10.11609/jott.2025.17.4.26763-26938
www.threatenedtaxa.org

26 April 2025 (Online & Print)
17(4): 26763-26938
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

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Journal of Threatened Taxa

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ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

Srivari Illam, No. 61, Karthik Nagar, 10th Street, Saravanampatti, Coimbatore, Tamil Nadu 641035, India
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Cover: Nilgiri Large Burrowing Spider *Haploclastus nilgirinus*. Acrylic on canvas. © Aakanksha Komanduri.

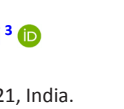
Journal of Threatened Taxa | www.threatenedtaxa.org | 26 April 2025 | 17(4): 26763–26779

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

https://doi.org/10.11609/jott.9494.17.4.26763-26779

#9494 | Received 16 November 2024 | Final received 24 February 2025 | Finally accepted 18 March 2025

OPEN ACCESS



ARTICLE

Biodiversity in Garh Panchkot and surroundings (Purulia, West Bengal) of residential and migratory land vertebrates with special reference to endangered species

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Abstract: This study examined land vertebrate biodiversity in Garh Panchkot (Panchet Hill) and surrounding forest areas in Purulia, West Bengal. Opportunistic field surveys and direct specimen collection were used to assess the abundance of endangered and vulnerable species. Previous studies recorded 106 land vertebrate species in the region, with the highest diversity in the class Aves and the lowest abundance in the class Amphibia. Endangered species recorded in the current study included Peafowl *Pavo cristatus*, Sloth Bear *Melursus ursinus*, Common Langur *Semnopithecus entellus*, Rhesus Macaque *Macaca mulatta*, Indian Rock Python *Python molurus*, and Fishing cat *Prionailurus viverrinus*. Also observed were Black-headed Ibis *Threskiornis melanocephalus* and Striped Hyaena *Hyaena hyaena* classed as "Near Threatened," and White-rumped Vulture *Gyps bengalensis* designated "Critically Endangered". An analysis of likely threats to vulnerable species identified rapid urbanization, accompanied by increased air, water and noise pollution. The results of this study will be useful in establishing spatiotemporal distribution patterns of land vertebrates and especially threatened species, aiding efforts to promote bio-conservation and sustainable development.

Keywords: Bio-conservation, diversity, endangered species, land vertebrates, Panchet Hill, Purulia, spatiotemporal distribution, threats, vulnerable species.

Editor: Jayanta Kumar Mallick, Wildlife Wing, Kolkata, India.

Date of publication: 26 April 2025 (online & print)

Citation: Panja, A., B. Kahar & S. Chattaraj (2025). Biodiversity in Garh Panchkot and surroundings (Purulia, West Bengal) of residential and migratory land vertebrates with special reference to endangered species. *Journal of Threatened Taxa* 17(4): 26763–26779. https://doi.org/10.11609/jott.9494.17.4.26763-26779

Funding: None.

Competing interests: The authors declare no competing interests.

Data availability statement: The original contributions presented in the study are included in the article/Supplementary Material; further inquiries can be directed to the corresponding author.

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Author contributions: AP wrote and conceptualised the manuscript. BK coordinated and analysed the data. SC captured the wild life photographs and organise the sample information. All authors contributed equally to the article and approved the submitted version.

Acknowledgements: The authors express their gratitude to the local tribal hunters and residents of the nearby villages in the Garh Panchkot hilly region for sharing valuable information that contributed to the study of biodiversity among land vertebrates in Garh Panchkot and its surrounding areas, Purulia, West Bengal, with a particular focus on endangered species.

INTRODUCTION

In the modern era, global biodiversity is progressively exhausted at a higher rate. Biodiversity has vital ecological role in maintaining the stability and support all forms of life within ecosystems. The term biodiversity loss, describes the reduction in genetic variability, biological diversity, and the natural ecosystem organizations (Sanyal et al. 2012; Achieng et al. 2023). India is regarded as one of the world's most varied nations, home to approximately 7–8 % of all known species as well as a few hotspots with diverse ecosystems, enhanced biodiversity (Himalaya, Indo-Burma, Western Ghats, Sundarbans) and it serves as a huge archive for traditional knowledge. Based on nationwide survey, it has been estimated that there are around 69 endemic bird species, 156 reptile species, and 110 endemic amphibian species in India (UNEP 2001; Rana & Kumar 2023). The recorded percentage of forest area in West Bengal is 13.38% (11,879 km^2) of the geographical area (88,752 km^2), whereas the corresponding data for Purulia District is 14% (Northern tropical dry deciduous forests cover an area of 876 km², which includes 112 km² of reserve forests, 729 km² of protected forests, and 35 km² of unclassed state forests and other areas) of the geographical area (6,259 km^2) (Annual Forest Administrative Report, West Bengal, 2021–2022). There are around eight different kinds of woods, each with a diverse range of vegetation and fauna. West Bengal's rich biodiversity combines the elements of the Himalayan, sub-Himalayan, and Gangetic plains in its diversified flora and wildlife. Garh Panchkot, a ruined fort, which dates back to probably the 90 AD is situated right by the Panchet Lake along the foothills of the famous Panchet Hill. This lush dense forested area was once fortified. Panchet Hill (Garh Panchkot) is located at the lateritic landscape of the Neturia Community development Block under the Raghunathpur subdivision of the Purulia District (northeastern tip of Purulia) and it has a maximum elevation of 650 m.

Garh Panchkot is rich in biological diversity. The inventories of flora in the sample plots include 40 tree species, 15 shrub species, seven liana species, and 18 herb species (https://westbengalforest.gov.in). Garh Panchkot also harbours 325 medicinal plants having rich gene pools of many threatened species. The lovely chirping and symphony of several bird species fill this remote, calm, and serene valley. In addition to the breathtaking beauty of nature, Garh Panchkot is renowned for its rich zoological treasure and a testament to a rich historical past. An assessment of the variety of bird species in and around Purulia Town, West Bengal, India, was conducted by Mahato et al. (2021). Mandal (2012) performed another investigation that identified uncommon macrophyte species connected to wetlands in the Purulia Districts. Raha & Pandey (2015) studied the hunting festival which causes a serious threat to the biodiversity of Ajodhya Hills, Purulia. Moreover, Samanta et al. (2017) and Das (2018) investigated on the butterfly diversity of Purulia, especially in the Baghmundi Region. Another study on diverse butterfly species and related host plants in Joychandi Hill of Purulia District, West Bengal was carried out by Chowdhury & Chowdhury (2020). Previously, a field study was performed on butterfly diversity in correlation to habitat utilization in Purulia (Das 2018). In addition, few more studies were done surrounding the Bagmundi Hill and Garh Panchkot area upon insect diversity (Sengupta et al. 2021; Mukherjee & Hossain 2024). Bhowmik et al. (2017) studied on snake biodiversity in Garh Panchakot and its surrounding areas in Purulia District. Another documentation was done by Samanta et al. (2021) on the globally threatened Indian Pangolin and its threats from Ajodhya Hills of Purulia. Sikdar et al. (2024) observed the coexistence of Indian Pangolin *Manis crassicaudata* (Mammalia: Pholidota: Manidae) and Indian Crested Porcupine *Hystrix indica* (Mammalia: Rodentia: Hystricidae) in Purulia District. Garh Panchkot, Purulia has been least explored regarding the threatened land vertebrate diversity and comparatively little published information is available to date. At present, there are scanty reports available on the prevalence of endangered faunal species in the Purulia District's Garh Panchkot region. The goal of the current field work is to gather up-to-date information about the land vertebrate species with special emphasis on the variety of Near Threatened (NT), Vulnerable (VU), Endangered (EN), and Critically Endangered (CR) in the Panchet Hill and adjoining forest areas. Investigating species abundance, likely causes of threats and extinction, and potential management approaches to save endangered species are the further objectives of the present study.

MATERIALS AND METHODS

Study area

The Purulia District is primarily associated with West Bengal's Chotanagpur Plateau. The district experiences subtropical weather, with summer temperatures reaching as high as 40^{0}C and winter lows of 7^{0}C with average rainfall 1,375.2 mm. The area is made up of highlands, low hills, scenery, and dense Sal Forest 0.61%,

mixed dense forest 2.27%, open Sal Forest 1.80%, mixed open forest 12.20%, other social forestry plantations and degraded forests (https://purulia.gov.in). The majority of the rainfall runs off due to the topography's undulations. The hilly location of Garh Panchkot (23.6 ^{0}N & 86.7 ^{0}E) has been the primary focus of this investigation (Image 1). This study area is 60 km away from Purulia Town and is part of the Neturia Block. Nine villages surrounding the Panchet Hill (Bagmara, Puapur and Chalmara villages are situated at the northern side whereas Panchut and Gobag at the southern side; Rampur, Lakhmanpur, and Aamdanga on the western side of the hilly region) were selected during the study as the focal sites. The aforementioned villages surrounding the Panchet Hill were included in this study as these are the habitats of several vertebrate species, including Jungle Cat, Indian Flying Fox, House Rat, Bengal Fox, Indian Grey Mongoose, Common/Brahminy Skink, Oriental Garden Lizard and birds such as Kingfisher, Asian Openbill, Dove, Parakeet, Red-naped and Black-headed Ibis. The area is also home to endemic species, including Indian Pangolin, Indian Crested Porcupine, and Striped Hyena. For the detailed study regarding the species habits, richness, abundance and geographical distribution, investigation of regional sites is important.

