

## Butterfly Diversity in the BNHS Nature Reserve, Goregaon, Mumbai (Lepidoptera : Rhopalocera)

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The primary aim of writing the present study is to document the diversity of butterflies found in the BNHS Nature Reserve and note their abundance. These observations can help in imparting environmental education to the students and citizens effectively, and also to implement strategies for conservation of butterflies in the Mumbai area.

### Study Area

BNHS Nature Reserve is a 33 acre and 35 guntha dense forest, located in Goregaon East in Mumbai, Maharashtra. The land was given to Bombay Natural History Society (BNHS) by the State Government of Maharashtra in 1983. A Conservation Education Centre (CEC) was established here by the BNHS in 1997. The forest land is nestled between the Dadasaheb Phalke Film City and Sanjay Gandhi National Park. BNHS conducts research and various environmental activities here. The Reserve also holds a 'Butterfly Garden' where specific larval host plants and nectar plants have been planted.

BNHS runs a Conservation Education Centre (CEC) which is situated in the BNHS Nature Reserve. The Reserve is a dense forest spread across 33 acres and 20 gunthas. It is nestled between the Dadasaheb Phalke Film City and Sanjay Gandhi National Park (SGNP).

The habitat here is mostly of the Tropical Dry Deciduous and Tropical Dry Evergreen Forest type. Much of the forest here is dominated by the *Tectona-Albizzia-Terminalia-Holarrhena-Firmiana-Dalbergia-Garuga-Grewia-Adina-Ficus-Madhuca-Caraya-Butea* and bamboo composition.

SGNP is home to various species of flora and fauna, including 25 species of mammals (including leopards), 275 species of birds and 172 species of butterflies (Kasambe, 2012). Many of the species seen in SGNP can be expected and seen in the BNHS Nature Reserve as well.

### Materials & Methods

Opportunistic visits were conducted along the six demarcated nature trails in the BNHS Nature Reserve and butterflies were noted and photographed. Total 120 species of butterflies were recorded during these visits on different trails. Abundance of butterflies was also taken into consideration.

Butterflies were observed opportunistically during the

course of 17 months i. e from November 2016 to March 2018. Most observations were taken along the six demarcated trails in the BNHS Nature Reserve and in the butterfly garden. Butterflies were photographed in field for identification purpose. No specimens were collected during the study period.

For identification of butterflies, books by Kehimkar (2008, 2016) and Kasambe (2016) were referred to. All butterflies were identified after taking photographs. For nomenclature we followed the latest catalogue by Varshney & Smetacek (eds.) (2015).

Butterflies were classified according to their abundance in five categories:

A—Abundant: Seen 80 - 90% of the times during visit in most habitats;

C—Common: Seen 60 - 80 % of the times during visit in most habitats;

U—Uncommon: Seen 40 - 60 % of the times during visit in most habitats;

R—Rare: Seen 20 - 40 % of the times during visit in most habitats;

VR—Very rare: Seen less than 20% of the times during visit in most habitats.

### Results & Discussion

Sharma & Chaturvedi (2006) have enlisted 138 species of butterflies from Mumbai region, which was based on various previous works. Kasambe (2012) enlisted 172 species in Sanjay Gandhi National Park, with additional records. Rodrigues (2012) has described 153 species in Mumbai and Patwardhan (2014) has reported occurrence of 142 species in SGNP. Gaonkar (1996) had reported 208 species in the entire Western Ghats stretch of Maharashtra.

Authors hereby report occurrence of the Bengal Spotted Flat *Celaenorrhinus putra* in Mumbai (Kasambe, see page 130). The butterfly was seen many times in the butterfly garden of the BNHS Nature Reserve. It is only reported from Sikkim to North-east India (Kehimkar, 2008, 2016; Varshney & Smetacek, 2015) and there are no published reports from south India (Gaonkar, 1996). However, the website (Bhakar et al., 2018) has many photographic records of the species



Table 1. Checklist of butterflies of the BNHS Nature Reserve, Mumbai.

