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Cover photo: Salim Ali's Fruit Bat by Rajesh Puttaswamaiah.



Conservation challenges: saving the Salim Ali's Fruit Bat one step at a time

One group of animals that have always been seen in bad light are the flying mammals, the bats. Myths and children's stories have mostly portrayed bats as evil, bloodsucking characters and at present, they are accused of being the reason behind the present Covid-19 pandemic with no scientific evidence. With the existence of such kind of fear for bats among the public, bat conservation becomes a challenging topic. But scientific researchers have realized the importance of their conservation and have started working on it.

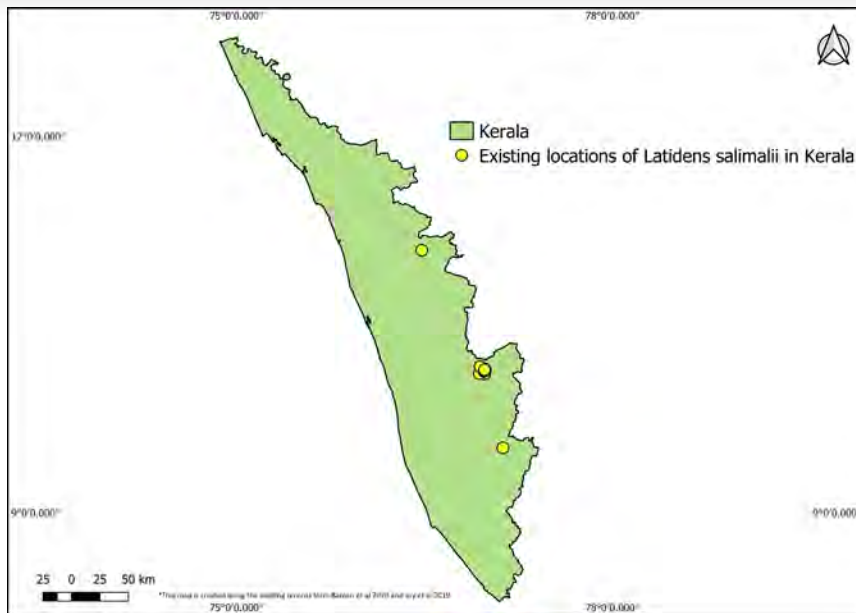
In India, there are about 130 species of bats (Saikia et al. 2021) but nothing much is known about many of their distribution, population, status, or behaviour. Of these, only two species are protected under India's Wildlife (Protection) Act 1972—Salim Ali's Fruit Bat *Latidens salimalii* and Wroughton's Free-tailed Bat *Otomops wroughtoni*.



Salim Ali's Fruit Bat (*Latidens salimalii*). © Rajesh Puttaswamaiah.

Salim Ali's Fruit Bat is a very rare species endemic to the southern Western Ghats. The first ever individual of the species was collected from the High Wavy Mountains,

Madurai in Tamil Nadu by Angus Hutton in 1948, who misidentified it as Greater Short-nosed Fruit Bat *Cynopterus sphinx*, which was a common species



Salim Ali's Fruit Bat existing location map.

found throughout India. It was then examined by Kitty Thonglongya much later in 1972, identified as belonging to a new genus and described as *Latidens salimalii* Thonglongya (Bates et al. 1994). The species falls under the 'Endangered' category of the IUCN Red List (Srinivasulu & Srinivasulu 2020).

It took 51 years after the first record from the High Wavy mountains to report the presence of this species in another location in 1999, from Kalakkad-Mundanthurai Tiger Reserve in Tamil Nadu (Ghosh et al. 1999). After this, there were reports of *L. salimalii* from several other localities in southern Western Ghats. It was reported to be

recorded and collected from Agasthyamalai Hill Complex in 2002 (Singaravelan & Marimuthu 2003a,b). Other reports were from Meghamalai (Singaravelan & Marimuthu 2003b), Courtallum and Kalakkad Hills in Tirunelveli and Valparai (Wordley et al. 2016). There were a few unconfirmed reports as well – Uppinangadi in Karnataka (Molur & Vanitharani 2008) and Periyar Tiger Reserve in Kerala (Molur et al. 2002). Apart from the unconfirmed reports, the presence of the species from Mankulam Forest Division, Munnar becomes the first sighting report from Kerala (Joy et al. 2019). The latest records of *L. salimalii* in Kerala are from Thondiyar region of

Periyar Tiger Reserve and Silent Valley National Park (Raman et al. 2020). They are distributed usually at altitude ranges of 800–1,100 m (Molur & Vanitharani 2008; Wordley et al. 2016).

Salim Ali's Fruit Bats are medium sized bats, with an adult measuring up to 10cm in length and weighing around 64g (Raman et al. 2020). They have dark brown to black dorsal pelage and round-tipped oval ears. Unlike other fruit bats, they do not have an external tail and have only one pair of upper and lower incisors (Bates et al. 1994; Vanitharani et al. 2004; Raman et al. 2020).

They mostly roost in caves and were also observed to occupy abandoned buildings. They were also observed to roost 4–5 m from the cave entrance and were found to prefer dark recesses of the caves where only dappled light comes through the cracks or crevices on the rocks (Vanitharani et al. 2004). They are frugivorous species, mainly observed to be feeding on *Prunus*, *Ficus*, *Elaeocarpus*, *Diospyros*, and *Dichapetalum* (Singaravelan



& Marimuthu 2003; Agoramoorthy & Hsu 2005; Vanitharani 2015). Not much is known about their feeding behaviour. Although, it has been noted that the bats arrived at the roosts with uneaten figs and continued feeding from the roosting site (Vanitharani et al. 2004). Being fruit-eaters, it is important to understand their major role as pollinators and seed dispersers in the ecosystem and how their interactions help in the restoration of evergreen forests of southern Western Ghats. Despite their important role, fruit bats are categorized as 'Vermin' under Schedule V of the Indian Wildlife (Protection) Act 1972, which paves way for the indiscriminate killing of bats.

Salim Ali's Fruit Bat is the only fruit bat that is currently protected under Schedule I of Wildlife (Protection) Amendment Act of 2002 (Singaravelan et al. 2009), however, given that it is difficult to identify this species from other fruit bats, it is likely to be treated as a vermin rather than be protected.

Bats, in general, face a number of threats in the form of habitat loss, land use changes, pesticide uses, hunting and emerging diseases. In the case of *L. salimalii*, being a threatened and endemic species with a very restricted population of only around 1,000 individuals and with a lack of enough data on its behaviour and distribution, the threats they face tend to be more severe.

Apart from habitat loss, anthropogenic pressure from plantations, and utilization of the species for meat consumption and in traditional medicine to cure asthma

(Raman et al. 2020) are some serious issues concerning the already endangered species. Also, the attitude of people towards bats have become worse after the Nipah virus outbreak in 2018 in Kerala. Moreover, inadequate knowledge or false notions about the species are hindrances to its conservation.

To improve the situation, we suggest the following recommendations of priority:

- i) To educate and create awareness among the public regarding the species, the important ecological services they provide and to bust the myths and misconceptions about them.
- ii) To train and work together with the concerned stakeholder groups like the forest department, local communities, policy makers, etc. so that they realize why it is important to conserve them and take up necessary measures to protect their existing roosting sites.

The role of the forest department, the local communities, policy makers, and scientific community are equally crucial in bringing about efficient protection of the species. What people do not realize is that it is our own interventions that cause disturbances to bat population which consequently becomes responsible for the outbreak of several disease-causing viruses. Therefore, it is important for us to understand that it is best to leave bats and their habitats undisturbed for the good of both us humans as well as the ecosystem health.



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Confirmatory record of Indian Eyed Turtle from Lumbini in Nepal

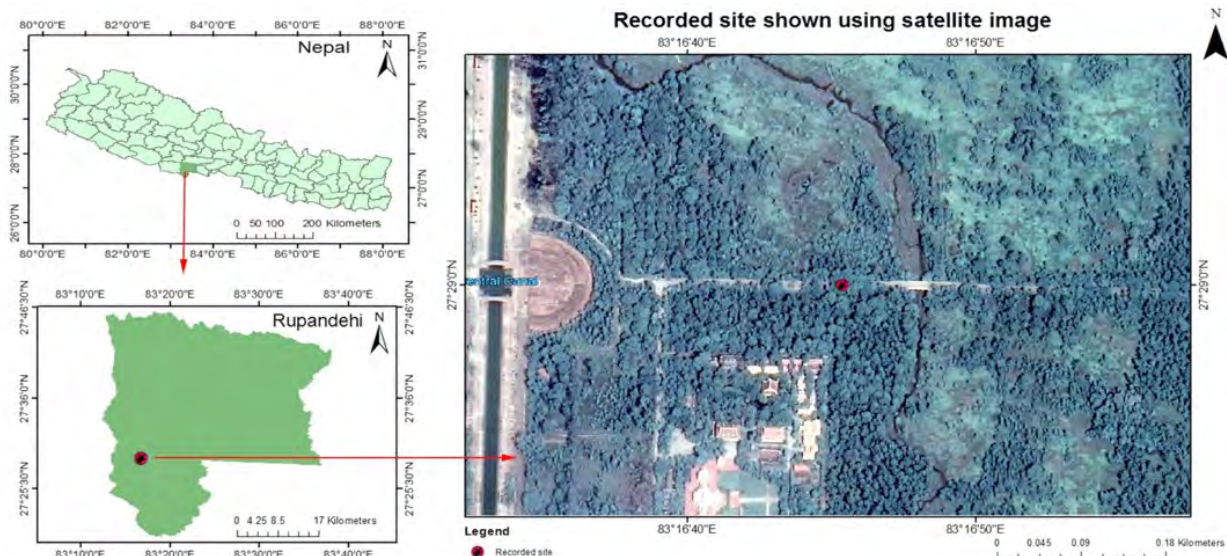


Dorsal and frontal view of *Morenia petersi* captured in Lumbini of Rupandehi District. ©Geeta Bhandari.

The Indian Eyed Turtle *Morenia petersi* (Anderson, 1879) is a small freshwater geoemydid turtle with its extant in Bangladesh, India, and Nepal (Schleich & Kästle 2002; Das & Sengupta 2010). In Nepal, the species is only reported from Gainda Tal of Rupandehi District based on an empty shell collected in a gas station (Biodiversity Profile Project 1995). The presence and origin of *Morenia petersi* in Nepal is stated as uncertain by Asian Turtle Trade Working Group (2000). An extensive survey was carried out and concluded it

to be locally extinct from Nepal (Aryal et al. 2009). Kästle et al. (2013) had affirmed its occurrence questionable in Nepal due to inadequate evidence. Here, we present the first photographic evidence of *Morenia petersi* from Nepal.

Lumbini lies in Rupandehi District of Lumbini Province under the current administrative division of Nepal. This popular World Heritage Site experiences a subtropical monsoon climate and here the wetlands and forest support a variety of aquatic as well as



Location of *Morenia petersi* sighting in Lumbini, western Nepal.

terrestrial faunal diversity. Turtle Rescue and Conservation Centre (TRCC) is the only community-based organization working solely to conserve turtles in Nepal (Rai 2017). Information on turtles is received from all over the country through its Facebook page and group. Further, the organization also monitors any sort of information on turtles that is being publicly shared on social media. Di Minin et al. (2015) have mentioned that social networks are an emerging data source for research and can play an important role in conservation science.

On 2 August 2020, a short video of Indian Peacock

Softshell Turtle *Nilssonia hurum* was uploaded on Facebook from Lumbini by Mr. Janga Bahadur Basnet, who works as a security incharge at Lumbini World Heritage Site. On inquiring, he provided us with turtle photos he had snapped in the area. It is confirmed that Indian Flapshell Turtle *Lissemys punctata*, Indian Roofed Turtle *Pangshura tecta*, and Brown Roofed Turtle *Pangshura smithii* are found in the area. A photo of an uncommon turtle species was also uploaded by the workmate of the person. The species was identified as *Morenia petersi* following Schleich & Kästle (2002), Das & Sengupta (2010), and

Kästle et al. (2013). As per the key witness, the specimen was captured in Lumbini (27.4833°N, 83.2792°E; 98m elevation) on 30 July 2020 at 09.14 h at the side of a road adjoining Harhewa River. The date stamp on the photo endorses the date and time mentioned by the witness. It was raining on that day and the surrounding area was heavily inundated. The witness found this turtle different, thus snapped photos and released into Harhewa River.