Study design

The study was conducted from March 2023 to February 2024 to record the diversity of common and endangered species. These months were selected for the study so that the diverse kinds of faunal species can be accessed both during winter as well as summer

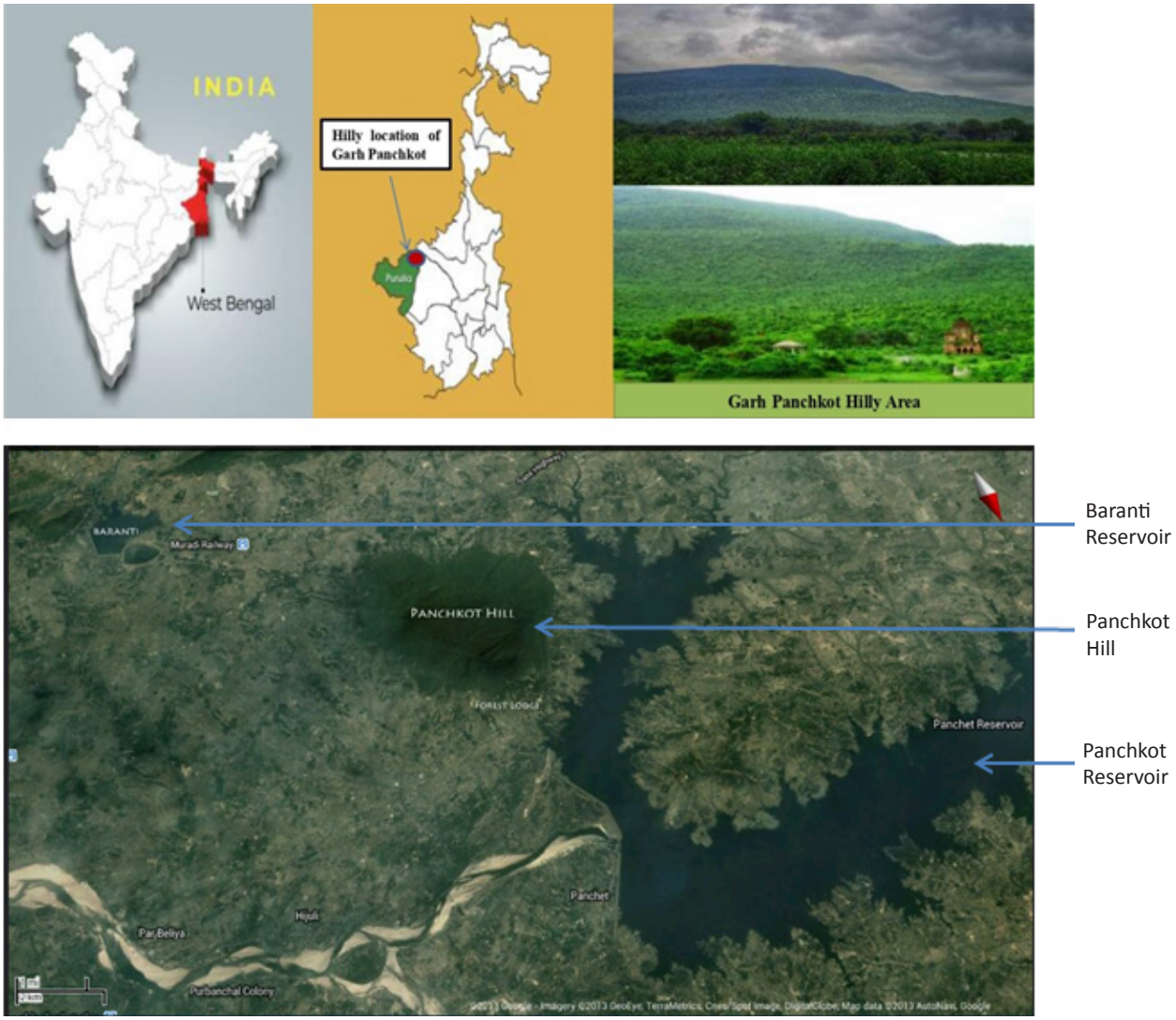

Image 1. The study site of present investigation of Panchet hill (Garh Panchkot) of Purulia District, West Bengal, India.

seasons. In addition, the selection of this period during the year prevents biases of vertebrate behaviour towards a particular season. The initial requirement was the selection of potential sampling sites which was accomplished by rigorous field survey and perception study of native villagers.

Data source and observation method

Both the primary and secondary data sources have been used in this study. In order to obtain primary data, field observations and documentation of endangered animal species were conducted, while a critical analysis of potential risks was accompanied. Quadrat analysis was included as a part of the study to further endorse if the chosen sampling sites could support the co-existence of different faunal species which might be endangered species. The data were collected by taking photographs of indirect evidence like animal footprints, and trails and by observing quills, faecal matter, and scales. The secondary data sources included several research articles, reputable websites (i.e., Google Scholar, Web of Science, Bio One), Wikipedia, Pub Med, and other online sources. Images of the various species that are accessible have been gathered. For the animal behavioural study of targeted animals, the selected appropriate time of investigation was one or two hours after dawn or before sunset as these times are devoid of much anthropological intervention. The species checklist was created in accordance with Mandal (2012) and Chattopadhyay et al. (2018).

Public interviews and perception study

Community interviews are one of the most well-known and cost-effective methods to determine the distribution of endangered species (Willcox et al. 2019). The local people can give an idea regarding the reduction in the number of wild animals overtime and the probable reason behind it. Local tribal hunters and common people of surrounding villages of Garh Panchkot hilly region (Baghmara, Rampur, Lakshmanpur, Aamdanga, Panchut, Ankduara, Gobag, Puapur, and Chalmara) were interviewed. The information obtained from local villagers were cross-checked by studying the existing scientific literature. The interviews which have been taken from local people are generally informal type. Most of the local tribal communities inhabiting the surrounding villages belong to lower socio-economic status. The objectives and primary intention of the survey have been clearly described to the common people. At each site 2–3 h have been invested for the interview process and the session was continued for 1–2 days in every alternate week. The studied villages are the homeland of different tribal communities like Bhumijs, Birhors, Kherias, Lodhas, Mundas, Oraons, Paharias, Santhals and most of these people are living below the poverty level. They are financially dependent on hunting in the forest region located nearby the Panchet Hilly region.

Data collection and analysis

The focus of the current study is solely on the endangered land vertebrate fauna. Throughout the study period, pertinent literature was used to identify several vertebrate species. From previous reports, several sampling techniques were followed in the current study to achieve the best results because there was no single sampling strategy that could be used to evaluate the vertebrate diversity fully (Table 1).

All of the study period's sampling data was collected from the first week of every month. To document the diversity and richness of birds, the line transect approach was used. The topography, roads, and bodies of water (rivers, ponds, & lakes) can all affect how long the migratory routes of the species under study are. To evaluate seasonal variations in the richness and number of faunal species, monthly data from a one-year study were further subdivided into four seasons: summer (March–May), monsoon (June–August), post-monsoon (September–November), and winter (December–February). There are certain animals which are not seasonal but found throughout the year (e.g., Cormorant, Cattle Egret, Kingfisher, Black Kite, Indian Hare, Common Palm Squirrel, & Indian Flying Fox).

Capturing photographs

A Nicon Aculon Binocular (A211 10–22 x 50) has been used for close observation of the encountered vertebrate species and a digital camera (Nicon D7200

Table 1. Methods used for studying different vertebrate classes (excluding fishes) from Panchet Hill ('+' indicates the method applied for studying the particular vertebrate class).

Method	Vertebrate class			
	Amphibia [8.73%]	Reptilia [17.47%]	Aves [59.23%]	Mammalia [15.56%]
Hand capturing	+	+	-	-
Extensive searches in micro-habitats	+	+	+	+
Opportunistic spotting	+	+	+	+
Call survey	+	-	+	-
Information from local villagers	+	+	+	+

with Nikkor Lens 70–300 mm) has also been used for capturing their photographs. Photographs and images are useful for distinguishing between various species. Data were collected by capturing photographs from the selected sites. Along with the pictures of different animals, termite mounds, nests, feeding signs on ground were also collected to trace the existence of different animals (Image 2). Data were collected during the day time randomly in each week during the studied period. Although, nocturnal observations were also carried out by using spot-light, headlight, and three celled torch. The duration of day along with night time observations was done from 0630 h to 1200 h with a midday break for three to four days in each area. The exact GPS coordinates were taken using GPS map camera application.

Quadrat method

Quadrat method (25 x 25 m) was used for analysing the faunal species found in the selected observation sites. In these places, camera traps were set up for investigation purpose. The data analysis procedure was repeated at least three times to avoid statistical biasness. The procedure was performed in the first week of each month and the minimum interval between two investigations was one month.

Species richness and diversity were calculated using Biodiversity Pro software (McAleece et al. 1997). The bird species diversity was calculated using the Shannon-Wiener Diversity index [$H' = \sum p_i \ln p_i$] and Shannon diversity index [$H_{max} = Log_{10}(S)$]. Measurement of Shannon's evenness index was calculated using the following formula $J = H'/ H_{max}$ (p_i = proportion of total sample belonging to i^{th} species, S = total number of species in habitats (species richness) (Magurran 2004).

