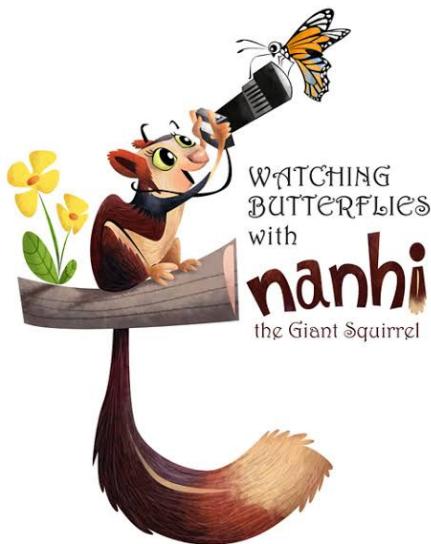


Satpura Tiger Reserve

Report of

Butterfly Survey and Awareness Meet



WATCHING
BUTTERFLIES
nanhi
the Giant Squirrel



INTRODUCTION

Located in Hoshangabad district of Madhya Pradesh, India; Satpura Tiger Reserve holds a pristine forest of 1339.87 sq.km. area which comprises of three protected areas: Satpura National Park (528.73 sq.km), Bori Wildlife Sanctuary (485.71 sq.km) and Pachmarhi Wildlife Sanctuary (491.63 sq.km). It is nestled in the Satpura landscape system, to the south of Narmada river between 22° 19'N to 22° 45'N and 77° 53'E to 78° 34'E.

Denwa river is the main water source of the park and the Tawa dam has been built on it. The reserve has the typical climate of Central India with hot summers (as high as 40°C and cool to cold winters especially in the higher altitudes. The park has a rugged landscape, from level plains to dense forests, gorges and sandstone peaks to a height of Dhoopgarh (1352m) in Pachmarhi.

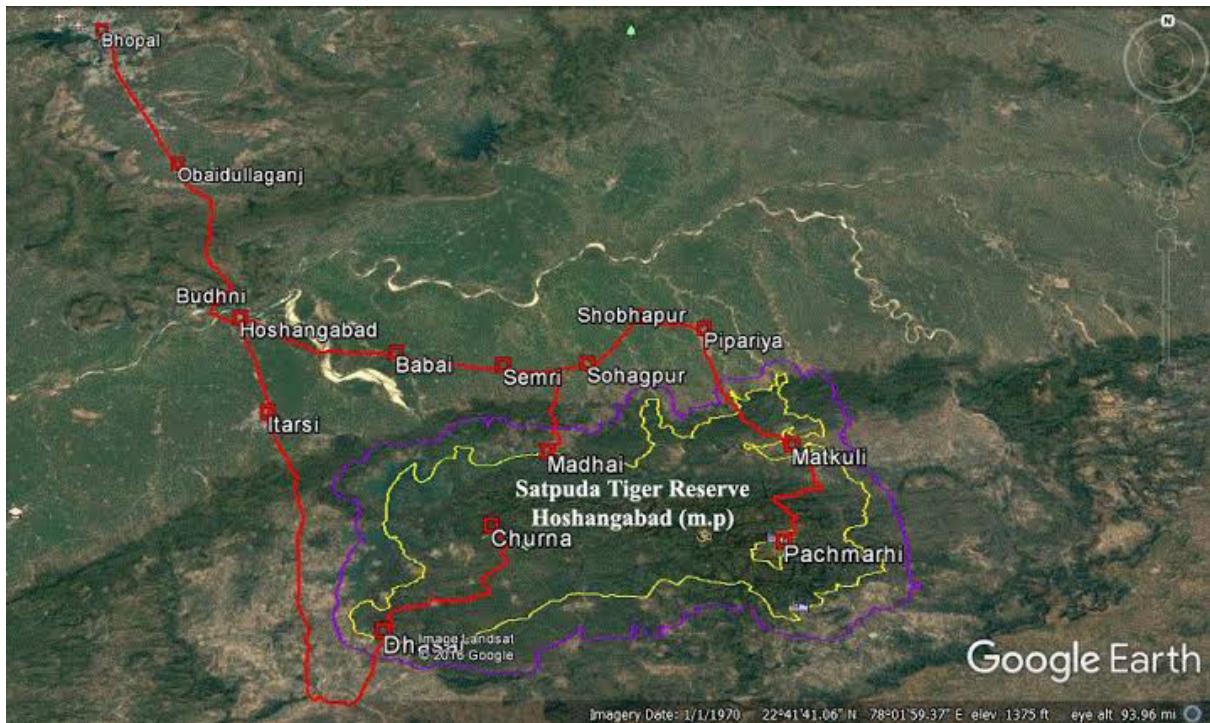
The geographical diversity and ample rainfall of around 1500mm per year brings forth rich biodiversity. An estimated 1300 species of plants spread out from the grasslands to dense forests providing for an equally rich faunal diversity. Consequently, a considerable butterfly population can be expected to thrive in the area. A survey of the same is imperative for various reasons. Firstly, butterfly is a major pollinator of forest plants and several plant species depend on them to thrive. Second, butterfly is a sensitive creature that cannot survive in highly polluted areas and are extremely sensitive to minute change in environment and ecological balance. As a result, it acts as a bioindicator of healthy system and its abundance can be used to assess the environmental and ecological health of a forested area. Thirdly, many insects, spiders, lizards, birds etc. prey on butterflies, making them an integral part of the food web. Fourth, they use many rare and endemic plant species as host plants, their presence suggests the probability of those plants growing in the area. Finally, the knowledge of species diversity of this charismatic group of insect can be an important conservation tool for strategizing bottom up conservation model for the tiger reserve as a whole.



