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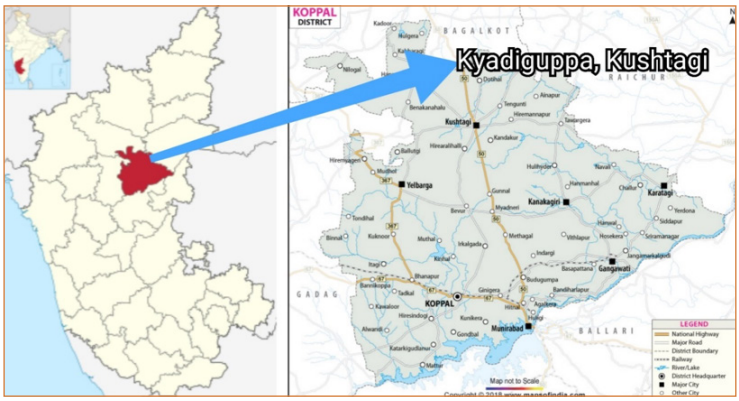
Cover photo: Scaly-breasted Munia © B. Ravichandran.

Squamate diversity and status in Kyadiguppa, Karnataka, India

A recent conservation assessment carried out by Srinivasulu et al. (2014) reveals the occurrence of about 157 species of reptiles endemic to both Western Ghats and Peninsular India.

However, there are very few records of herpetofaunal diversity, especially squamate diversity status in the northern Karnataka region. The objective of this investigation was to document the squamate diversity status in and around Kyadiguppa village (15.90°N, 76.16°E), Kushtagi Taluk.

The sampling was done in grasslands, bushlands, rocky regions, and dry black soil fields (totally 4.73 km²), particularly during early morning from June 2020 to May 2021 when the sunlight was low and the lizards were out for basking. The study was carried out mainly by visual-encounter method, but opportunistic road kill observations were also documented. All spotted squamates were identified up



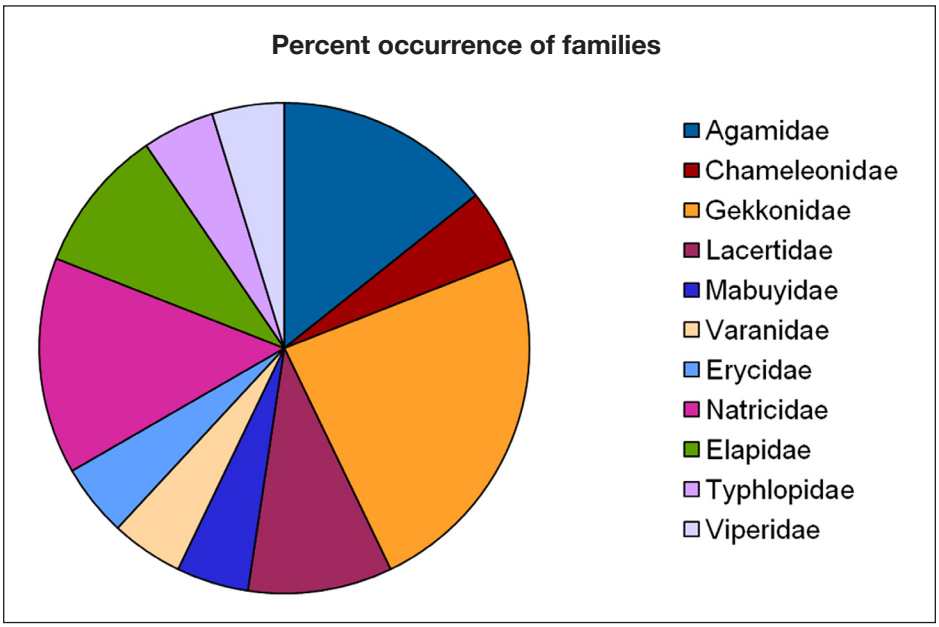
Karnataka map showing Koppal District location of Kyadiguppa Village in Kushtagi Taluk

Satellite image of the study area

Table 1. Checklist of Squamate fauna in Kyadiguppa Village, Kushtagi Taluk

	Scientific name	Common/ Local name	IUCN Red List status
Order – Squamata			
	Family – Agamidae		
1	*Psammophilus dorsalis*	Peninsular Rock Agama	LC
2	*Calotes versicolor*	Oriental Garden Lizard	NA
3	*Sitana dharwarensis*	Dharwar Fan-throated Lizard	NA
	Family: Chameleonidae		
4	*Chamaeleo zeylanicus*	Chameleon	LC
	Family: Gekkonidae		
5	*Hemidactylus frenatus*	Common House Gecko	LC
6	*Hemidactylus flaviviridis*	Yellow-bellied Gecko	NA
7	*Hemidactylus giganteus*	Giant Leaf-toed Gecko	LC
8	*Hemidactylus murrayi*	Murray`s House Gecko	LC
9	*Hemidactylus hemchandrai*	Hemchandra's Rock Gecko	NA
	Family: Lacertidae		
10	*Ophisops leschenaultii*	Leschenault's Lacerta	NA
11	*Ophisops nictans*	Snake-eyed Lacerta	LC
	Family: Mabuyidae		
12	*Eutropis carinata*	Common Skink	LC
	Family: Varanidae		
13	*Varanus bengalensis*	Bengal Monitor Lizard	NT
	Family: Erycidae		
14	*Eryx johnii*	Red Sand Boa	NT
	Family: Natricidae		
15	*Fowlea piscator*	Checkered Keelback	NA
16	*Coelognathus helena*	Common Trinket Snake	NA
17	*Ptyas mucosa*	Indian Rat Snake	NA
	Family: Elapidae		
18	*Naja naja*	Indian Cobra	NA
19	*Bungarus caeruleus*	Common Krait	NA
	Family: Typhlopidae		
20	*Indotyphlops braminus*	Brahminy's Worm Snake	NA
	Family: Viperidae		
21	*Daboia ruselli*	Russell's Viper	NA

LC—Least Concern | NA - Not Assessed | NT—Near Threatened



to the species level using taxonomic literature (Daniels 2002; Das & Das 2018; Das 2020).

The present study documented the occurrence of 21 species of squamate reptiles, which included 13 species of lizards and eight species of snakes belonging to 11 families (Table 1). The gekkonid lizards belonging to *Hemidactylus* genus dominated with five species (23.80%), followed by agamid lizards and snakes belonging to Natricidae family, which include the keelbacks, rat snakes, and trinket snakes (14.28% each), the common venomous snakes such as Indian Cobra and Common Krait belonging to Elapidae family, and lacertid lizards (9.52% each). Other squamates like skinks, Chameleons, monitor lizards, boas, worm snakes, and vipers belonging to families Mabuyidae, Chamaeleonidae, Varanidae, Boidae, Typhlopidae and Viperidae, respectively were the most infrequent (4.76% each). While the majority of the squamates observed in this study are either not listed or placed under 'Least Concern' status, the Bengal Monitor Lizard and Red Sand Boa are listed as 'Near Threatened' in IUCN Red List.

The gekkonid lizards such as *Hemidactylus frenatus, H. flaviviridis*, and *H. hemachandrai* were commonly found in the urban areas, whereas other species were found either in rocky regions or on trees. The agamids such as Peninsular Rock Agamas were seen basking diamorphically (yellow and bright orange) on the boulders, whereas the Dharwar Fan-throated Lizards were usually spotted in the black soil and grassland regions.

The Common Garden Lizard *C. versicolor* and the skinks were seen either on trees or in the house gardens and bushes in both rural as well as urban areas, whereas the lacertilians were found exclusively in the rocky regions. The arboreal camouflage lizards such as Chameleons and the Monitor Lizard were found only in the rocky regions, but were rarely sighted. Among snakes, natricid species such as keelbacks and trinket snakes were sighted in dead condition, whereas the Rat Snakes were found moving in the ground holes. The most commonly found poisonous snakes that belong to Elapidae family, such as the Indian

Cobra was seen in the fields, whereas the Common Krait was found dead on the road. Russell's Viper was found usually in bushes and dry areas. Some fossorial snakes such as worm snakes and the Red Sand Boa were spotted in anthropogenic areas.

Overall, the abundance of squamate species observed in the small village like Kyadiguppa might be due to the favourable environmental conditions such as the arid climate and agricultural fields. However, the road mortalities spotted in the present study suggest the possible threat to the squamate reptilian diversity due to urbanization. Some conservative measures are required in order to preserve the reptilian diversity in this area.

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An overview of the Little Tree Frog records from the Western Ghats and a report of a new locality record

Rhacophorus lateralis was described by Boulenger (1883) based on a single male specimen (BMNH 82.2.10.75) from "Malabar" deposited at the British Museum. No further collections were available until Das (2000) rediscovered the species from Coorg, Karnataka with two voucher specimens (ZSI A9071 and ZSI A9072). Das (2000) also removed the species from provisional synonymy with *Rhacophorus malabaricus* Jerdon, 1870 proposed by Wolf (1936).

This species was considered to be very rare, documented from Wayanad (Biju 2000) and Periyar Tiger Reserve in Kerala (Easa 2003; Daniels 2005). In 2004, the IUCN Red Listed this species as 'Endangered' and considered its range to be restricted to two small areas of Wayanad and Coorg in central Western Ghats of India (Biju et al. 2004). However, several new localities were reported recently from Kerala and Karnataka (Molur & Molur 2010; Dinesh et al. 2010) including a few natural history observations (Biju 2009; Goel & Goel 2010; Sachi & Dinesh 2015; Princy et al. 2017). Apart from the published report (Princy et al. 2017), there were also reports of this species from Nilgiris in Inaturalist.org (https://www.inaturalist.org/observations?taxon_id=26494), with one report as close as 10 km from the newly reporting location. Although they are not scientifically published, reports in the citizen science portals are very important and are used for scientific publications and cannot be ignored. Hence, this record has a significant merit of record from dry deciduous locality along the river Moyar. But we tried to provide an overview of this taxon's status from Tamil Nadu by including all these records mentioned from Inaturalist.org.