Ethical permission

The present study was carried out by following all the instructions of the forest rangers. Some villagers were involved in the survey and they informed us regarding the availability of local endangered species. Evidence were also gathered with the help of some forest officers (anonymised for the sake of research integrity) of the Neturia block near Garh Panchkot. The participants for the survey were informed thoroughly regarding the survey goals, in their local languages without using scientific verbiage and the work was preceded only when they spontaneously consented to the contribution in the study. The survey-based fieldwork was undertaken and performed after getting permission from the Raghunathpur Range, Kangsabati (northern side) Forest division, Purulia, West Bengal.

During the data collection, special care was taken so that silence could be maintained and a hassle-free ambience can be prevailed without any major changes after the investigation. The data collection method was non-invasive, including field study, camera trapping, quadrat study, and collection of biological samples. Specific body parts (Quill, scales, skin, and a few epidermal derivatives) were only collected from the ground when these were shed off naturally from animal bodies.

RESULTS AND DISCUSSION

Purulia is characterised by many plateaus and rocky regions and covers an area of forest landscape [Northern tropical dry deciduous forest (5B/C1c)], with dominant tree species (as per importance value index (IVI)) *Terminalia anogeissiana*, *Lagerstroemia parvifolia*, *Shorea robusta*, *Terminalia alata*, *Careya arborea*, *Semecarpus anacardium*, *Lannea coromandelica*, *Aegle marmelos*, *Alangium salvifolium*, and *Croton persimili* (https://www.westbengalforest.gov.in/upload/publication/Garhpanchokot.pdf). The areas are bounded by the Ranchi and Hazaribag districts of Jharkhand on the western side, Singhbhum District of Jharkhand on the southern side, and Bokaro and Hazaribag districts of Jharkhand on the northern side. Garh Panchkot falls in the Raghunathpur Forest Range of Neturia Block in the Kangsabati (northern side) forest division in Purulia. The tropic of cancer passes through the district, so climatic variation can be observed across the line which is the major reason for the biodiversity of Purulia. The scattered vegetation, bare earth, and lack of cultivation are the characteristics of the Garh Panchkot Foothill region. The diversity of vertebrates in the Panchet Hilly region was previously documented by Chattopadhyay et al. (2018) and according to the study, with nine species (9%), amphibia had the lowest faunal diversity, followed by Reptilia (19 species, 18%), Mammalia (11 species, 14%), and Aves (63 species, 59%). In the present study, special emphasis has been given to diverse faunal availability in land area with special reference to endangered, threatened or near threatened organisms. The majority of the species recorded in this survey fall into the IUCN Red List 'Least Concern' category (2017). The miscellany of land vertebrates in the study area has been depicted in Table 2. In the present study, 103 different species have been studied with the highest species diversity observed in class Aves (61 species, 59.23%), followed

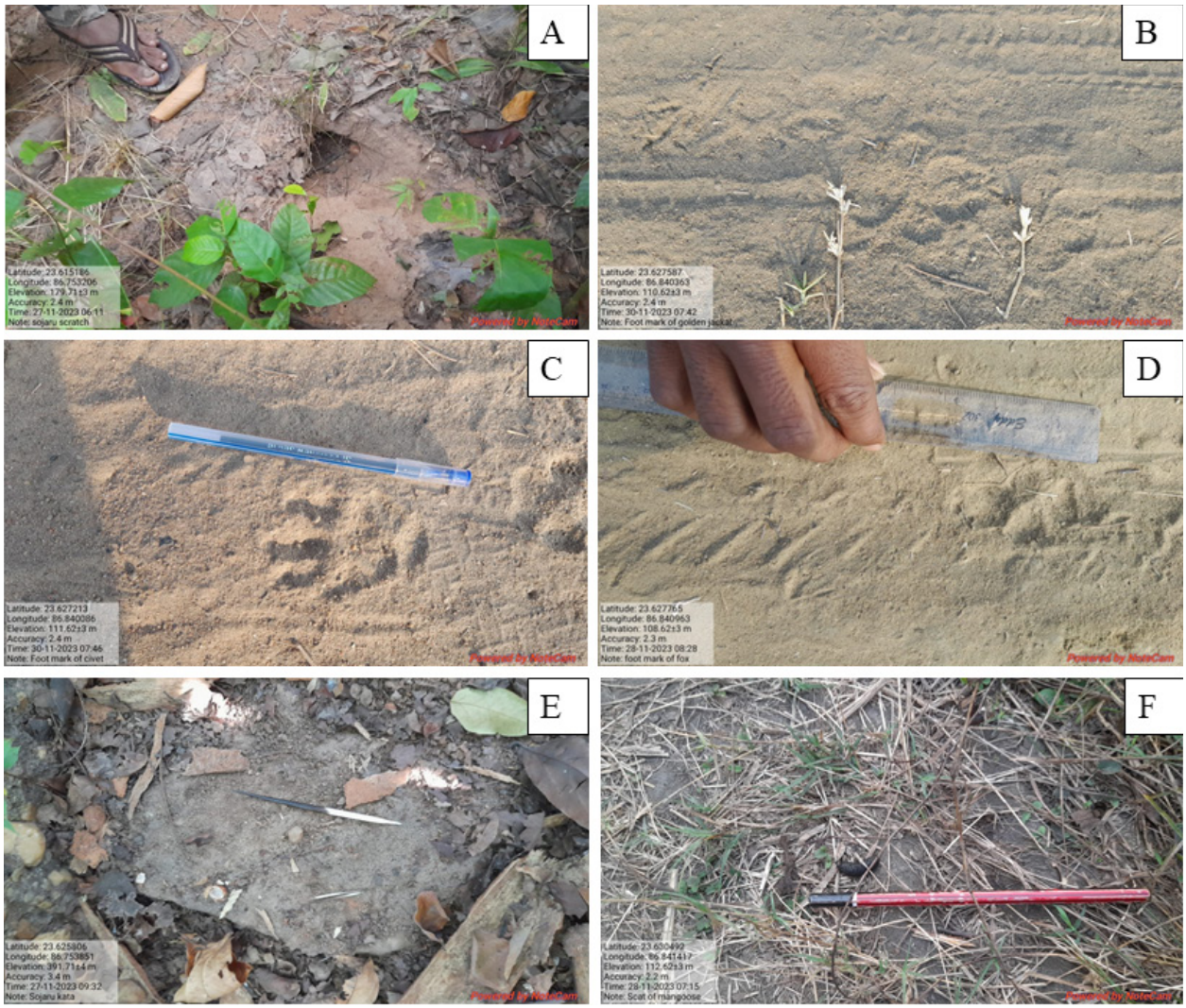

Image 2. Different body parts of animals including scales, spines, feathers, and faecal matter as well as behavioural activities like nest formations, scratches, and paw marks help detect the existence of different land vertebrates within the studied area: A—scratches of Indian Crested Porcupine *Hystrix indica*, | B—foot marks of Golden Jackle *Canis aureus* | C—foot marks of Asian Palm Civet *Paradoxurus hermaphroditus* | D—foot marks of Bengal Fox *Vulpes vulpes* | E—spines of Indian Crested Porcupine | F—scat of Indian Grey Mongoose *Urva edwardsii*.

by Reptilia (18 species, 17.47%), Mammalia (15 species, 15.56%), and Amphibia (nine species, 8.73%).

In the Panchet Hilly region, the Black-headed Ibis *Threskiornis melanocephalus* and Striped Hyaena *Hyaena hyaena* are categorized as 'Near Threatened' vertebrate species; the White-rumped Vulture *Gyps bengalensis* is listed as 'Critically Endangered' (Table 2).

Amphibians including the Indian Cricket Frog, also known as the Rice Field Frog (Jijhi byng; *Fejervarya limnocharis*), and Indian Burrowing Frog (Gortobasi byng; *Sphaerotheca breviceps*) are less commonly found in this hilly region. Moreover, Indian Common Toad or Kuno byng *Duttaphrynus melanostictus,* Indian Bullfrog or Sona byng *Hoplobatrachus tigerinus,* Common Indian Tree Frog or Gecho byng *Polypedates maculatus,* Ornamented Pygmy Frog or Metho byng *Microhyla ornata* are found abundantly [Image 3.1–3.3]. The studied amphibians have been observed in different microhabitats including open surface, under vegetation, log, and in burrows.

Among different types of reptiles, snakes are predominantly found in Garh Panchkot and its surrounding areas. Russell's Viper is quite rare although it is found near Kashipur and Panchet Hilly region. Banded Krait *Bungarus fasciatus* is regarded as one of the most venomous snakes which measures about 2.01 m (Bhowmik 2017). Another poisonous snake is King Cobra *Ophiophagus hannah* which is obtained during the study and is categorised as vulnerable on the IUCN Red List due

Table 2. Diversity of land vertebrate species of Panchet hill and surrounding forests as recorded during the present study.