NANHI, the Giant Squirrel

METHODOLOGY

- **Study Area:** The survey area encompassed Satpura Tiger Reserve and Pachmarhi Biosphere Reserve. It is spread over Hoshangabad district of Madhya Pradesh. There were a variety of forest types: grasslands, scrub forest, open forest, dense forest in the hills and so on. The map below chalks out the outline of the Tiger Reserve (yellow). The extensive and biodiverse buffer area is outlined in purple. Major towns in the vicinity and connecting roads are marked in red.



- **Duration of Survey:** 02-Nov-2019 to 05-Nov-2019
- **Selection of the Camps:** Prior to survey an initial investigation on the study area was carried out followed by gridding of the entire study area and on the basis of the distribution of the grids and habitat diversity 8 camps were chosen in order to opportunistically cover all the possible habitats, elevations and the buffer as well as the core areas of the tiger reserve.

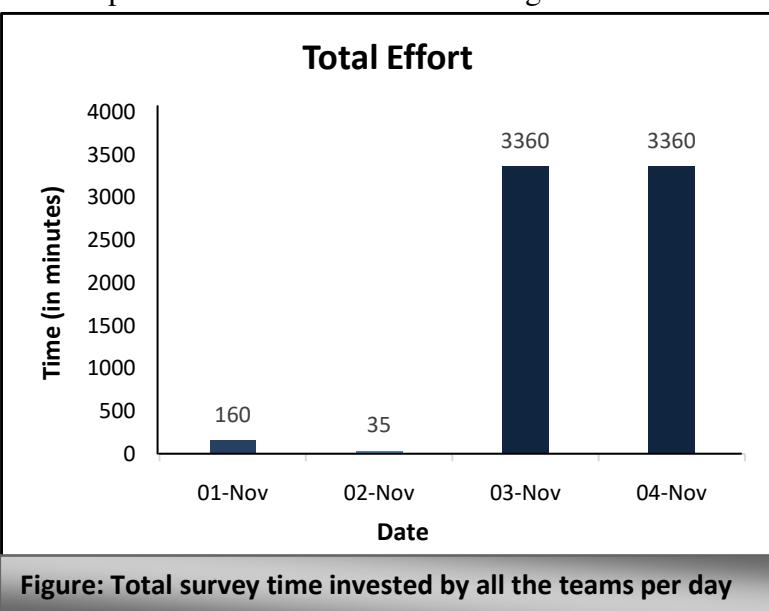
Camp details

Eight different camps were selected which varied in their ecology and landscape with the objective of covering the maximum possible butterfly diversity found in Satpura Tiger Reserve. Survey participants were grouped into eight teams of 3-5 members each. They surveyed respectively from one of the following camps. Existing forest camps and lodges were chosen as bases for the survey period.

- **Team 1 & Team 2, Pachmarhi-** Very undulating terrain surrounded by lots of peaks. Some deep gorges where sunlight falls for very little time. An island of Sal forest and also endemic species of plants (eg. *Ficus cupulatahaines*, *Achyran thescoynei*, *Tricholepis*

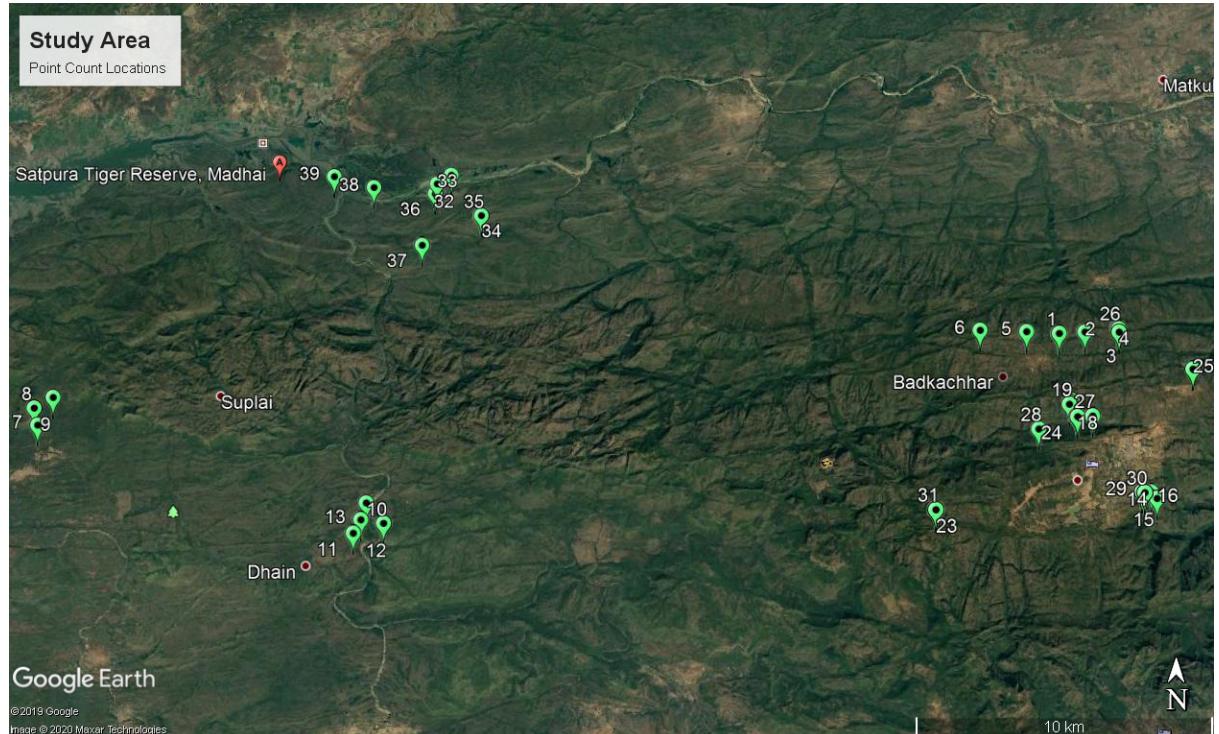
amplexicaulis) owing to its location. The highest point of the reserve, Dhoopgarh (1352m) is located here. Several waterfalls are present. High tourist footfall. Temperature during survey was ~26°C.