Based on the evidence, a field survey was carried out for two days in October 2020 following the safety protocols



Released site of *Morenia petersi* in Harhewa River.

of the COVID-19 pandemic during the post lockdown period. The turtle recorded site is a floodplain area with several pools in the vicinity. The GPS coordinates were recorded and the photos of the habitat captured. The dominant grasses in the area are Kans Grass *Saccharum spontaneum* and Kunai Grass *Imperata cylindrica* whereas the common trees included Kadam *Neolamarckia cadamba*, Northern Indian Rosewood *Dalbergia sissoo*, Cotton Tree *Bombax ceiba*, and Mango *Mangifera indica*. Water Hyacinth *Eichhornia crassipes* was not observed as it might have been swept

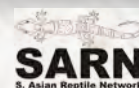
away by the monsoon flood. We interviewed the key witness and interacted with local people on the occurrence of Indian Eyed

Turtles by showing Turtles Field ID Cards by ARCO-Nepal (2012).

The biology of *Morenia petersi* is poorly known and documentation of natural history will aid in the informational gap. The species is typically associated with oxbow lakes, however, in recent times, it has been documented from the floodplain of Sarju River in the Terai region (Mital et al. 2019), and a small pond that was originally part of an irrigation canal in West Bengal (Mahapatra et al. 2020). The species has a fragmented distribution, even in its home



Potential habitat of *Morenia petersi* in Lumbini.



range (Das & Sengupta 2010), and is likely extirpated from most of its previous range forming isolated populations in only some areas (Mital et al. 2019; Mahapatra et al. 2020). Globally, the species is categorized as 'Vulnerable' under IUCN Red List and is listed in Appendix II of CITES. This record of a live specimen of *Morenia petersi* in Lumbini is a strong indication that its small population might be still dwelling in the lowlands of western Nepal.

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Notes on mating behavior of Slender Wolf Snake



Image 1. A—A mating pair of *Lycodon anamallensis* observed in Madurai, Tamil Nadu (© P.R. Vishwanath) | B—Dorsal view of the mating pair portrayed herein for species confirmation (© J. Samson Krubakaran).

The Slender Wolf Snake *Lycodon anamallensis* is a non-venomous, oviparous colubrid snake native to southern Asia (Ganesh & Vogel 2018). It is often found in and around human habitat apart from natural habitat. The nomenclature, classification and distribution of this species were refined by Ganesh & Vogel (2018) before which work, this taxon was under the name *Lycodon*

osmanhilli or was considered a sub species of *Lycodon aulicus* (Das 2002; Das & DeSilva 2005). Not much information, especially published data exists on the reproduction of Indian snakes. Reproductive aspect of Slender Wolf Snakes has only been subjected to rather minimal study (Ganesh & Vogel 2018) as compared to other common snakes and many have mainly studied under

captive condition. In this note, we present our observation on mating of free-ranging Slender Wolf Snakes at Madurai (9.87472°N & 78.05806°E, 143m) in SRV Nagar, Harveypatti, Thirupparamkundram, Madurai District, Tamil Nadu, southern India.

On 26 April 2020 we received a rescue call in Madurai at 22.02h. Immediately we rushed to the spot and found a mating pair of Slender Wolf Snake at 22.15h intertwined on top of a garden fence at a height of 1.5m above the ground. The larger snake with a swollen cloaca (due to the insertion of the organ by the smaller snake) was determined as the female. The other, i.e., smaller snake was determined as a male, as it had inserted its organ into the other snake's cloaca. The

snakes were not captured and measured so as to not disturb their mating. They were photographed for documentation purposes.

On enquiry, the resident said that he found the snakes around 21.45h above the fence intertwined crawling from the nearby wall to the fence and immediately called for rescue.

A yellowish/olive yellow color fluid found surrounded the cloaca's exterior opening. The male often showed repeated, jerky movement of its tail which apparently correlates with the ejaculation process. Tail movement of female was not shown.

Mating duration lasted more than an hour and both naturally got separated by 23.35h

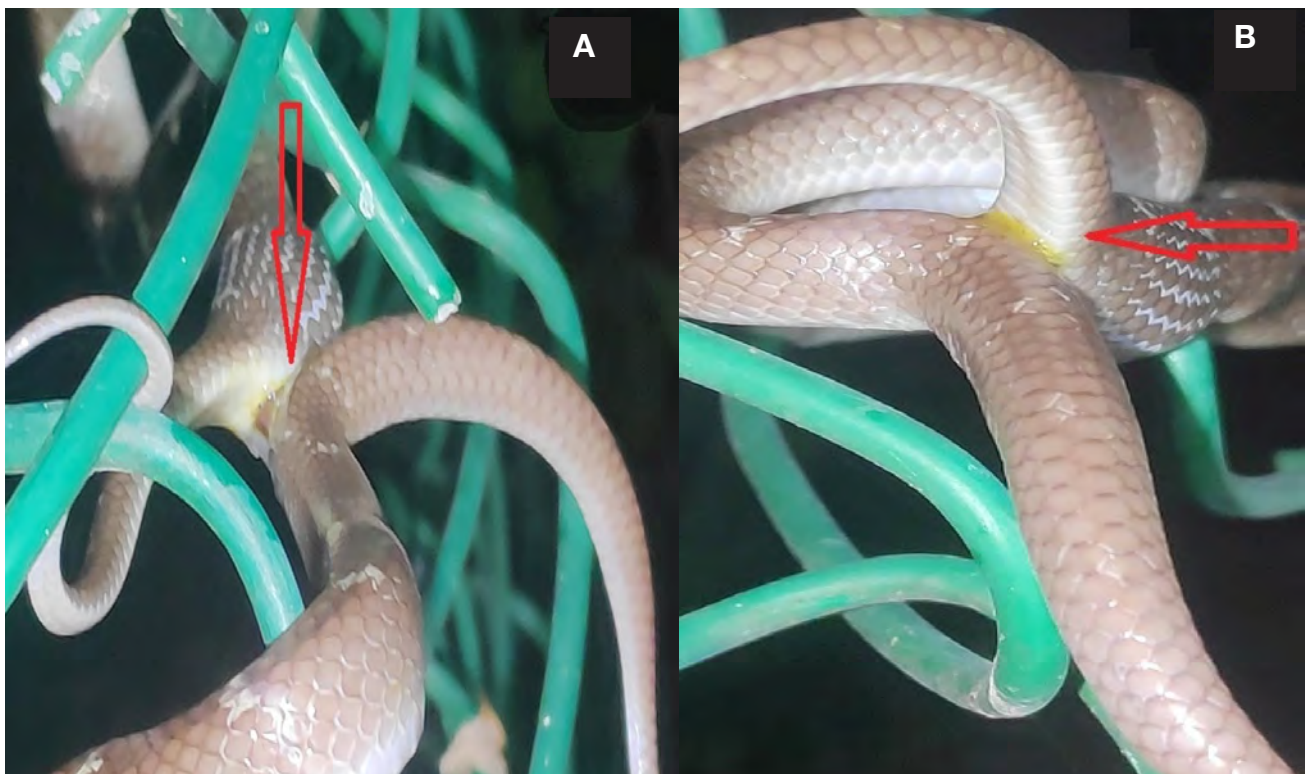


Image 2. A—Close-up of cloacal region showing intromission | B—A yellowish/olive yellow colour fluid found surrounded the cloaca's meeting exterior opening (stipulated by arrow marks). (© P.R. Vishwanath).



(21.45–23.35 hr). As it was a residential area, both were gently bagged and released close by in its natural habitat.

This note adds to the meager body of published literature is available on the reproductive behaviour of Indian snakes, even for rather common and widespread one like the Slender Wolf Snake.

Based on the present observation and available records, we infer that in mating pairs, female Indian Rock Pythons are usually larger than males in size (Reed & Rodda 2009; Ramesh 2012). Females appear to attain significantly larger body sizes than males in most python species (Shine & Slip 1990). The larger size of females might have evolved to increase reproductive success by increasing fecundity (Blueweiss et al. 1978; Keogh et al. 2000), egg size (Forsman & Shine 1995).

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Bugs R All

Newsletter of the
Invertebrate Conservation & Information Network of South Asia (ICINSA)

Giant Golden Orb-weaving Spider in human diet at Kamrup District, Assam

Consumption of the Giant Golden Orb-weaving Spider by the Rabha tribal was recorded at Kamrup, Assam during September 2017.

Nephila pilipes (Fabricius) (Araneae: Nephilidae) is a common species of spider found in India. The female *N. pilipes* is eye-catching due to its size (total length 37.5mm) and its huge web (more than a meter in diameter). The species is common in northeastern India and I had seen it opportunistically in northern West Bengal, Assam, Arunachal Pradesh, and Meghalaya. Literature survey shows the species is well spread over southern and southeastern Asia, as well as in Australia, Japan, the Solomon Islands, and Vanuatu (Harvey et al. 2007). In Assam, the young female spider with a web appears in July. These large web weavers can be sighted from August to mid January.



Giant golden orb-weaving spider female *Nephila pilipes*. ©Sachin Ranade.



Prepared spiders for cooking. ©Sachin Ranade.

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Shallow fry in mustard oil. ©Sachin Ranade.



Consumption of the cooked spiders. ©Sachin Ranade.

I came across a Rabha tribesman collecting the Giant Golden Orb-weavers at Rani in Kamrup (26.000N, 91.548E). The large females

were hand-picked from their web and collected in a carry bag. On investigation, it was found that the spiders were taken for local consumption.

The Rabha tribal community was interviewed about this practice which revealed that the species is collected for local consumption. The members of the older generation were engaged in the collection of the spiders (250–500 g) from the wilderness around. This consumption was also practiced by other tribes in the areas such as Khasi and Bhoi in Meghalaya. The spiders after removal of the legs are shallow fried in mustard oil and consumed along with local rice beer. It is treated as a delicacy and extra source of protein. Entomophagy in northeastern India is well documented, yet documentation of use of spiders as alternate protein source are few (Meyer-Rochow 2005; Chakravorty et al. 2011; Dey 2013; Pongener et al. 2019). Two species from the genus *Nephila* have been recorded as food item from Madagascar and northeastern India. There are a few studies on the nutritional values of these invertebrate fauna (Jongema 2015).

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An updated checklist of butterflies of Rajgir Wildlife Sanctuary, Bihar

The study was carried out in the Rajgir Wildlife Sanctuary (RWS) to prepare an updated inventory of Lepidoptera (Butterflies) belonging to class Insecta. There are more than 28,000 species of butterflies, with about 80 percent found in tropical regions. The butterfly diversity and abundance depends on the availability of plant species and changes in climate and vegetation patterns (Kunte 1997). India is one of the mega biodiverse country in the world; and is home to around 1,504 species of butterflies (Kunte et al. 2012), which is about 8.74% of total butterfly species of the world.

We randomly surveyed the study region and recorded a total of 64 species of butterflies belonging to five families. RWS is situated near Rajgir City in Nalanda District of Bihar covering an area of 35.84km² and the sanctuary is the only leftover forested area in Nalanda District declared as sanctuary in 1978 under section 18 of the Wildlife Protection Act 1972 Vide S.O. No 727.

The ancient Rajgir is located about 25km away from the district headquarters. The study area comes under Indo-Gangetic plains and lies between 24.9167°-



Rajgir Wildlife Sanctuary, Rajgir, Nalanda.

