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Higher altitudinal diversity of avian fauna of Kalimpong District of West Bengal, India

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Abstract
The most significant element in the ecology is birds. Anthropogenic influences are primarily to blame for their sharp decline. Although protecting these faunal groupings has become a top priority, there is little research on them in the Kalimpong district of West Bengal, which is only 1,053.60 square kilometres in size and is located in the foothills of the Himalayas, has a diverse climate and vegetation, with lowland forests in the south and chilly slopes in the north. An important ecological tool for assessing various habitats both qualitatively and quantitatively is the study of avian faunal diversity. The goal of the current study was to document the diversity of avian fauna above 1500-meter altitude from Delo hill to the Lava Forest via via Rishyap and Maria Khasmahal. A total of 36 families and 78 species of birds were identified. The current study contributes some important data regarding the diversity of birds in the study area.

Keywords: Avian fauna, birds, diversity, Kalimpong, distribution, RDi

Introduction

Bird communities are often regarded as dependable indicators of ecological health, as they demonstrate connections with forest vegetation, encompass a diverse array of feeding niches, and play crucial roles as pollinators or scavengers within their natural habitats, thereby reflecting environmental stability (Bock and Jones, 2004; Padoa-Schioppa et. Al., 2006) [6, 15]. Regrettably, the global diversity of birds is continuously declining, mainly as a result of human-induced disturbances (Rapoport, 1993) [19] and Climate change (Bhagarathi et. al., 2024) [2]. Bird communities' makeup plays a significant role in determining the ecology and well-being of regional landscapes or local ecosystems (Bhutia et.al., 2020) [3]. Many forest regions throughout the world have been transformed for agricultural use and development in the last few decades (Dobson *et al*., 1997) [8] can have an impact on the quantity, and accessibility of bird food sources (Atkinson et. Al., 2004) [1]. It was clear that the 0.8 °C global average temperature increase during the previous century had a significant detrimental effect on the avifaunal population (Both *et al*., 2006) [5]. The Indian avifauna is classified into 491 genera, 111 families, and 26 orders (Praveen et. al.,2019) [17] among this India is in sixth place with 88 threatened bird species (BirdLife International 2010).

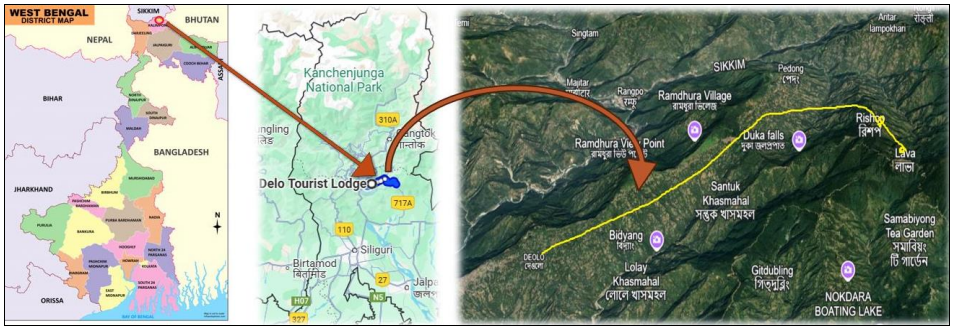

Fig 1: Map exhibiting study area from Delo hill to lava via Rishyap and Maria Khasmahal