	Common Name	Scientific Name	Abundance
<b>Family Hesperidae</b>			
1.	Malabar Spotted Flat	<i>Celaenorrhinus ambareesa</i>	U
2.	Common Spotted Flat	<i>Celaenorrhinus leucocera</i>	C
3.	Bengal Spotted Flat	<i>Celaenorrhinus putra</i>	U
4.	Tricolored Pied Flat	<i>Coladenia indrani</i>	U
5.	Common Small Flat	<i>Sarangesa dasahara</i>	C
6.	Golden Angle	<i>Caprona ransonnettii</i>	C
7.	Black Angle	<i>Tapena thwaitesi</i>	VR
8.	Chestnut Bob	<i>Iambrix salsala</i>	U
9.	Indian Palm Bob	<i>Suastus gremius</i>	U
10.	Vindhyan Bob	<i>Arnetta vindhiana</i>	C
11.	Conjoined Swift	<i>Pelopidas conjuncta</i>	C
12.	Small Branded Swift	<i>Pelopidas mathias</i>	C
13.	Blank Swift	<i>Caltoris kumara</i>	C
14.	Rice Swift	<i>Borbo cinnara</i>	C
15.	Parnara Swift spp.	<i>Parnara</i> spp.	U
16.	Grass Demon	<i>Udaspes folus</i>	U
17.	Common Redeye	<i>Matapa aria</i>	U
18.	Dark Palm Dart	<i>Telicota bambusae</i>	U
19.	Orange Awlet	<i>Bibasis harisa</i>	C
20.	Orange-tailed Awlet	<i>Bibasis sena</i>	VR
21.	Brown Awl	<i>Badamia exclamationis</i>	C
22.	Comon Banded Awl	<i>Hasora chromus</i>	C
23.	Moore's Ace	<i>Halpe porus</i>	VR
<b>Family Papilionidae</b>			
24.	Southern Bluebottle	<i>Graphium teredon</i>	R
25.	Common Jay	<i>Graphium doson</i>	U
26.	Tailed Jay	<i>Graphium agamemnon</i>	C
27.	Spot Swordtail	<i>Graphium nomius</i>	U
28.	Common Mormon	<i>Papilio polytes</i>	A
29.	Blue Mormon	<i>Papilio polymnestor</i>	C
30.	Lime Butterfly	<i>Papilio demoleus</i>	C
31.	Common Mime	<i>Papilio clytia</i>	U
32.	Crimson Rose	<i>Pachliopta hector</i>	C
33.	Common Rose	<i>Pachliopta aristolochiae</i>	A
<b>Family Pieridae</b>			
34.	Common Emigrant	<i>Catopsilia pomona</i>	C
35.	Mottled Emigrant	<i>Catopsilia pyranthe</i>	R
36.	Pioneer	<i>Belenois aurota</i>	R
37.	White Orange Tip	<i>Ixias marianne</i>	C
38.	Yellow Orange Tip	<i>Ixias pyrene</i>	A
39.	Great Orange Tip	<i>Hebomoia glaucippe</i>	A
40.	Common Wanderer	<i>Pareronia valeria</i>	A
41.	Striped Albatross	<i>Appias libythea</i>	R
42.	Common Gull	<i>Cepora nerissa</i>	A
43.	Common Jezebel	<i>Delias eucharis</i>	U
44.	Psyche	<i>Leptosia nina</i>	A
45.	Small Salmon Arab	<i>Colotis amata</i>	VR
46.	Spotless Grass Yellow	<i>Eurema laeta</i>	U
47.	Common Grass Yellow	<i>Eurema hecabe</i>	A
<b>Family Lycaenidae</b>			
48.	Indian Sunbeam	<i>Curetis thetis</i>	R
49.	Angled Sunbeam	<i>Curetis acuta</i>	R
50.	Red Pierrot	<i>Talicauda nyseus</i>	R
51.	Common Pierrot	<i>Castalius rosimon</i>	C
52.	Angled Pierrot	<i>Caleta deciduas</i>	C
53.	Banded Blue Pierrot	<i>Discolampa ethion</i>	R
54.	Yamfly	<i>Loxura atymnus</i>	R
55.	Monkey Puzzle	<i>Rathinda amor</i>	U

