Ornithological results of the Siang Biodiversity Expedition 2022, Arunachal Pradesh, India

Puja Sharma, Priya Singh, Vivek Ramachandran, Rajkamal Goswami, Sanjay Sondhi, Nilanjan Mukherjee, Jagdish Krishnaswamy & Sandesh Kadur

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Puja Sharma, A-13, New Friends Colony, New Delhi 110025, India. E-mail: pujasharma1@gmail.com [PUS] [Corresponding author]
Priya Singh, Felis Creations, 14th Cross Road, 5th Main Road, Sadashivanagar, Bengaluru 560080, Karnataka, India. E-mail: karnisar@gmail.com [PRS]
Vivek Ramachandran, Wildlife Biology and Conservation Program, National Centre for Biological Science (NCBS) and Tata Institute for Fundamental Research (TIFR), Bellary Road, Bengaluru 560065, Karnataka, India. E-mail: vivekr@ncbs.res.in [VR]
Rajkamal Goswami, Ashoka Trust for Research in Ecology & the Environment (ATREE), Royal Enclave, Srirampura, Jakkur Post, Bengaluru 560064, Karnataka, India. E-mail: rajkamal@atree.org [RG]
Sanjay Sondhi, Titli Trust, 49 Rajpur Road Enclave, Dhoran Khas, PO Sahastradhara Road, Dehradun 248013, Uttarakhand, India. E-mail: sanjay.sondhi1@gmail.com [SS]
Nilanjan Mukherjee, Ashoka Trust for Research in Ecology & the Environment (ATREE), Royal Enclave, Srirampura, Jakkur Post, Bengaluru 560064, Karnataka, India. E-mail: nilanjan.mukherjee@atree.org [NM]
Jagdish Krishnaswamy, School of Environment and Sustainability, Indian Institute for Human Settlements, 2nd Main Road, Sadashivanagar, Bengaluru 560080, Karnataka, India. E-mail: jagdish.krishnaswamy@iihs.ac.in [JK]
Sandesh Kadur, Felis Creations, 14th Cross Road, 5th Main Road, Sadashivanagar, Bengaluru 560080, Karnataka, India. E-mail: sandesh@felis.in [SK]
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Abstract

In 2022, we conducted a multi-taxa survey of the sites covered during the colonial Abor Expedition of 1911–12 in the Siang Valley of Arunachal Pradesh. The survey included birds from locations in the East Siang, Siang, and Upper Siang Districts. The bird survey conducted between February and May 2022 involved cataloguing all bird species reported in the region through direct or indirect sightings, including documenting bird data obtained on camera traps as incidental captures and encounters of dead or hunted bird specimens. A total of 267 checklists and 94 bird species' vocalizations were contributed to the citizen-science eBird portal as a result of the survey. A total of 285 species (plus one hybrid) were recorded with some additions to the avifauna of the Upper Siang and Siang Districts. This included 26 species that were recorded as dead or hunted. However, 12 species reported in the 1911–12 study from the same sites were not recorded at this time. Important records include Temminck's Tragopan *Tragopan temminckii*, Blyth's Tragopan *Tragopan blythii*, Sclater's Monal *Lophophorus sclateri*, and migrating flocks of Common Cranes *Grus grus*. This survey from human-modified habitats of Arunachal Pradesh would be a baseline to compare against the bird richness of intact habitats at similar altitudes in the state.

Introduction

In 1911–12, a team of British explorers, surveyors, and military personnel collected numerous zoological specimens, including birds, from southern parts of the Siang Valley in present-day Arunachal Pradesh, the findings from which were published as the 'Zoological Results of the Abor Expedition 1911–12'; these included 192 bird specimens, representing 111 species collected by multiple officers, and catalogued by Baker (1913). In 2022, we resurveyed the same valley with additional areas to conduct a comparative multi-taxa study aimed at understanding how changing landscapes over relatively large temporal scales influence biodiversity.

In this study, we documented the avifauna of the Siang Valley (Fig. 1) from February to May 2022 and present an annotated checklist of birds reported in the region during this period. In addition to direct sightings, we documented bird data obtained on camera-traps as incidental captures during the mammal surveys of the study. We also documented any encounters of dead or hunted bird specimens during the course of our study. Finally, we discuss significant ornithological records and noteworthy sightings with respect to previously published literature and records of the region. We compared our findings with all previously published literature and checklists for the region, including the eBird Basic Dataset up to December 2022 (eBird 2023a), and report new additions of bird species to the Upper Siang and Siang Districts of Arunachal Pradesh.