- **Team 3, Churna-** Flat area dominated by grasslands. Villages used to be present which have now been relocated. A perennial stream through the grassland is its lifeline.
 - **Team 4, Madhai-** On the bank of river Denwa, this is an area of mostly grasslands with some smaller hill patches. This was the camp where all teams assembled prior to, and at the end of the survey.
 - **Team 5, Dhain-** Mostly flat grasslands with a stream. River 'Sonbhadra' flows in this part. There is also some teak and bamboo dominated forest. The temperature during the survey was ~28°C.
 - **Team 6, Parsapani-** It is in the buffer zone of the reserve having grassland, bushes and open forest. There are some hilly patches.
 - **Team 7, Pattan-** River front landscape. There is dense forest with some grassland patches. Average temperature was recorded to be ~25°C.
 - **Team 8, Badkachar-** A perennial stream, mostly dense forest with some open and grassy patches. Some other smaller streams and very undulating terrain. Plant diversity is high. Panarpani Butterfly Garden is situated close to the camp. Average temperature during survey was ~27°C.
- **Survey for Estimating Species Richness:** The survey procedure was mostly *ad libitum* and carried out by opportunistic thorough scanning through the study area. In this process, the survey team members tried to cover as much area surrounding the camps as possible mostly by walking. On sighting a species of butterfly, the name of the species was noted down and photographically documented. All the species were identified following the identification keys provided in the literature. Upon observing any special behaviour, the observation was also noted down. If any early stage of a butterfly species was spotted, that observation along with the associated host plant was also recorded and photographically documented. On an average all the camp members surveyed for approximately 7 hours on 3rd and 4th November.



➤ **Point Count for Estimating Butterfly Abundance:** During the survey on 3rd and 4th November the team members of each camp took a 30 minutes count, thrice per day. During this period of 30 minutes, the observer noted the names of the encountered species along with number of individuals sighted for each species in a particular location point. The co-ordinates and habitat of the point locations were noted down alongwith the time frame, temperature and humidity during the point count.

The teams conducted point counts at a total of 39 points and the data thus obtained was compiled and analysed. The map and the table below shows the positions and co-ordinates of these points.



Point NO.	TEAM	COORDINATES
1	BADKACHAR	22.50375°N, 78.41489°E
2		22.50425°N, 78.4235°E
3		22.50528°N, 78.43486°E
4		22.50425°N, 78.4348611°E
5		22.5042056°N, 78.4038889°E
6		22.5045833°N, 78.3884722°E
7	CHURNA	22.473219°N, 78.071473°E
8		22.47851°N, 78.070048°E
9		22.481896°N, 78.076211°E
10	DHAIN	22.45°N, 78.1833333°E
11		22.440681°N, 78.179263°E
12		22.443819°N, 78.18939°E
13		22.444824°N, 78.181709°E
14	PACHMARHI 01	22.455°N, 78.4413167°E
15		22.45515°N, 78.4436167°E
16		22.4532333°N, 78.4458°E

17	PACHMARHI 02	4.	22.4553667°N, 78.4401333°E
18		5.	22.4780833°N, 78.4196333°E
19		6.	22.48185°N, 78.4174333°E
20		7.	22.4823333°N, 78.4176667°E
21		8.	22.48295°N, 78.4183667°E
22		9.	22.4781167°N, 78.41975°E
23		10.	22.4494833°N, 78.37155°E
24		1.	22.4780167°N, 78.4198833°E
25		2.	22.4928333°N, 78.4586111°E
26		3.	22.5055167°N, 78.4345056°E
27	PATTAN	4.	22.4782417°N, 78.4248111°E
28		5.	22.4741667°N, 78.4068833°E
29		6.	22.4553°N, 78.4403333°E
30		7.	22.455°N, 78.4412167°E
31		8.	22.4495°N, 78.3715667°E
32		1.	22.553938°N, 78.20927°E
33		2.	22.551041°N, 78.204455°E
34		3.	22.540772°N, 78.219972°E
35		4.	22.540772°N, 78.219972°E
36		5.	22.547794°N, 78.203869°E
37		6.	22.531116°N, 78.199837°E
38		7.	22.54973 °N, 78.182674 °E
39		8.	22.553187 °N, 78.168877 °E

RESULTS AND DISCUSSIONS

A total of 104 species of butterflies were sighted over the three days of survey period. Among these 104 species, 6 belonged to Papilionidae, 12 were from Pieridae, 38 from Nymphalidae, 2 from Riodinidae, 29 from Lycaenidae and 17 belonged to Hesperiidae.

Some species were observed in abundance by every team, eg., Chocolate Pansy, Baronet, Common Grass Yellow, Common Bushbrown, etc. On the other hand, some species were encountered very few times and in some cases, just once. For example, Plum Judy, Silverstreak Blue, Common Ciliate Blue, Orange Tailed Awl were seen just once at Pachmarhi. Peacock Royal was seen once each by Batkachar and Parsapani teams. Eggs of some species were identified, viz., Plains Blue Royal and Peacock Royal by Parsapani team and Baronet by Batkachar team, Common Crow by Churna team, Emigrant sp. at Madhai. Caterpillar of Lime Swallowtail was seen at Churna and of Emigrant sp. at Madhai. Butterflies were seen to be most active in the 9am to 12pm period.

The complete list of butterflies observed and identified is given in the following table.