56.	Indian Red Flash	<i>Rapala iarbus</i>	VR	89.	Striped Tiger	<i>Danaus genutia</i>	C
57.	Indigo Flash	<i>Rapala varuna</i>	R	90.	Common Crow	<i>Euploea core</i>	A
58.	Common Silverline	<i>Spindasis vulcanus</i>	U	91.	Brown King Crow	<i>Euploea klugii</i>	A
59.	Long-banded Silverline	<i>Spindasis lohita</i>	R	92.	Common Nawab	<i>Charaxes bharata</i>	U
60.	Plumbeous Silverline	<i>Spindasis schistacea</i>	VR	93.	Anomalous Nawab	<i>Charaxes agrarius</i>	R
61.	Common Lineblue	<i>Prosotas nora</i>	C	94.	Tawny Rajah	<i>Charaxes bernardus</i>	U
62.	Tailless Lineblue	<i>Prosotas dubiosa</i>	C	95.	Black Rajah	<i>Charaxes solon</i>	U
63.	Dingy Lineblue	<i>Petrelaea dana</i>	VR	96.	Common Evening Brown	<i>Melanitis leda</i>	C
64.	Leaf Blue	<i>Amblypodia anita</i>	U	97.	Bamboo Treebrown	<i>Lethe europa</i>	U
65.	Dark Cerulean	<i>Jamides bochus</i>	C	98.	Common Palmfly	<i>Elymnias hypermnestra</i>	U
66.	Common Cerulean	<i>Jamides celeno</i>	C	99.	Common Bushbrown	<i>Mycalesis perseus</i>	C
67.	Pea Blue	<i>Lampides boeticus</i>	A	100.	Tawny Coster	<i>Acraea terpsicore</i>	U
68.	Gram Blue	<i>Euchrysops cnejus</i>	U	101.	Common Leopard	<i>Phalanta phalantha</i>	A
69.	Malayan Common	<i>Megisba malaya</i>	A	102.	Commander	<i>Modusa procris</i>	C
70.	Hedge blue	<i>Acytolepis puspa</i>	A	103.	Common Sailer	<i>Neptis hylas</i>	A
71.	Zebra Blue	<i>Leptotes plinius</i>	C	104.	Chestnut-streaked Sailer	<i>Neptis jumbah</i>	A
72.	Plains Cupid	<i>Chilades pandava</i>	A	105.	Short-banded Sailer	<i>Phaedyma columella</i>	A
73.	Lime Blue	<i>Chilades lajus</i>	U	106.	Common Baron	<i>Euthalia aconthea</i>	C
74.	Dark Grass Blue	<i>Zizeeria karsandra</i>	C	107.	Gandy Baron	<i>Euthalia lubentina</i>	C
75.	Tiny Grass Blue	<i>Zizula hylax</i>	C	108.	Baronet	<i>Symphaedra nais</i>	C
76.	Pointed Ciliate Blue	<i>Anthene lycaenina</i>	U	109.	Common Castor	<i>Ariadne merione</i>	C
77.	Forget-me-not	<i>Catochrysops strabo</i>	C	110.	Chocolate Pansy	<i>Junonia iphita</i>	A
78.	Peacock Royal	<i>Tajuria cippus</i>	R	111.	Lemon Pansy	<i>Junonia lemonias</i>	A
79.	Large Oakblue	<i>Arhopala amantes</i>	VR	112.	Peacock Pansy	<i>Junonia almanac</i>	U
80.	Cornelian	<i>Deudorix epijarbas</i>	R	113.	Yellow Pansy	<i>Junonia hierta</i>	U
81.	Common Guava Blue	<i>Virachola isocrates</i>	R	114.	Blue Pansy	<i>Junonia orithya</i>	R
82.	Common Acacia Blue	<i>Surendra quercetorum</i>	U	115.	Grey Pansy	<i>Junonia atlites</i>	C
83.	Grass Jewel	<i>Freyeria trochylus</i>	R	116.	Great Eggfly	<i>Hypolimnas bolina</i>	A
84.	Silverstreak Blue	<i>Iraota timoleon</i>	VR	117.	Danaid Eggfly	<i>Hypolimnas misippus</i>	U
85.	Apefly	<i>Spalgis epius</i>	R	118.	Blue Oakleaf	<i>Kallima horsfieldii</i>	A
<b>Family Nymphalidae</b>				119.	Common Five-ring	<i>Ypthima baldus</i>	R
86.	Blue Tiger	<i>Tirumala limniace</i>	C	<b>Family Riodinidae</b>			
87.	Glassy Tiger	<i>Parantica aglea</i>	A	120.	Double-banded Judy	<i>Abisara bifasciata</i>	C
88.	Plain Tiger	<i>Danaus chrysippus</i>	R				



from South India, including Mumbai (Maharashtra), Goa, Karnataka and Kerala.