	Class / Common name	Local name	Scientific name	Authority	Abundance	IUCN Red List status
	Amphibia					
1.	Common Indian Toad	Kuno Byang	*Duttaphrynus melanostictus*	(Schneider, 1799)	++++	LC
2.	Indian Marbled Toad	Metho Byang	*Duttaphrynus stomaticus*	(Lütken, 1864)	++	LC
3.	Indian Cricket Frog or Rice Field Frog	Jhinjhi-Byang	*Fejervarya limnocharis*	(Gravenhorst, 1829)	+	LC
4.	Indian Burrowing Frog	Gortobasi Byang	*Sphaerotheca breviceps*	Schneider, 1799	+	LC
5.	Asian Painted Frog	Rongin Venpu Byang	*Kaloula pulchra*	Gray, 1831	++	LC
6.	Ornamented Pygmy Frog	Chhoto Loubichi Byang	*Microhyla ornata*	Duméril & Bibron, 1841	+++	LC
7.	Jerdon's Bull Frog	Jerdoner Kola Byang	*Hoplobatrachus crassus*	Jerdon, 1853	++	LC
8.	Magadha Burrowing Frog	-----	*Sphaerotheca magadha*	Dinesh, 2019	+	LC
9.	Indian Skipper Frog	Kotkoti Byang	*Euphlyctis cyanophlyctis*	Schneider, 1799	++	LC
	Reptilia					
1.	Forest Calotes	Jangli girgiti	*Monilesaurus rouxii*	Duméril & Bibron, 1837 vide Pal et al., 2018	+++	NA
2.	Brook's House Gecko	Grihabasi tiktiki	*Hemidactylus brookii*	Gray, 1845	++++	NA
3.	Indian Flapshell Turtle	Sundi/chiti kachim	*Lissemys punctata*	Bonnaterre C, 1789	++	LC
4.	Peninsular Rock Agama	Pahari girgiti	*Psammophilus dorsalis*	Gray et al, 1831	++	LC
5.	Oriental Garden Lizard	Baganer girgiti	*Calotes versicolor*	Daudin, 1802	++++	NA
6.	Common/Brahminy Skink	Boro Ghase Anjani	*Eutropis carinata*	Schneider, 1801	++	LC
7.	Asian Chameleon	Bohurupi	*Chamaeleo zeylanicus*	Laurenti, 1768	+	LC
8.	Common Indian Monitor	Go sanp	*Varanus bengalensis*	Daudin, 1802	++	LC
	Non- venomous snake					
9.	Indian Python	Ajogor sanp	*Python molurus*	Linnaeus, 1758	++	NA
10.	Indian Sand Boa	Thutu sanp	*Eryx johnii*	Linnaeus, 1758	+	NA
11.	Oriental Rat Snake	Sona dhamna	*Ptyas mucosa*	Linnaeus, 1758	++++	NA
12.	Buff-striped Keelback	Hele sanp	*Amphiesma stolatum*	Linnaeus, 1758	++++	NA
13.	Checkered Keelback	Joldhora	*Xenochrophis piscator*	Schneider, 1799	++++	NA
14.	Brahminy Blind Snake	Telega sanp	*Ramphotyphlops braminus*	Schneider, 1799	+++	NA
	Venomous snake					
15.	Common Krait	Chiti sanp	*Bungarus caeruleus*	Schneider, 1801	++++	NA
16.	Banded Krait	Sakhamuti	*Bungarus fasciatus*	Schneider, 1801	++	LC
17.	Russell's Viper	Chondrobora	*Daboia russelli*	(Shaw & Nodder, 1797)	++	NA
18.	Indian Cobra/ Spectacled Cobra	Gokhro	*Naja naja*	Cantor, 1836	++	LC
	Aves					
	Birds of Wetland					
1.	Eastern Cattle Egret	Gobok	*Ardea coromanda*	Boddaert, 1783	++++	LC
2.	Little Egret	Korchebok	*Egretta garzetta*	Linnaeus, 1766	++++	LC
3.	Asian Opened-billed Stork	Shamuk khol	*Anastomus oscitans*	Boddaert, 1783	++++	LC
4.	Black-headed Ibis	Kalomatha Kastechara	*Threskiornis melanocephalus*	Latham, 1790	+	NT
5.	Red-naped Ibis	Kalo Dochara	*Pseudibis papillosa*	Temminck, 1824	+	LC
6.	Little cormorant	Chhoto pankouri	*Microcarbo niger*	Vieillot, 1817	++	LC
7.	Oriental Darter	Gayar	*Anhinga melanogaster*	Pennant, 1769.	++	LC
8.	Black-necked Grebe	Pandubi	*Tachybaptus ruficollis*	*Pallas*, 1764	++	LC

	Class / Common name	Local name	Scientific name	Authority	Abundance	IUCN Red List status
9.	Lesser Whistling Duck	Chhoto sarali	*Dendrocygna javanica*	Horsfield, 1821	++	LC
10.	Small Kingfisher	Choto machranga	*Alcedo atthis*	Rafinesque, 1815	+++	LC
11.	White- breasted/throated Kingfisher	Sadabuk/gala machranga	*Halcyon smyrnensis*	Horsfield, 1821	+++	LC
12.	Asian Openbill	Shamuk khol	*Anastomus oscitans*	Boddaert, 1783	+++	LC
13.	Greater Adjutant Stork	Hargila	*Leptoptilos dubius*	Gmelin, 1789	++	LC
14.	Great Indian Bustard	Indian bustard	*Ardeotis nigriceps*	Vigors, 1831	++	LC
	Land birds					
15.	White-rumped Vulture	Bangla sokun	*Gyps bengalensis*	Gmelin, 1788	+	CE
16.	Brahminy Kite	Sonkhochil	*Haliastur indus*	Boddaert, 1783	++	LC
17.	Black Kite	Chil	*Milvus migrans*	Boddaert, 1783	++++	LC
18.	Blue Rock Pigeon	Jalali kobutor	*Columba livia*	Gmelin, 1789	++++	LC
19.	Eastern Spotted Dove	Tile ghughu	*Streptopelia chinensis*	Scopoli, 1782	++++	NA
20.	Red Turtle Dove	Lal ghughu	*Streptopelia tranquebarica*	Hermann, 1804	++	LC
21.	Rose-ringed Parakeet	Sobuj tia	*Psittacula krameri*	Scopoli, 1769	++++	LC
22.	Plum-headed Parakeet	Fultusi	*Psittacula cyanocephala*	Brisson, 1760	++	LC
23.	Spotted Owlet	Kuture pecha	*Athene brama*	Temminck, 1821	++	LC
24.	Eastern Barn Owl	Lakshmi pecha	*Tyto javanica*	Scopoli, 1769	++	LC
25.	Little Swift	Ghar Batasi	*Apus affinis*	Gray, 1830	+++	LC
26.	Indian Roller	Nilkontho	*Coracias benghalensis*	Linnaeus, 1758	+++	LC
27.	Grey Francolin	Titir	*Ortygornis pondicerianus*	Gmelin, 1789	++	LC
28.	Jungle Bush Quial	Bater	*Perdicula asiatica*	Latham, 1790	++	LC
29.	Common Hoopoe	Mohanchura	*Upupa epops*	Linnaeus, 1758	+++	LC
30.	Blue-throated Barbet	Basanta bouri	*Psilopogon asiaticus*	Lathm, 1790	+++	NA
31.	White Wagtail	Sada khanjan	*Motacilla alba*	Linnaeus, 1758	++++	LC
32.	Yellow Wagtail	Holud khanjan	*Motacilla flava*	Linnaeus, 1758	+++	LC
33.	Red-vented Bulbul	Bulbuli	*Pycnonotus cafer*	Linnaeus, 1766	++++	LC
34.	Brown Shrike	Badami kasai	*Lanius cristatus*	Linnaeus, 1758	++	LC
35.	Oriental Magpie-robin	Doyel	*Copsychus saularis*	Wagler, 1827	++++	LC
36.	Indian Robin	Shamya	*Copsychus fulicatus*	Linnaeus, 1766	+++	LC
37.	Purple Sunbird	Moutusi	*Nectarinia asiatica*	Lathm, 1790	+++	LC
38.	Indian Silverbill	Sormunia	*Euodice malabarica*	Linnaeus, 1758	+++	LC
39.	Baya Weaver	Babui	*Ploceus philippinus*	Linnaeus, 1758	+++	LC
40.	Brahminy Starling	Bamune salikh	*Sturnia pagodarum*	Gmelin, 1789	+++	LC
41.	Golden Oriole	Sonabou	*Oriolus kundoo*	Sykes, 1832	++	LC
42.	House Crow	Kak	*Corvus splendens*	Vieillot, 1817		LC
43.	Large-billed Crow	Darkak	*Corvus macrorhynchos*	Wagler, 1827	++	LC
	Migratory birds					
44.	Green Sandpiper	Sabuj batan	*Tringa ochropus*	Linnaeus, 1758	+	LC
45.	Marsh Sandpiper	Lariyati	*Tringa stagnatilis*	Bechstein, 1803	+	LC
46.	Common Sandpiper	Cha-pakhi	*Actitis hypoleucos*	Linnaeus, 1758	+++	LC
47.	Golden Plover	Swarna chatar	*Pluvialis fulva*	Gmelin, 1789	++	LC
48.	Tufted Duck	Isti kutum/ Tiki hans	*Aythya fuligula*	Linnaeus, 1758	+	LC
49.	Common Pochard	Bamunia hans	*Aythya ferina*	Linnaeus, 1758	+++	NT