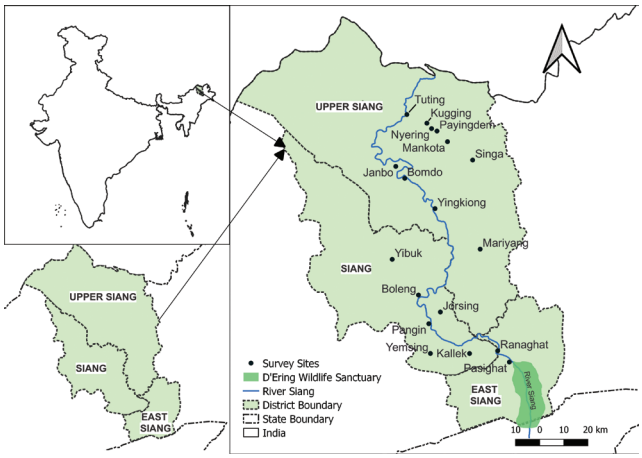

Fig 1. Map of the study area and the field sites (map prepared using QGIS v.3.26.3).

Methods

Study Area

The Siang Valley, located in the state of Arunachal Pradesh, is recognized as a part of the Assam Plains and the Eastern Himalaya Endemic Bird Areas (Stattersfield et al. 1998) and includes several Important Bird Areas (IBAs) (Birdlife International 2023a). Our study area within this region is spread across three districts of the state: Upper Siang, Siang, and East Siang, and therefore extends

beyond the spatial extent of the area previously surveyed during the Abor Expedition in 1911–12.

The data were collected in three districts of the state: Upper Siang, Siang, and East Siang, with a primary focus on four sites in the Yangsang Chu River Valley in Upper Siang. In addition to the locations mentioned (Table 1), birds recorded anywhere within the Siang Valley during the course of our survey were documented.

Table 1. Details of locations surveyed in the Siang Valley, Arunachal Pradesh, India

Location	District	Coordinates	Elevation (m asl)
Kugging	Upper Siang	28.956°N, 94.991°E	800–1,400
Nyering	Upper Siang	28.936°N, 95.011°E	1,200
Payingdem	Upper Siang	28.927°N, 95.031°E	1,500
Tuting	Upper Siang	28.998°N, 94.896°E	500
Singa	Upper Siang	28.816°N, 95.187°E	1,500
Yingkiong-Mariyang	Upper Siang	28.718°N, 94.956°E	400–800
Boleng-Jorsing	Siang	28.257°N, 95.046°E	400–1,000
Kallek	Siang	28.108 °N, 95.169°E	900
Yemsing-Pangin	Siang	28.132°N, 94.956°E	600–1,400
Yibuk	Siang	28.463°N, 94.837°E	800
D'Ering Wildlife Sanctuary	East Siang	27.994°N, 95.439°E	100
Pasighat-Ranaghat area	East Siang	28.112°N, 95.287°E	100–400

The habitat at these locations in the Upper Siang and Siang Districts is primarily tropical wet evergreen forest in the lower areas of the Siang gorge and subtropical broadleaf hill forest at low to mid-elevations up to 1,500 m and Himalayan moist temperate forest at higher elevations, depending on the aspect of the slope (Choudhury 2006). Our field work in these areas primarily focused on private and community-managed lands and forests near the said villages outside the protected areas. In addition to the data obtained via camera traps, our survey sites were all located within an elevation gradient of 100–1,500 m asl throughout the three districts, with 1,500 m asl as the upper limit of our sampling elevation. This included a variety of habitats, such as primary and secondary forests; agricultural lands, including *jhum* shifting cultivation fields and fallow areas; plantations at the edge of secondary forests; and riparian areas in valleys. Habitat in high-elevation areas with temperate coniferous forests, subalpine scrubs, and alpine meadows was not included in our survey sites.

Data collection and analysis

Birds were observed with binoculars and documented using non-invasive methods such as photographs and sound-recordings. Bird checklists were carefully maintained using the eBird app following its recommended protocols during the entire study period from 21 February to 21 May 2022. A dedicated eBird group account, 'Siang Expedition 2022', was managed for this purpose, on which checklists prepared on individual eBird accounts were collectively shared (Siang Expedition 2022). Separate lists were maintained for different habitat-types and for different times of day. Double counting was avoided by maintaining separate lists while backtracking. Field work mainly consisted of walks along accessible hiking trails or established tracks or roads near settlements.