Sr. No.	Family	Scientific Name	Common Name
1.	Papilionidae	<i>Graphium nomius</i>	Spot Swordtail
2.		<i>Pachliopta aristolochiae</i>	Common Rose
3.		<i>Pachliopta hector</i>	Crimson Rose
4.		<i>Papilio clytia</i>	Common Mime
5.		<i>Papilio demoleus</i>	Lime Swallowtail
6.		<i>Papilio polytes</i>	Common Mormon
7.	Pieridae	<i>Belenois aurota</i>	Pioneer
8.		<i>Catopsilia pomona</i>	Lemon Emigrant
9.		<i>Catopsilia pyranthe</i>	Mottled Emigrant
10.		<i>Cepora nerissa</i>	Common Gull
11.		<i>Delias eucharis</i>	Indian Jezebel
12.		<i>Eurema blanda</i>	Three-spot Grass Yellow
13.		<i>Eurema laeta</i>	Spotless Grass Yellow
14.		<i>Eurema hecabe</i>	Common Grass Yellow
15.		<i>Eurema brigitta</i>	Small Grass Yellow
16.		<i>Ixias marianne</i>	White Orange Tip
17.		<i>Colotis etrida</i>	Little Orange Tip
18.		<i>Ixias pyrene</i>	Yellow Orange Tip
19.	Nymphalidae	<i>Ariadne ariadne</i>	Angled Castor
20.		<i>Charaxes solon</i>	Black Rajah
21.		<i>Charaxes bernardus</i>	Tawny Rajah
22.		<i>Danaus chrysippus</i>	Plain Tiger
23.		<i>Danaus genutia</i>	Striped Tiger
24.		<i>Euploea core</i>	Common Crow
25.		<i>Tirumala limniace</i>	Blue Tiger
26.		<i>Acraea terpsicore</i>	Tawny Coster
27.		<i>Phalanta phalantha</i>	Common Leopard
28.		<i>Athyma perius</i>	Common Sergeant
29.		<i>Euthalia aconthea</i>	Baron
30.		<i>Moduza procris</i>	Commander
31.		<i>Neptis hylas</i>	Common Sailer
32.		<i>Symphaedra nais</i>	Baronet
33.		<i>Hypolimnas bolina</i>	Great Eggfly
34.		<i>Hypolimnas misippus</i>	Danaid Eggfly
35.		<i>Junonia almana</i>	Peacock Pansy
36.		<i>Junonia atlites</i>	Grey Pansy
37.		<i>Junonia hirta</i>	Yellow Pansy
38.		<i>Junonia iphita</i>	Chocolate Pansy
39.		<i>Junonia lemonias</i>	Lemon Pansy
40.		<i>Junonia orithya</i>	Blue Pansy
41.		<i>Kallima inachus</i>	Orange Oakleaf
42.		<i>Vanessa cardui</i>	Painted Lady
43.		<i>Lethe rohria</i>	Common Treebrown
44.		<i>Melanitis leda</i>	Common Evening Brown
45.		<i>Melanitis phedima bethami</i>	Betham's Evening Brown

46.		<i>Melanitis phedima</i>	Dark Evening Brown
47.		<i>Mycalesis mineus</i>	Dark-branded Bushbrown
48.		<i>Mycalesis perseus</i>	Common Bushbrown
49.		<i>Ypthima baldus</i>	Common Five-ring
50.		<i>Ypthima baldus satpura</i>	Satpura Five-ring
51.		<i>Ypthima huebneri</i>	Common Four-ring
52.		<i>Athyma inara</i>	Colour Sergeant
53.		<i>Euploea klugii</i>	Brown King Crow
54.		<i>Ypthima asterope</i>	Common Three Ring
55.		<i>Elymnias hypermnestra</i>	Common Palmfly
56.		<i>Ypthima inica</i>	Lesser Three-ring
57.	Riodinidae	<i>Abisara bifasciata</i>	Double-banded Judy
58.		<i>Abisara echerius</i>	Plum Judy
59.		<i>Acytolepis puspa</i>	Common Hedge Blue
60.		<i>Caleta decidia</i>	Angled Pierrot
61.		<i>Castalius rosimon</i>	Common Pierrot
62.		<i>Catochrysops strabo</i>	Forget-me-not
63.		<i>Chilades lajus</i>	Lime Blue
64.		<i>Chilades pandava</i>	Plains Cupid
65.		<i>Chilades parrhasius</i>	Small Cupid
66.		<i>Curetis acuta</i>	Acute Sunbeam
67.		<i>Euchrysops cnejus</i>	Gram Blue
68.		<i>Freyeria trochylus</i>	Orange-spotted Grass Jewel
69.		<i>Iraota timoleon</i>	Silverstreak Blue
70.		<i>Jamides bochus</i>	Dark Cerulean
71.		<i>Jamides celeno</i>	Common Cerulean
72.	Lycaenidae	<i>Leptotes plinius</i>	Zebra Blue
73.		<i>Prosotas nora</i>	Common Lineblue
74.		<i>Prosotas dubiosa</i>	Tailless Lineblue
75.		<i>Pseudozizeeria maha</i>	Pale Grass Blue
76.		<i>Zizeeria karsandra</i>	Dark Grass Blue
77.		<i>Zizina otis</i>	Lesser Grass Blue
78.		<i>Zizula hylax</i>	Tiny Grass Blue
79.		<i>Rapala iarbus</i>	Common Red Flash
80.		<i>Spindasis vulcanus</i>	Common Silverline
81.		<i>Tarucus nara</i>	Striped Pierrot
82.		<i>Virachola isocrates</i>	Guava Blue
83.		<i>Tajuria cippus</i>	Peacock Royal
84.		<i>Tajuria jehana</i>	Plains Blue Royal
85.		<i>Tarucus callinara</i>	Spotted Pierrot
86.		<i>Petrelaea dana</i>	Dingy Lineblue
87.		<i>Anthene emolus</i>	Common Ciliate Blue
88.	Hesperiidae	<i>Baoris farri</i>	Complete Paint-brush Swift
89.		<i>Borbo bevani</i>	Bevan's Swift
90.		<i>Borbo cinnara</i>	Rice Swift
91.		<i>Caltoris kumara</i>	Blank Swift
92.		<i>Caprona ransonnettii</i>	Golden Angle