	Class / Common name	Local name	Scientific name	Authority	Abundance	IUCN Red List status
50.	Eurasian Wigeon	Sinthi hans	*Mareca penelope*	Linnaeus, 1758	+++	LC
51.	Indian Spot-billed Duck	Deshi mete hans	*Anas poecilorhyncha*	Forster, 1781	+++	LC
52.	Common Moorhen	Jal murgi	*Gallinula chloropus*	Linnaeus, 1758	+++	LC
53.	Cotton Pygmy Goose	Dhala bali hans	*Nettapus coromandelianus*	Gmelin, 1789	+++	LC
54.	Yellow-wattled Lapwing	Halde gal ti ti	*Vanellus malabaricus*	Boddaert, 1783	+++	LC
55.	Red-wattled Lapwing	Lal gal ti ti	*Vanellus indicus*	Leclerc, 1781	+++	LC
56.	Peregrine Falcon	Baj pakhi	*Falco peregrines*	Tunstall, 1771	+++	LC
57.	Marsh Harrier	Halde khanjan	*Cirus aeruginosus*	Linnaeus, 1758	+++	LC
58.	Siberian Rubythroat	Siberian chunikanthi	*Calliope calliope*	Pallas, 1776	++	LC
59.	Northern Pintail	Lenja hans	*Anas acuta*	Linnaeus, 1758	+++	LC
60.	Northern Shoveler	Pantamukhi hans	*Spatula clypeata*	Linnaeus, 1758	+++	LC
61.	Greylag Goose	Mete raj hans	*Anser anser*	Linnaeus, 1758	+++	LC
	Mammalia					
	Diurnal					
1.	Indian Hare	Khorgosh	*Lepus nigricollis*	Cuvier, 1823	++	LC
2.	Common Palm Civet	Gondhogokul	*Paradoxurus hermaphroditus*	Pallas, 1777	++	LC
3.	Northern Plains GrayLangur	Hanuman	*Semnopithecus entellus*	Dufresne, 1797	+++	LC
4.	Indian Grey Mongoose	Neul	*Urva edwardsii*	E,Geoffroy Saint-Hilaire, 1818	++	LC
5.	Common Palm Squirrel	Kathbirali	*Funambulus palmarum*	Linnaeus, 1766	++++	LC
	Nocturnal					
6.	Indian Flying Fox	Badur	*Pteropus giganteus*	Temminck, 1825	++++	LC
7.	Indian Pygmy Bat	Chamchike	*Pipistrellus tenuis*	Temminck, 1840	++++	LC
8.	House Rat	Idur	*Rattus rattus*	Linnaeus, 1758	+++	LC
9.	House Mouse	Nengti idur	*Mus musculus*	Linnaeus, 1758	+++	LC
10.	House Shrew	Chucho	*Suncus murinus*	Carl Linnaeus, 1766	+++	LC
11.	Indian Mole-rat	Metho idur	*Bandicota bengalensis*	Haerdwicke & Grey, 1833	+++	LC
12.	Bengal Fox	Khaksial	*Vulpes bengalensis*	Shaw, 1800	++	LC
13.	Jungle Cat	Bonbiral	*Felis chaus*	Güldenstädt, 1776	+	LC
14.	Striped Hyaena	Lakra	*Hyaena hyaena*	Linnaeus, 1758	+	NT
15.	Indian Crested Porcupine	Sojaru	*Hystrix indica*	Kerr, 1792	+	LC

Abbreviations used: Relative abundance expressed as +—less abundant | ++++—more abundant | CE—Critically Endangered | LC—Least Concern | NA—This taxon has not yet been assessed on the IUCN Red List | NT—Near Threatened. Ref: Raha & Pandey 2015; Chattopadhyay et al. 2018.

to gross habitat destruction (Image 3.4). Dhaman *Ptyas mucosa* is commonly known as the Oriental Rat Snake; it is a non-venomous species of colubrid snake (1.5–1.95 m) (Image 3.5). The field study revealed the presence of Indian Rock Python *Python molurus* which is believed to be the longest snake (7.3–7.6 m) (Image 3.6). Apart from snake, several other reptiles are found abundantly in the studied hilly region including Yellow-bellied House Gecko *Hemidactylus flaviviridis,* Forest Calotes *Monilesaurus rouxii*, Asian Chameleon *Chamaeleo zeylanicus*, and Common/ Brahminy Skink *Eutropis carinata.* (Image 3.10–3.12). Here, in this present study, reptiles live in a variety of microhabitats, including terrestrial, aquatic, and arboreal environments. The observed snakes have been found from shaded small rocks, leaf litter, rotting logs, temporary pools, sun exposed rocks.

The avian species biodiversity depends on the pattern of landscape. The pattern of biodiversity alters with the climatic conditions, environmental factors, habitats and topography. Though Purulia is an arid district, there are certain local aquatic bodies including Saheb Bandh and Kansai River, which provide life support for the aquatic

avian group. Due to the presence of large number of migratory birds, the species richness value becomes high in winter, especially in Baranti Dam and Saheb Bandh. According to ebird checklist at Garh Panchkot-Lalpur, 81 species have been recorded so far, although in the present study 61 species have been found. The avian food habit is influenced by scarcity of water and the lesser availability of foods according to seasonal variation. The birds of different feeding habits including omnivorous (15 species), carnivorous (seven species), invertivorous (four species), molluscivorous (three species), herbivorous (three species), granivorous (five species), insectivorous (15 species), frugivorous (four species), piscivorous (five species) found throughout the year enforces the fact. Most of the birds existing here are omnivores and insectivores which might be due to extreme weather condition of Purulia (Mahato et al. 2021). Among the different local bird species, Cattle Egret (Gobok), Little Egret (Korchebok), Asian Opened-billed Stork (Shamuk khol), Black-headed Ibis (Kalomatha kastechara), Red-naped Ibis (Kalo kastehara), Red-vented Bulbul (Bulbuli), Brown Shrike (Korkota), Oriental Magpie-robin (Doyel), Indian Robin (Shamya), Purple Sunbird (Moutusi) etc. are most commonly found whereas migratory birds include Lesser Whistling Duck, Cotton Pygmy Goose, Northern Pintail, Indian spot-billed duck, Northern Shoveler, and Greylag Goose (Image 3.13–3.21).

Various types of mammals with wide range of feeding habit and variable habitat are found during the studied period. Characteristically few of them exhibit nocturnal habit and adapted for highly developed eyesight, senses of hearing, and smell, e.g., certain species of Indian hare *Lepus nigricollis*, Indian Pygmy Bat *Pipistrellus tenuis*, Indian Flying Fox *Pteropus medius*, Hyena *Hyaena hyaena*, House Shrews *Suncus murinus* whereas considerable number of species are observed in daytime, e.g., Common Palm Squirrel *Funambulus palmarum*, Indian Mongoose *Urva edwardsii*, and Northern Plains Gray Langur *Semnopithecus entellus*. Few of them are carnivorous in nature, like the Striped Hyaena *Hyaena hyaena,* Bengal Fox *Vulpes bengalensis*, and Jungle Cat *Felis chaus* which feed on the flesh of other small animals or remnants of any debris generated from other animals. During the studied period, mammals have been observed from the vegetation of ground and canopy cover, rocky caves, underground holes, and crevices (Image 3.22–3.30).

Peafowl *Pavo cristatus*, Sloth Bear *Melursus ursinus*, Common Langur *Semnopithecus entellus*, Rhesus Macaque *Macaca mulatta*, Indian Rock Python *Python molurus*, and Fishing Cat *Prionailurus viverrinus* are among the endangered species discovered during the current study. The Black-headed Ibis *Threskiornis melanocephalus* and Striped Hyaena *Hyaena hyaena* are classed as 'Near Threatened', whilst the White-rumped Vulture *Gyps bengalensis* is designated as 'Critically Endangered'.

The Black-headed Ibis, or Oriental White Ibis *Threskiornis melanocephalus*, is a species of bird in the ibis family. The head and neck of this species are black, but its general plumage is white with black, with lengthy legs and a downward-curving beak. Despite being classified as a wetland species, this bird can also be found on land that borders wetlands, such as freshwater and saltwater marshes, reservoirs, lakes, and ponds; it can also be found in rice fields, recently ploughed crop fields, riversides, urban lakes, and open sewage gutters (Nandi et al. 2004; Roy et al. 2011; Khan et al. 2016). They often build their nests during the rainy season, which coincides with their breeding season. Similarly, another endangered bird species, *Pseudibis papillosa*, the Red-naped Ibis, is primarily found in marshes where it lives in flocks. It is commonly seen in small flocks of 2–4, which could be family groups, and rare to see larger groups. They have ruby red warty skin on the crown and a usually dark body with a white spot on the shoulder. It typically stays in pairs during the breeding season and makes a loud call to entice companions. Usually, they build their nests atop big trees or power towers (Nandi et al. 2004) (Image 4). Due to progressive urbanization and developmental activities, the natural habitats of these birds might be destroyed or degraded. It is observed that the wetlands are undergoing an unwanted rapid decline in biodiversity due to climate change, illegal hunting, huge pollution, deforestation, and eutrophication of wetlands.