**Table 1. Checklist of butterflies of Rajgir Wildlife Sanctuary, Bihar.**

	Family	Common name	Scientific name
1	Nymphalidae	Peacock Pansy	<i>Junonia almana</i> (Linnaeus, 1758)
2		Lemon Pansy	<i>Junonia lemonias</i> (Linnaeus, 1758)
3		Blue Pansy	<i>Junonia orithya</i> (Linnaeus, 1758)
4		Yellow Pansy	<i>Junonia hierta</i> (Fabricius 1798)
5		Grey Pansy	<i>Junonia atlites</i> (Linnaeus, 1763)
6		Chocolate Pansy	<i>Junonia iphita</i> (Cramer, 1779)
7		Common Baron	<i>Euthalia aconthea</i> (Cramer, 1777)
8		Gaudy Baron	<i>Euthalia lubentina</i> (Cramer, 1777)
9		Plain Tiger	<i>Danaus chrysippus</i> (Linnaeus, 1758)
10		Blue Tiger	<i>Tirumala limniace</i> (Cramer, 1775)
11		Common Tiger	<i>Danaus genutia</i> (Cramer, 1779)
12		Common Leopard	<i>Phalanta phalantha</i> (Drury, 1773)
13		Common Evening Brown	<i>Melanitis leda</i> (Linnaeus, 1758)
14		Common Indian Crow	<i>Euploea core</i> (Cramer, 1780)
15		Common Bushbrown	<i>Mycalesis perseus</i> (Fabricius, 1775)
16		Common Sailor	<i>Neptis hylas</i> (Linnaeus, 1758)
17		Commander	<i>Moduza procris</i> (Cramer, 1777)
18		Common Castor	<i>Ariadne merione</i> (Cramer, 1777)
19		Tawny Coster	<i>Acraea terpsicore</i> (Linnaeus, 1758)
20		Great Eggfly	<i>Hypolimnas bolina</i> (Linnaeus, 1758)
21		Danaid Eggfly	<i>Hypolimnas misippus</i> (Linnaeus, 1764)
22		African Ringlet	<i>Ypthima asterope</i> (Klug, 1832)
23		Common Fourring	<i>Ypthima huebneri</i> (Kirby, 1871)
24		Baronet	<i>Euthalia nais</i> (Forster, 1771)
25		Painted Lady	<i>Vanessa cardui</i> (Linnaeus, 1758)
26		Glassy Tiger	<i>Parantica aglea</i> (Stoll, 1782)
27	Pieridae	Common Emigrant	<i>Catopsilia pomona</i> (Fabricius, 1775)
28		Molted Emigrant	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)
29		Cabbage Butterfly	<i>Pieris brassicae</i> (Linnaeus, 1758)
30		White Orange Tip	<i>Ixias marianne</i> (Cramer, 1779)
31		Yellow Orange Tip	<i>Ixias pyrene</i> (Linnaeus, 1764)
32		Common Jezebel	<i>Delias eucharis</i> (Drury, 1773)
33		Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus, 1758)
34		Spotless Grass Yellow	<i>Eurema laeta</i> (Boisduval, 1836)
35		Common Gull	<i>Cepora nerissa</i> (Fabricius, 1775)



	Family	Common name	Scientific name
36	Pieridae	Pioneer Butterfly	<i>Belenois aurora</i> (Fabricius, 1793)
37		Common Wanderer	<i>Pareronia valeria</i> (Cramer, 1776)
38		Psyche	<i>Leptosia nina</i> (Fabricius, 1793)
39	Papilionidae	Lime Butterfly	<i>Papilio demoleus</i> (Linnaeus, 1758)
40		Common Mormon	<i>Papilio polytes</i> (Linnaeus, 1758)
41		Common Jay	<i>Graphium doson</i> (C. & R. Felder, 1864)
42		Common Mime	<i>Papilio clytia</i> (Linnaeus, 1758)
43		Common Rose	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)
44		Blue Mormon	<i>Papilio polymnestor</i> (Cramer, 1775)
45		Spot Swordtail	<i>Graphium nomius</i> (Esper, 1793)
46	Lycaenidae	Pea Blue	<i>Lampides boeticus</i> (Linnaeus, 1767)
47		Common Pierrot	<i>Castalius rosimon</i> (Fabricius, 1775)
48		Rounded Pierrot	<i>Tarucus extricatus</i> (Butler, 1886)
49		Common Silver line	<i>Cigaritis vulcanus</i> (Fabricius, 1775)
50		Zebra Blue	<i>Leptotes plinius</i> (Fabricius, 1793)
51		Indian Gram Blue	<i>Euchrysops cnejus</i> (Fabricius, 1798)
52		Lesser Grass Blue	<i>Zizina otis</i> (Fabricius, 1787)
53		Tiny Grass Blue	<i>Zizula hylax</i> (Fabricius, 1775)
54		Lime Blue	<i>Chilades lajus</i> (Stoll, 1780)
55		Dark Grass Blue	<i>Zizeeria karsandra</i> (Moore, 1865)
56		Tailless Line blue	<i>Prosotas dubiosa</i> (Semper, 1879)
57		Forget Me Not	<i>Catochrysops strabo</i> (Fabricius, 1793)
58		Plains Cupid	<i>Luthrodes pandava</i> (Horsfield, 1829)
59		Slate Flash	<i>Rapala manea</i> (Hewitson, 1863)
60		Large Oakblue	<i>Arhopala amantes</i> (Hewitson, 1862)
61	Hesperiidae	Indian Palm Bob	<i>Suastus gremius</i> (Fabricius, 1798)
62		Small Branded Swift	<i>Pelopidas mathias</i> (Fabricius, 1798)
63		Indian Grizzled Skipper	<i>Spialia galba</i> (Fabricius, 1793)
64		Oriental Dark Palm Dart	<i>Telicota bambusae</i> (Moore, 1878)
65		Grass Demon	<i>Udaspes folus</i> (Cramer, 1775)

25.0833°N and 85.1000°-85.5000°E. RWS is surrounded by five hillocks named Ratnagiri, Vipalachal, Vaibhagiri, Songiri, and Udaygiri. Temperature may reach up to 45°C in the month of May–June and

maximum precipitation in July–August. The RWS inhabits a number of wildlife including threatened species such as Indian Pangolin *Manis crassicaudata*, Striped Hyaena *Hyaena hyaena*, Small Indian Civet *Viverricula*

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Images. © Rahul Kumar.



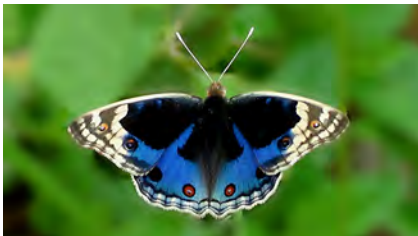
Peacock Pansy *Junonia almana*



Yellow Pansy *Junonia hierta*



Lemon Pansy *Junonia lemonias*



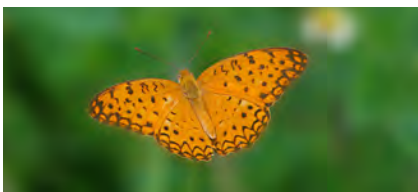
Blue Pansy *Junonia orithya*



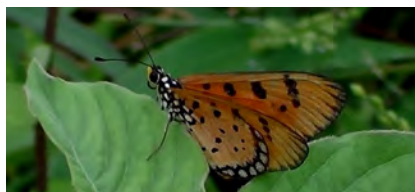
Lime Butterfly *Papilio demoleus*



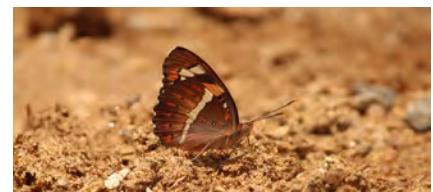
Common Tiger *Danaus genutia*



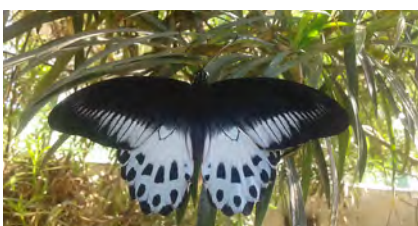
Common Leopard *Phalanta phalantha*



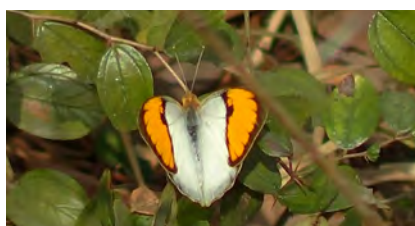
Tawny Coster *Acraea terpsicore*



Baronet *Euthalia nais*



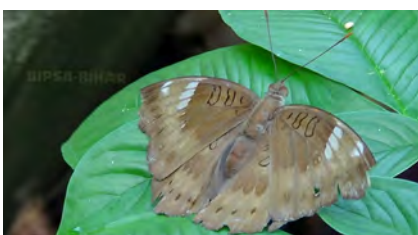
Blue Mormon *Papilio polymnestor*



White Orange Tip *Ixias marianne*



Large Oakblue *Arhopala amantes*



Common Baron *Euthalia aconthea*



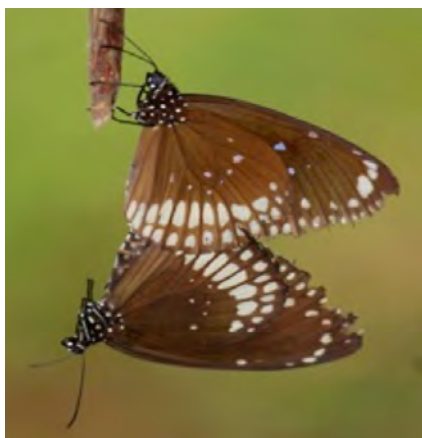
Commander *Moduza procris*



Common Jay *Graphium doson*

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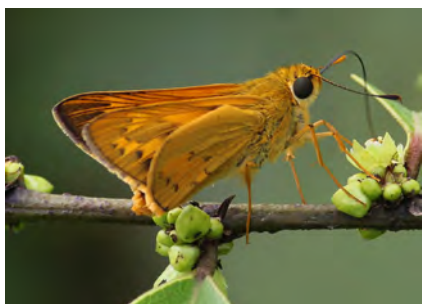
Common Indian Crow *Euploea core*



Common Jezebel *Delias eucharis*



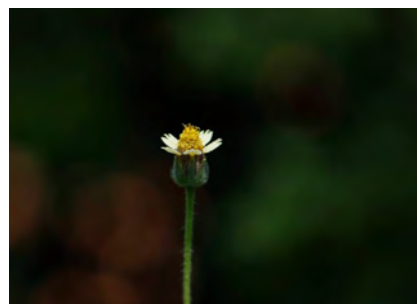
Indian Gram Blue *Euchrysops cnejus*



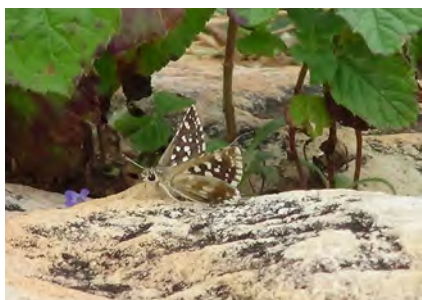
Oriental Dark Palm Dart *Telicota bambusae*



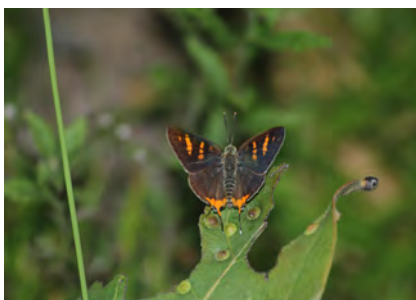
Common Grass Yellow *Eurema hecabe*



Coat button *Tridax procumbens*
common host plant for
butterflies.