93.		<i>Celaenorrhinus ambareesa</i>	Malabar Spotted Flat
94.		<i>Hasora chromus</i>	Common Banded Awl
95.		<i>Badamia exclamationis</i>	Brown Awl
96.		<i>Bibasis sena</i>	Orange-tailed Awl
97.		<i>Pelopidas mathias</i>	Small Branded Swift
98.		<i>Sarangesa purendra</i>	Spotted Small Flat
99.		<i>Sarangesa dasahara</i>	Common Small Flat
100		<i>Spialia galba</i>	Indian Grizzled Skipper
101		<i>Suastus gremius</i>	Indian Palm Bob
102		<i>Telicota bambusae</i>	Dark Palm-Dart
103		<i>Telicota colon</i>	Pale Palm-Dart
104		<i>Baoris pagana</i>	Figure of 8 Swift

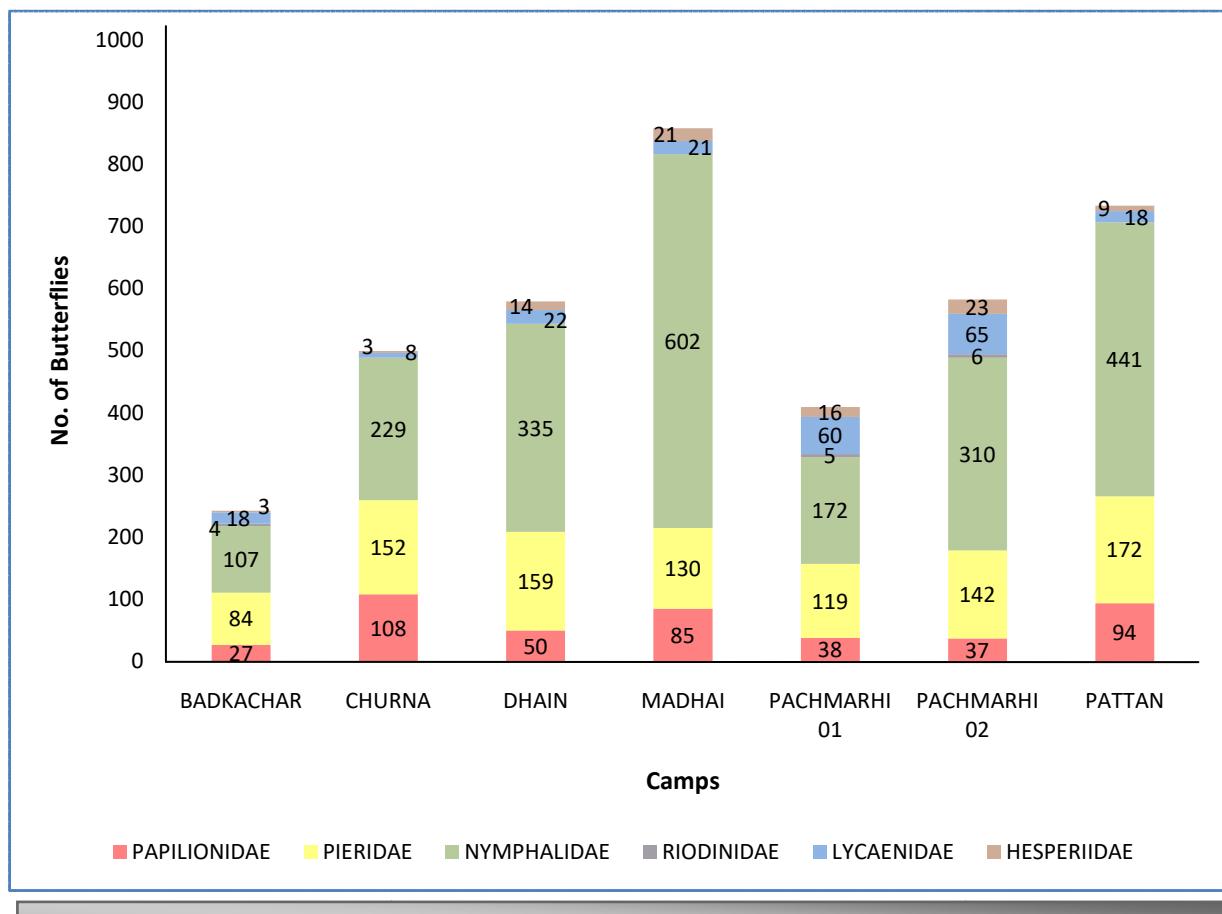
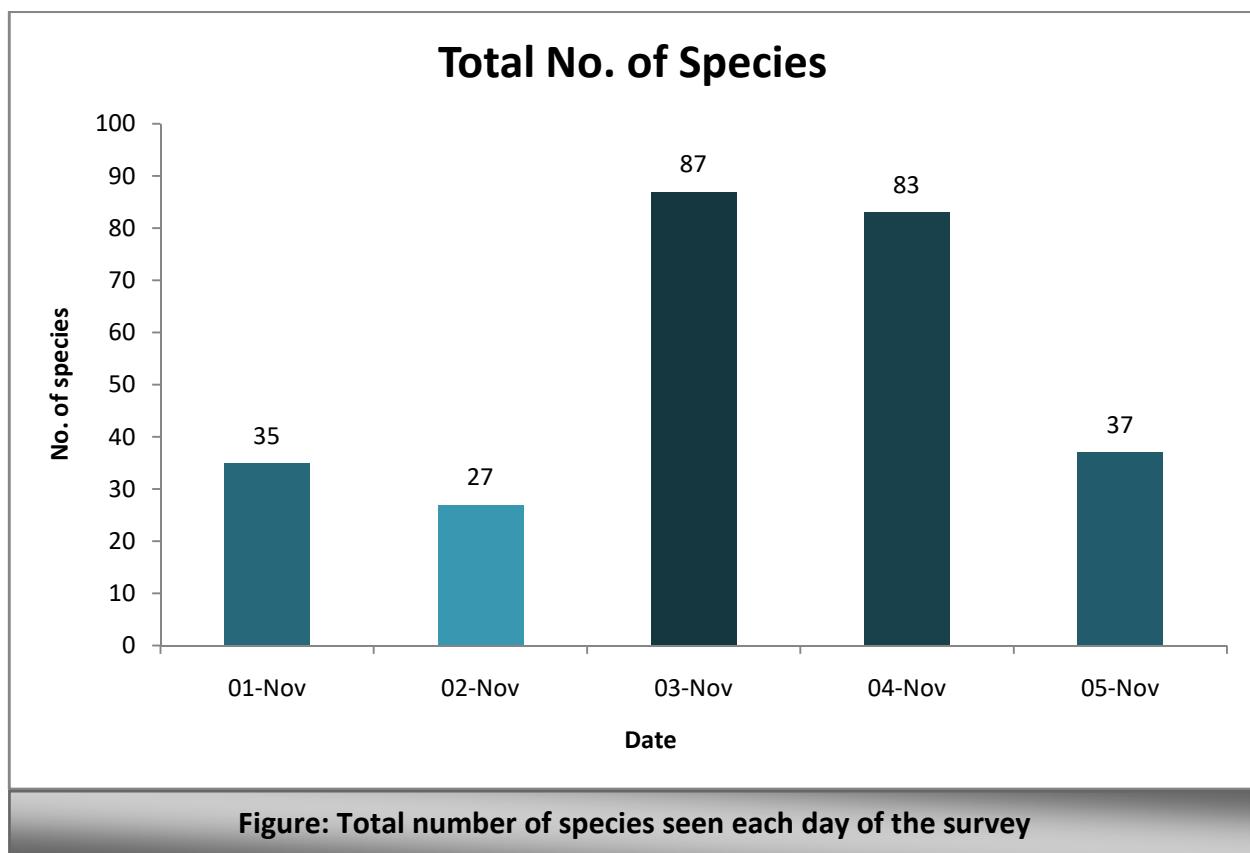
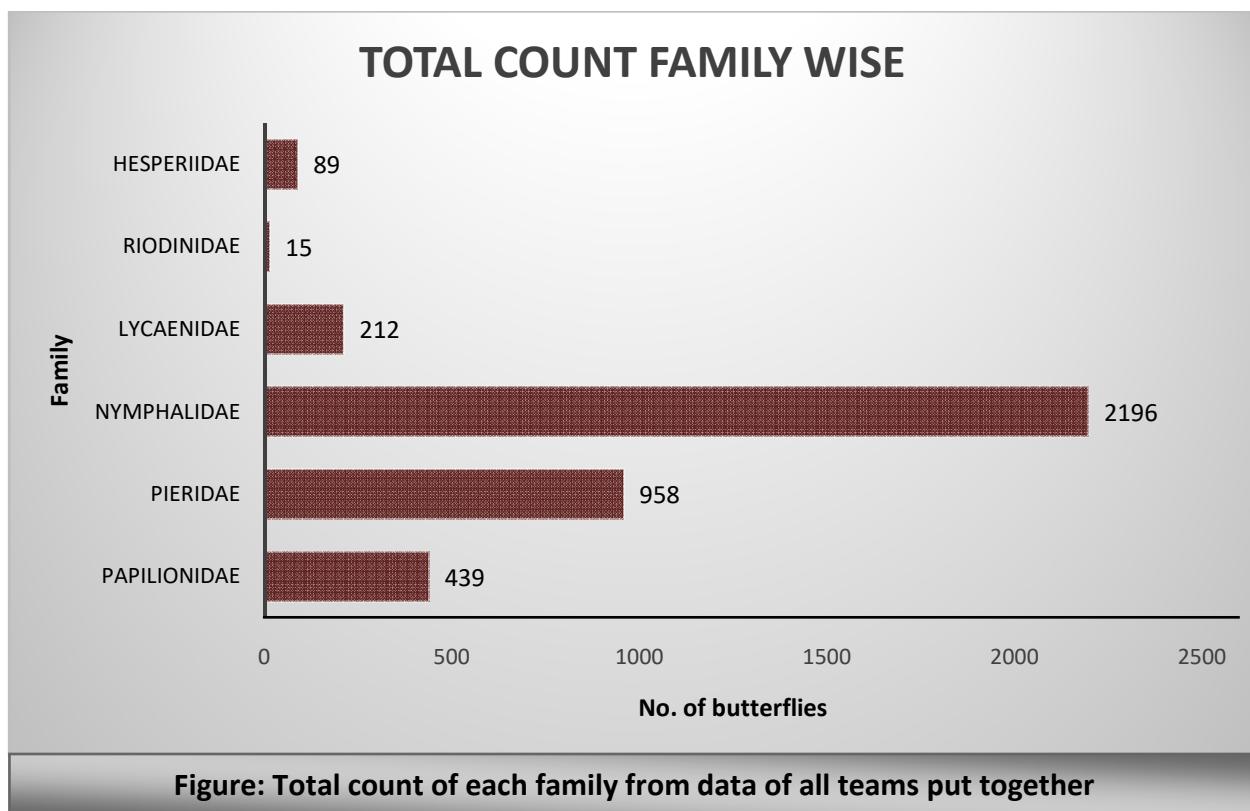


Figure: Total number of butterflies of 6 families noted during point counts by each