With an unfeathered head and neck, the White-rumped Vulture *Gyps bengalensis* is a typical medium-sized vulture. These birds have short tail feathers, a white neck ruff, and very large wings. The adult's dark plumage is contrasted with pale features on the rump, underwing coverts, and back (Grimmett et al. 1998). Like other vultures, it hunts by flying high in thermals and seeing other scavengers (Image 4). It primarily feeds on carcasses. Consequently, there are some drugs (e.g. diclofenac) used for the treatment of livestock (cattle, donkeys) when they fall ill (Swan et al. 2006). Although, these drugs help the animals feel better, in majority of the cases, cattle will get sick again. When these animals die, the diclofenac remains in their system and the vultures who feed on these animals; they unknowingly

Image 3. Selected pictures of the different land vertebrates recorded from the forest region of Panchet Hill and adjacent areas. Amphibia (3.1–3.3): 3.1—Asian Painted Frog *Kaloula pulchra* | 3.2—Indian Common Toad *Duttaphrynus melanostictus* | 3.3—Indian Skipper Frog *Euohlyctis cyanophylactis* | Reptilia (3.4–3.12): 3.4—Indian Cobra *Naja naja* | 3.5—Dhaman *Ptyas mucosa* | 3.6—Indian Python *Python molurus* | 3.7—Raj Sanp *Bungarus fasciatus* | 3.8—Boa Sanp *Eryx johnii* | 3.9—Kalach or Common Krait *Bungarus caeruleus* | 3.10—Common Indian Monitor *Varanus bengalensis* | 3.11—Brahminy Skink *Eutropis carinata* | 3.12—Bronze Grass Skink *Mabuya macularia.* © Sujoy Chattaraj.

swallow the residual drugs which poison the vultures and causes serious kidney damage (Rana & Prakash 2003).

In general, Striped Hyenas are slightly smaller than spotted and brown hyenas. They have a big head, thick nose, large, pointed ears, and black eyes. These are mostly scavengers and frequently target humans for attack. Male and female Striped Hyenas cooperate with one another to raise their young, making them nocturnal and monogamous creatures (Alfred et al. 2002; Biswas et al. 2008) (Image 4). Due to the scavenging habits, the hyenas are often believed to deplete the livestock. This causes conflict with local communities and triggers the hunting of hyenas. A hyena was allegedly killed, beheaded and chopped into pieces by some residents of Dhanardih Village in Kashipur Block of Purulia in July, 2020. A 15-year-old Striped Hyena was killed by poachers at the Jharbagda Forest near Manbhum College campus

Image 3. Selected pictures of the different land vertebrates recorded from the forest region of Panchet Hill and adjacent areas. Aves (3.13–3.21): 3.13—Peacock *Pavo cristatus* | 3.14—Eastern Barn Owl *Tyto javanica* | 3.15—Rose-ringed Parakeet *Psittacula krameri* | Budgerigar Bird *Melopsittacus undulates* | 3.16—Spotted Dove *Streptopelia chinensis* | 3.17—Greater Adjutant Stork *Leptoptilos dubius* | 3.18—Small Kingfisher *Alcedo atthis* | 3.19—Indian Robin *Copsychus fulicatus* | 3.20—Baya Weaver *Ploceus philippinus* | 3.21—Little Swift *Apus affinis* | Mammalia (3.22–3.30): 3.22—Striped Hyaena *Hyaena hyaena* | 3.23—Elephant *Elephas maximus indicus* | 3.24—Northern Plains Gray Langur *Semnopithecus entellus* | 3.25—Indian Grey Mongoose *Urva edwardsii* | 3.26—House Rat *Rattus rattus* | 3.27—Wild Boar *Sus scrofa* | 3.28—Indian Crested Porcupine *Hystrix indica* | 3.29—Indian Pygmy Bat *Pipistrellus tenuis* | 3.30—Common Palm Civet *Paradoxurus hermaphroditus*. © Sujoy Chattaraj.

under Manbazar PS area in December, 2013. According to some previous literature reviews, there are nearly 15 contemporary records (2010–2021) in Bengal, from sites situated on the eastern side of the Chota Nagpur Plateau. These records indicated deaths of hyenas due to poaching, vehicle accidents, and retaliatory killings (Akash et al. 2021). According to Chattopadhyay et al. (2018), striped hyenas were observed from Medinipur-Purulia zone only once during their study period (two years) and the probable reason for their decline in number is human-hyena conflict.

According to the most recent animal census conducted in the forest of southern Bengal, the population of Indian pangolins *Manis crassicaudata* has dropped dramatically and 42 pangolins survived in the forest area of Purulia (Samanta et al. 2021). Several rocky cavities were detected at various places in the Panchkot Hilly region and surrounding forest areas, where the evidence of Indian pangolin and crested porcupine sharing their living space were identified. The focal rocky cavity was found in certain places in hilly forest areas where recent tail, drag-marks, footprints and claw marks of Pangolins were found [Image 4]. Few trees were identified (e.g. Karam *Neolamarckia cadamba*, Bael fruit *Aegle marmelos,* Tendu *Diospyros melanoxylon*) where both pangolins and porcupines are found in comparatively less number and vulnerable. These animals prefer to eat fruits, tubers, bulbs, and roots of plants (Sikdar et al. 2024). As per the native villagers there are several trees (White Siris *Albizia procera*, Indian Plum or Kul *Ziziphus mauritiana*, Banyan *Ficus benghalensis*, Palash *Butea monosperma*, Shisu *Dalbergia sissoo*) which are known to be the habitat of several land vertebrates including Spotted Dove *Streptopelia chinensis*, Parakeet *Psittacula krameri*, Pangolin *Manis crassicaudata*, Porcupine *Hystrix indica*, Palm Squirrel *Funambulus palmarum*, Gray Langur *Semnopithecus entellus*, Indian Flying Fox *Pteropus medius*, Pygmy Bat *Pipistrellus tenuis*. The possible reason for the Indian pangolin *Manis crassicaudata* and Indian crested porcupine *Hystrix indica* becoming endangered is excessive hunting and poaching for its meat which is consumed by native villagers as well as tribal communities as delicious food (Hughes 2014). The pangolin scales are also used for making different types of medicines for promoting blood circulation, stimulate lactation, cure rheumatisms, and reduce swelling (Mohapatra et al. 2015; Xu et al. 2016). The WWF has classified pangolins as an endangered species, marking their status in red ink (Tikadar 1983; WII ENVIS 2017).

Anthropogenic activity has an impact on the hilly Garh Panchkot Region both directly and indirectly. With the gradual increase of human population, their caste and religious faith as well as advancement of living standard, industrialization and urbanization, the forest range has started reducing and its floral and faunal variety affected severely. Under the administration of divisional headquarter at Purulia, there are eight territorial forest ranges (viz. Balarampur, Matha, Bagmundi, Ajodhya, Jhalda, Kotshila, Joypur and Arsha). The officers and staffs of forest department are trying to protect the faunal species of Garh Panchkot, but unable to restore the diversity of vegetation and the old glory of this hilly region possibly due to lack of proper management strategy and suitable planning (Raha & Pandey 2015). Moreover, there is a sponge iron factory within a radius of 100 m and the contaminants are typically deposited on top of the greenery (Image 5). It has been found that the ash and slag from factories cover the leaves with a layer of pollutants, which further destroy the delicate ecological balance and the nutrient cycles.

Moreover, fire is one of the major threats to wild life. Forest fire causes long-term negative impacts on faunal species including endangered species and destroys the floral diversity (trees, herbs, shrubs, grassland). Repeated firework can convert some shrublands to grasslands whereas fire exclusion transforms grassland into shrub-land and forest. Fires influence the animals by destroying their habitats. Generally, the fire season initiates from March/April and continues up to June (Jhariya & Raj 2014).

In addition to pollution, ancient tribal hunting festivals ("Shikar Parba") and cultural events held on the night of Buddha Purnima (Baishakhi Purnima) are major factors in the extinction of species. Santhal (local tribe) men wander in the forests and kill wild porcupines, pangolin, deer, monkeys, wild boar, and bears to acquire meat for its delicacy, and exoskeleton parts are made into rings to prevent rheumatic fevers (Banerjee 2022). The illegal hunting and poaching are thought of as a threat to the avian species. Most of the lakes in the district forest areas are surrounded by many tribal communities (Mahato et al. 2021). Generally, local tribal people hunt birds for their mental satisfaction as well as a source of food. Due to a lack of proper knowledge (literacy rate of Purulia - 64.48 %), they are not aware of the socioeconomic impact of avian species and the substantial role of the ecosystem (Mandal et al. 2023). Previously, Chattopadhyay et al. (2018) reported on the hunting of wild animals from the Garh Panchkot area. Ritualistic hunting and cultural events have been reported from the forest area of Jhargram, West Midnaporee,