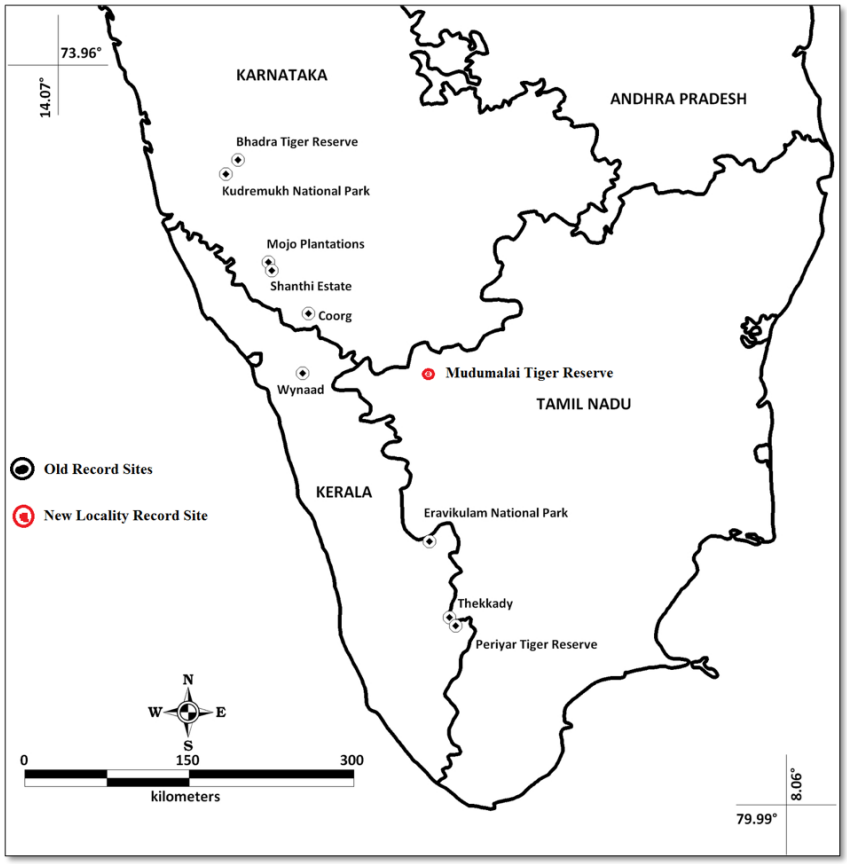
Type locality of *Rhacophorus lateralis* in Mudumalai Tiger Reserve © K. Narasimmarajan

On 14 March 2016, at 1313 h, a single adult male of *Rhacophorus lateralis* (SVL. = 11.6 cm) was observed fallen from a *Maginfera indica* tree from about 15 m height along the river Moyar (11.574 °N, 76.564 °E; 868 m) in Mudumalai Tiger Reserve, Western Ghats, India. The individual was identified as an adult male owing to its large size and presence of

***Rhacophorus lateralis* colour-changing ability**

nuptial pads and vocal sac (male secondary sexual characters). The habitat was characterized by lowland tropical deciduous with riparian forest formation with sparsely covered canopy dominated by *Bambusa bambos* and *Lantana camera*.

The colour of the individual was noted to be lime green with blue dots on its dorsum with metallic yellow lateral stripes running from eye to groin and thin blue stripes on its legs, but as soon as it was placed on a rock for taking photographs, the dorsal and leg coloration started to change. In a span of a few minutes, the colour changed from green to dull brown, increasing the contrast with background and making the animal



***Rhacophorus lateralis* records in Western Ghats**

highly conspicuous. The leg colour became reddish and finger webs and toes became orange.

It took approximately 10 minutes for the frog to change its color from green to brownish with reddish legs. The initial colour change from lime green to brown was faster but the time taken was not accurately quantified. Our understanding regarding colour-changing ability, factors influencing the behaviour and its adaptive function in anurans are currently limited by a dearth

Table 1. Collection/sight localities of *Rhacophorus lateralis* in the Western Ghats.

Collection localities	Latitude (N)	Longitude (E)	Date/ Year of sighting	Source/ Year of publication
Karnataka				
Bhadra Wildlife Sanctuary, Chikkamagaluru District	13.018	75. 27	12.viii.2006	Dinesh et al. 2010
Kudremukh National Park, Chikkamagaluru District	13.011	75.021	25.vii.2008	Dinesh et al. 2010
Mojo Plantation, Coorg District	12.028	75.042	2007–2009	Goel & Goel 2010
Shanthi Estate, Coorg District	12.024	75.044	May 2005	Molur & Molur 2010
Luckunda Estate, Coorg District	12.003	76.002	1998	Bennet et al. 1998; Das 2000
Kerala				
Kalpetta, Wayanad District	11.034	75.059	1997 & April 2005	Dinesh et al. 2010; Biju et al. 2013
Eravikulam National Park, Idukki District	10.012	77.002	4.iii.1995	Dinesh et al. 2010
Thekkady, Idukki District	09.035	77.012	Not available	Easa 2003
Periyar, Idduki District	09.031	77.015	1990	Biju 2000; Daniels 2005
Tamil Nadu				
Mudumalai Tiger Reserve	11.574	76..564	14.iii.2016	Present report
Ovalley, Nilgiri District	-	-	-	Princy et al. 2017
Nilgiris	-	-	-	www.inaturalist.org

of natural history observations and carefully designed experimental studies (Deepak et al. 2019).

The species is being reported here for the first time from the Mudumalai Tiger Reserve; earlier records being Gudalur just 10 km away from the present report (Table 1) but the habitat was completely dry deciduous and furthermore westward known distribution in Coorg and Wayanad regions are completely wet (Goel & Goel 2010; Dinesh et al. 2010).

Our observation gives an insight to the researchers to understand more about the species distribution and its adaptability towards various habitat guilds. It appears that the species probably has wider distribution range than what was known to us so far in the Western Ghats.

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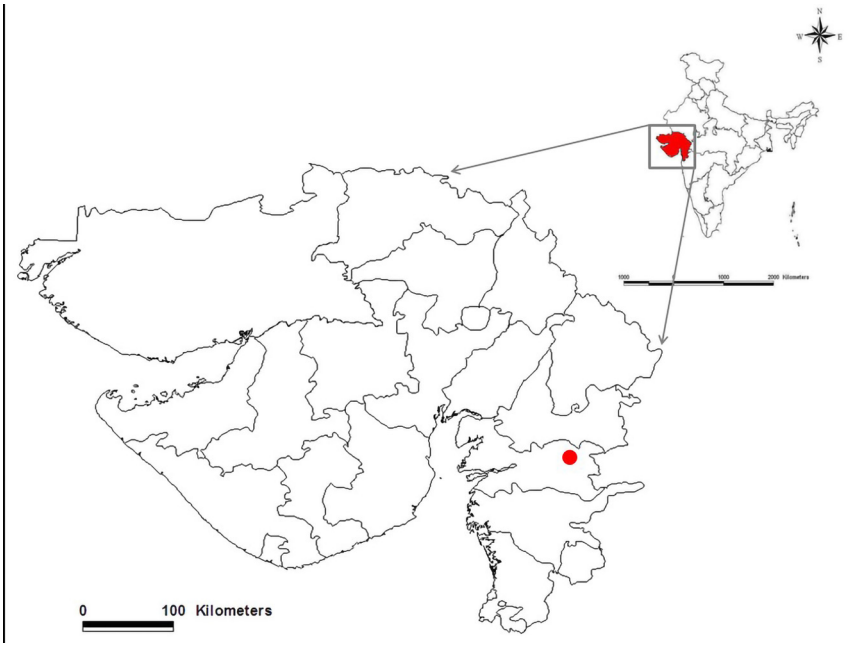
Rediscovery of Red Helen in Gujarat, India

The *Papilio* is a genus in the swallowtail butterfly family Papilionidae (Vattikonda et al. 2014). Globally, around 210 species of *Papilio* have been documented (Wu 2001), of which 28 are recorded in India (Varshney & Smetacek 2015). *P. helenus* is represented by two sub-species, namely, *P. helenus helenus* (Linnaeus 1758) and *P. helenus daksha* (Hampson 1988), in India. *P. h. daksha* prefers moist dense forests and is active at the edges of forest and also in forest clearings (Bhakare & Ogale 2018).

***Papilio helenus daksha* nectaring on *Tecoma* flower**

The present rediscovery is based on an opportunistic survey in Narmada District of Gujarat, India. On 5 August 2020, at about 1015 h, one of the authors, Rajdeep Jhala clicked a butterfly nectaring on *Tecoma* flowers at forest colony campus, Rajpipla, Gujarat (21.858325 N, 73.517603 E;



Location of sighting

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at approximately 148 m). The butterfly exactly matched the description of *P. h. daksha*, i.e. tailed, hindwing with large discal white patches in spaces 5,6 and 7, in the published literature (Bhakare & Ogale 2018). The second encounter with the same species, with another author Ruchi Dave, was on 15 August 2020 at Gora (21.827430 N, 73.736885 E; at approximately 68 m) of Narmada District. Both localities of the sightings are on the periphery of Shoolpaneshwar Sanctuary of Gujarat.

Sanctuary encompasses mixed dry deciduous forest, riverine forest, pockets of moist teak forest and two large water reservoirs. The sanctuary has a vast undulating terrain, lush ever pervading greenery, tall canopy, deep valleys, gentle streams, and waterfalls. All of these are in the Vindhyan and Satpuda mountain ranges.

P. h. daksha is reported as endemic in the peninsular belt by Talbot (1939). In India, it is reported from Andhra Pradesh, Maharashtra, Kerala, Karnataka, and Tamil Nadu (Anon 2022). Bhakare & Ogale (2018) also reported it from Goa.

There is only one report of *P. h. daksha* from Gujarat with location and number of individuals seen 63 years back (Shull 1963). He netted one individual on 25 October 1957 at Ahwa, Dang District of Gujarat and stated as very rare or accidental. Gaonkar (1996) has listed Red Helen, without location, in his report for which he did field visit to south Gujarat during 1987–88. It is also noteworthy that previously the species was only limited to southern-most of Gujarat, which is part of northern Western Ghats. Hence, this rediscovery also suggests that the geographical range of *P. h. daksha* has extended into Gujarat and this can be the northern-most report of the subspecies in India. Exhaustive study on butterflies may result in more sightings of this rare butterfly of Gujarat.

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The invasive Giant African Snail in Sikkim Himalaya

Lissachatina fulica.

Lissachatina fulica belongs in the subfamily Achatininae which is up to 15 cm in length and 5–8 cm wide having darker brown and cream bands. Recently, this invasive species was found in the Himalayan region of Sikkim at Melli Paiyoung Gram Panchayat Unit (GPU) and Jorethang subdivision of Sikkim at an altitude ranging 155–1,200 m. The GPS coordinates of representative specimen collected site of Sikkim is at 27.112 N 88.465E at 753 m.