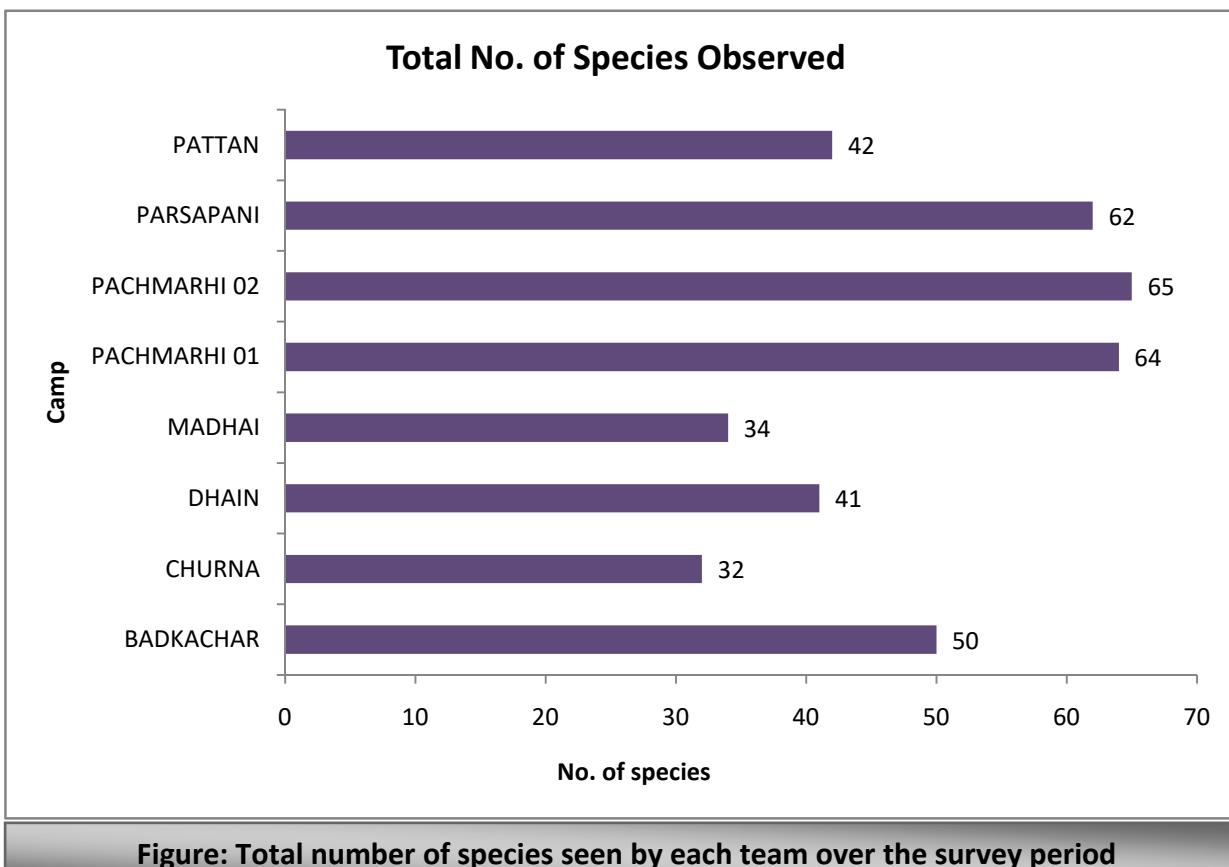


Figure: Total number of species seen by each team over the survey period

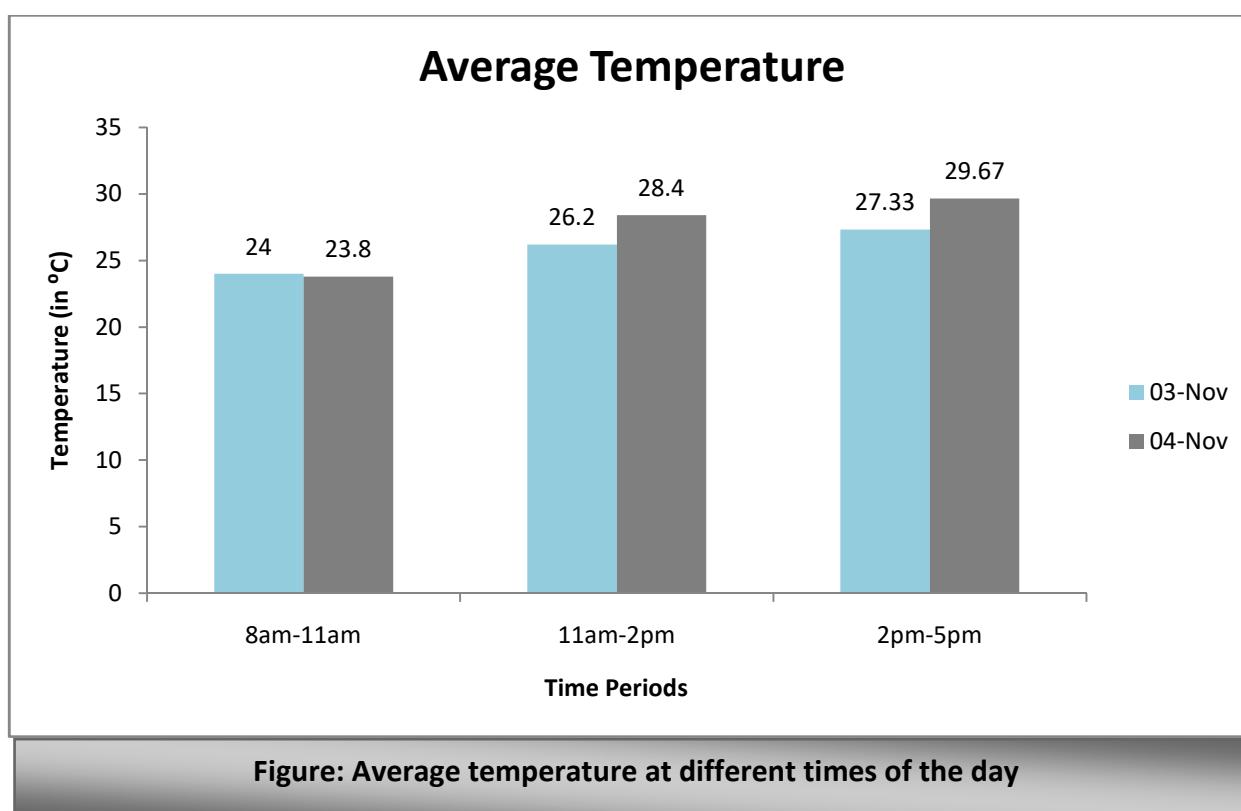


Figure: Average temperature at different times of the day

PAPILIONIDAE



Common Mormon (*Papilio polytes*)

