azonus jesous gamra</i>	Blues	



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76	Silverstreak Blue	<i>Iraota timoleon</i>	Blues	
77	Pointed Ciliate Blue	<i>Anthene lycaenina</i>	Blues	
78	Bright Babul Blue	<i>Azanus ubaldus</i>	Blues	
79	Redspot	<i>Zesius chrysomallus</i>	Blues	
80	Suffused Double Banded Judy	<i>Abisara bifasciata</i>	Judies	
81	Blue Tiger	<i>Tirumala limniace</i>	Brush footed	
82	Dark Blue Tiger	<i>Tirumala septentrionis</i>	Brush footed	
83	Striped Tiger	<i>Danaus genutia</i>	Brush footed	
84	Plain Tiger	<i>Danaus chrysippus</i>	Brush footed	
85	Common Crow	<i>Euploea core</i>	Brush footed	
86	Double-branded Black Crow	<i>Euploea sylvester</i>	Brush footed	
87	Common Evening Brown	<i>Melanitis leda</i>	Brush footed	
88	Bamboo Treebrown	<i>Lethe europa</i>	Brush footed	Schedule I
89	Common Bushbrown	<i>Mycalesis perseus</i>	Brush footed	
90	Common Four Ring	<i>Ypthima huebneri</i>	Brush footed	
91	Tailed Palmfly	<i>Elymnias caudata</i>	Brush footed	
92	Tawny Coster	<i>Acraea violae</i>	Brush footed	
93	Anomalous Nawab	<i>Charaxes agrarius</i>	Brush footed	
94	Baronet	<i>Symphhaedra nais</i>	Brush footed	
95	Common Leopard	<i>Phalanta phalantha</i>	Brush footed	
96	Common Sailer	<i>Neptis hylas</i>	Brush footed	
97	Chestnut-streaked Sailer	<i>Neptis jumbah</i>	Brush footed	Schedule I
98	Common Lascar	<i>Pantoporia hordonia</i>	Brush footed	
99	Angled Castor	<i>Ariadne ariadne</i>	Brush footed	
100	Common Castor	<i>Ariadne merione</i>	Brush footed	
101	Common Baron	<i>Euthalia aconthea</i>	Brush footed	
102	Chocolate Pansy	<i>Junonia iphita</i>	Brush footed	
103	Lemon Pansy	<i>Junonia lemonias</i>	Brush footed	
104	Peacock Pansy	<i>Junonia almana</i>	Brush footed	
105	Blue Pansy	<i>Junonia orithya</i>	Brush footed	
106	Yellow Pansy	<i>Junonia hierta</i>	Brush footed	
107	Great Eggfly	<i>Hypolimnas bolina</i>	Brush footed	
108	Danaid Eggfly	<i>Hypolimnas missipus</i>	Brush footed	Schedule I
109	Common Three Ring	<i>Ypthima asterope mahratta</i>	Brush footed	

110	Joker	<i>Byblia ilithyia</i>	Brush footed	
111	Painted Lady	<i>Vanessa cardui</i>	Brush footed	
112	Black Rajah	<i>Charaxes solon</i>	Brush footed	
113	Commander	<i>Moduza procris</i>	Brush footed	
114	Gaudy Baron	<i>Euthalia lubentina</i>	Brush footed	Schedule IV
115	Common Treebrown	<i>Lethe rohria</i>	Brush footed	
116	Lobed Beak	<i>Libythea laius</i>	Brush footed	

Table 3: species of butterflies' Site wise

Site No	Selected Study Area	Species	Percent
8	R K Mission	72	62.07
7	Madivala Lake	62	53.45
4	IISc Campus	56	48.28
6	Hebbal Lake	51	43.97
2	Lalbagh Botanical Garden	45	38.79
5	Puttenahalli Lake	38	32.76
1	Yediyur Lake	31	26.72
3	Cubbon Park	27	23.28

CONCLUSION

The present study reveals that the diversity of Lycaenidae is the largest with maximum number of 36 species followed Nymphalidae and Pieridae. The least diversity is observed in Hesperidae, Papilionidae and Riodinidae. Though many butterflies may immediately be identified in the field, but certain butterflies vary locally, seasonally and individually, some female butterflies' mimics other species for their protection and sometimes the difference between two different species may be very minute, hence continuous monitoring of butterfly species is required. Butterflies depend on host plants to complete their early stages; the habitats of butterflies are strictly terrestrial. Virtually all butterflies are associated with plants and trees; therefore their occurrence depends on the presence of plants and trees. The selection of host plants by butterflies is very specific, butterflies have a greater ecological significance, as various higher groups of organisms such as lizards, birds and some mammals feed on butterflies and their caterpillars, thus forming more than one link in the food web, hence there is a need to conserve both butterflies and host plants for conserving the butterfly population.

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