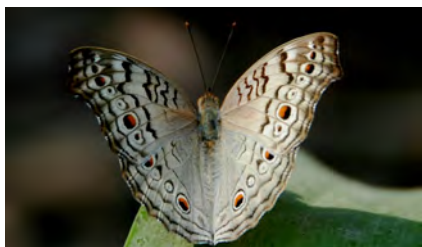
Indian Grizzled Skipper *Spialia galba*



Common Silverline *Cigaritis vulcanus*



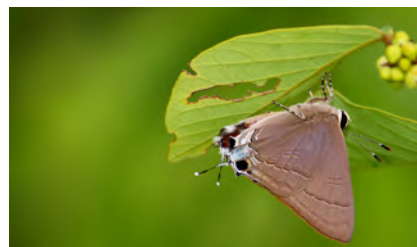
Common Wanderer *Pareronia valeria*



Grey Pansy *Junonia atlites*



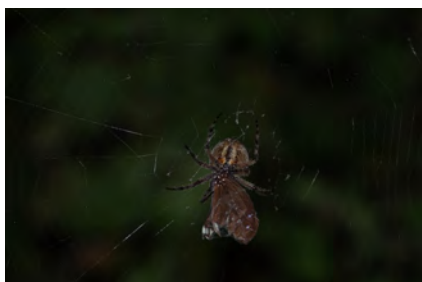
Mottled Emigrant feeding on
Tridax procumbens Nector.



Slate Flash *Rapala manea*

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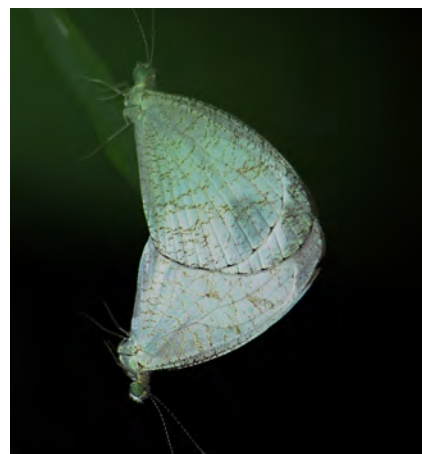
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Spider preying on Common
Indian Crow *Euploea core*



Spot Swordtail *Graphium
nomius*



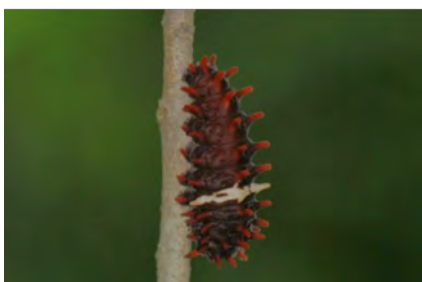
Psyche *Leptosia nina*



Common Pierrot *Castalius
rosimon*



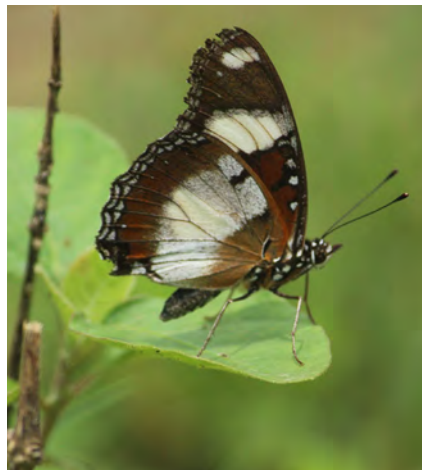
Rounded Pierrot *Tarucus
extricatus*



Common Rose *Pachliopta
aristolochiae* caterpillar



Pea Blue *Lampides boeticus*



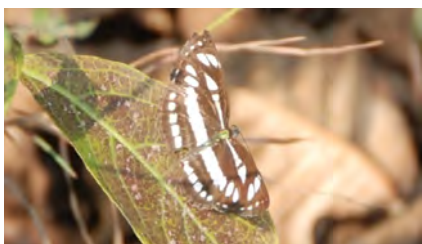
Great Eggfly *Hypolimnast
bolina*



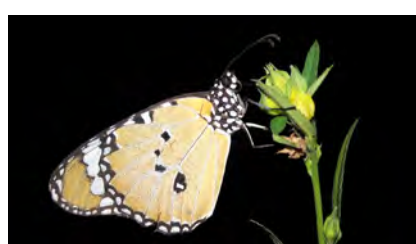
Pioneer *Belenois aurota*



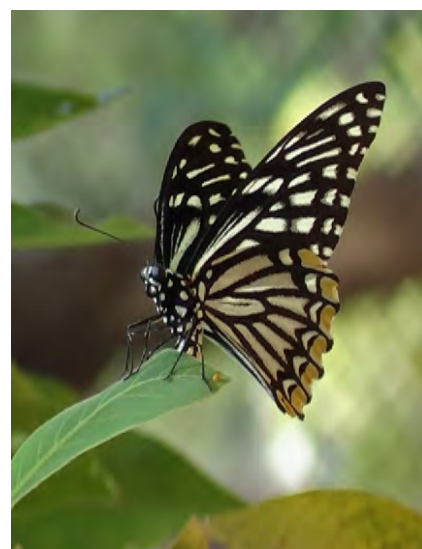
Common Mormon *Papilio
polytes*



Common Sailor *Neptis hylas*



Plain tiger *Danaus chrysippus*



Common Mime *Papilio clytia*



indica, Common Palm Civet
Paradoxurus hemaphorditus,
Indian Crested Porcupine
Hystrix indica, and Indian Hare
Lepus nigricollis.

The species have been recorded from various habitat types in RWS; dry deciduous, Sal-mixed moist deciduous, including dry deciduous scrublands, and patches of bamboo grooves (Champion & Seth 1968). Historical studies suggest that there are 399 species of vascular plants in Rajgir (Paul 1981). The dominating species of trees and shrubs in the study area include; *Cassia* sp., *Ziziphus oenoplia* (Dithora), *Carissa opaca* (Kanauda), *Bridelia retusa* (Kaaj), *Ziziphus* sp., *Ficus* sp. (Gular), *Buchanania lanzan* (Piar), *Aegle marmelos* (Bel), *Lantana camara* (Putus), and *Tridax procumbens* that attract butterfly species.

The survey yielded total 65 species of butterflies belonging to the five families from March to August in the

year of 2018. Specimens were documented in natural habitat with the help of Canon 1300D efs 55–250 mm lens and Garmin GPS. The dominating family Nymphalidae contributing 25 species, followed by Lycaenidae (15), Pieridae (12), Papilionidae (7), and Hesperidae (5). The survey site includes: Jayprakash Udhhan (25.003, 85.423), Vaibhargiri Giri (25.008, 85.412), Griddhakuta (25.001, 85.446), Venu Vana (25.015, 85.418), Vaitarani, FRH (25.001, 85.415), Ghora katora forest trail (24.998, 85.453), and nearby village (24.986, 85.318).

Photographed specimens were identified by using relevant literature of Kehimkar (2008), Gupta & Majumdar (2012) and Kunte (2006).

The dominant species in the Nymphalidae was Peacock Pansy *Junonia almana*, and Plain Tiger *Danaus chrysippus* while in family Pieridae was

White Orange Tip *Tiplixias marianne*, Common Grass Yellow *Eurema hecabe*, Common Gull *Cepora nerissa*, Common Emigrant *Catopsilia Pomona*, and Psyche *Leptosia nina*. Dominant papilionids were Common Mormon *Papilio polytes* and Spot Swordtail *Graphium nomius*. While trekking on Vaibhara Hill we got a chance to photograph *Spialia galba*, *Rapala manea* and mating of *Eurema laeta* while Blue Mormon *Papilio polymnestor*, Common Rose *Pachliopta aristolochiae* were rarely seen in the study region.

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Extant of Panther *Neurosigma siva siva* in Royal Manas National Park, Bhutan

The Nymphalidae species butterfly, monotypic (Brower 2009) *Neurosigma siva* is a rare species (Nidup et al. 2015; Sondhi & Kunte 2016) found in Bhutan, Bangladesh, Myanmar, Nepal, upper Burma, southeastern Tibet (China), and India (Kehimker 2008; Sondhi & Kunte 2016). A majority of the butterfly species has been thoroughly studied worldwide; however, only limited knowledge and rare sighting of *N. siva* has been recorded so far. The current study is the first of its kind to understand butterfly species wise and showcase the presence of *N. siva* and its preference of habitat use in the RMNP, Bhutan.

Neurosigma siva preferred forested region and flies between 300–500 m of altitude. However, Haribal (1992), Wangdi et al. (2013), and Sondhi & Kunte (2016) have recorded this species between 1,350–1,750 m in



Neurosigma siva siva at Changazam.

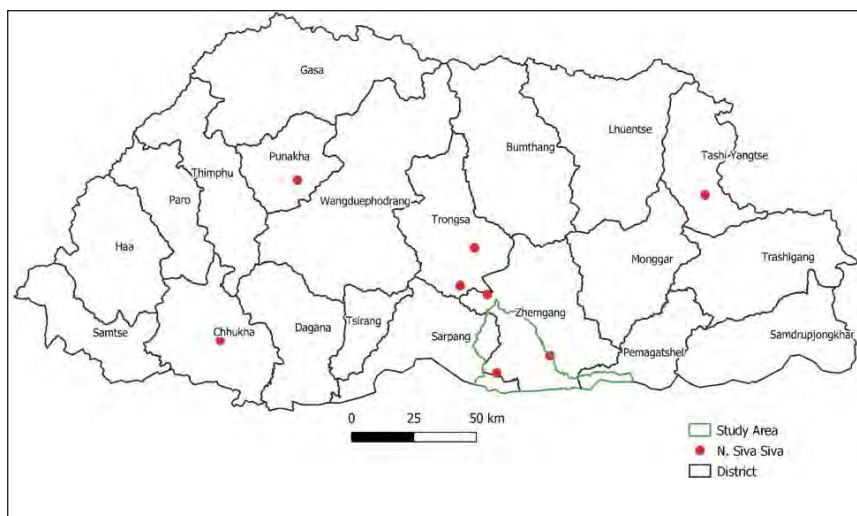
evergreen broadleaf forest. Dorji (2013) and Nidup et al. (2015) have reported its sighting in September below 500m but Haribal (1992) reported that the species flies in spring and comes back in October.

Wangdi & Sherub (2012); Singh (2017) has mentioned it as a rare species. So, due to its rarity in situ, it is a legally protected subspecies *siva*, under its synonym

doubledayi (Beccaloni et al. 2019), under schedule II of Indian Wildlife Protection Act 1972 (IWPA 1972), but yet needs to be evaluated in IUCN Red list. However, currently accepted scientific name for the species is *Neurosigma doubledayi siva* (Beccaloni et al. 2019). It came to be learnt during the current study that only six individuals have been sighted till now in the country from different

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Red dots indicating the occurrence *N. siva* in Bhutan.

locations and only three individuals from RMNP. So, such rare species should receive attention and protection in the country.

The study was carried out along the southern foothills (90.583°E–91.216°E & 26.766°N–27.133°N) of RMNP- the oldest protected area known for its outstanding biodiversity. The altitude ranges between elevations of 80–2,714 m. Owing to varied climatic and topographic features, the park hosts varieties of forest habitat types.

Modified Pollard walk (Pollard 1977) of 1,000m length and 2.5m width on either side

(Nidup et al. 2015) were laid within 200–500 m of altitudes in different habitat types. The study area was categorized into three types of habitat: open canopy (OC), closed canopy (CC), and stream bed (SB).

The field survey was conducted during 09.00–12.00 h and 14.00–17.00 h as butterflies generally become active around this time of the day (Nidup et al. 2015). Equal number of transects were laid in every habitat, and same pace of 30–35 minutes were spent to scan for butterflies in every transect. The survey was conducted four times in a year starting from September 2015 to

July 2016. However, in the third year (2017), surveys were conducted with a higher sampling effort from 23 to 29 transects in order to increase the probability of encountering *N. siva*.