Both direct sightings and vocalizations were used for bird identification. All direct sightings, including direct encounters with dead or freshly hunted/snared birds, along with sound-recording bird vocalizations, were utilised for documentation of records. All indirect sightings of dead or hunted birds from preserved specimens (such as body parts, feathers etc.) were substantiated with photographic evidence, in addition to indigenous knowledge that included descriptions of their habitats and the hunting methods employed by the local population. Avifauna data obtained via 22 camera-trap stations placed between 734–2,189 m asl, primarily aimed at photographing mammals, were also incorporated. Separate lists were manually maintained for both camera-trap data and for dead/hunted bird specimens as per the eBird protocol, which recommends reporting only living wild birds on an eBird Checklist (eBird 2023b).

Bird vocalizations were sound-recorded to understand and study the vocal repertoire of birds found in the region. A total of 742 raw sound-recording files amounting to a total duration of 19.6 hours (19 hours 40 minutes) of field sound-recordings of 94 species were collected between 26 February and 31 March 2022. All sound recordings were made with Tascam DR-100MKIII and Sennheiser ME66/K6 and are archived at the Macaulay Library.

All eBird lists as well as all media collected from different sources were vetted for accuracy by PUS. All records were treated on their merits and substantiated with either sound recordings or photographs; some sight records supplemented with conclusive descriptions were accepted. Records that were inconclusive or unconfirmed for want of more evidence were treated as provisional and not included in the final list documented in this work. Data management and analysis of the dataset downloaded from our eBird group account were performed using MS Excel. Our taxonomy followed the Clements Checklist (Clements et al. 2022) for uniformity with our eBird data during the consolidation and analysis stages of our data. We subsequently converted the nomenclature and taxonomy to follow the 'India Checklist' (Praveen & Jayapal 2024).

Results & Discussion

A total of 267 eBird checklists (178 complete and 89 incomplete checklists as per eBird protocols) were contributed amongst eight observers during the span of this study. To quantify this effort, our field surveys amounted to a total duration of 266.3 hours (266 hours and 18 minutes) and covered a distance of 350.05 km and involved 178 complete eBird checklists. A total of 285 species (plus one hybrid) were reported from the region from February to May, sampling a limited elevation range (<1,500 m). Of the total species, 94 species were sound-recorded, making this study the first of its kind to document the avian bioacoustics of the region.

A total of 111 species were listed in Baker (1913), of which only 81 species were listed from our study area, with a majority of specimens collected from the Rotung, Kallek, and Mishing areas. The remaining 30 species were not considered because they were collected from locations outside our study area, such as the Mishmi Hills and Lower Dibang Valley District in Arunachal Pradesh and the Sadiya Ghat and Kobo Chapori areas in Assam. Of the 81 species listed by Baker (1913) from our study area, 12 species were not detected during our survey period (Table 2).

In comparison with previously published ornithological works and checklists for the region, our study added 20 (plus one hybrid) and 32 species to the avifauna of the Upper Siang and Siang Districts, respectively. Some details of noteworthy ornithological records and significant sightings are briefly described below in taxonomical order. A full list with all the details is available in the

Table 2. List of species in Baker (1913) not encountered during this study
*Locations correspond with map illustrated in Plate I in Kemp (1912: 6)

Species	Locations
Lesser Coucal *Centropus bengalensis*	Abor Hills
Pale-headed Woodpecker *Gecinulus grantia*	Rotung
Greater Yellownape *Chrysophlegma flavinucha*	Between Kallek and Mishing
Large Cuckooshrike *Coracina macei*	Sirpo
White-spectacled Warbler *Phylloscopus intermedius*	Between Kallek and Mishing
White-breasted Parrotbill *Psittiparus ruficeps*	Rotung
Black-crowned Scimitar Babbler *Pomatorhinus ferruginosus*	Rotung
Little Forktail *Enicurus scouleri*	Yembung
White-crowned Forktail *Enicurus leschenaulti*	Mishing
Rufous-breasted Bush Robin *Tarsiger hyperythrus*	Rotung and Bipani
Snowy-browed Flycatcher *Ficedula hyperythra*	Between Kallek and Mishing
Blue Rock Thrush *Monticola solitarius*	Mishing

supplementary information on Zenodo (https://doi.org/10.5281/zenodo.11051941). Several birds (44 individuals belonging to 26 species) were recorded as dead/hunted specimens (Table 3), and camera-trap records are available in the supplementary information (https://doi.org/10.5281/zenodo.11051941). Photographs of dead/hunted specimens are available from the authors upon request.