The active period of this species is found during rainy season of the year in Sikkim. It always avoids dry climate sealing its shell. The eggs of this species are found in batches of 200–300, but can lay up to 1,000 eggs. These eggs can hatch within 15 days, so the development of this pest species perpetually damages crops resulting in losses to the farmers. *Lissachatina fulica* can live up to five years. This invasive species is pestiferous in nature in all parts of the world (Fontanill et al. 2007) and reported in different states of India (Sridhar et al. 2014; Sarma et al. 2015; Thakuri et al. 2019).

This species is not reported from the natural forest habitat of Sikkim, however, the alien species is now present in the potential farmlands of Sikkim namely, Melli Paiyoung GPU, Jorethang subdivision and some lower tropical belt of Sikkim. A noteworthy point is that *Lissachatina fulica* was first noticed

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by the farmers in Melli Paiyoung, Sikkim in 2017 after their farm crops were damaged. The population density of this species in the farmland during 2020–2021 survey was 4–5 per m^2, which is alarming. Thus, the population explosion of Lissachatina *fulica* will definitely harm the organic crops of Sikkim.

The food plants of *Lissachatina fulica* are *Pisum sativum*, *Capsicum annuum, Capsicum frutescens*, *Brassica oleracea, Sechium edule*, *Lycopersicon esculentum*, *Brassica oleracea* var. *botrytis*, *Allium cepa*, *Solanum melongena*, *Daucus carota, Raphanus sativus*, *Brassica oleracea* var. *capitata*, *Phaseolus vulgaris*, *Glycine max*, *Vigna radiata*, *Brassica campestris* and *Allium hookeri* .

The most effective control of this species is found to be by spraying 30 kg of sodium chloride (NaCl) in one acre farm land. This treatment can kill this pest and destroy the eggs. Other potential alternate way to control the pest is by boiling for an hour-and-half until it is cooked properly and use as feed for the piggery.

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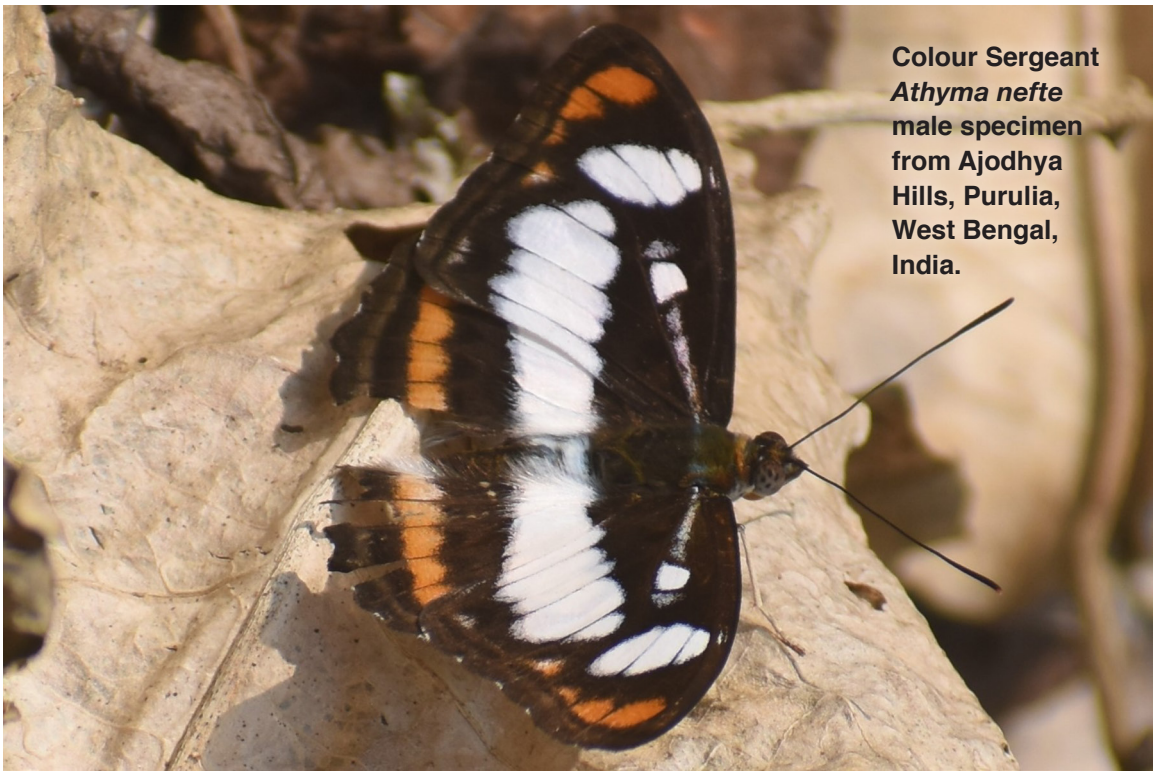
First photographic documentation of Colour Sergeant from Purulia, West Bengal, India



Colour Sergeant *Athyma nefte* male specimen from Ajodhya Hills, Purulia, West Bengal, India.

The butterfly Colour Sergeant *Athyma nefte* Westwood, 1850 has a localised distribution throughout India from Uttarakhand to Arunachal Pradesh, the Western Ghats (Maharashtra southwards), and West Bengal, Jharkhand, & Odisha (Singh 2010; Kehimkar 2016; Khan et al. 2021; Anonymous 2022).

The Colour Sergeant is a species under the genus *Athyma* which belongs to the Limenitidinae subfamily under the family Nymphalidae; belongs to the brush-footed butterflies.

Authors photographed a single specimen of Colour Sergeant during a field study on 16 February 2022 at 1420 h from Gobaria Forest of Ajodhya Hills in Purulia, West (23.10°N & 86.06°E, at 361 m) using a Nikon D5600 camera with 70–300 mm lens. The specimen was not collected from the study area. During the time of the observation, the specimen was busking on a dry leaf. It was identified on the basis of UP (upper wing) velvety black with a white band and orange markings, UPF or upper forewing white band continues on UPH or upper hindwing , presence of orange

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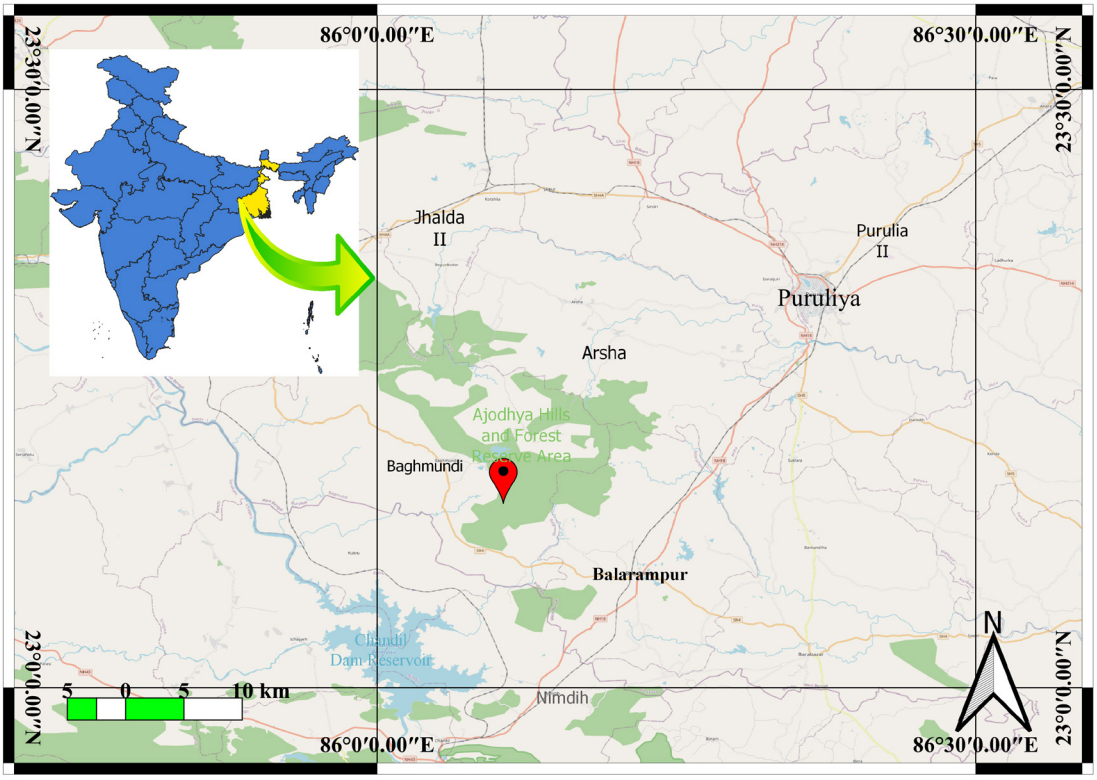

Map of the study area where Colour Sergeant *Athyma nefte* was sighted.

markings at UPF apex & UPH with orange band near outer edge (Kehimkar 2016).

The species is usually reported from low elevation & can fly up to 1,150m (Kehimkar 2016). They are mainly confined to forested regions. Flight is powerful and swift, using a snappy flap-and-glide technique. Males are often found in wet sand, while females rarely leave the forest. Both sexes are fond of flowers (Smetacek 2017).

The area is a dry deciduous forest with some moist patches in it, the temperature varies between 2.8°C to 52°C & the average annual rainfall of the area ranges 1,100–1,500 mm (Das 2016; Samanta et al. 2017).

There are no past records of the species from Purulia District before (Samanta et al. 2017; Das 2018). So, it can be concluded that this is the first record of Colour Sergeant *Athyma nefte* from Purulia District, West Bengal, India.

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First photographic documentation of Large-spotted Oakblue from West Bengal, India

The butterfly *Arhopala nicevillei* (Bethune-Baker, 1903) is commonly known as Large-spotted Oakblue and it belongs to the family Lycaenidae under the genus Arhopala. *Arhopala nicevillei* is very rarely distributed all over India. Only few records from West Bengal (Jalpaiguri), Sikkim, Assam & Manipur are found till date (Evans 1957; Gogoi 2015; Varshney & Smetacek 2015). The present study reports first photographic record and rediscovery of *A. nicevilei* from West Bengal, India.

Large-spotted Oakblue *Arhopala nicevillei* sighted at Turga Falls in Baghmundi, Purulia, W.B, India. © Adarsha Mukherjee

Large-spotted Oakblue *Arhopala nicevillei* sighted in Khairabera Dam under Ajodhya Hill range, Purulia, West Bengal, India. © Binay Kuiry.