Only three individuals of *N. siva* were sighted in the high forested area; two from Changazan trail towards Silingtoe (26.914°N & 90.894°E) at 254m under Manas Range and another one along the Gortey trail towards Menchuna (26.847°N & 90.680°E) at 210m under Umling Range. These butterflies were sighted on 5 and 27 June 2016 in Changazam trail and Gortey trail, respectively, and the third one on 11 September 2017 in Changazam trail on the ground. The butterflies were sighted on wet days while they were basking in the sun with open wings.

Due to the elusive nature of the species and its rarity, we could not study in detail since the species was not seen in areas where it was sighted before indicating its intolerance for disturbance

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and other anthropogenic factors. This species was also reported to be sighted rarely (Westwood 1850) in the country (Wangdi & Sherub 2012; Wangdi et al. 2013; Nidup et al. 2015).

Butterflies being genuinely scarce, there is a need for more extensive surveys to determine the species 'status and to provide ecological basis for assessing its conservation status and needs. Further, our findings necessitate careful consideration of its conservation status in Bhutan as they are not legally protected under any Acts and Rules in Bhutan.

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New record of the dragonfly *Epophthalmia frontalis* from Palghar District, Maharashtra, India

In India, the family Macromiidae Needham, 1903 has 17 species represented by two genera namely, *Epophthalmia* Burmeister, 1839 and *Macromia* Rambur, 1842 (Kalkman et al. 2020). Genus *Epophthalmia* has three species in India—*E. frontalis* Selys, 1871, *E. vittata* Burmeister, 1839, and *E. vittigera* (Rambur, 1842) (Kalkman et al. 2020). *E. vittata*, being the commonest among the three species is reported from Andaman & Nicobar Islands, Andhra Pradesh, Goa, Jharkhand, Chhattisgarh, Kerala, Maharashtra, Odisha, Uttarakhand, Tamil Nadu, Tripura, Uttar Pradesh, and West Bengal (Tiple & Koparde 2015; Dawn & Chandra 2016; Subramanian et al. 2018). *E. vittigera* is reported from Assam and West Bengal (Mittra 2002). *E. frontalis* (Selys 1871) is known from the Western Ghats (Maharashtra, Kerala,

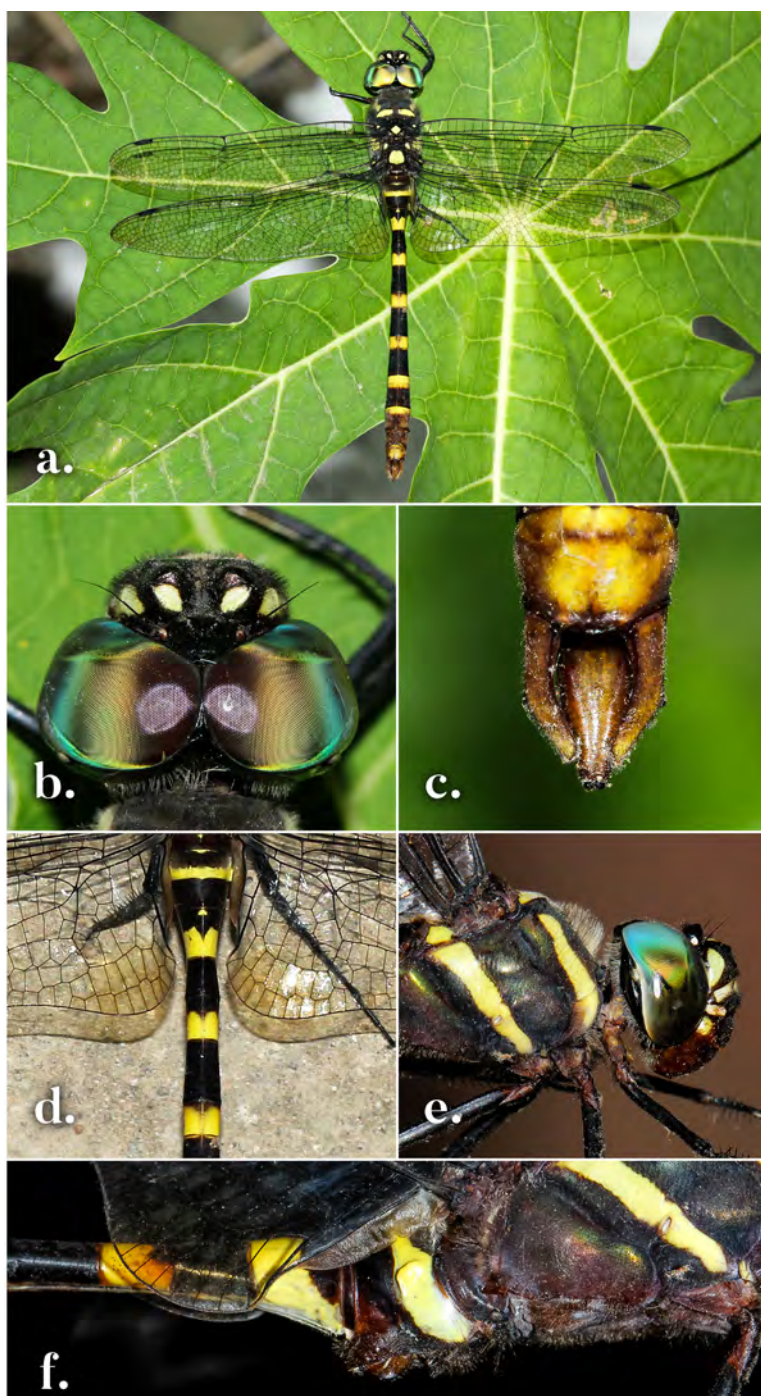


Image 1. *Epophthalmia frontalis*: a—male habitus, dorsal view | b—head, dorsal view | c—caudal appendages, dorsal view | d—base of HW | e—head and thorax, lateral view | f—thorax and S1-S4, lateral view. © Fahim Khan.

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Figure 1. Satellite map of Palghar District showing Ambhai Village, Vada Taluka, locality of *Epophthalmia frontalis* (Map is created in QGIS 3.10.2, ©Dattaprasad Sawant).

Tamil Nadu) and eastern India (Assam, Meghalaya, Odisha) (Lieftinck 1931; Mitra 2002; Subramanian et al. 2018). According to Fraser (1936), *E. frontalis* of eastern India is *E. frontalis frontalis* and that from the Western Ghats is *E. frontalis binocellata*. *E. frontalis* could be easily overlooked by many researchers due to its close resemblance with the congeneric and more widespread species, *E. vittata*. In this paper, we report the northernmost distributional record of *E. frontalis* from Ambhai Village, Vada Taluka,

Palghar District, Maharashtra. We provide the diagnostic characters along with the first photographic evidence of the species from Maharashtra.

Fahim Khan photographed a male individual of *Epophthalmia* genus on 28.xi.2020 at Ambhai Farmhouse (19.696°N, 72.992°E; 102m), Ambhai Village, Vada Taluka of Palghar District (Figure 1), which is a private holiday destination and situated in the close vicinity of Kohoj Fort forest area. Photographs were taken with the help of

Canon 1300D and 100mm macro lens (Canon Inc. Tokyo, Japan). The individual was handled gently for close photographs and set free after necessary documentation. We identified the species with the help of standard reference field guides (Fraser 1936; Subramanian et al. 2018) and referred the website of the IUCN Red List for the conservation status of it. Abbreviations in the text: FW= fore wing, HW= hind wing, S1–S10= abdominal segments 1–10. Map used in Figure 1 is created using QGIS v3.10.2 by Dattaprasad Sawant.

The individual showed following characteristics which led to the diagnosis of *Epophthalmia frontalis*. The large-sized dragonfly has metallic frons, thorax, and dark abdomen with yellow spots & annules (Image 1a). According to Fraser (1936), *E. frontalis* can be distinguished from the closely resembling species *E. vittata* by the presence of two widely separated triangular yellow spots on superior surface of the frons



and extreme melanism (except *E. vittata cyanocephala*) and longer paraprocts, while the latter has a single medial yellow spot of roughly heart shaped in the floor of the notch of superior frons and nearly equal cerci and paraprocts. *E. frontalis* can be distinguished by *E. vittigera* by almost straight cerci, while the latter has angulated cerci and blackish-brown rays at the wing base. We observed the following characteristics to determine the identity of our specimen as *E. frontalis*.

1. The superior surface of frons has a yellow spot on each side of its margin separated by metallic black area (Image 1b,e).
2. The abdomen (Image 1a,f) is black till S7, and ferruginous brown S8–S10. S1 is brownish-black. S2 has a narrow yellow annular mark in the midway. S3–S5 have basal interrupted yellow annular marking resembling two spots on dorsum. S6–S8 have basal broader yellow annular rings. S8–S10 are ferruginous brown with a broad yellow spot on the dorsum of S10.
3. Caudal appendages are rusty brown (Image 1c). Cerci are almost straight. Paraprocts are longer than cerci.
4. Wings are hyaline except the tornus of HW, which is tinted with pale amber (Image 1d). Apices of both wings are clear. Traversed discoidal cells are seen in both the wings (Image 1a,d).

In contrast to above characteristics, *E. vittata* has a medial roughly heart shaped yellow spot on superior surface of frons, nearly equal cerci and paraprocts, yellow annular

markings on the base of abdominal segments and clear HW tornus with tinted wing apices. Traversed discoidal cells of *E. frontalis* distinguishes it from *Macromia* spp.

Epophthalmia frontalis was originally described by Selys in 1871. Later, subspecies *E. frontalis binocellata* was described by Fraser in 1924. Fraser distinguished these two subspecies by the presence of yellow basal rings on the abdomen of *E. frontalis frontalis* and spot like basal yellow markings on abdomen of *E. frontalis binocellata*. However, Kalkman et al. (2020) has not mentioned any subspecies of *E. frontalis* in the recent checklist of southern Asia. We follow the same nomenclature and limit our diagnosis up to the species level. It is listed as Least Concern (LC) under the IUCN conservation status.

Prasad (1996) and Subramanian et al. (2018) have mentioned the presence of *E. frontalis* from Maharashtra State. However, no photographic evidence or specimen description of the studied material was given by any of the authors. Apart from Maharashtra, *E. frontalis* has been recorded from Madhya Pradesh, Kerala, Tamil Nadu, Odisha, and Assam (Lieftinck 1931; Mitra 2002; Subramanian et al. 2018; Tiple & Payra 2020). Outside India, it was recorded from Nepal, Myanmar, Thailand, and Lao PDR (Sharma & Dow 2010; Subramanian et al. 2018). However, the description given by Asahina (1987) has some taxonomic ambiguities with the original description.

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Further molecular studies are needed to resolve the taxonomic discrepancies with respect to the species.

The increasing anthropogenic disturbance such as urbanization and industrialization have become a serious threat to the poorly known fauna in Palghar District. Current record of this uncommon species highlights the rich fauna of this area. More systematic surveys should be conducted to document its biodiversity. Effective conservation strategies and management policies are required to conserve such remarkable species.

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A record of early breeding season of Blue-bearded Bee-eater in Buxa Tiger Reserve, West Bengal

The Blue-bearded Bee-eater *Nyctyornis athertoni* (Jardine & Selby 1830) (Family Meropidae) is a species found in the Indian subcontinent and southeastern Asia (Rasmussen & Anderton 2012; BirdLife International 2016). It is a common, forest mid-storey resident species in Buxa Tiger Reserve in West Bengal (Sivakumar et al. 2006).

The bee-eater prepares its nest by digging burrows tunnelled into vertical sandy banks, often at the side of a river or stream, and at times in sloping hillsides. The breeding season for this species is recorded from February to August by the earlier studies (Ali & Ripley 1983; Rasmussen & Anderton 2012). Ali & Ripley (1983) mentioned that the excavation commences a month or more before actual egg laying, while Rasmussen & Anderton (2012) has mentioned that the excavation may start by December.