Noteworthy observations

Some migrating waterfowl and shorebirds: At least three Northern Pintails *Anas acuta*, together with at least two Green Sandpipers *Tringa ochropus*, and a Common Snipe *Gallinago gallinago*, were seen in a small pond at Payingdem (1,500 m) between 20 and 27 March 2022. The first two species were previously reported only from Bomdo (Datta-Roy et al. 2018), while the latter was previously reported only from Tuting (Naoroji & Sangha 2006). While previously reported in the region, a flock of at least 12 Ruddy Shelducks *Tadorna ferruginea* flying low at Nyering in inclement weather was observed on 26 March 2022, and three Bar-headed Geese *Anser indicus* and four Ruddy Shelducks were also observed in the Pasighat-Ranaghat area on the river bank on 26 March 2022.

Blyth's Tragopan *Tragopan blythii* (likely ssp. *T. b. molesworthi*): While previously reported from Mouling National Park (Sen & Jayahari 2017; Datta-Roy et al. 2018), a dead male specimen was encountered near Yibuk village near Mouling National Park on 01 May 2022. As per the local hunter it was hunted in the nearby forest, but the date could not be ascertained. The skin of this specimen with intact plumage was in pristine condition, suggesting that it was hunted in the recent past, and a keychain was attached to its beak, possibly for use for display or decorative purposes. The species is also reported to occur in suitable habitats in Upper Siang District (Choudhury 2010).

Temminck's Tragopan *Tragopan temminckii*: This species was identified based on a photographic record of a dead specimen dated 26 May 2018; a male hunted near the temperate forests of Titapuri located north of Kugging on its northern ridge. Parts of this area fall under the Dihang-Dibang Biosphere Reserve, one of the two IBAs identified in the Upper Siang District (BirdLife International 2023b). A common hunting technique is to lure the birds by mimicking their calls, luring them to an extensive network of snares or traps strategically set up, and effectively fencing off a

Table 3. Records of dead or hunted bird specimens in 2022
*Recorded from the survey sites outside survey period

Dead/hunted bird specimens (direct encounters)			
Common Name	Count	Location	Date of encounter
Blyth's Tragopan *Tragopan blythii*	1	Yibuk	01 May
Kalij Pheasant *Lophura leucomelanos*	1	Kugging	10 March
Grey Peacock-Pheasant *Polyplectron bicalcaratum*	1	Yemsing	27 April
Orange-breasted Green-Pigeon *Treron bicinctus*	1	Bomdo-Janbo	04 January*
Square-tailed Drongo-Cuckoo *Surniculus lugubris*	1	Ramsing	09 May
Golden-throated Barbet *Psilopogon franklinii*	1	Bomdo-Janbo	04 January*
Blue-naped Pitta *Hydrornis nipalensis*	2	Kugging	10 March
Common Green-Magpie *Cissa chinensis*	1	Tuting-Kugging	03 March
Grey-throated Babbler *Stachyris nigriceps*	1	Kugging camp	06 March
Grey-throated Babbler *Stachyris nigriceps*	1	Kugging	10 March
Eyebrowed Wren-Babbler *Napothera epilepidota*	1	Kugging	10 March
Long-billed Wren-Babbler *Napothera malacoptila*	1	Kugging	10 March
Striated Laughingthrush *Grammatoptila striata*	1	Kugging	10 March
Blue-winged Laughingthrush *Trochalopteron squamatum*	1	Kugging camp	06 March
Long-tailed Sibia *Heterophasia picaoides*	1	Kallek	27 February
Beautiful Sibia *Heterophasia pulchella*	1	Kallek	27 February
Silver-eared Mesia *Leiothrix argentauris*	1	Kallek	27 February
Silver-eared Mesia *Leiothrix argentauris*	1	Yibuk	02 May
Lesser Necklaced Laughingthrush *Garrulax monileger*	1	Kugging camp	06 March
Long-tailed Thrush *Zoothera dixoni*	1	Kugging	10 March
Dead/hunted bird specimens (indirect records/photo evidence by local peoples)			
Rufous-throated Partridge *Arborophila rufogularis*	4	Kugging	10 February
Temminck's Tragopan *Tragopan temminckii*	1	Titapuri	26 May*
Kalij Pheasant *Lophura leucomelanos*	4	Kugging	27 February
Red-headed Trogon *Harpactes erythrocephalus*	1	Kugging	21 November*
Long-tailed Broadbill *Psarisomus dalhousiae*	8	Kugging	10 February
Common Green-Magpie *Cissa chinensis*	1	Mankota-Yortong	11 March
Grey Treepie *Dendrocitta formosae*	1	Mankota-Yortong	11 March
Red-faced Liocichla *Liocichla phoenicea*	1	Kugging	10 February
Scaly Thrush *Zoothera dauma*	1	Kugging	10 February
Blue Whistling-Thrush *Myophonus caeruleus*	1	Kugging	01 March
Total Number of Individual Specimens	44		