Both of the areas where *A. nicevillei* was sighted are under Ajodhya Hills. According to Google Earth, the study areas Thurga Falls & Khairabera Dam are located at 23.12°N & 86.04°E with 370 m elevation and 23.15°N & 86.00°E with 300 m elevation, respectively. Ajodhya Hills is a dry deciduous forest with

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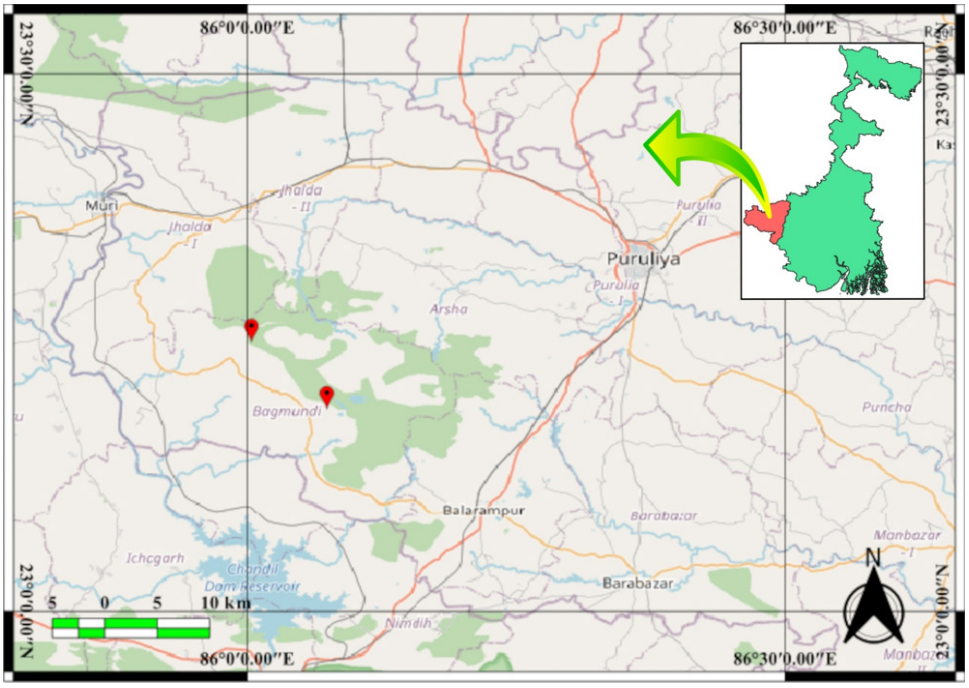

Study areas Khairabera Dam and Turga Falls in Ajodhya Hills, Purulia, West Bengal, India.

some moist patches in it and the temperature varies between 2.8–52°C (Samanta et al. 2017). The average annual rainfall of the area ranges 1,100–1,500mm (Das 2016).

During recent field studies on 13 October 2020 and 16 January 2021, the authors photographed one specimen of *A. nicevillei* from Thurga Falls and another specimen from Khairabera Dam of Ajodhya Hills, Purulia, West Bengal, India. Both of the specimens were photographed using Nikon D5300 and 5600 camera with 70–300 mm lens. Authors were not able to get any dorsal or open wing photographs due to its puddling position.

The species was identified on the basis of unf discal band sinuous at vein 4 and unf spot in space 6 was much larger than the spot in space 5 (Evans 1957). The images of the species were uploaded on the Butterflies of India website with media code fw642 and fw286 (Anonymous 2022).

There is no previous record of *A. nicevillei* from Purulia, Bankura, Jhargram & Mednipur districts under Chotanagpur Plateau area (Samanta et al. 2017; Dwari & Mondal 2020; Mukherjee & Mondal 2020) as well as other districts under south Bengal such as Kolkata, Birbhum, Nadia, North-24 Parganas, South 24 Parganas (Mukherjee et al. 2015, Mitra et al. 2018). But the species was reported by Evans 1957 from Jalpaiguri, situated at the northern part of West Bengal. Therefore, it can be concluded that this is the rediscovery of Large-spotted Oakblue *Arhopala nicevillei*

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from West Bengal after 63 years. As well as this is the first photographic documentation of *Arhopala nicevillei* from West Bengal & It also belongs to one of the first photographic documentation from India.

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Status of summer birds in Delhi, India

India, known for its rich biodiversity harbors around 1,210 species of birds (BirdLife International 2020). The Delhi list now stands at 457 species of birds, depending on the taxonomic approach adopted (with another 27 that have not been re-recorded since 1970), which has given India's capital the reputation of being one of the most bird-rich capital cities of the world (Vyas 2019).

Despite the forbidding, semi-arid nature of its 574 sq. miles, the state of Delhi is a birdwatcher's paradise especially in the winter, when so many Palaearctic species are present, and in the spring during the northward migration. Studies on the status of birds in Delhi so far has been done by Urfi (2003), Gupta et al. (2012), Prakash (2013), Tiwary & Urfi (2016), and Grewal et al. (2017).

The study area—Aravalli Biodiversity Park (28.546° N, 77.147° E)—having an area of 692 acres, is located on the south-central ridge in Delhi, between Vasant Vihar and Vasant Kunj. Previously known for morrum and clay mining, the park has now been reclaimed restored with different layers of native plant cover.

The vegetation type includes the tropical moist and dry deciduous, thorny jungle, shrubland, semi-evergreen forest. The tree species include Tendu *Diospyros melanoxylon*, Haldu *Haldina cardifolia,* Mahua *Madhuca longifolia*, Ken *Mitragyna parviflora*, and Soapnut *Sapindus laurifolius*. The park also has a rich diversity of snakes, amphibians, birds, and mammals. More than 200 species of birds are reported till now in the park.

The field work was carried out mainly in three zones divided as restored area, unrestored area, and the open degraded area.

The area was monitored during the study period by systematic early morning walks through the trails to collect data on various parameters on birds. A total of 21 monitoring

were undertaken in restored area, nine monitoring in unrestored area and 16 monitoring in open degraded area from 29 May 2019 to 19 July 2019. The monitoring was done only by one person and about one hour was spent in each monitoring.

The bird activity was monitored using 8 x 42 Wingspan Optics's Skybirder binoculars. Mckinonn's method was used for collecting the data as number and species of birds observed during the trail walk; 6–10 lists with 10 species per list were made with specified time intervals. The checklist of birds with specified number of individuals, trail and date were recorded.

For evaluation of the diversity at three sites of study area following diversity indices- Shannon-Weiner Index (H), Margalef's Richness Index (d), Pielou's Evenness Index (J) with help of MS Excel 2007 was used. Relative abundance of species was also calculated using formula, ratio of total number of individuals of a particular species to the total number of individuals of all species. The common species has relative abundance (0.1–0.01), uncommon species (0.011–0.0016) and rare species (0.0017–0.0001). A species discovery curve was plotted for all the three areas to analyze the probability for encountering a new species in future. For statistical comparison of differences between number of individuals sighted and number of species among the three sites was assessed through ANOVA test using SPSS Version.26 software.

During present study, an assemblage of 79 bird species belonging to 16 orders, 40 families were recorded from the study area. List of recorded species along with their breeding status, residential status, relative abundance and area observed were analyzed. Order Passeriformes with 41 species in 22 families dominated the bird community which contributed for 51.89% of the whole assemblage. It was followed by Pelecaniformes, Columbiformes, and Cuculiformes order with five species each.

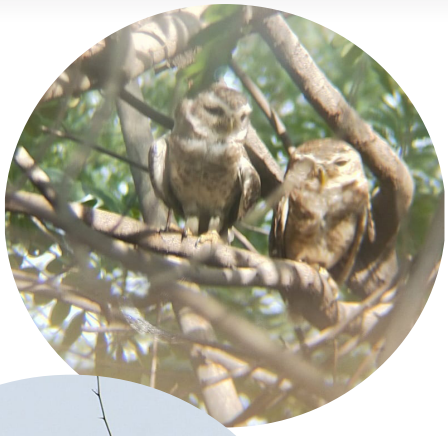
Minimum diversity of species was in order Anseriformes, Podicipediformes, Strigiformes, Psittaciformes, and Apodiformes with only single species. Among all, families Columbidae and Cuculidae were most dominant in list with five species each. Upon further analysis, on the basis of calculated relative abundance; 38

Common hawk cuckoo

Blue tailed bee eater

species were categorized as “Common”, 20 species as “Uncommon” and 21 species as “Rare” in the study area. Out of 79 species, 64 species were resident, eight species were summer migrants, three species were winter migrants, one species was local migrant, one vagrant and two species were both summer visitor as well as passage migrants. Among the summer migrants were Green Bee-eater *Merops orientalis,* Blue-tailed Bee -eater *Merops phillipinus*, Asian Koel *Eudynamys scolopaceus*, Common Hawk-Cuckoo *Hierococcyx varius*, Pied Cuckoo *Clamator jacobinus,* Common Cuckoo *Cuculus canorus*, Indian Golden Oriole *Oriolus kundoo*, Indian Paradise-Flycatcher *Terpsiphone paradisi*, Little Swift *Apus affinus* and Rain Quail *Coturnix coromandelica.* The winter migrants included Tree Pipit *Anthus trivialis,* Common Rosefinch *Carpodacus erythrinus* and Black Redstart *Phoenicurus ochrurus.* Two species namely Common Cuckoo *Cuculus canorus* and Indian Paradise-Flycatcher *Terpsiphone paradisi* were passage migrants also. Spotted Dove *Streptopelia chinensis* was the only local migrant recorded. Oriental Pied-Hornbill *Anthracoceros albirostris* was a vagrant species. Among the assemblage of species, only Black-headed Ibis *Threskiornis melanocephalus* was found to be Near Threatened and rest all species were found Least Concern. (IUCN 2021).

Ashy Prinia *Prinia socialis* with 690 individuals (relative abundance 0.1) was the most abundant species in the community followed by Jungle Babbler *Argya striata with* 590



Pair of spotted owlet

Pied cuckoo

individuals, Common Myna *Acridotheres tristis with* 501 individuals, Rose-ringed Parakeet *Psittacula krameri with* 424 individuals, House Crow *Corvus splendens* with 414 individuals and Common Tailorbird *Orthotomus sutorius* with 389 individuals. Species which had the least abundance were Rain Quail *Coturnix coromandelica,* Spotted Dove *Streptopelia chinensis*, Eurasian Hoopoe *Upupa epops,* Oriental Pied-Hornbill *Anthracoceros albirostris,* Blue-tailed Bee-eater *Merops phillipinus,* Indian Paradise-Flycatcher *Terpsiphone paradisi*, Indian White-eye *Zosteropus palpebrosus* etc with only one recorded individual during study. The diversity indices values calculated for the whole study area were; Shannon Weiner’s diversity index (H’) = 1.44, Simpson’s dominance index (D) = 0.052, Pielou’s evenness index (J) = 0.759 & Margalef’s richness index (d) = 20.58.