In November 2018, a Blue-bearded Bee-eater pair was noticed excavating a burrow on a wall of a trench made for the water channel on the boundary of the Vulture Conservation Breeding Centre at the Rajabhatkhawa range

(26.6161°N, 89.5362°E) in Buxa Tiger Reserve. The area represents eastern Himalayan moist-mixed deciduous forest (Champion & Seth 2005).

The nest hole was at the height of about two feet from the base of the channel. The ground vegetation was scanty around it, although the location was in the woodland. The nesting did not succeed, however, on 19 October 2019, the pair was seen again preparing tunnels at the same location.

There were two nest holes dug, both circular, about eight cm in width. The process of excavation continued for a week and then birds were observed perching nearby. On 8 December 2019, the pair was seen with two juveniles. In January 2020, more than a month after the breeding concluded, the nest hole

Adult Blue-bearded Bee-eater at Rani, Assam in May 2020.
© Sachin Ranade.





Nest of Blue-bearded Bee-eater at Rajabhatkhawa, BTR, in January 2020. © Sachin Ranade.

was photographed. On 12 October 2020, consecutively for the third year, the pair prepared a nest in same location in Rajabhatkhawa and bred successfully. These records of the nest-tunnel building and breeding of the Blue-bearded Bee-eater are almost two months earlier than the previous known records (Ali & Ripley 1983; Rasmussen & Anderton 2012).

Two additional nesting attempts were recorded in Buxa Tiger Reserve during December 2019-January

2020. One attempt produced a single fledgling at Rani, Kamrup District in Assam during May 2020.

It is possible that the earlier breeding documented here is a characteristic of the population of Blue-bearded Bee-eater in northeastern India, however this could also be variation influenced by climate change.



Blue-bearded Bee-eater near the nest of Greater banded hornet at BTR, December 2019. © Sachin Ranade.

The diet of the Blue-bearded Bee-eaters included the Dwarf Honey Bee *Apis florea* that prepared a comb-nest in my wooden house at Rajabhatkhawa, which attracted a pair of Blue-bearded Bee-eater. The pair perched on a wire close to the window and fed on the bees. Adults and newly fledged young also foraged on a nest of Greater Banded Hornet, *Vespa cf. tropica*, on a tree near their nest.

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Nesting record of Oriental Pratincole in Debrigarh Wildlife Sanctuary, Odisha, India

The Oriental Pratincole *Glareola maldivarum* (Forster, 1795) is one of the three species of genus *Glareola* found in the Indian subcontinent that belongs to the family Glareolidae and order Charadriiformes (Rasmussen & Anderton 2012). Globally, the breeding population subsists between the southeastern Palearctic and the Indo-Malayan realms that range from the Indian subcontinent to eastern Mongolia, China and parts of Japan; and the wintering habitat spreads from the Indo-Malayan to the Australasian biogeographic realms (BirdLife International 2020).

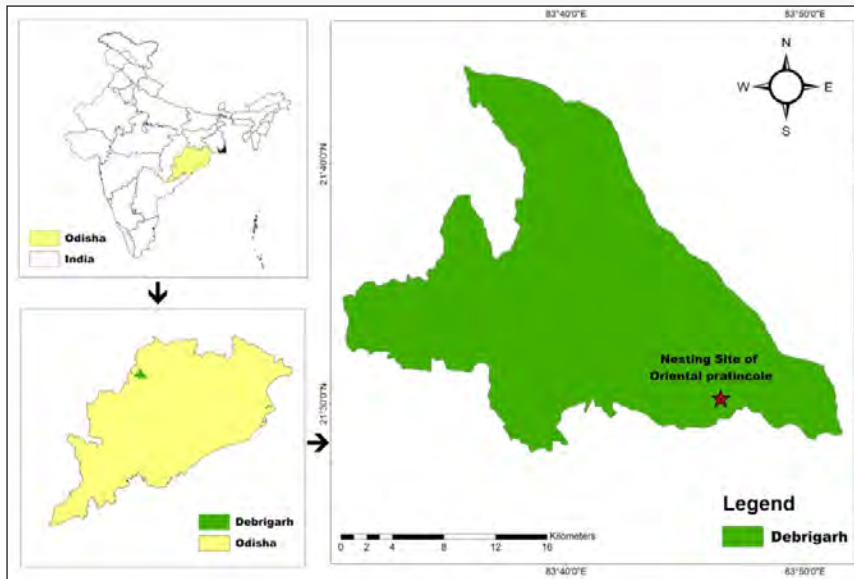
In the subcontinent, it has been recorded breeding from Sind, through northern India to Odisha, West Bengal, Assam and Bangladesh and has been recorded from Kerala, Sri Lanka, and Maldives in south and also been recorded from Lakshadweep Archipelago recently (Khan 2017). As



Oriental Pratincole *Glareola maldivarum*. © Bhubaneswar Patra.



Oriental Pratincole nest with egg clutches.



Nesting site of the Oriental Pratincole on the bank site of Hirakud Reservoir.

per the literature survey, the species has isolated records more or less throughout the subcontinent (Ali & Ripley 1987; Grimmett et al. 2011; Manakadan et al. 2011). In Odisha, it has been recorded from Chilika, Nalabana, Mangalajodi, Bhitarkanika, and Hirakud (Balachandran et al. 2002; Gopi & Pandav 2007; Grimmett et al. 2011; Nair et al. 2014). The breeding records of Oriental Pratincole were earlier reported at Nalabana islands, Odisha (Balachandran et al. 2002). Nair et al. (2014) documented seven species of colonial ground-nesting birds including Oriental Pratincole from the Hirakud Wildlife Division; however, their nesting record

has not been reported from other suitable habitats in Odisha except Nalabana Wildlife Sanctuary, Chilika.

Oriental Pratincole is a moderately sized (18–30 cm) short-legged shorebird much similar to Collared Pratincole. They have shallow like tail-fork, long pointed wings but

the tail tip falls short to the wing tip at rest. The breeding plumage contains strong perch-orange underparts, a cream throat bordered by black gorget (Grimmett et al. 2011). Pratincoles are a group of desert-adapted shorebirds that are also colonial ground nesters which breed on sandy shores or lagoons and saltmarshes (Higgins & Davies 1996). These birds breed mostly in summer in colonies and nest on the open ground with a shallow scrape or natural depression.

On 20 June 2019, during fieldwork carried out by the research team of Odisha Biodiversity Board at Debrigarh Wildlife Sanctuary, the team observed three individuals of Pratincoles



Oriental Pratincole producing threat calls nearby the nest.



Oriental Pratincole incubating eggs.

hovering over the bank of Hirakud Reservoir (21.5039°N & 83.7744°E). The reservoir has a large forest fringe on one side adjoining the Debrigarh Wildlife Sanctuary and in summer the exposed bank area provides nesting ground for variety of shorebirds. The observed birds were flying fast, constantly changing directions and producing sharp calls. It is a common behaviour in pratincoles or other colonial ground-nesting birds to evade predators near the vicinity. Soon after, a nest clutch with three eggs was spotted at the dried out bare flat formed due to receding of water from the reservoir, surrounded by small grasses and shrubs. Eggs were oval or sub-elliptical in shape,

smooth, creamy coloured, spotted and streaked black or dark brown. After sighting an individual near the nest and the literature survey, it was confirmed that the nest was of Oriental Pratincole (Higgins & Davies 1996). After that, the bird activities were observed silently just away from the nest, following 10 minutes of

observation, another Oriental Pratincole landed about 3-5 meters away from the nest and watching over us and producing a continuous threat call. Since then, the bird gradually approaches the nest and after some time, it sat on the egg clutch to incubate probably. After some time, another individual came to incubate. The predator evading behaviour in Pratincoles differs with respect to different predator size. Small predators are chased off by a single parent while the other incubates the eggs (Jayasinghe et al. 2018) but in the case of large predators, both the parents take charge. It also differs depending on weather conditions. In pleasant



Livestock grazing pose threats to the natural breeding habitats of Oriental Pratincole.

weather, both the parents engage in evading predators while in temperate conditions, one parent incubates and the other drives off the invaders (Jayasinghe et al. 2018). Since ground nesters, these birds face many natural as well as anthropogenic threats as these are small birds and are unable to chase off invaders like stray dogs and other birds of prey.

Apart from this, wetlands are an easy target of anthropogenic disturbances and the Hirakud Reservoir is also not barred from that. Though there are some regulations still people are fishing in the reservoir, grazing of livestock along the banks cause serious threats to the nests of these shorebirds. Poaching is one of the greatest threats to the birds which require constant watch by the forest department. All these problems can be reduced by awareness of local people, making them a part of the major stakeholder and promote them for conservation. To prevent the disturbances, the sanctuary management should take measures to ensure successful breeding of these shorebirds. Future studies are needed to understand the behaviour and ecology of these shorebirds which will help in further implementation of a proper conservation plan.

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Communal roosting behavior of Grey Wagtails in Wayanad, Kerala



Image 1. Grey Wagtail *Motacilla cinerea*. © Akshay Shinde.

Grey Wagtails *Motacilla cinerea* (Image 1) are small, slender insectivorous birds, with the characteristic long and constantly wagging tail. Communal roosting is seen in wagtail species.

Avian communal roosting is a behavior seen in birds where they assemble by nightfall and spend the night together. It benefits the birds in terms of reduced thermoregulation costs, decreased predation risk, and an increase in foraging efficiency. We looked into a fourth benefit that is the migratory factor.

On the evening of 15 February 2020 at 18.20h, a flock of around 50 individuals of Grey Wagtails was observed on a Champaka tree *Magnolia champaca* in Pookode Veterinary University Campus, Wayanad District, Kerala (11.534°N 76.019°E). The campus is surrounded by evergreen, moist deciduous forests, montane grassland, and coffee plantations.

As the Grey Wagtails are solitary and territorial in nature, seeing such a huge flock of them on the same tree made us curious and



Figure 1. The map showing pre, post and roosting areas of Grey Wagtails in Wayanad. (Map Credit: Google Earth).

introduced us to a behavior of them known as communal roosting.

It is a behavior seen in birds, wherein many birds either of the same species or multiple species roost at specific places. Communal roosting of Wagtails with other avian species has been observed in India with Large Pied Wagtails in Kunnathurmedu, Kerala (Praveen 2006) and with Grey Wagtails in Mangalore University campus, Karnataka in southern India (Rodrigues 2019).

After 10 days, on the evening of 25th February, we observed that due to constant chasing by Large-billed Crows *Corvus macrorhynchos* which were roosting in the same

tree, most of the wagtails (30–35 from a total of 50 approximately) had shifted the roosting to an *Erythrina* tree inside Jawahar Navodaya Vidyalaya School Campus, Pookode (11.534°N 76.020°E), which was 50m away from the Champaka tree (first roost tree). The next day, on 26th

February, all the individuals of wagtail were observed to be roosting on the *Erythrina* tree.

At the start of the roost, the wagtails were seen perching on the upper branches that were more open and had less leaf cover (height of the *Erythrina* tree is 18m) but as dusk proceeded, the birds moved towards the lower branches with dense leaf cover, which were at the height of 2–6 m from the ground. Surprisingly, we could spot a Forest Wagtail *Dendronanthus indicus* (Image 2) roosting along with these wagtails. Mixed species communal roosting behavior was observed in other species of wagtails (Gadgil & Ali 1975).



Image 2. A Forest Wagtail *Dendronanthus indicus* was observed to be roosting with the Grey Wagtails. © Pranjali Bhujbal.

All the wagtails were observed to be pre-roosting in the dried marsh grassland area (Image 3) 50m away from the roost tree (*Erythrina*). They started arriving around one hour before the sunset from different directions, alone or in groups of two to three individuals. Pre-roosting activities included preening, foraging, resting, and even slight clashes with the accompanying members.

Some wagtails were observed on the rooftop of a house in school premises (15m away from the roost tree), making it the second pre-roosting site. In around 15 to 20 minutes, most of the wagtails (40–45) gathered on the pre-roosting grounds, and half an hour before the sunset (18.35h) they flew towards the roosting tree.