large area of the bird's habitat for successful capture. It occurs in temperate conifer and broadleaf forests and in subalpine scrub, and is reported to occur in such suitable habitats in the Upper Siang District (Choudhury 2006, 2010).

Sclater's Monal *Lophophorus sclateri*: On 12 and 13 March 2022, a single female and a single male were photo-captured on our camera traps at two sites in Singa at elevations of 1,988 m and 2,144 m, respectively **[35, 36]**. These photographs confirm that it is the nominate subspecies *L. s. sclateri,* and our records are consistent with its known range and distribution (Kumar & Singh 2004). Although the species is reported to occur in Upper Siang District (Choudhury 2006, 2010), there are only two previous records of its primary sightings from Upper Siang District: one recent photographic record of a male during an expedition to Eko Dumbing from April 2021, during which a male Himalayan Monal *Lophophorus impejanus* was also photographed (Ghosh 2021); and an older record likely of a hunted male whose tail was being used as a fan at a local person's house in Mankota, which was documented in December 1999-January 2000 (Newton 2002).

35. A male Sclater's Monal captured on a cameratrap at Singa site 1, at 2,144 m asl, 13 March 2022.

Both: Felis Creations

36. A female Sclater's Monal captured on a cameratrap at Singa site 2, at 1,988 m asl, 12 March 2022.

Grey Peacock-Pheasant *Polypectron bicalcaratum*: While previously reported from Mouling National Park (Sen & Jayahari 2017), we came across the tail feathers of this species being used as a fan in Yemsing village on 30 April 2022. According to the hunter, the bird was trapped from the forests near Yemsing using a snare approximately one year prior to this date. The hunter mentioned that the species is usually found in pairs or small family parties and was once common but has become increasingly difficult to trap.

New cuckoos for Siang District: Eight species of cuckoos were reported, which are new additions to the avifauna of Siang District. These include the Asian Emerald Cuckoo *Chrysococcyx maculatus*, Plaintive Cuckoo *Cacomantis merulinus*, Square-tailed Drongo-Cuckoo *Surniculus lugubris*, Large Hawk-Cuckoo *Hierococcyx sparverioides*, Lesser Cuckoo *Cuculus poliocephalus*, Indian Cuckoo *C. micropterus*, Himalayan Cuckoo *C. saturatus*, and Common Cuckoo *C. canorus*. All species were reported in April and May, with a majority of sightings in May, with the exception of Large Hawk-Cuckoo, which was detected by mid-March, as it started singing inconsistently from the third week of March onwards and was sound-recorded regularly in late March, especially during wet weather. There are no previously documented records for the district for these species, as previous surveys in the region were restricted to winter months, a time when it is usually difficult to detect cuckoos. As per previously published literature and records on eBird, of the eight aforementioned species all have been recorded in the Upper Siang District, except for the Plaintive Cuckoo (Datta-Roy et al. 2018). Banded Bay Cuckoo *Cacomantis sonneratii*, however, is a new addition to the Upper Siang District from our list.

Common Crane *Grus grus*: On 01 March 2022, at 1230 h, a flock of at least 300 individuals was observed circling over the Siang River at Pasighat (150 m) **[37]**. After circling low for 6 minutes, the flock did not settle but split into two large groups and started flying high and further north. On 04 March 2022, at approximately 1215 h, a large flock of vocalising Common Cranes were sound-recorded and observed flying just over the northern ridge of Kugging village (800 m). The flock was sound-recorded from an elevation of 1,200 m, as seen through the forest canopy, for which the numbers were conservatively estimated at 100. This is a significant addition to the avifauna of both the Upper Siang and East Siang Districts and confirms that the Siang River valley is used as a migration route by Common Crane. Our sighting at Kugging suggests that the Yangsang Chu River valley is used as a migration route further north, particularly the valley of Apong Asi (the tributary between the Nyaming and Kugging villages, which joins the Yangsang Chu River on its north bank). In addition to recent sightings of this species reported from Dibang valley (eBird 2023a), the only previously confirmed record of this species from Arunachal Pradesh east of West Kameng District is from the Lower Dibang Valley District of large flocks photographed over the Dibang River near Nizamghat on 07 March 1993 (Choudhury 1994, Choudhury 2006), and another from Mouling but without any details (Sen & Jayahari 2017). Our record also corroborates the suggestion that the Siang River valley is used as a migratory route by cranes, based on a sighting of an unidentified crane flying over the river by Datta-Roy et al. (2018). The first half of March appears to be the time when this species migrates through this region in large numbers, and regular surveys in the area in March should prove productive for monitoring this migration route. It would be useful to bear in mind that both our sightings were at midday, when the birds were likely utilizing thermal updrafts for energy-efficient migration—a phenomenon fundamental for the migration of large species of birds over long distances. The initial low circling that we observed at Pasighat may also suggest that the birds might be testing the thermal efficiency for their onwards flight.