From the above results it was found that species diversity and evenness was higher in restored area as compared to unrestored and open degraded areas. The reason for this is the negative relationship of bird diversity with *Prosopis juliflora* which is abundant in unrestored and open degraded area but only traces in restored area. Bird diversity and density are affected by the type of tree species present in the greenspaces.

The bird diversity index has a negative relationship with the total density of the exotic tree species. It was found that high density exotic tree species like Vilayati Keekar *Prosopis juliflora* had a negative relationship with the bird diversity, which can be explained by the inability of this tree species to provide feeding requirements and shelter to birds (Khera et al. 2009; Barhadiya et al. 2021).

Of the 79 species recorded during the study, 66 species were recorded from the restored area. The most abundant species was Jungle Babbler *Argya striata* (9.29%) followed by Ashy Prinia *Prinia socialis* (8.64%), Indian Peafowl *Pavo cristatus* (8.16%), House Crow *Corvus splendens* (7.21%), Red-vented Bulbul *Pycnonotus cafer* (6.68%) and Rose-ringed Parakeet *Psittacula krameri* (6.62%) in order of most abundant species of the area.

Forty-three species were recorded from the unrestored area. Out of these, the most abundant species was Jungle Babbler *Argya striata* (13.78%) followed by Blue Rock Pigeon *Columba livia* (10.28%), Rose-ringed Parakeet *Psittacula krameri* (7.97%), Ashy Prinia *Prinia socialis* (7.6%) and Common Tailorbird *Orthotomus sutorius* (7.45%) in order of abundance.

Sixty species were recorded from open degraded area. Out of these, the most abundant species was Ashy Prinia *Prinia socialis* (12.94%) followed by Common Myna *Acridotheres tristis* (11.05%), Indian Robin *Copsychus fulicatus* (6.45%) and Red-vented Bulbul *Pycnonotus cafer* (5.18%) in order of abundance. Bank Myna *Acridotheres ginginianus* was only sighted in this area during study period preferring the open land and foraging near cattle every time they were monitored.

They are found mainly in the vicinity of open water and their usual habitat is cultivated

Red wattled Lapwing chick

Red wattled lapwing adult

Table 1. Checklist of bird species recorded during the study

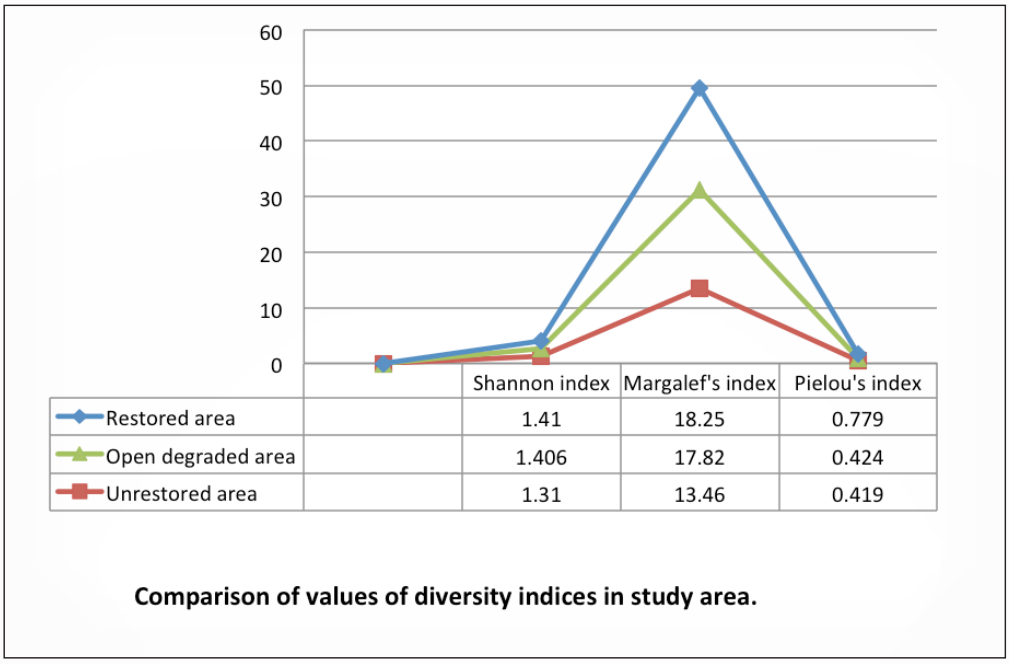
Species	Global threat status	Breeding status	Residential status	Relative observation obundance	Area
Grey Francolin *Francolinus pondicerianus*	LC	Br.	RS	0.0295	R,U,OD
Indian Peafowl *Pavo cristatus*	LC	Br.	RS	0.0154	R,U,OD
Rain Quail *Coturnix coromandelica*	LC	Br.	SM	0.0001	OD
Indian Spot-billed Duck *Anas poecilorhyncha*	LC	Br.	RS	0.0009	U,OD
Little Grebe *Trachybaptus ruficolis*	LC	Br.	RS	0.0004	U
Blue Rock Pigeon *Columba livia*	LC	Br.	RS	0.0408	R,U,OD
Yellow-footed Green -igeon *Treron phoenicoptera*	LC	Br.	RS	0.0171	R,U,OD
Eurasian Collared-Dove *Streptopelia decaocto*	LC	Br.	RS	0.0082	R,U,OD
Laughing Dove *Streptopelia senegalensis*	LC	Br.	RS	0.0289	R,U,OD
Spotted Dove *Streptopelia chinensis*	LC	NBr.	LM	0.0001	R
Greater Coucal *Centropus sinensis*	LC	Br.	RS	0.016	R,U,OD
Asian Koel *Eudynamys scolopaceus*	LC	Br.	SM	0.0294	R,U,OD
Common Hawk-Cuckoo *Hierococcyx varius*	LC	Br.	SM	0.0027	R,U,OD
Eurasian Cuckoo *Cuculus canorus*	LC	Br.	SM	0.0003	R,OD
Pied Cuckoo *Clamator jacobinus*	LC	Br.	SM	0.002	U,OD
Eurasian Moorhen Gallinula chloropus	LC	Br.	RS	0.0001	U
White breasted Waterhen *Amaurornis phoenicurus*	LC	Br.	RS	0.0007	R,OD
Cattle Egret *Bubulcus ibis*	LC	Br.	RS	0.0017	R
Little Egret *Egretta garzetta*	LC	Br.	RS	0.0007	R,U
Black-headed Ibis *Threskiornis melanocephalus*	LC	Br.	RS	0.0015	R
Glossy Ibis *Plegadis falcinellus*	LC	Br.	RS	0.0001	OD
Red-naped Ibis *Pseudibis papillosa*	LC	Br.	RS	0.0006	OD
Red-wattled Lapwing *Vanellus indicus*	LC	Br.	RS	0.0131	R,U,OD

Species	Global threat status	Breeding status	Residential status	Relative observation obundance	Area
Yellow-wattled Lapwing *Vanellus malabaricus*	LC	Br.	RS	0.0015	OD
Spotted Owlet *Athene brama*	LC	Br.	RS	0.0003	R
Black Kite *Milvus migrans*	LC	Br.	RS	0.0251	R,U,OD
Shikra *Accipiter badius*	LC	Br.	RS	0.0004	R,U
Eurasian Hoopoe *Upupa epops*	LC	Br.	RS	0.0001	R
Indian Grey Hornbill *Ocyceros birostris*	LC	Br.	RS	0.0011	R,U,OD
Oriental Pied-Hornbill *Anthracoceros albirostris*	LC	Br.	V	0.0001	R
Blue-tailed Bee-eater *Merops philippinus*	LC	Br.	SM	0.0001	R
Green Bee-eater *Merops orientalis*	LC	Br.	SM	0.0275	R,U,OD
White-throated Kingfisher *Halcyon smyrnensis*	LC	Br.	RS	0.0122	R,U,OD
Black-rumped Flameback Woodpecker *Dinopium benghalense*	LC	Br.	RS	0.0027	R,U,OD
Brown-headed Barbet *Psilopogon zeylanicus*	LC	Br.	RS	0.0011	R,U,OD
Coppersmith Barbet *Psilopogon haemacephalus*	LC	Br.	RS	0.0073	R,U,OD
Rose ringed Parakeet *Psittacula krameri*	LC	Br.	RS	0.0674	R,U,OD
Rufous Treepie *Dendrocitta vagabunda*	LC	Br.	RS	0.013	R,U,OD
House Crow *Corvus splendens*	LC	Br.	RS	0.0658	R,U,OD
Indian Jungle Crow *Corvus macrorhynchos culminatus*	LC	Br.	RS	0.0049	R,U,OD
Black Drongo *Dicrurus macrocerus*	LC	Br.	RS	0.0085	R,U,OD
Oriental Skylark *Alauda gulgula*	LC	Br.	RS	0.0003	OD
Crested Lark *Galerida cristata*	LC	Br.	RS	0.0003	OD
Indian Paradise-Flycatcher *Terpsiphone paradisi*	LC	Br.	SM&PM	0.0001	OD
Red-vented Bulbul *Pycnonotus cafer*	LC	Br.	RS	0.0618	R,U,OD
Red-whiskered Bulbul *Pycnonotus jocosus*	LC	Br.	RS	0.0036	R,U
White-eared Bulbul *Pycnonotus leucotis*	LC	Br.	RS	0.0079	R,U,OD