Common Mime (*Papilio clytia*)

Lime Swallowtail (*Papilio demoleus*)

PIERIDAE



Lemon Emigrant (*Catopsilia pomona*)

Indian Jezebel (*Delias eucharis*)

Common Gull (*Cepora nerissa*)



Common Grass Yellow (*Eurema hecabe*)

Small Grass Yellow (*Eurema brigitta*)

Spotless Grass Yellow (*Eurema laeta*)

NYMPHALIDAE

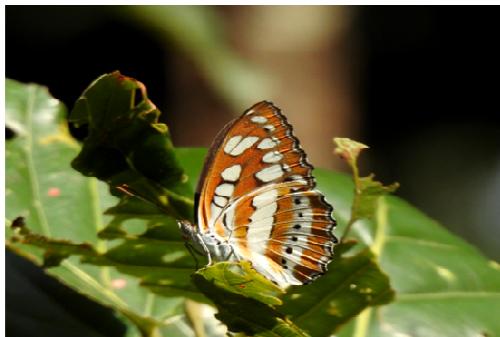


Striped Tiger (*Danaus genutia*)

Blue Tiger (*Tirumala limniace*)

Common Crow (*Euploea core*)

NYMPHALIDAE



Common Leopard (*Phalanta phalantha*)

Common Sergeant (*Athyma perius*)

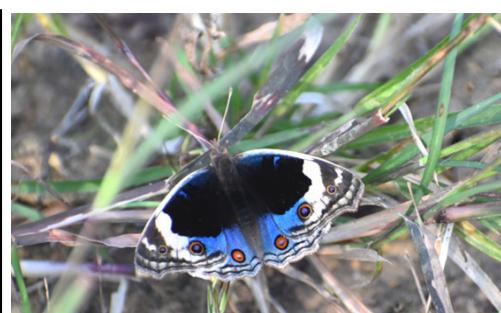
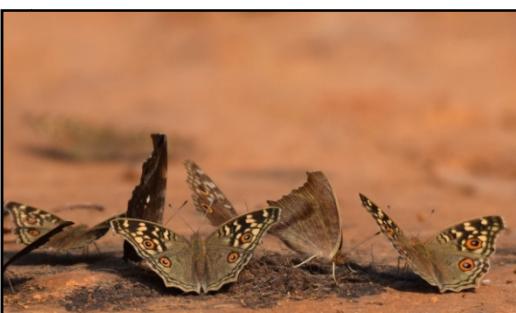
Common Sailor (*Neptis hylas*)



Great Eggfly (*Hypolimnas bolina*)

Danaid Eggfly (*Hypolimnas misippus*)

Baronet (*Symphaedra nais*)



Grey Pansy (*Junonia atlites*)

Lemon Pansy (*Junonia lemonias*)

Blue Pansy (*Junonia orithya*)



Chocolate Pansy (*Junonia iphita*)

Peacock Pansy (*Junonia almana*)

Yellow Pansy (*Junonia hirta*)

NYMPHALIDAE



Painted Lady (*Vanessa cardui*)



Common Treebrown (*Lethe rohria*)



Orange Oakleaf (*Kallima inachus*)



Common Evening Brown (*Melanitis leda*)



Dark Evening Brown (*Melanitis phedima*)



Bushbrown sp. (*Mycalesis* sp.)



Baron (*Euthalia aconthea*)



Common Five-ring (*Ypthima baldus*)

RIODINIDAE



Double-banded Judy (*Abisara bifasciata*)

LYCAENIDAE



Common Hedge Blue (*Acytolepis puspa*)



Forget-me-not (*Catochrysops strabo*)



Angled Pierrot (*Caleta decidia*)



Lesser Grass Blue (*Zizina otis*)



Tarucus sp.



Plains Cupid (*Chilades pandava*)



Common Lineblue (*Prosotas nora*)



Tailless Lineblue (*Prosotas dubiosa*)



Common Cerulean (*Jamides celeno*)



Dark Grass Blue (*Zizeeria karsandra*)



Peacock Royal (*Tajuria cippus*)



Gram Blue (*Euchrysops cneus*)

LYCAENIDAE



Zebra Blue (*Leptotes plinius*)



Tiny Grass Blue (*Zizula hylax*)



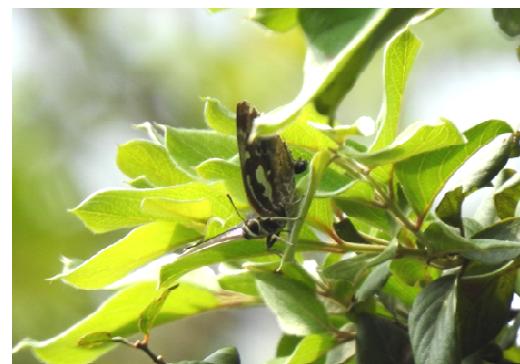
Dingy Lineblue (*Petrelaea dana*)



Lime Blue (*Chilades lajus*)



Indian Red Flash (*Rapala iarbus*)



Silverstreak Blue (*Iraota timoleon*)

HESPERIIDAE



Common Small Flat (*Sarangesa dasahara*)



Palm-Dart (*Telicota sp.*)



Indian Palm Bob (*Suastus gremius*)

Participants' Activity during the Butterfly Survey