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37. A part of a flock of 300 Common Cranes (133 in the photograph) in flight, Pasighat, 01 March 2022.

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38. Ringed Great Cormorant record bearing details 'Beijing, China. Box 1928 M01-4260', Yibuk, 01 Jan 2020.

Black Stork *Ciconia nigra*: Another species new for Upper Siang District, though it is regularly reported in the plains of the D'Ering Wildlife Sanctuary. Two individuals flying over the Siang River between Yingkiong and Mariyang, likely migrating through the region towards their breeding grounds, were photographed. Previous records include migrating birds along the Dibang River and small numbers recorded in Mechuka, where one was shot in November 2002 (Choudhury 2010).

Great Cormorant *Phalacrocorax carbo*: On a reconnoitre visit to the region in January 2020, a soft-part specimen of a bird's foot with an attached ring bearing details 'Beijing, China. Box 1928 M01-4260' was found at Yibuk (800 m), bordering Mouling National Park **[38]**. Based on the preliminary descriptions of the bird by the local hunter and from the morphological features of the specimen, it was provisionally identified as a Cormorant sp. These details were then shared with the officials of the BNHS, Wetlands Programme, who further corresponded with the Beijing Ringing Scheme for more information on the ringing details. The banding agency subsequently confirmed that the ring record was of a Great Cormorant, banded as a nestling at Qinghai Lake, China (36.860°N, 100.129°E), on 14 June 2006. Unfortunately, we were unable to establish the exact date of death of this individual. The only two previous records of ring recoveries of this species from Arunachal Pradesh were documented from Seijosa, Pakke-Kessang District and Yazali, Lower Subansiri District, from October-November 1999, and both of those individuals were banded as nestlings at Qinghai Lake in June 1999 (Kumar 2003). Our recovery of this ringed specimen further corroborates the suggestion that some populations of the subspecies *P. c. sinensis* may be regularly wintering in the region and likely migrating through the eastern flyway across the Eastern Himalayas (Kumar 2003).

Oriental Bay-Owl *Phodilus badius*: A new addition to the avifauna of Siang District; a single individual was encountered at dusk, perched on a fence at the edge of a *jhum* field, between Yemsing and the neighbouring forest (650 m) on 28 April 2022. It was a small owl with short ear tufts and an angular face with square facial disks. It flew across the road, giving us an opportunity to see the underparts that were pale buff with some spotting. The angular facial discs eliminated other possible nocturnal species, such as Eastern Grass-Owl *Tyto longimembris* and Short-eared Owl *Asio flammeus*, which have broad, round facial discs. It was also distinguishable from Barn Owl *T. alba,* which is relatively smaller with shorter wings and buff underparts. Barn Owl has been previously reported from Bomdo, Upper Siang District (Datta-Roy et al. 2018), and it is known to be sympatric with Oriental Bay-Owl across parts of their range (Bruce et al. 2020).

Amur Falcon *Falco amurensis* and Eurasian Hobby *Falco subbuteo*: At least 31 Amur Falcons were observed flying at dusk over the Yamne River on 19 May 2022 near Yingkiong-Mariyang, while six were observed at midday, along with one Eurasian Hobby, perched on poles and trees within a wet rice paddy field in the river valley. A few individuals were observed hawking on insects by performing aerial sorties and swoops. It is likely that Amur Falcon uses this route for short-stop overs during its spring migration. Both species are new additions for the Upper Siang District.