On cloudy days, we observed that the pre-roosting and roosting were earlier than usual as the roosting behavior is mediated by light intensity where the birds return to the roost when the ambient light has sufficiently dimmed (Ian 1977).



Image 3. The birds would gather at the dried marshland for pre-roosting. © Jeff Francis.

While roosting, more than one individual was observed in the same branch but all of them were resting individually, at a distance of ~20 to 30 cm (Image 4). Huddling among the individuals was not observed.

We observed adult birds (they were classified as adult and juvenile by their size) occupying the interior branches of the roosting tree, mainly secondary and tertiary branches which were closest to the trunk. Communal roosting has demonstrated a hierarchy of sorts where older individuals roost in the interior of the group, decreasing their exposure to predators (Weatherhead 1983) such as Brown-hawk Owl *Ninox*

scutulata, Spot-bellied Eagle-Owl *Bubo nipalensis*, Brown Fish-Owl *Bubo zeylonensis* and Brown Wood-Owl *Strix leptogrammica*, which were frequently sighted in the campus (based on direct observations).

In the morning, the post roosting activity started 15–20 minutes before sunrise (06.20h). The adult birds moved out of the tree first and then juveniles came out later. Wagtails flew out from the tree in flocks of 3–5 individuals; in different directions. They were seen post-roosting on the same rooftop of the house in the school premises and also on the same pre-roosting ground, in small flocks of 10–15 individuals.

Table 1. Roost tree characteristics of Grey Wagtail at Pookode Campus, Wayanad.

Tree species	Tree height (m)	GBH (cm)	No. of primary branches	No. of secondary branches
Champaka (sp) (Roost tree-1)	17	414	2	13
<i>Erythrina</i> (Roost tree 2)	18	148	4	47
GBH—Girth at Breast Height				

Table 2. Pre/post roost characteristics of Grey Wagtail at Pookode Campus, Wayanad, Kerala.

Distance from roost trees	Pre/post roosting sites	
	Dry marshland (m)	House rooftop (m)
From Champaka (sp) (Roost tree 1)	35	38
From <i>Erythrina</i> (Roost tree 2)	50	15

Earlier studies suggested the reasons for communal roosting, some being climatic factors (Kendeigh 1969), thermoregulation benefits (Yom-Tov et al. 1977; Du Plessis et al. 1994), information sharing of abundant food locations (Wynne-Edwards 1962) and predation avoidance (Weatherhead 1983; Eiserer 1984).

Since the wagtails were observed to be roosting individually and not forming any huddles, thermoregulation cannot be a factor in this

case. Being a solitary forager, information sharing of the abundance of food resources is meaningless, thus the information hypothesis also

fails to explain this communal roosting behaviour.

Roosting communally helps birds to protect from predation as the detection of the predator becomes easier and it also dilutes individual predation risk (Eiserer 1984). Birds on the edge of the roost provide a buffer from predation to more centrally roosting birds (Weatherhead 1983).

This same scenario was observed in wagtails, where the adult birds were competing for the interior branches in the roost tree, hence predation avoidance can be one of the reasons for communal roosting in grey wagtails.

**Image 4. Grey Wagtails roosting in the *Erythrina* tree. © Pranjali Bhujbal.**

We observed this communal roosting behavior continuously for a month (from 15 February 2020 to 17 March 2020). This denotes that the site was a wintering ground for these migratory Grey Wagtails. As the Forest Wagtails are also migratory birds, a more plausible reason for the communal roosting might be that it helps them in migration. It might be helping the younger individuals (first-time visitors) to go back to their breeding grounds by following the older/experienced individuals. Further studies on the migration and foraging behavior of Grey Wagtails will shed light on this apart from other factors such as protection, information sharing, or thermoregulation.

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Rediscovery of Crested Goshawk from southern Bengal, India

Crested Goshawk *Accipiter trivirgatus* (Temminck, 1824) is a small-sized bird of prey belonging to the family Accipitridae. It is considered as Least Concern as per IUCN assessment in 2016 (BirdLife International 2016). This bird species is resident and can be found mainly in the Himalaya, northeastern portion and southwestern region of the Indian subcontinent where it prefers mostly the dense, deciduous, evergreen tropical, and subtropical forests (Grimmett et al. 2011). The population of this species is supposed to be declining due to the anthropogenic interventions and habitat destructions (BirdLife International 2016).

An adult individual was first observed on 27 February 2021 at Biharinath Hill, Bankura (23.5764°N, 86.9533°E) (Adhurya et al. 2021). The habitat was typically a tropical deciduous forest with mainly tree species like *Shorea robusta*, *Madhuca* sp., *Terminalis* spp., *Acacia*



Image 1. Crested Goshawk from Biharinath Hills, Bankura. © Debayan Gayen on 27 February 2021.

spp., *Bauhinia* spp., and their associated species. This forest is mainly used as a tourist destination and also villagers collect firewood from here. The bird was seen flying above the canopy layer and photographs were taken.

The bird was identified based on the following characteristics: (i) six primary fingers in flight, (ii) bright yellow iris, (iii) white throat with black mesial stripe, (iv)

alternative black and white tail bands of equal width, (v) white under tail covert, (vi) heavily dark brown streaked breast, and (vii) bold dark brown-barred belly (Naoroji 2006; Clark & Marks 2020). *Besra Accipiter virgatus* shows similar pattern to undertail covert, mesial stripe and tail banding. But it shows five fingers instead of six as in Crested Goshawk and also slimmer in appearance (Chow 2011). Another *Accipiter*,

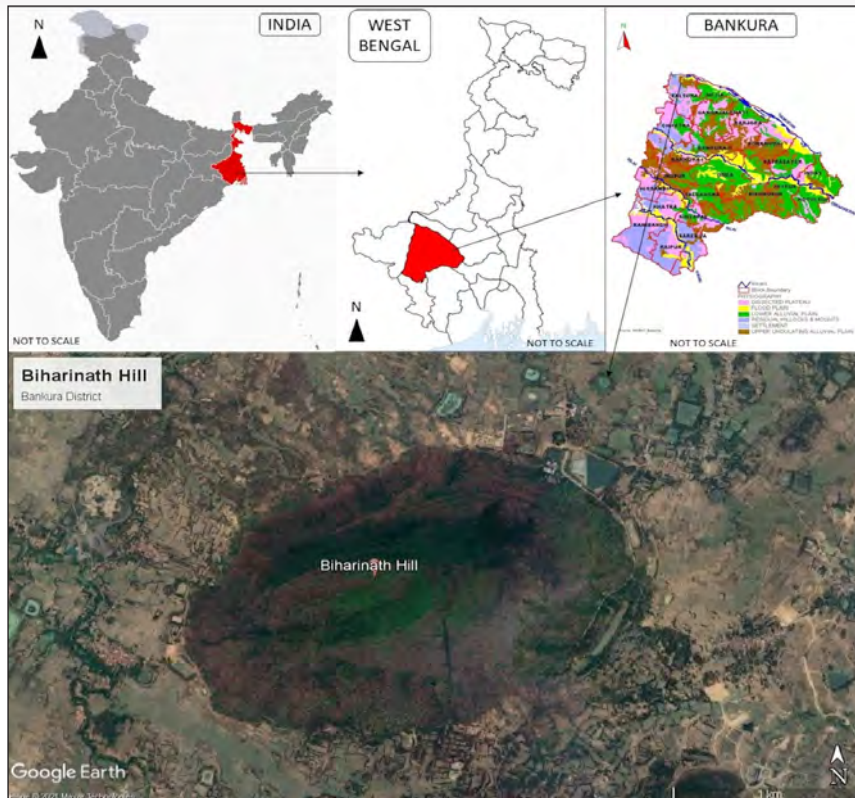


Image 2. Location from where Crested Goshawk was recorded.

Eurasian Sparrowhawk *Accipiter nisus* though shows similar tail banding, but it lacks the black mesial stripe (Grimmett et al. 2011).

The species was further recorded around the same location on 7 March 2021 (23.5828° N, 86.945° E) (Gayen 2021). Images of the bird and its habitat can be seen in Images 1-3, respectively.

The range maps found in standard works of (Grimmett et al. 2011; Rasmussen & Anderton 2012), and online sources (BirdLife International 2021; eBird 2021), indicate

that the species is mainly found in the Himalayan foothills of West Bengal (the districts of Darjeeling,

Alipurduar, Jalpaiguri, and Cooch Behar).

There was only one previous record from southern West Bengal till date from Sundarban (Mukherjee 1975). It is probably second documentation of this species after 46 years from southern Bengal. This habitat is affected by various anthropogenic activities like habitat destruction, picnic, collection of firewood and many others. Recently, a forest fire was also noticed in the particular habitat of Crested Goshawk. Hence, conservation of the habitat of this species is the prime need of the hour from the concerned authorities.



Image 3. Habitat of Crested Goshawk from Biharinath Hills, Bankura.

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Transect stop counts of birds along the paddy fields, canals, and village at west Arpookara, Kerala, India

Wetlands and the backwaters of Kerala once harboured a rich bird fauna according to early records (Ali 1999). In recent years there is an increasing awareness on protecting the backwaters which is ecologically and economically important (Schreiter 2014). Preliminary surveys conducted on the wetland birds in Kerala (Gaston 1978; Zacharias & Gaston 2004) presented the current status of wetland birds in the state. A decline in the number and diversity of wetland birds was noted in Kerala in recent years (Sreekumar 2002; Laxmi 2014; VJZ pers. obs.).

The reasons for this trend are lowering water levels in lakes and drying up of wetlands due to illegal sand mining, dredging, reclamation, pollution and indiscriminate developmental activities around. However, species like the Great Cormorant, *Phalacrocorax carbo*, Asian Openbill *Anastomus oscitans*,



A view of the study area - coconut palm rows on the man-made bunds.

and Black-headed Ibis *Threskiornis melanocephala* were found to be increasing in numbers in Kerala. This conclusion is based on random observations and not based on a systematic study. In fact, few systematic studies on the population of wetland birds have been carried out in Kerala.

We conducted a population estimation of birds on fixed routes with limited stop counts in the Arpookara Village, adjoining the Vembanad Lake, to determine

the current status of the avifauna of the region. We hope that the data presented here could be compared with a future data to determine the changes which are likely to occur over the years.

Study area: Arpookara Village, adjoining the Vembanad Lake (9.632°N, 76.480°E) is situated in the Kottayam District of Kerala. The area is characterized by open paddy fields and canals flanked with coconut palms, which are used for boat traffic. Adjacent villages are

Table 1. Stops and characteristics of the 4.8–5 km line transect near west_Arpookara.

Stop no.	Description of the areas
1	End of rickshaw route, open paddy fields with a main irrigation ditch, side canals and bordering pools.
2	Pump station flanked by stone walls, coconut palm rows and a cattle rest area.
3	Iron foot bridge over the canal, with access to agricultural land across.
4	Lake shore 440 m westwards, lake inundated, appr. 250 acres.
5	Houses and wooden bridge over a side canal, farm with bananas, coconut palms, pepper vines, vegetables, etc.
6	Rest/storage hut right to the canal near the day roost of Night Herons in a thicket.
7	Opening of the canal, fishing and bathing site, breast deep water. Local ferry station, few houses across with partly flooded paddy fields behind.
8	From stop 8 about 500 m along the southern side of the canal; row of tall coconut palms with cultivation of bananas, vegetables, pepper vines.
9	Back in the direction to stop 3 about 500m: Palm trees, marked at breast height (dbh), nearby a circular widening of the canal, exit to the paddy fields.
10	From stop 7, along the canal, about 500m to the beginning of the village Arpookara, palm rows with a marked tree, on the open area to the right and left; open paddy fields with irrigation system, few houses.
11	Inside the village, across the canal a house, with cattle, sheep, ducks, and chicken. A small trail along the canal side used by, motor bikers, and rickshaws construction equipments transported by boat.
12	Westwards about 500m, a turn at the canal, across a pump station, two shops at the turn, palm trees, rubber trees, teak trees, bananas, and open paddy fields.
13	End of the transect: 300m along the left side of the canal up to a brick bridge, at the other side a parking lot for rickshaws and a road to the centre of the village with the bus station and rickshaw stands.

connected by canals which run through the paddy fields. The land adjoining the paddy fields has scattered shrubs and coconut palms with cultivation of bananas and various types of vegetables and harbours land birds such as babblers, bulbuls and wren-warblers.