Species	Global threat status	Breeding status	Residential status	Relative observation obundance	Area
Common Babbler *Argya caudata*	LC	Br.	RS	0.0073	R,OD
Jungle Babbler *Argya striata*	LC	Br.	RS	0.0938	R,U,OD
Large Grey Babbler *Argya malcolmi*	LC	Br.	RS	0.0019	R,U,OD
Yellow-eyed Babbler *Chrysomma sinense*	LC	Br.	RS	0.0085	R,U,OD
Indian Golden Oriole *Oriolus kundoo*	LC	Br.	SM	0.0003	R,OD
Wire -tailed Swallow *Hirundo smithii*	LC	Br.	RS	0.0007	U,OD
Red-rumped Swallow *Cecropsis daurica*	LC	Br.	RS	0.0003	OD
Asian Pied Starling *Gracupica contra*	LC	Br.	RS	0.0004	R,U,OD
Brahminy Starling *Sturnia pagodarum*	LC	Br.	RS	0.0042	R,OD
Common Myna *Acridotheres tristis*	LC	Br.	RS	0.0796	R,U,OD
Bank Myna *Acridotheres ginginianus*	LC	Br.	RS	0.0065	OD
Common Woodshrike *Tephrodornis pondicerianus*	LC	Br.	RS	0.0006	U
Long-tailed Shrike *Lanius schach*	LC	Br.	RS	0.0036	R,OD
White-browed Wagtail *Motacilla maderaspatensis*	LC	Br.	RS	0.0001	R
Tree Pipit *Anthus trivialis*	LC	Nbr.	WM	0.0001	R
Common Tailorbird *Orthotomus sutorius*	LC	Br.	RS	0.0492	R,U,OD
Ashy Prinia *Prinia socialis*	LC	Br.	RS	0.1	R,U,OD
Grey-breasted Prinia *Prinia hodgsonii*	LC	Br.	RS	0.0009	R,U
Plain Prinia *Prinia inornata*	LC	Br.	RS	0.0001	R,OD
Indian Silverbill *Euodice malabarica*	LC	Br.	RS	0.0193	R,U,OD
Common Rosefinch *Carpodacus erythrinus*	LC	NBr.	WM	0.0001	U
Indian Robin *Copsychus fulicatus*	LC	Br.	RS	0.04	R,U,OD
Oriental Magpie-Robin *Copsychus saularis*	LC	Br.	RS	0.005	R,U
Black Redstart *Phoenicurus ochrurus*	LC	NBr.	WM	0.0001	OD

Species	Global threat status	Breeding status	Residential status	Relative observation obundance	Area
Pied Buschat *Saxicola caprata*	LC	Br.	RS	0.0004	R,OD
Brown Rock Chat *Oenanthe fusca*	LC	Br.	RS	0.0003	R,OD
Purple Sunbird *Cinnyris asiaticus*	LC	Br.	RS	0.0111	R,U,OD
House Sparrow *Passer domesticus*	LC	Br.	RS	0.0119	R
Cinereous Tit *Parus cinereus*	LC	Br.	RS	0.0003	R
Black-breasted Weaver *Ploceus benghalensis*	LC	Br.	RS	0.0003	R
Indian White-eye *Zosteropus palpebrosus*	LC	Br.	RS	0.0001	R
Little Swift *Apus affinus*	LC	Br.	SM	0.0044	R,U,OD

Abbreviations: LC- Least Concern, NT- Near Threatened, Br.- Breeding, NBr.- Non-breeding, RS- Resident, SM- Summer migrant, WM- Winter migrant, PM- Passage migrant, LM- Local migrant, V-Vagrant, R-Restored area, U-Unrestored area, OD- Open degraded area

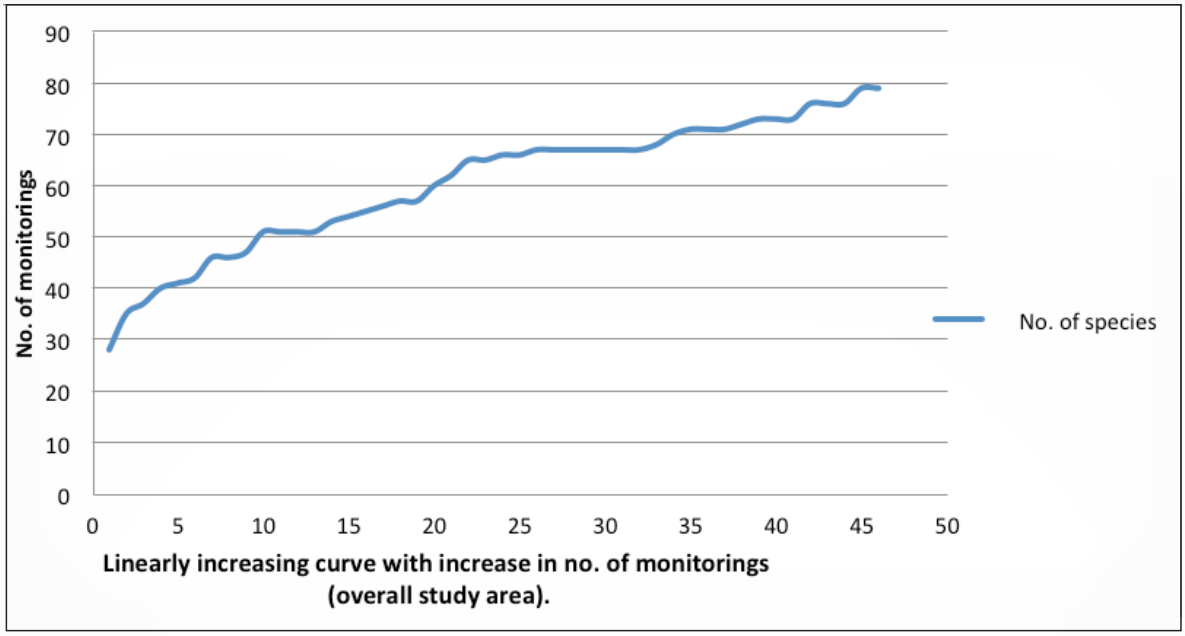


	Shannon index	Margalef's index	Pielou's index
Restored area	1.41	18.25	0.779
Open degraded area	1.406	17.82	0.424
Unrestored area	1.31	13.46	0.419

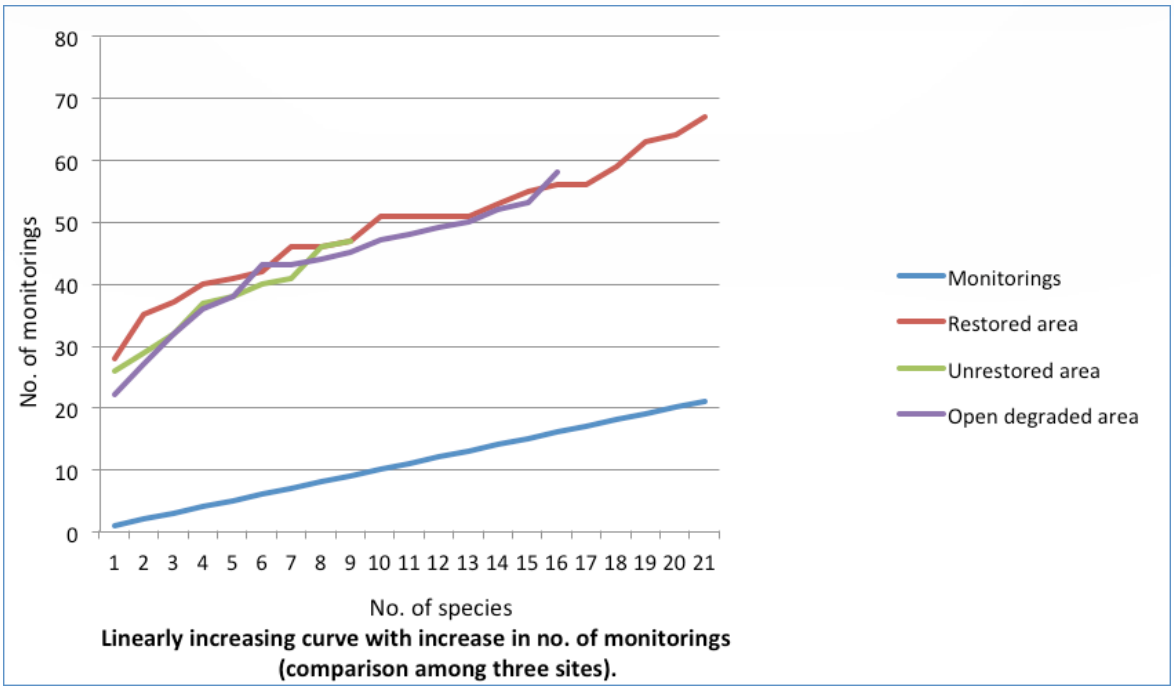
Comparison of values of diversity indices in study area.

farmland and open country, but flocks often live within cities, in markets and railway stations. Bank mynas feed on grain, insects, and fruits. Like the Common Myna, they sometimes follow grazing animals picking up disturbed insects or even ticks on the animals.

One way ANOVA showed significant difference in the abundance of species between all three areas ($F_{(2,23)}$=28.204,p=0.000). Similarly, number of species was also significantly different between all three areas ($F_{(2,42)}$=7.996, p=0.001).



Linearly increasing curve with increase in no. of monitorings (overall study area).



Linearly increasing curve with increase in no. of monitorings (comparison among three sites).

The species discovery plots for overall study area and for all three (Restored area, Unrestored area and Open degraded area) showed a linearly increasing curve which has not yet reached an asymptote. Thus, it can be concluded that there is more probability of encountering a new species when finite efforts are made for monitoring in the unexplored areas.

Moreover, during the study period many resident birds were engaged in nesting as this period was the peak breeding season in summer. Yellow-footed Green-Pigeon *Treron phoenicoptera,* Black Drongo *Dicrurus macrocerus,* Red-wattled Lapwing *Vanellus indicus* and House Crow *Corvus splendens* were observed nesting in restored area. Common Myna was found nesting on the

rocks in open degraded area. Nest of Purple Sunbird *Cinnyris asiaticus,* Yellow-eyed Babbler *Chrysomma sinense* and Rufous Treepie were observed in unrestored area. This shows that the study area is a viable habitat for birds.

Some novel as well as off-season/unusual observations were made during the study period. There were few bird species recorded that had not been sighted before in the park.

- Oriental Pied-Hornbill *Anthracoceros albirostris*
  This vagrant species was spotted in restored area during monitoring on 20 June 2019. The sighting was incidental when an individual flew from a eucalyptus tree. The white belly and white rectrices under tail, overall black plumage and cream coloured bill and casque were visible.

- Rain Quail/Black-breasted Quail *Coturnix coromandelica*
  This quail species is a breeding summer visitor to Delhi region. A male bird was spotted in the open degraded area on 23 June 2019. It was identified on basis of black beak and distinct head pattern of black and white; white supercillium, blackish-brown eye-stripe and prominent moustachial stripe, blackish-brown crown with white crown-stripe. The black breast-patch was visible slightly when it turned its head aside and flew into the ditch nearby. This was the first record for this park.

- Eurasian Cuckoo *Cuculus canorus*
  This species is a summer visitor as well as passage migrant in Delhi region. Most probably two different individuals of this species were observed at two different areas during monitoring. On 20 June 2019, one adult male was sighted perching on a tree in grassland and was identified by its distinct two note song “koo-coo”. The iris was yellow with yellow eye-ring, black barrings on white belly. The second individual was only heard in Open degraded area on 26 June 2019. This was also the first record for the park.