Long-tailed Broadbill *Psarisomus dalhousiae*: While reported previously for the region, we reported this species from multiple locations, and at least eight individuals were documented as hunted by catapults near Kugging on 10 February 2022. Such large numbers of this species may easily be targeted due to its behaviour of congregating in large flocks in the non-breeding season in winter. Other conspicuous, brightly coloured, or commonly occurring species near human habitations, such as Grey Treepie *Dendrocitta formosae*, Green Magpie *Cissa chinensis*, Blue Whistling Thrush *Myophonus caeruleus*, Silver-eared Mesia *Leiothrix argentauris*, and various other species, were also easy targets of catapults (Table 3).

Blue-naped Pitta *Hydrornis nipalensis*: While previously reported for Upper Siang District (Ritschard 2006; Datta-Roy et al. 2018), this species was detected when it started vocalizing mid-March onwards and was sound-recorded near Kugging (1,000 m) on 12 and 15 March 2022. On 10 March 2022, we encountered two dead specimens, of a male and a female, that were freshly snared near this area. The local name for this species is 'Pejik' in the Adi Tangam language, a much sought after species, as it is considered a delicacy due to its high fat content and larger size. The locals, including children, use the method of mimicking its fluty whistle-like call to lure the bird, either to hunt it with a catapult or trapping it in bamboo snares placed on the ground. Interestingly, Baker (1913) reported that 'the Abor name for this bird is 'Pajuk'', along with local mythology and folklore associated with this species.

Russet Bush Warbler *Locustella mandelli*: Between 20 and 28 March 2022, at least five very vocal birds were observed and

sound-recorded at Payingdem (1,500) meadows in a small area of 0.4 sq. km, suggesting a healthy population of breeding birds here. The birds were using dense ferns, bushes, and shrubby habitats around the meadows in open areas at the edge of primary forest. However, it was noted that the same land was allocated for an upcoming cardamom plantation by the horticulture department, which may threaten the current breeding habitat of the species at this location. The plantation could instead be reallocated to an abandoned *jhum* field with the support of the local people and the Forest Department to protect the natural habitat of dense ferns and scrub in the meadows. The only two previous records for the species from the Upper Siang District are from Jengging (Alström et al. 2015: 16) and Mouling National Park (Sen & Jayahari 2017), suggesting that it may be an uncommon breeding bird in the region owing to its specific habitat needs.

Grey-headed Parrotbill *Psittiparus gularis*: A new addition for Upper Siang, a flock of seven individuals were sound-recorded in a secondary forest near Kugging (1,100 m) on 08 March 2022, and observed feeding in a mixed flock with Black-chinned *Yuhina nigrimenta* and White-naped Yuhinas *Y. bakeri*. On the same trail, Grey-sided Bush Warbler *Cettia brunnifrons* and Long-billed Wren-Babbler *Napothera malacoptila* were also sound-recorded, the latter two also new additions for the Upper Siang District.

Long-tailed Sibia *Heterophasia picaoides* and Beautiful Sibia *Heterophasia pulchella* (possibly ssp. *H. p. nigroaurita*): Both species were encountered as dead specimens hanging from bamboo/wire snares that were placed on a single orange tree in an orange orchard plantation on 27 February 2022 at Kallek. The tree was deliberately left unharvested with all its fruits either ripe or rotting, primarily for hunting purposes. It is also possible that by leaving one tree unharvested, the orchard owner wanted to prevent crop damage by birds; however, no mesh-net coverings were used in the fruit orchards for this purpose.

Long-tailed Thrush *Zoothera dixoni*: Although previously reported from Bomdo in Upper Siang District (Datta-Roy et al. 2018), this was the only species that was reported across all types of detections that we used in our data: one direct observation of a bird feeding in a cabbage patch at a house in Nyering (1,200 m) on 04 March 2022; one direct encounter of a dead specimen of a freshly snared bird was found near Kugging (1,100 m) on 10 March 2022. Finally, videos from two consecutive days, 16 and 17 March 2022, were subsequently recorded at one camera-trap site of the species feeding on the ground at Simuling (1,939 m), possibly the same individual. These multiple records suggest that this species may not be uncommon in this area in March.

Alpine Thrush *Zoothera mollissima*: Although previously reported in the region, we recorded it only once during our survey, as it usually inhabits elevations above 1,500 m. After a bout of inclement weather with constant rain, one Alpine Thrush was found feeding at an edge of a muddy canal in Kugging village (800 m) on 07 March 2022.

Scaly Thrush *Zoothera dauma*: A new addition to the avifauna of the Upper Siang District, this species was identified from a dead specimen of a bird trapped in a bamboo snare at Kugging village (800 m) on 10 February 2022.