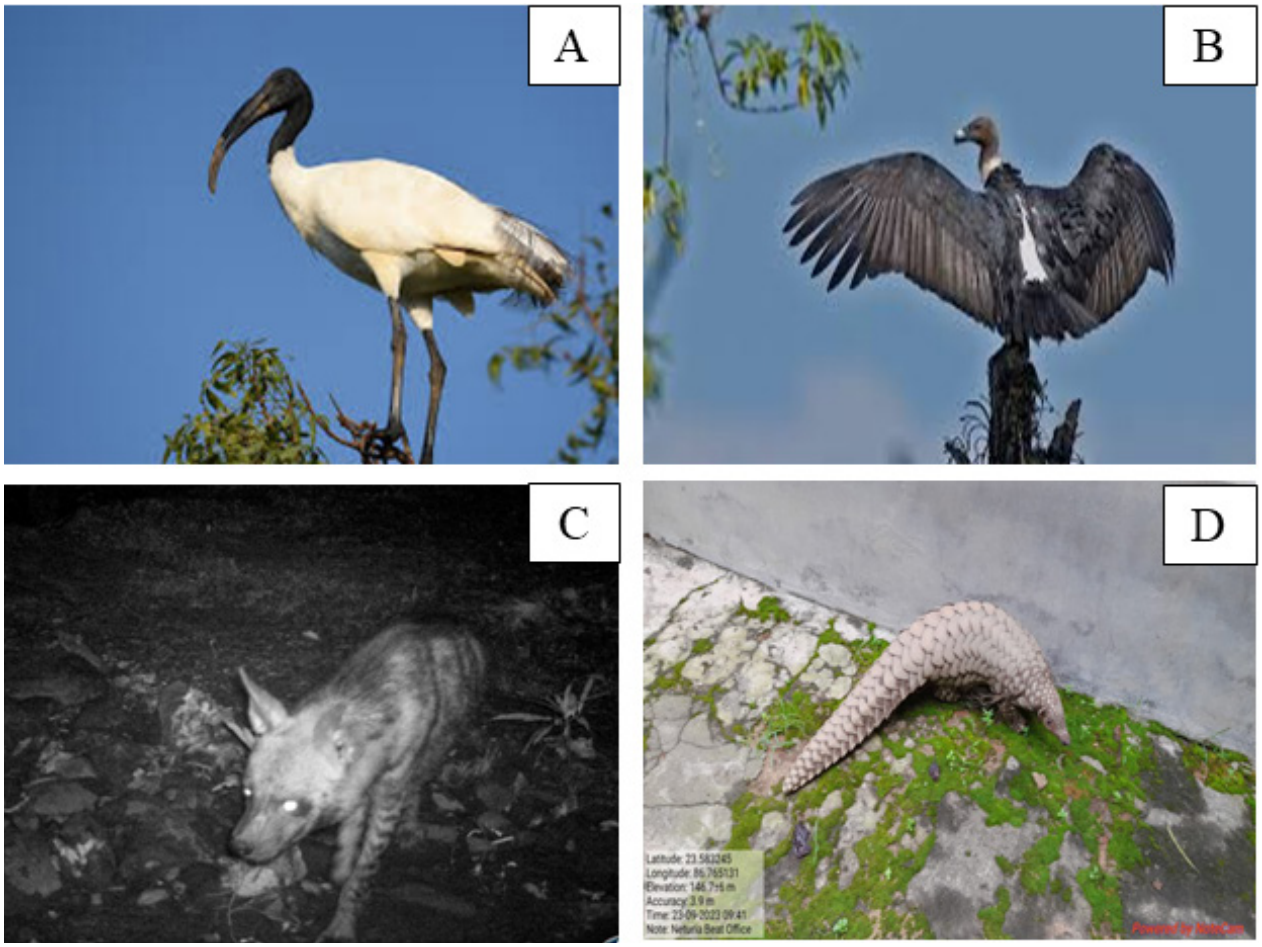

Image 4. A few threatened species observed in the Garh Panchkot Hilly region and its surroundings: A—Striped Hyena *Hyaena hyaena* | B—Black-headed Ibis *Threskiornis melanocephalus* | C—White-rumped Vulture *Gyps bengalensis* | D—Indian Pangolin *Manis crassicaudata*. © Sujoy Chattaraj.

and certain areas of Purulia (D'Cruze et al. 2024); the migratory bird population of the Purulia District has declined due to illegal hunting. In extent, Sikdar et al. (2024) reported tribal hunting of several mammalian species including Indian Pangolin *Manis crassicaudata* (Geoffroy, 1803) (Mammalia: Pholidota: Manidae) and Indian Crested Porcupine *Hystrix indica* (Kerr, 1792) (Mammalia: Rodentia: Hystricidae) in Purulia District. Deforestation causes rapid loss of habitat for migratory bird species (Mahato et al. 2021; Mahato 2021). The tribal community residing in the villages surrounding the hilly region, abolish the forest area vigorously. They often depend on the forest not only for fuel and wood collection but also as the main source of income for their daily life. Rapid destruction of the forest surrounding the wetland raises uncertainty in the avian diversity (Image 5).

Eutrophication is another threatening agent for making the wild fauna (e.g., Cattle Egret, Little Egret, Asian Open-billed Stork, Black-headed Ibis, Cormorant, Small Kingfisher, Greater Adjutant Stork) vulnerable. Algal bloom causes discolouration of water and depletes the oxygen level. In addition, the excessive growth of phytoplankton resists the sun light penetration beneath the lower depth of the water column [Image 5E]. Water pollution is now exponentially increased due to human activities like throwing plastics, garbage and waste food products into water bodies (Bashir et al. 2020; Wang et al. 2021) (Image 5).

Awareness programme should be generated regarding the conservation significance of faunal diversity and natural resources. In the foot hill region of Garh Panchkot, regular man-wildlife conflict has resulted in death of many wild animals. Human-elephant negative interactions have been reported previously from Purulia and Bankura districts due to several developmental activities (Mondal et al. 2016; Das Chatterjee & Mandal 2020). There are more than a few contemporary

Image 5. Major causes of biodiversity loss in Garh Panchkot Forest region and nearby wet land: A–B—Pollutants released from sponge iron factories located in Uttara and Gopalpur Villages, Purulia which are within 100 m radius of south-eastern face of Panchet Hill | C–D—Deforestation leads to extinction of several animal species due to destruction of natural habitat and severe climatic alteration | E—Eutrophication causes hypoxic condition in lakes and water bodies which in turn severely affect aquatic animal diversity. As a result, food sources of local or migratory birds are being lesser | F—Polythene bags and bottles loitering on lake side leading to lead poisoning and toxic effect on environment. © Sujoy Chattaraj.

records (2010–2021) upon human-hyena from Bengal, from sites specially located on the eastern limit of the Chota Nagpur Plateau including forest areas of Purulia District. These records noted around nine deaths due to poaching, avenging killings, and train accidents (Akash et al. 2021). Regarding this concern, anthropogenic activity (deforestation, urbanisation, industrialisation, and hunting) should be checked and well managed.

Sanctuaries and wildlife protected areas should be developed around the Garh Panchkot region to restore and conserve the entire biodiversity wealth of this hilly region. The concerned Forest Division should take more protective measures for preserving wildlife species as per the Schedules of Wildlife (Protection) Act. 1972 (Chakraborty & Kar 2004). Among the different wildlife protective approaches habitat conservation, wildlife sanctuaries, ex-situ conservation including zoological parks, botanical gardens, and wildlife safari, nature-based projects, sustainable land use, wildlife habitat creation, tree plantation, anti-poaching laws, public education are most important. There should be some strict management strategies for visitors to conserve the biodiversity of forests and wetlands. Government should take proper sustainable and holistic administrative strategies to make the land a plastic-free zone.

The present study is a pioneer investigation of endangered faunal species of the Garh Panchkot Hilly area and its surroundings; more research encompassing a wider range of plant and animal taxa will improve our understanding of the richness of wild species found in this particular area. The information gathered from this study will be useful in determining what needs to be done to conserve endangered and near-threatened species in order to ensure their long-term viability and best interests.

REFERENCES

Achieng, A.O., G.B. Arhonditsis, N. Mandrak, C. Febria, B. Opaa, T.J. Coffey, F.O. Masese, K. Irvine, Z.M. Ajode, K. Obiero, J.E. Barasa & B. Kaunda-Arara (2023). Monitoring biodiversity loss in rapidly changing Afrotropical ecosystems: an emerging imperative for governance and research. *Philosophical Transactions of the Royal Society B* 378(1881): 20220271. https://doi.org/10.1098/rstb.2022.0271

Akash, M., A. Dheer, S.M. Dloniak & A.P. Jacobson (2021). The faded stripes of Bengal: a historical perspective on the easternmost distribution of the Striped Hyena. *European Journal of Wildlife Research* 67(108): 1–12. https://doi.org/10.1007/s10344-021-01552-9

Alfred, J.R.B., N.K. Sinha & S. Chakraborty (2002). Checklist of Mammals of India.Published by Director, Zool. Surv. India, Kolkata. *Records of the Zoological Survey of India* Occasional Paper 199: 1–289.

Annual Administration Report (2021–22). Department of Forest, Government of West Bengal, 217–219 pp. https://www.westbengalforest.gov.in/publications_administrative_report_banabithi.php

Banerjee, A. (2022). Bodding's Santal Medicine and Connected Folklore vis-à-vis Vidyasagar's understanding of Anthropological Study. *Journal of the Asiatic Society* 63(4): 131–154.

Bashir, I., F.A. Lone, R.A. Bhat, S.A. Mir, Z.A. Dar & S.A. Dar (2020). Concerns and threats of contamination on aquatic ecosystems. *Bioremediation and Biotechnology* 27: 1–26. https://doi.org/10.1007/978-3-030-35691-0_1

Bhowmik, B. (2017). Studies on biodiversity of snake fauna in Purulia District with special reference to Garh Panchokot and its surroundings. *PANCHAKOTESSAYS* 8(2):1–9

Biswas, K.K., P.C. Saren & D. Basu (2008). Mammalian and avian fauna of some selected areas of Purulia District, West Bengal. *Records of the Zoological Survey of India* 108(3): 59–76.

Chakraborty, R. & S. Kar (2004). Assessment of habitat as well as avian and mammalian diversiiy in the Purulia District, West Bengal. *Records of the Zoological Survey of India* 103 (part–34): 87–124.

Chatterjee, N.D. & M. Mandal (2020). Human-elephant confict in Panchet Forest Division, Bankura, West Bengal, India. *Gajah* 51: 10–15.