- Common Rosefinch *Carpodacus erythrinus*
  A female was sighted in the unrestored area on a tree while foraging but couldn’t be photographed. The identification was made on the basis of visual sight of short thick beak (thicker than house sparrow), light brown triangular-shaped head with a creamy-white belly and two white edges to primaries. It was sighted on 5 July 2019 that seems to be an individual that might be over-summering. Earlier also in Delhi region, few sightings had been reported during summer season (Kumar 2018; Prakash 2019).

- Black Redstart *Phoenicurus ochrurus*
  An individual was heard in the open degraded area with the distinct faint “tsip...” calls repeated after every 1.5/2 seconds. The identification was confirmed after listening to the recording from Merlin eBird app. It was sighted on 14 June 2019. One sighting had been reported in the

same year during summer season in Delhi (Singh 2019).

- Tree Pipit *Anthus trivialis*
  This individual was seen perching on a tree near the Office in restored area. Identification was done based on the fact the individual was heavily streaked on breast with an overall wheat coloured plumage though no photographic evidence could be possibly provided. Olive backed pipit was ruled out because no ear spot was observed. It was sighted on 31 May 2019. Few sightings had been reported previously also during summer months in Delhi region (Ray 2015).

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Study on Scaly-breasted Munia around the wetlands of Veedur, Tamil Nadu, India

The Scaly-breasted Munia or Spotted Munia *Lonchura punctulata* (Linnaeus, 1758) (Aves: Passeriformes: Estrildidae) is a sociable, estrildid finch native to India, Nepal, Bhutan, Sri Lanka, Afghanistan, Bangladesh, Cambodia, Myanmar, Vietnam, China, and Thailand. The species is introduced to Australia, Cuba, Haiti, Jamaica, Mauritius, Seychelles, UAE, United States, and French Polynesia (BirdLife International 2016). In India, the species presence has been reported in Pune District, Maharashtra (Sumant et al. 2019), Raipur, Madhya Pradesh (Ali & Ripley 1983) and Ramtirtha, Odisha (Singh & Rout 1992). Scaly-breasted Munia feeds on seeds of grass (Mehta 1997). Though Scaly-breasted Munia occurs widely in India, no systematic study on its number, and nesting sites exists especially from southern India barring few published works on records in regional checklists, from parts of Andhra Pradesh, Telangana (Arigela et al. 2020), Kalpakkam and Tambaram areas, (Hussain et al. 2011) of Tamil Nadu. In this paper, bird count, foraging, and roosting habits of the Scaly-breasted Munia in the

high resoultion images required as jpgs or pngs

Various behaviours of Scaly-breasted Munia: a—An individual roosting on twig of *Prosopis juliflora* | b—Female individual foraging grass seeds with Tricolored Munia | c—Group of birds foraging on grass seeds | d—A female individual carrying nest material.

Table 1. Individuals of Scaly-breasted Munia enumerated in various sites of Veedur wetlands.

	Village/Place	GPS	Number of birds counted	Percentage (%)
1	Veedur Reservoir	12.075642°N – 79.596735°E	48	22.64
2	Veedur-Mailam Road	12.075305°N – 79.597768°E	4	1.89
3	Veedur Lake-Sugarcane field	12.085330°N – 79.606292°E	52	24.53
4	Veedur Lake reeds	12.080586°N – 79.608387°E	18	8.49
5	Veedur village pond	12.069227°N – 79.598269°E	32	15.09
6	Veedur Lake bund area	12.152909°N – 79.904296°E	58	27.36
	Total		**212**	**100.00**

wetlands adjacent to Veedur Reservoir (12.07°N—79.58°E) in Tindivanam Taluk, Villuppuram District, Tamil Nadu were documented. The aim of this study was to investigate the number of individuals of Scaly-breasted Munia inhabiting the area, their roosting, foraging behaviours, and interactions with other bird species.

The Veedur reservoir covers an area of 7.7 km^2 with storage capacity of 600 tmc water, and irrigates 1,295 ha of cultivating lands. Agriculture is the primary occupation in the district. The major crops of the region are rice, jowar, pearl millet, finger millet, sugarcane, and pulses such as black gram, green gram, and pigeon pea. Temperature ranges 36–20°C. The average annual rainfall is 1,060 mm (Viluppuram 2021).

With the help of an assistant, survey was conducted in the study area from 01 February to 30 June 2021 between 0600 and 1800 h. The individual numbers of Scaly-breasted Munia, communal roosting behaviour, foraging behaviours, and interactions with other species were observed from a safe distance (c.30m) with help of binoculars, without causing disturbance to the birds. The total number of birds was enumerated by following the total count method (Bibby et al. 2000) and analyzing the photographs taken when the birds were foraging, and roosting during the day.

Bird censuses were conducted every second week of month during February–June 2021 and bird population size is expressed as an average of each session's total count. The foraging and roosting behaviours, and the choices of grains/seeds consumed by the birds were photographed. Locations of the study sites were determined using a Garmin Etrex 20x GPS device. Photographs and videography were made using a Nikon P1000 digital camera.

A total of 212 adult individuals of Scaly-breasted Munia were enumerated at six sites in the Veedur wetland areas. Site-VI contained the highest number of birds (58; 27.36%) and least number of birds (4; 1.89%) were observed in site-II (Table 1). The present study area consisting of multiple sites (wetlands) adjacent to the reservoir harbours high number of Scaly-breasted Munia

individuals. Paddy crops occurred within 100–200 m distance from the study sites.

The birds were observed in flocks containing Baya Weavers *Ploceus philippinus*, Streaked Weavers *Ploceus manyar*, Indian Silverbills *Euodice malabarica*, White-rumped Munia *Lonchura striata*, Tricolored Munia *Lonchura malacca* and Red Avadavat *Amandava amandava*. In India, Scaly-breasted Munia occurs in open scrub, cultivated lands interspersed with trees (Grewal et al. 2016). In the present study also, the species were found in open scrub wetlands adjacent to cultivating agricultural lands as stated by Grewal et al. (2016).

The present study revealed that Scaly-breasted Munia always moved as small flocks along with other birds and followed communal roosting and foraging. They preferred *Saccharum officinarum*, *Saccharum spontanreum* (Poaceae), *Typha angustifolia* (Typhaceae), *Azaditachta indica* (Meliaceae), *Lantana camara* (Verbenaceae), *Vachellia nilotica*, *Prosopis juliflora* (Fabaceae), and overhead power transmission lines as roosting sites. Observation on 20 foraging flocks revealed that the individuals of Scaly-breasted Munia always moved with Baya Weavers, Streaked Weavers, Indian Silverbills, White-rumped Munia, Tricolored Munia, and Red Avadavat. It was observed that Scaly-breasted Munia had the habit of moving with associate birds for foraging thrice a day. The flocks moved out of roosting sites between 0615 and 0630 h, 1030 h, and 1130 h and between 1600 h and 1730 h daily for foraging on paddy *Oryza sativa* (Poaceae) and seeds of grasses. The grasses foraged by birds were identified as *Eleocharis attenuata*, *Fimbristylis* sp., *Eragrostis japonica*, *Echinochloa* sp., Chrysopogon zizanoides, *Setaria pallide-fusca*, *Paspalidium geminatum* (all Poaceae), and a reed *Typha angustifolia*. In the present study, individuals of Scaly-breasted Munia were found foraging on seeds of grasses as stated by Mehta (1997). They forage on paddy when it is at the milky and unripe seed stage. Some individuals targeted spilled, moist paddy grains on the harvested fields as well.

The mixed communal roosting consisting of different species serves as the centre for the communication of information regarding the location of food sources, and exchange of warning signals about the approach of any predators (Zahavi 1971; Gadgil 1972; Ward & Zahavi 1973; Gadgil & Ali 1976). In the present study area, flocks containing individuals of Scaly-breasted Munia, Streaked Weaver, Baya Weaver, Indian Silverbills, Tricolored Munia, White-rumped Munia, and Red Avadavat were found roosting and foraging collectively without any interspecific competition among them over sharing of common food and roosting sites (Images 1a–c).

In the present study, a solitary nest was observed in the thick crown of lemon tree *Citrus limon* (Rutaceae). A ball-shaped nest with lateral entrance facing eastwards was found at a height of 3 m above the ground. The nest was made up of leaf blades of grasses and fibres of *Typha angustifolia*. No

other nests were observed in the nearby trees. Many birds were observed carrying nest materials to the *T. angustifolia* reeds grown in standing water (Image 1d). It was not possible to enumerate and study the patterns of nest construction in the thick reeds due to distance from edges of water bodies, inaccessibility, and depth of water. It shows that the birds used *T.* angustifolia reeds as nesting sites. It further indicates that the reed beds have become a potential breeding ground for this species due to the availability of nearby paddy crops and grasslands.

During the present study, 212 individuals of Scaly-breasted Munia were documented. Here, the birds followed mixed communal roosting and foraging. Apart from paddy, they consumed seeds of various grass species. A solitary nest was observed on lemon tree and the birds used *T. angustifolia* reeds as nesting species in the studied wetland areas. Harvesting of roosting plants/grass/trees would result in habitat loss to the species. In spite of rapid urbanization, industrialization, increasing human populations, habitat destruction, and increasing areas of cultivation of grain crops, the wetlands adjacent to the reservoir provides habitat to considerable populations of the Scaly-breasted Munia. A special management plan could be devised to protect the wetlands in the areas.