Chestnut Thrush *Turdus rubrocanus*: Although previously reported in the region, one male Chestnut Thrush was recorded at Payingdem village (1,500 m), feeding in large oak trees behind the Payingdem Monastery, along with White-collared Blackbirds *T. albocinctus*. The bird showed a very dark blackish-grey head with a bright yellow bill but without an evident collar and showed a striking contrast to chestnut on the back with dark wings and body in flight. These features matched those of the subspecies *T. r. gouldii*. The photograph of an individual, a female, previously reported from the Yangsang Chu River Valley in early March 2014, also appears to indicate this subspecies (Datta-Roy et al 2018).

Dusky x Naumann's Thrush *Turdus eunomus* x *T. naumanni* (hybrid): On 28 March 2022, while observing some Red-throated *T. ruficollis* and Black-throated *T. atrogularis* Thrushes at Payingdem, a different individual was photographed that showed overlapping features of both Dusky and Naumann's Thrush **[39]**. Due to extremely wet and foggy conditions, it could not be located again after the initial brief sighting. It showed bright rufous underparts with a pale whitish belly; a prominent broad, pale supercilium extending from the bill; a dark greyish face and head pattern with dark ear-coverts patch, dark lores; a whitish chin and throat with no malar stripes or markings; breast and flanks broadly scalloped rufous on an off-white background; extensive rufous on the wings and tail; and a blackish bill with basal half paler. The dark face and head pattern are features of Dusky Thrush, while extensive orange rufous on the breast and flanks is a feature of Naumann's Thrush. Based on these features and because the strong face pattern was more than expected for pure Naumann's Thrush, it was concluded that this individual was a hybrid. Although this hybrid has been recently reported from three districts, West Kameng, Tawang, and Lower Dibang Valley, with a total of only seven records from Arunachal Pradesh (Abhinav et al. 2022), it is a new addition to the avifauna of Upper Siang District.

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39. Hybrid Dusky x Naumann's Thrush, Payingdem, 28 March 2022.

Maroon-backed Accentor *Prunella immaculata*: Previously reported from the region, up to four individuals were observed feeding on Kodo millet grains *Paspalum scrobiculatum* nearly throughout the day at a house in Nyering village during an extremely wet spell on 29 and 30 March 2022, together with one Rufous-breasted Accentor *P. strophiata*. It is likely that the birds were fuelling up during inclement weather before moving on to their breeding grounds at higher elevations. The millets are used by locals to extract alcoholic beverages such as Arak and Apong, and the birds were observed feeding on the fermented grains that were discarded after the extraction process.

Conclusion

Our study provides important ornithological and ecological information on the avifauna of the Upper Siang and Siang Districts of Arunachal Pradesh. Despite high anthropogenic pressures and relatively greater population density than in protected areas in the region, we recorded a total of 285 species (plus one hybrid). The deep valleys of the River Siang that cut across the taller ranges of the Eastern Himalaya are probably acting as an excellent migratory corridor for several species from the lower plains of the Brahmaputra River, including Common Cranes. Our survey also highlights important conservation issues through systematic documentation of dead specimen records, particularly for mountain pheasants and brightly coloured woodland passerines. Major conservation issues currently faced in the region include hunting for food, local trade and trafficking; habitat loss and degradation due to multiple factors, such as the expansion of various forms of agriculture, such as shifting cultivation (*jhum*), wet cultivation, monoculture plantations, logging and felling for various purposes, including local-level use, timber trade, and the construction of mega dams (Choudhury 2010). Urbanization is an emerging phenomenon that is likely to directly or indirectly impact bird habitats (Mandal et al. 2022). The impacts of climate change on landcover and on people-nature relationships are another phenomenon of concern (Saikia et al. 2020). Our results, when compared to similar surveys wholly located in Protected Areas, would contribute in revealing a true picture of the effects of anthropogenic pressures on this region. Our study, therefore, demonstrates the value of documenting birds outside protected areas in relatively heavily populated areas with higher anthropogenic pressure.

Previous surveys and published literature of the region (listed in Choudhury 2006, Choudhury 2010) and recently published studies and checklists for the Mouling National Park (Sen & Jayahari 2017) and for the Upper Siang region (Datta-Roy et al. 2018) have significantly contributed to understanding the incredible avian diversity of the region. Periodic, comprehensive surveys that systematically document data focused on multiple taxonomic groups for a given region are essential for long-term biodiversity monitoring. This study further underscores the avian diversity of this landscape, and we hope our data can be used as a baseline to address its conservation issues.

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