The eastern Himalayas, which include parts of northern West Bengal and northeastern Indian states, are one of the world's hotspots for biodiversity (Mittermeier *et al*., 2005) [13]. The IUCN has designated North Bengal as a "Himalaya Biodiversity Hotspot," with approximately 30% of higher plant species being indigenous. (Ghosh and Das, 2009) [9]. There are numerous sanctuaries, national parks, reserve forests, and wetlands in the northern region of West Bengal, which is home to a vast amount of biodiversity (Islam and Rahmani, 2004) [18]. For a larger range, the Himalayan bird diversity is still comparatively understudied (Sultana et. Al., 2007) [20]. India, which is home to 1340 different kinds of birds, is currently ranked 10th among the world's bird-rich nations. Of these, the Indian Himalaya is home to 80% of the birds (Mandal *et al*., 2018) [12]. Kalimpong (27° 4' 0.0048" N and 88° 28' 0.0012" E.) belonging to the eastern Himalayas, with an elevation range of 91-3000 meters above sea level and has an average annual rainfall of 220 centimetre. Kalimpong land area is only 1,053.60 km^2 , but a significant portion of it is under forest cover, and there are around 550 different kinds of birds living there (Kalimpong.gov.in). The largest families among these groups are the Timaliidae, which include babblers and laughing thrushes among their 61 species. The Kalimpong

district has an 88 km^2 Neora valley National Park (NVNP). It is recognized as one of the Eastern Himalayas' most important places for avian and mammal species (WWF-US, Asia Program, 2005) [22]. For long-range wildlife traveling to and from other contiguous protected areas (PAs) in northern Bengal, NVNP and the nearby woods of Kalimpong Forest Division serve as a crucial biologicalcorridor in the Eastern Himalayas (Chettri *et al*., 2007; Wangchuk, 2007) [7, 21]. In recent year Kalimpong is facing an immense depletion of natural habitat due to anthropogenic factor which causes the increase in the threatened species. By the year 2100, more than 90% of the Himalayan forests are expected to have been destroyed due to ongoing forest degradation, which would result in their extinction (Pandit *et al*., 2007) [16].

Table 1: Checklist and diversity of birds from Delo Hill to Lava area via Rishyap and Maria khasmahal