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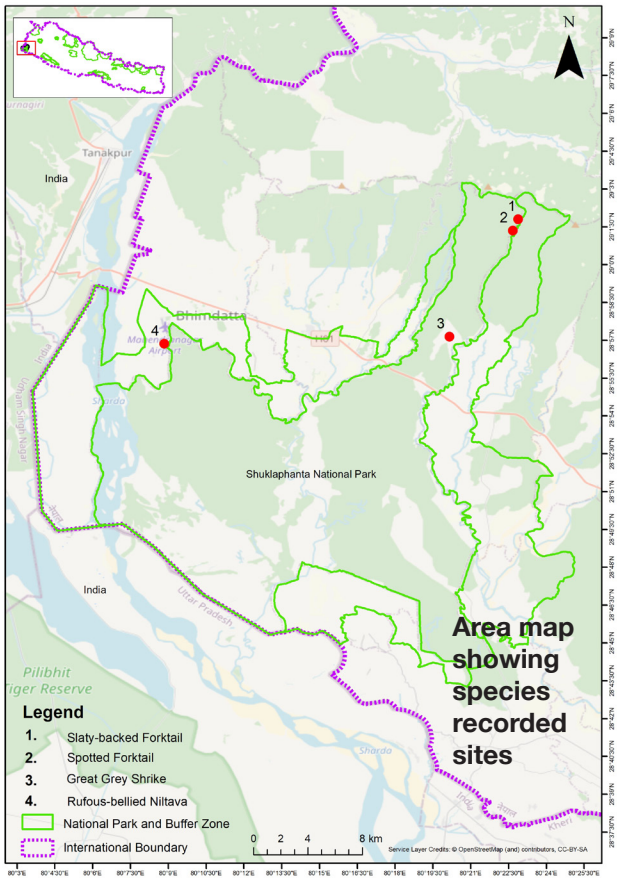
First report of four bird species from Nepal's Shuklaphanta National Park

Shuklaphanta National Park was a renowned hunting area for royals and their guests managed since 1969 as a Royal Hunting Reserve within an area of 131 km^2 (Yadav et al. 2000). It was promulgated as Royal Shuklaphanta Wildlife Reserve in 1976 with a 155 km^2, which was then expanded to 305 km^2 in 1994 with the goal of increasing habitats for its species and their seasonal migration from the Terai to the Hills of Churia. The Shuklaphanta National Park (ShNP) is located in Kanchanpur District, in the southwest of the country, between 28.750N & 29.050N latitudes and 80.050E & 80.350E longitudes, with river beds, open grasslands, and mixed forests covering the park at elevations ranging 175–1,300 m (Poudyal et al. 2020).



Area map showing species recorded sites

The Syali River in the east, Mahakali River in the west, Churia Hills in the north, and the India-Nepal international border in the south define the park's boundaries. It is an important transboundary protected area due to its linkages to India's Dudhwa National Park in the east via the Laljhadi Forest corridor and the Nandhaur Wildlife Sanctuary in the northwest via the Boom-Brahmadev Forest corridor and the Mahakali River. The park lies within the Terai Arc Landscape, a highly biodiverse region and priority conservation area, that covers 14 protected areas of Nepal and India (Chanchani et al. 2014).

The park is known for its 14 different designated grassland habitats, the largest of which is the Shuklaphanta Grassland (approximately 34 km^2) in Nepal's lowland terai (ShNP 2017), as well as the world's largest herd of Swamp Deer *Rucervus duvaucelii* (Poudyal et al. 2020). So far, the park has been home to 57 mammals, 56 reptiles, and 15 amphibians (Poudyal et al. 2020; Rawat et al. 2020; Poudyal et al. 2021).

The avian checklist history of the park leads back to 2008 when the count was 423 recognized by Baral & Inskipp (2009). Since

then, Regmi & Acharya (2012) upgraded it with 424 species and till 2018, 17 species have been added to the list making it a total of 441. Poudyal & Chaudhary (2019) added 9 birds and listed a total of 450 birds among which 23 were globally threatened and 74 nationally threatened (Poudyal & Chaudhary 2019). Another paper documented five more species as occurring in Shuklaphanta, summing the total to 455 species (Giri et al. 2020). We have chosen five of the six species reported by Giri et al. (2020) since the Black-breasted Thrush *Turdus dissimilis* in their study was a conditional statement.

This paper aims to document additional four more avian species reliably recorded in Shuklaphanta: Slaty-backed Forktail *Enicurus schistaceus*, Spotted Forktail *Enicurus maculatus*, Great Grey Shrike *Lanius excubitor* and Rufous-bellied Niltava *Niltava sundara*.

Species were opportunistically observed and photographed in the park, and records were confirmed using the Cornell Lab's Merlin Bird ID app by Cornell University (2022) on a mobile device, as well as the field guide Birds of Nepal Revised Edition by Grimmett et al. (2016).

Slaty-backed Forktail *Enicurus schistaceus* (Hodgson, 1836)
Two individuals were seen and photographed on 1 January 2021 at 1051 h perching on rocks of upper Kharghat Khola at Siwalik, the northern part of the park (29.030N, 80.381E; 686 m). The surrounding habitat type was *Terminalia* dominated mixed forest. Species may be confused with Black-backed Forktail

Slaty-backed Forktail © Dharmajit Saud

Enicurus immaculatus but *E. schistaceus* has slate-grey crown and mantle, dark black throat covert wings (Grimmett et al. 2016). Slaty-backed Forktail is a resident, generally uncommon, but fairly common locally in Nepal; and elevation range is 900–1600 m, however it was occasionally recorded down to 450 m in Terai (Inskipp et al 2016). The species is possibly a rare winter visitor to the park.

Spotted Forktail *Enicurus maculatus* Vigors, 1831
An individual was sighted and photographed on 1 January 2021 at 1102 h in same habitat where the Slaty-backed Forktail was recorded. This species was found perched on rocks near *Terminalia* dominating forest of upper Kharghat khola (29.023N, 80.378E; 555 m). Spotted Forktail is a widespread resident and frequent in west and central Nepal, and very uncommon in the east; recorded in the elevation range of 290–3100 m (Inskipp et al. 2016). The species is possibly a rare winter visitor to the park.

Spotted Forktail © Dharmajit Saud

Great Grey Shrike *Lanius excubitor* Linnaeus, 1758
An individual was observed and photographed on 6 January 2021 at 1554 h on an old stump of a tree at Hirapur (28.952N, 80.336E; 225 m). The habitat of recorded area is open grassland surrounded by mixed forest. Great Grey Shrike is a rare and local resident in the terai of Nepal (Inskipp et al. 2016). The species' status in the park is uncertain, possibly a rare winter visitor.

Great Grey Shrike © Dharmajit Saud

Rufous-bellied Niltava *Niltava sundara* Hodgson, 1837
An individual was photographed on 2 March 2021 at 1144 h, perched on a *Mallotus philippensis* branch near the park headquarters at Majhgaon (28.948N & 80.147E; 192 m). *Dalbergia sissoo, Saraca indica,* and *Shorea robusta* were among the nearby tree species. Rufous-bellied Niltava is a widespread resident of Nepal, ranging from the far west to the far east, and is a seasonal altitudinal migratory bird that winters between 275 and 1,830 m and breeds at higher

Rufous-bellied Niltava © Kum Thakur

elevations ranging 2135–3200 m (Inskipp et al. 2016). The species is possibly a rare winter visitor to the park.

Three of these four additional species were detected in the park's northern section in the Churia Hills. These hills have received less attention in terms of scientific exploration and overall conservation. We strongly recommend conducting periodic bird surveys in the national park including Churia Hills. With the addition of these four species, the checklist on the Birds of ShNP now stands at 459 species.

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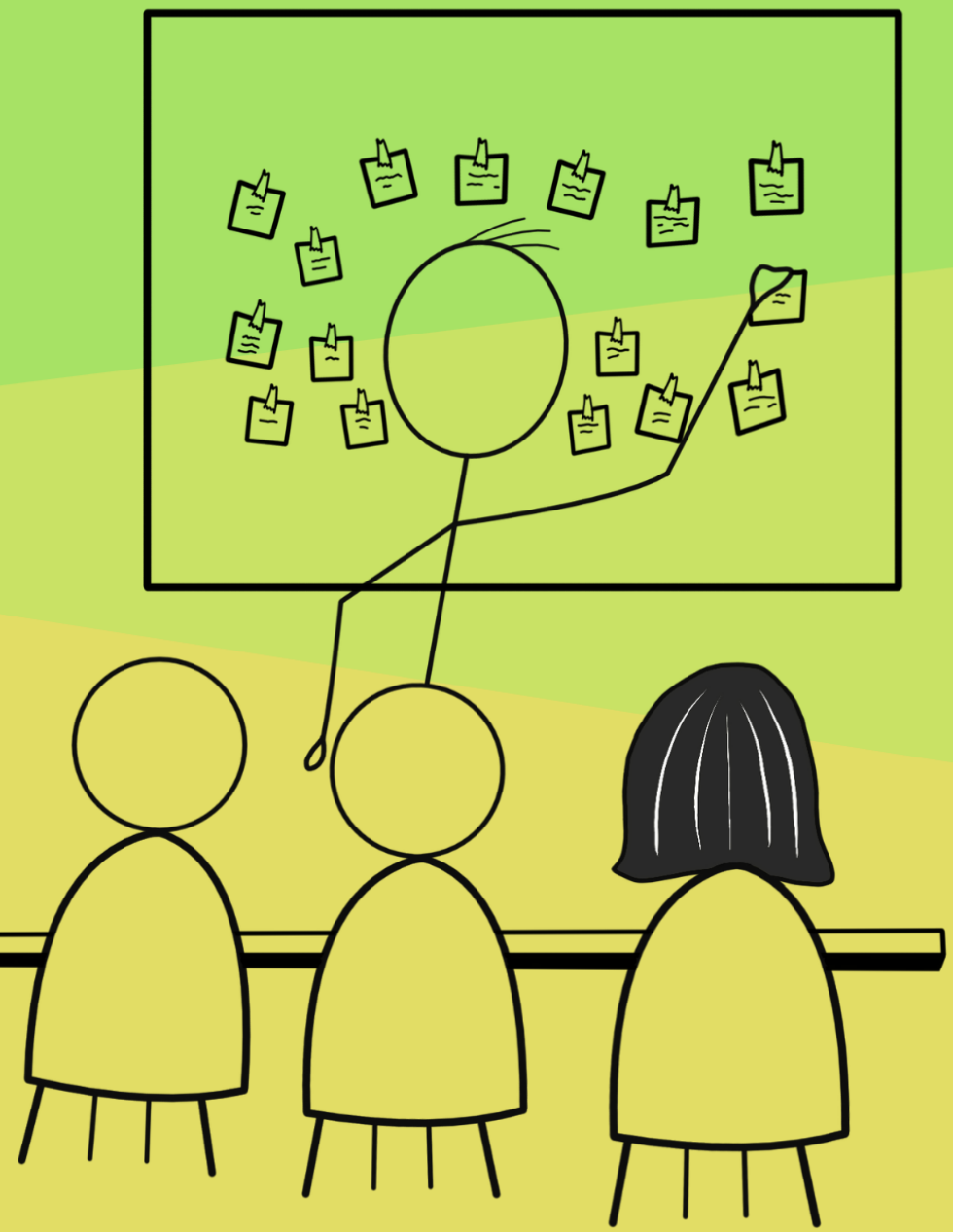

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