The weather is tropical with high humidity and rainfall but there is little rain from December to March. There was rain shower in the area near mid-day and during night on February 15. Towards the end of February there was an increase in the cloud cover resulting in

heat and humidity. Some mornings were foggy but mostly sunny and hot. The paddy fields were harvested in January, and subsequently plowed. Most rice fields, turned from green to yellow during the study period. The harvest was conducted using modern techniques with tractors, in February (10–15). The grains gathered were stored for drying along trails in the village, easily accessible for transportation.

Method: At each stop we observed and counted birds for 10 minutes (walked a distance of appr. 500m). Observations were recorded in a field note book. We used a Swarovski binocular 7 x 50 and a Canon camera. The studies followed Bibby et al. (1995) and Oelke et al. (2008) and nomenclature followed Rasmussen & Anderton (2012). Occasional contacts were made with local farmers and elder villagers.

The counts were conducted on January 14 (09.25–13.45 h), Jan 15 (15.30–18.10 h), Jan 16 (08.10–12.30 h), Jan

Table 2. Bird species observed along the canals and paddy fields of the Arpookara Village Kottayam, Kerala, India.

Family	English name	Scientific name	Av. no. per no. of stop points
Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i>	36/9
Phalacrocoracidae	Great Cormorant	<i>Phalacrocorax carbo</i>	132/16
	Little Cormorant	<i>Phalacrocorax niger</i>	112/15
Anhingidae	Darter	<i>Anhinga melanogaster</i>	11/8
Ardeidae	Intermediate Heron	<i>Egretta intermedia</i>	937/23
	Little Egret	<i>Egretta garzetta</i>	29/5
	Cattle Egret	<i>Bulbulcus coromandus</i>	1620/4
	Purple Heron	<i>Ardea purpurea</i>	15/11
	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	82/6
	Indian Pond Heron	<i>Ardeola grayii</i>	128/18
	Great Egret	<i>Egretta alba</i>	4/4
Threskiornithidae	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	6/4
Anatidae	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	7142/11
	Mallard, domestic duck	<i>Anas platyrhynchos</i>	35500/6
	Cotton Teal	<i>Nettapus coromandelianus</i>	108/9
Accipitridae	Brahminy Kite	<i>Haliastur indus</i>	12/4
	Eurasian Marsh Harrier	<i>Circus aeruginosus</i>	3/3
	Montagu's Harrier	<i>Circus pygargus</i>	2/2
	Crested Serpent Eagle	<i>Spilornis cheela</i>	2/2
	Booted Eagle	<i>Hieraaetus pennatus</i>	1/1
Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	19/11
	Purple Swampphen	<i>Porphyrio poliocephalus</i>	1/1
Jacanidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	20/10
Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i>	9/6
	Kentish Plover	<i>Charadrius alexandrinus</i>	1/1
	Common Sandpiper	<i>Actitis hypoleucos</i>	1/1
	Wood Sandpiper	<i>Tringa glareola</i>	4/1
	Common Snipe	<i>Gallinago gallinago</i>	3/2
Sternidae	Great Crested Tern	<i>Thalasseus bergii</i>	1/1
	Little Tern	<i>Sterna albifrons</i>	5/5
Sternidae	Common Tern	<i>Sterna hirundo</i>	1/1
	Whiskered Tern	<i>Chlidonias hybrida</i>	261/14
	Black-bellied Tern	<i>Sterna acuticauda</i>	23/6
Columbidae	Rock Pigeon	<i>Columba livia</i>	47/3
	Spotted Dove	<i>Streptopelia chinensis</i>	3/3
	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1/1

Family	English name	Scientific name	Av. no. per no. of stop points
Psittacidae	Rose-ringed Parakeet	<i>Psittacula krameri</i>	9/6
Cuculidae	Common Hawk Cuckoo	<i>Hierococcys varius</i>	1/1
	Jacobin Cuckoo	<i>Clamator jacobinus</i>	1/1
	Asian Koel	<i>Eudynamus scolopaceus</i>	2/2
	Southern Coucal	<i>Centropus parotti</i>	2/2
Apodidae	Asian Palm Swift	<i>Cypsiurus balasiensis</i>	4/2
Alcedinidae	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	5/4
	Common Kingfisher	<i>Alcedo atthis</i>	1/1
Meropidae	Little Green Bee-eater	<i>Merops orientalis</i>	14/3
Coraciidae	Indian Roller	<i>Coracias benghalensis</i>	2/1
Picidae	Black-rumped Flame-back	<i>Dinopium benghalense</i>	3/3
Hirundinidae	Barn Swallow	<i>Hirundo rustica</i>	150/3
	Wire-tailed Swallow	<i>Hirundo smithii</i>	8/1
Pycnonotidae	Red-vented Bulbul	<i>Pycnonotus cafer</i>	5/4
Muscicapidae	Oriental Magpie Robin	<i>Copsychus saularis</i>	5/4
Chloropseidae	Brown Shrike	<i>Lanius cristatus</i>	1/1
Sylviidae	Zitting Cisticola	<i>Cisticola juncidis</i>	3/1
	Ashy Prinia	<i>Prinia socialis</i>	3/3
	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	1/1
	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	1/1
Nectariniidae	Purple-rumped Sunbird	<i>Nectarinia zeylanica</i>	2/1
	Purple Sunbird	<i>Cynniris asiaticus</i>	1/1
Plocidae	Yellow-throated Sparrow	<i>Petronia xanthocollis</i>	35/4
	Baya Weaver	<i>Ploceus phillippinus</i>	29/4 6 nests,
Sturnidae	Common Myna	<i>Acridotheres tristis</i>	17/4
Oriolidae	Indian Golden Oriole	<i>Oriolus kundoo</i>	8/4
	Black-hooded Oriole	<i>Oriolus xanthornus</i>	3/3
Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	20/11
Corvidae	House Crow	<i>Corvus splendens</i>	40/8
	Indian Jungle Crow	<i>Corvus macrorhynchos</i>	17/7

17 (08.20–11.30 h), Jan 18 (08.25–12.50 h), Jan 29 (07.25–10.45 h), Jan 30 (14.30–17.50 h), Jan 31 (07.25–11.00 h), February 1 (07.50–11.00 h), Feb 15 (08.20–12.30 h). A total of about 37 hours were spent in the field. The weather conditions favoured the counts.

Results: Altogether 66 species of birds were recorded in the stop count at Arpookara. This included 32 species of water/wetland birds, terns and plovers and 34 species of land birds. Of these, only 10 species of water/wading birds were found in good

Table 3. The most abundant water bird species in the transect Jan–Feb 2014. Base: average number (= minimum) during multiple visits, maxima, calculated pairs in colonies.

	Species	App. Number
1	Mallard domestic.	> 30,500
2	Lesser Whistling duck	> 7100
3	Cattle Egret	> 1620
4	Intermediate Heron	> 717
5	Whiskered Tern	> 219
6	Indian Pond Heron	106
7	Little Cormorant	98 + 1 nesting colony
8	Cotton Teal	98
9	Great Cormorant	96 + 2 nesting colonies
10	Black-crowned Night Heron	77 + 1 nesting colony

numbers (Table 3). Domestic ducks and the Lesser Whistling-Ducks constituted the largest portion of the water bird population in the area. We found very few birds in the canals. Pond Heron, Little Egret, and Purple Swampphen, which are common in most of the wetland habitats in the state, were seen in lesser numbers which was unusual. The land birds were found in smaller numbers probably due to the edge effect and/or poor-quality habitat. Migrants included the Barn Swallow, four species of terns and three species of plovers, arriving after the rice harvest.

The number of bird species recorded (66) at Arpookara village during this study is probably under-represented as some species might have been overlooked. The bird numbers varied within the transects. Both wild and domesticated, ducks were observed in large numbers in February. During this time, the domestic duck herds were driven through the wider canals mostly

by a person at the front and another one at the rare end (in a boat). Some herds stayed overnight (Prabhu 2014) in the nearby, empty paddy fields, and guarded by dogs.

When the herds passed through the canals, the vegetation was destroyed and the clear water got muddy. This disrupted the breeding and feeding facilities of the wild birds such as waterhens, herons, and kingfishers. The duck herds driven into the lake during the day time passed through the resting sites of the large flocks of Lesser Whistling Ducks and Cotton Teals and disturbed them.

These species used the lake as a feeding/roost site at night. Occurrence of a healthy population of the Lesser Whistling Ducks shows that the species is habituated to the frequent disturbances. The capability of waterfowl for habituating frequent and regular disturbances was reported. (Mahaulipatha et al. 2000) However, the conflicts between wild birds and the domestic duck population as well as the predator protection on the wild birds are worth investigating.

During the study, we witnessed the starting and ending of the rice harvest. We observed the departure of Barn Swallows feeding over the fields and herons dispersing along the canals. We witnessed an increase in the number of cattle egrets and an influx of Rock Pigeons.

Very few birds were found breeding during the study period. We found eight pairs of Rock Pigeons nesting under a bridge

(stop 13) and several males displaying around. Two colonies of Baya Weavers were detected, one in the center of Arpookara and another near stop 2. Several fresh broken Heron eggs were found between stop 2 and 5. The breeders were not confirmed. Little and Great Cormorants were nesting at stop 5 and inside the village in a palm grove, behind the houses. The occurrence of the large number of Cormorants, Grebes and Kingfishers along the canals indicated good fish resource.

About 75% of the species encountered (Table 3); were represented by smaller numbers with less than 10 birds/species. This included the Roller, Black-rumped Flame back, Bee-eaters, Parrots, Drongos, Southern Coucal, Oriental Magpie Robin, Red-vented Bulbul, Mynas, and Cisticolas.

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Photographic record of Horned Grebe from Harike Bird Sanctuary, Punjab, India

During the course of documentation status survey of Avian diversity from Harike Bird Sanctuary, a pair of rare Horned Grebe or Slavonian Grebe *Podiceps auratus* was sighted, photographed and identified on 23 and 24 January 2021, during the annual bird census at Harike Bird Sanctuary (HBS) (31.15°N, 74.97°E).

Two individuals were spotted in their non-breeding plumage with distinguishable features such as a black cap pattern around their eye forming straight line toward neck, pale lores, grey sides of neck, white fore neck, and two white patches on upper wings (Grimmett et al. 2014).

Earlier individuals of same species were reported at Harike lake, Punjab in 2001 and Dighal, Haryana in 2017 (Prasad 2008; Ahlawat 2018) other sighting was from Jodhpur at Bhaniyana wetland in 2018 published in Hindustan Times newspaper. After a gap of 20 years, these



Horned Grebe 24th January 2021 at Harike Wetland.



Horned grebe feeding with Little grebe 23rd January.

birds were spotted at the same wetland again. The species is a winter vagrant in India and found in Pakistan and northwestern India (Grimmett et al. 2014). The Horned Grebe is listed as 'Vulnerable' under the IUCN

Red List of Threatened Species (BirdLife International 2021).

A pair of birds was observed with Little Grebe *Tachybaptus ruficollis* as they were feeding together on small fishes

and amphibians by diving into water; diving duration last for 30 seconds to 1 minute and emerge a few metres away from the diving location. They were found near the bank of Beas River just beside the confluence point of the rivers Satluj and Beas amid the wetland. Earlier birds were considered as Black-necked Grebe *Podiceps nigricollis* but during its identification at Harike we finally confirmed it as Horned Grebe. This rare species was sighted again the next day on 24 January, at HBS during the annual bird count.

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