Chattopadhyay, S., S. Dey & S.U. Roy (2018). On the diversity of the vertebrate fauna (excluding fishes) of Panchet Hill (Garh Panchkot), Purulia, West Bengal, India. *Journal of Threatened Taxa* 10(15): 12979–12985. https://doi.org/10.11609/jott.4102.10.15.12979-12985

Chowdhury, S & S.K. Chowdhury (2020). A study on butterfly diversity and related host plants in Joychandi Hill of Purulia District, West Bengal, India. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)* 14(10): 55–60.

Das, D. (2018). Butterfly (Lepidoptera: Rhopalocera) diversity in relation to habitat utilization at Jagannath Kishore College, Purulia, West Bengal (India). *Journal of Insect Biodiversity* 7(1): 1–16.

D'Cruze, N., A. Elwin, S. Ghosh, A.E. Asfaw, E. Coulthard, D. Megson, J. Norrey, S. Giri, V. Mishra, T. Adhya, S. Chatterjee, M. Banerjee, A. Banerjee & L. Harrington (2024). Ritualistic hunts: exploring the motivations and conservation implications in West Bengal, India. *Nature Conservation* 56: 243–273. https://doi.org/10.3897/natureconservation.56.132178

Grimmett, R., C. Inskipp & T. Inskipp (1998). *Birds of the Indian Subcontinent*. Oxford University Press, Delhi, 888 pp.

Hughes, J.E. (2014). Thinking (with) the Indian Pangolin: a humananimal perspective on India's colonial and princely histories. Nehru Memorial Museum and Library, Teen Murt House, New Delhi, India, 45 pp.

IUCN (2017). The IUCN Red List of Threatened Species. Version 2017–3. www.iucnredlist.org. Downloaded on 26 February 2018.

Jhariya, M.K. & A. Raj (2014). Effects of wildfires on flora, fauna and physico-chemical properties of soil—an overview. *Journal of Applied and Natural Science* 6(2): 887–897.

Khan, T.N., A. Sinha & P. Hazra (2016). Population trends and community composition of migratory waterbirds in three emerging wetlands of global significance in southwestern Bengal, India. *Journal of Threatened Taxa* 8(3): 8541–8555. https://doi.org/10.11609/jott.2652.8.3.8541-8555

Magurran, A.E. (2004). *Measuring Biological Diversity*. Blackwell Publishing, Oxford, 256 pp.

Mohapatra, R.K., S. Panda, M.V. Nair, L.N. Acharjyo & D.W.S. Challender (2015). A note on the illegal trade and use of pangolin body parts in India. *TRAFFIC Bulletin* 27(1): 33–40.

Mahato, S., S. Mandal & D. Das (2021). An appraisal of avian species diversity in and around Purulia Town, West Bengal, India. *Journal of Threatened Taxa* 13(3): 17906–17917. https://doi.org/10.11609/jott.4733.13.3.17906-17917

Mahato U. (2021). Deforestation induced change in subsistence pattern of the Kharia Tribe: a study from Purulia District. *Annals of Anthropological Research and Reviews* 1: 86–93.

Mandal, S.K. (2012). Survey of wetlands in Puruliya District, West Bengal, with special emphasis on their macrophytes. PhD Thesis. Department of Botany, The University of Burdwan, 377 pp.

Mandal, M., D. Ghosh, M. Karmakar, S. Mandi, P. Modak, B. Ghosh & D. Mandal (2023). Rural child health in India: the persistent nature of deprivation, undernutrition and the 2030 Agenda. *Environment, Development and Sustainability* 26: 4837–4860. https://doi.org/10.1007/s10668-023-02912-y

Martínez-Ramos, M., I.A. Ortiz-Rodríguez, D. Piñero, R. Dirzo & J. Sarukhán (2016). Anthropogenic disturbances jeopardize biodiversity conservation within tropical rainforest reserves. *Proceedings of the*

National Academy of Sciences 113(19): 5323–5328. https://doi.org/10.1073/pnas.1602893113

McAleece, N., J.D.G. Gage, P.J.D. Lambshead & G.L.J. Paterson (1997). BioDiversity Professional statistics analysis software. Jointly developed by the Scottish Association for Marine Science and the Natural History Museum, London.

Mukherjee, S.S. & A. Hossain (2024). Assemblage and diversity analysis of butterfly species in relation to climatic conditions in some tropical habitats: optimization through artificial neural network model. *Journal of Ecology and Environment* 48: 44. https://doi.org/10.5141/jee.24.065

Nandi, N.C., S. Bhuinya & S.R. Das (2004). Notes on mid-winter water birds population of some selected wetlands of Bankura and Purulia District, West Bengal. *Records of the Zoological Survey of India* 102(Part1–2): 47–51.

Raha, S. & S. Pandey (2015). The hunting festival — a serious threat to biodiversity of Ajodhya Hills, Purulia. *Panchakotessays* 6(1): 1–7.

Rana, A.K. & N. Kumar (2023). Current wildlife crime (Indian scenario): major challenges and prevention approaches. *Biodiversity Conservation* 32(5): 1473–1491. https://doi.org/10.1007/s10531-023-02577-z

Rana, G. & V. Prakash (2003). Cannibalism in Indian White-backed Vulture *Gyps bengalensis* in Keoladeo National Park, Bharatpur, Rajasthan. *Journal of the Bombay Natural History Society* 100: 116–117.

Roy, U.S., A.R. Goswami, A. Aich & S.K. Mukhopadhyay (2011). Changes in densities of water bird species in Santragachi Lake, India: potential effects on limnochemical variables. *Zoological Studies* 50(1): 76–84.

Samanta, S., D. Das & S. Mandal (2017). Butterfly fauna of Baghmundi, Purulia, West Bengal, India: a preliminary checklist. *Journal of Threatened Taxa* 9(5): 10198–10207. https://doi.org/10.11609/jott.2841.9.5.10198-10207

Samanta, S., S. Mahato & A. Mukherjee (2021). Documentation of the globally threatened Indian Pangolin and its threats from Ajodhya Hills, Purulia, West Bengal, India. Mammal Tales #36. In: *Zoo's Print* 36(12): 65–66.

Sanyal, A.K., J.R.B. Alfred, K. Venkataraman, S.K. Tiwari & S. Mitra (2012). *Status of Biodiversity of West Bengal*. Zoological Survey of India, Kolkata, 969 pp.

Sengupta, A., H. Ogale & E. Malaiyappan (2021). *Euploea sylvester* (Fabricius 1793) — Double-branded Crow. In: Kunte, K., S. Sondhi & P. Roy (eds.). *Butterflies of India,*v. 3.15. Indian Foundation for Butterflies. https://www.ifoundbutterflies.org/sp/972/Euploea-sylvester

Sikdar, D., S. Bhandari & S. Paira (2024). Coexistence of Indian Pangolin Maniscrassicaudata (Geoffroy 1803) (Mammalia: Pholidota: Manidae) and Indian Crested Porcupine Hystrixindica (Kerr 1792) (Mammalia: Rodentia: Hystricidae) in Purulia District, West Bengal, India. *Journal of Threatened Taxa* 16(2): 24630–24645. https://doi.org/10.11609/jott.8736.16.2.24630-24645

Swan, G., V. Naidoo, R. Cuthbert , R.E. Green, D. J. Pain, D. Swarup D, V. Prakash, M. Taggart, L. Bekker, D. Das, J. Diekmann, M. Diekmann, E. Killian, A. Meharg, R.C. Patra, M. Saini & K. Wolter (2006). Removing the threat of diclofenac to Critically Endangered Asian Vultures. *PLoS Biology* 4(3): e66. https://doi.org/10.1371/journal.pbio.0040066

Tikadar, B.K. (1983). *Threatened Animals of India*. Zoological Survey of India. Calcutta, 307 pp.

UNEP (2001). *India: State of the Environment 2001*. United Nations Environment Programme, Regional Resource Centre for Asia and the Pacific, Pathumthani, Thailand, xv + 171 pp.

Wang, H., J. García Molinos, J. Heino, H. Zhang, P. Zhang & J. Xu (2021). Eutrophication causes invertebrate biodiversity loss and decreases cross-taxon congruence across anthropogenically-disturbed lakes. *Environment International* 153: 106494. https://doi.org/10.1016/j.envint.2021.106494

WBFD (2017). West Bengal Forest Department. http://www.westbengalforest.gov.in/history.php. Accessed on 29 September 2017.

WII ENVIS (2017). ENVIS Centre on Wildlife & Protected Areas. https://www.wiienvis.nic.in/Database/Protected_Area_854.aspx. Accessed on 29 September 2018.

Willcox, D., H.C. Nash, S. Trageser, H.J. Kim, L. Hywood, E. Connelly, G. Ichu, J.K. Nyumu, C.L.M. Moumbolou, D.J. Ingram & D.W.S. Challender (2019). Evaluating methods for detecting and monitoring pangolin (Pholidota: Manidae) populations. *Global Ecology and Conservation* 17: e00539. https://doi.org/10.1016/j.gecco.2019.e00539

Xu, L., J. Guan, W. Lau & Y. Xiao (2016). An overview of pangolin trade in China. *TRAFFIC* 1–10. Accessed on 28th June, 2024. https://www.westbengalforest.gov.in/upload/publication/Garhpanchokot.pdf

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

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Journal of Threatened Taxa

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

April 2025 | Vol. 17 | No. 4 | Pages: 26763–26938
Date of Publication: 26 April 2025 (Online & Print)
DOI: 10.11609/jott.2025.17.4.26763-26938

Publisher & Host

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