Following species were photographed only once in the area: Silverstreak Blue *Iraota timoleon*, Plumbeous Silverline *Spindasis schistacea*, Dingy Lineblue *Petrelaea dana*, Orange-tailed Awlet *Bibasis sena*, Moore's Ace *Halpe porus*, and Small Salmon Arab *Colotis amata*.

Total 120 species were found in BNHS Nature Reserve. The family-wise abundance was family Hesperidae: 23 species (19.16%); family Papilionidae: 10 species (8.33%); family Pieridae: 14 species (11.66%); family Lycaenidae: 38 species (31.66%); family Nymphalidae: 34 species (28.33%) and family Riodinidae: one species (0.83%). The unidentified *Parnara* siffs were considered as one species, as they cannot be identified easily based on external traits such as wing patterns. Their species-level identification is based largely on structures of the male genitalia.

The butterfly abundance was as follows: Abundant: 23 species; Common: 38 species; Uncommon: 30 species; Rare: 20 species and Very Rare: 9 species.

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#### References

- Bhakare, M., K. Kunte, H. Ogale, K. Saji, & V. Sarkar 2018. *Celaenorrhinus putra* (Moore, [1866]) Restricted Spotted Flat. Kunte, K., S. Sondhi, and P. Roy (Chief Ed.). *Butterflies of India*, v. 2.56. Indian Foundation for Butterflies. As accessed on 02 April 2018. <http://www.ifoundbutterflies.org/sp/1032/Celaenorrhinus-putra>
- Gaonkar, H. 1996. *Butterflies of Western Ghats, India (including Sri Lanka): A Biodiversity Assessment of a Threatened Mountain System*. Centre for Ecological Sciences, Indian Institute of Science, Bangalore; Zoological Museum, Denmark and The Natural History Museum, London: 82 Pp.
- Kasambe, Raju 2012. Butterfly fauna of the Sanjay Gandhi National Park and Mumbai. *Bionotes*, 14 (3): 76-80.
- Kasambe, Raju 2016. *Maharashtra's Phulpakhare*. Second ed. Sahitya Prasar Kendra, Nagpur: 152 Pp.
- Kehimkar, I. 2008. *The Book of Indian Butterflies*. Bombay Natural History Society, Mumbai: 497 Pp.
- Kehimkar, I. 2016. *BNHS Field Guide: Butterflies of India*.

Bombay Natural History Society, Mumbai: 516 Pp.

Patwardhan, A. 2014. Butterflies of Sanjay Gandhi National Park, Mumbai, Maharashtra, India. *Ambient Science*, National Cave Research and Protection Organization, India: 1(1): 7-15.

Rodrigues, N. 2012. *Butterflies of Mumbai*. Anitha Art Printers: 199 Pp.

Sharma, R.M. & Chaturvedi, N. 2006. Fauna of Sanjay Gandhi National Park (Invertebrates). *Conservation Area Series, Zoological Survey of India*, 26: 71-124.

Varshney, R.K. & Smetacek, P. (eds.) 2015. *A Synoptic Catalogue of the Butterflies of India*. Butterfly Research Centre, Bhimtal and Indinov Publishing, New Delhi: ii + 261 pp., 8 pl.

### Shrinking Crow Population

"In the last decade, the population of house crows has declined at such an alarming rate that the bird is hardly seen in towns and cities these days. The day is not far when this species will completely go extinct", said Dr BM Arora, president of Association of Indian Zoos and Wildlife Veterinarians.

"When the number of sparrows started declining, both government agencies and NGOs carried out several surveys and studies. However, no attention was paid to dwindling population of house crows," added Dr Arora.

Former director of NGO Bombay Natural History Society (BNHS), Asad R Rahmani, said "Due to their innate characteristic of eschewing forests for villages and cities, crow species had buoyant coexistence with humans. However, with time, large scale urbanization meant human beings not regularly feeding birds. Now crows feed on worms and grains from agricultural fields. As this new food was toxic due to presence of pesticides, its consumption started resulting in deaths."

According to experts, crows feed largely upon the refuse of human habitat. The bird which is known to clean up the environment by eating the waste is facing existential problem as people offer or give food wrapped in polythene bags. Also, the bird's nesting space has shrunk with construction of multistorey buildings in cities as it also means that there was less open area. "Shraadh is deemed incomplete until a crow doesn't eat the food offered to it," said astrologer and religious preacher Pandit SJ Goswami.