SN	Common Name	Scientific Name	IUCN Status	Family	Availability	Occurrence
1	Crested Serpent Eagle	*Spilornis cheela*	LC	Accipitridae	Common	OV
2	Shikra	*Accipiter badius*	LC	Accipitridae	Common	PM
3	Mountain Hawk Eagle	*Nisaetus nipalensis*	NT	Accipitridae	Uncommon	OV
4	Common lora	*Aegithina tiphia*	LC	Aegithinidae	Common	WR
5	Great Hornbill	*Buceros bicornis*	VL	Bucerotidae	Uncommon	OV
6	Oriental Pied Hornbill	*Anthracoceros albirostris*	LC	Bucerotidae	Uncommon	OV
7	Large Cuckooshrike	*Coracina macei*	LC	Campephagidae	Uncommon	SV
8	Scarlet Minivet	*Pericrocotus flammeus*	LC	Campephagidae	Common	WV
9	Sikkim Treecreeper	*Certhia discolor*	LC	Certhiidae	Uncommon	OV
10	Rufescent Prinia	*Prinia rufescens*	LC	Cisticolidae	Uncommon	SV
11	Common Tailorbird	*Orthotomus sutorius*	LC	Cisticolidae	Common	R
12	Barred Cuckoo Dove	*Macropygia unchall*	LC	Columbidae	Common	OV
13	Wedge-tailed Green Pigeon	*Treron sphenurus*	LC	Columbidae	Common	OV
14	House Crow	*Corvus splendens*	LC	Corvidae	Common	R
15	Asian Koel	*Eudynamys scolopaceus*	LC	Cuculidae	Common	OV
16	Green-billed Malkoha	*Rhopodytes tristis*	LC	Cuculidae	Uncommon	PM
17	Common hawk Cuckoo	*Hierococcyx varius*	LC	Cuculidae	Common	OV
18	Spangled Drongo	*Dicrurus bracteatus*	LC	Dicruridae	Common	WR
19	Ashy Drongo	*Dicrurus leucophaeus*	LC	Dicruridae	Common	SV
20	White-rumped Munia	*Lonchura striata*	LC	Estrildidae	Common	WR
21	Long-tailed Broadbill	*Psarisomus dalhousiae*	LC	Eurylaimidae	Common	OV
22	Collared Falconet	*Microhierax caerulescens*	LC	Falconidae	Uncommon	OV
23	Red-rumped Swallow	*Cecropis daurica*	LC	Hirundinidae	Common	WR
24	Grey-backed Shrike	*Lanius tephrontus*	LC	Laniidae	Common	PM
25	Rufous necked laughingthrush	*Pterorhinus ruficollis*	LC	Leiothrichidae	Common	PM
26	Citrine Wagtail	*Motacilla citreola*	LC	Motacillidae	Uncommon	WR
27	White Wagtail	*Motacilla alba*	LC	Motacillidae	Common	WR
28	White-browed Wagtail	*Motacilla maderaspatensis*	LC	Motacillidae	Common	WR
29	Plumbeous Water Redstart	*Rhyacornis fuliginosa*	LC	Muscicapidae	Common	R
30	White-capped Redstart	*Chaimarrornis leucocephalus*	LC	Muscicapidae	Common	R
31	Little Forktail	*Enicurus scouleri*	LC	Muscicapidae	Common	R
32	Grey Bushchat	*Saxicola ferreus*	LC	Muscicapidae	Common	SV
33	Blue Whistling Thrush	*Myophonus caeruleus*	LC	Muscicapidae	Common	R
34	Oriental Magpie Robin	*Copsychus saularis*	LC	Muscicapidae	Common	R
35	Hodgson's Redstart	*Phoenicurus hodgsoni*	LC	Muscicapidae	Uncommon	PM
36	Slaty-backed Forktail	*Enicurus schistaceus*	LC	Muscicapidae	Uncommon	R
37	Taiga Flycatcher	*Ficedula albicilla*	LC	Muscicapidae	Common	SV
38	Verditer Flycatcher	*Eumyias thalassinus*	LC	Muscicapidae	Common	WR
39	White rumped shama	Copsychus malabaricus	LC	Muscicapidae	Common	R
40	Siberian Flycatcher	*Muscicapa sibirica*	LC	Muscicapidae	Un common	WV
41	Blue whistling Thrush	*Myophonus caeruleus*	LC	Muscicapidae	Common	WR
42	Large Niltava	*Niltava grandis*	LC	Muscicapidae	Common	R
43	Streaked Spiderhunter	*Arachnothera magna*	LC	Nectariniidae	Common	WV
44	Crimson Sunbird	Aethopyga siparaja	LC	Nectariniidae	Common	WR
45	Green tailed Sunbird	*Aethopyga nipalensis*	LC	Nectariniidae	Common	WR
46	Mrs.Gould's Sunbird	Aethopyga gouldiae	LC	Nectariniidae	Uncommon	OV
47	Maroon Oriole	*Oriolus traillii*	LC	Oriolidae	Common	SV
48	Green-backed Tit	*Parus monticolus*	LC	Paridae	Common	R
49	Sultan Tit	*Melanochlora sultanea*	LC	Paridae	Common	PM
50	Himalayan black lored Tit	*Machlolophus xanthogenys*	LC	Paridae	Uncommon	OV
51	Eurasian Tree Sparrow	*Passer montanus*	LC	Passeridae	Common	R
52	Puff-throated Babbler	*Pellorneum ruficeps*	LC	Pellorneidae	Uncommon	R
53	Red Junglefowl	*Gallus gallus*	LC	Phasianidae	Common	R
54	Indian Peafowl	*Pavo cristatus*	LC	Phasianidae	Common	R
55	Rufous Woodpecker	*Micropternus brachyurus*	LC	Picidae	Uncommon	OV
56	Lesser Yellownape	*Picus chlorolophus*	LC	Picidae	Common	WR

57	Greater Yellownape	*Picus flavinucha*	LC	Picidae	Common	WR
58	Greater Goldenback	*Chrysocolaptes lucidus*	LC	Picidae	Common	WR
59	Fulvous breasted Woodpecker	Dendrocopos macei	LC	Picidae	Common	R
60	Eurasian Wryneck	*Jynx torquilla*	LC	Picidae	Uncommon	WV
61	Rose-ringed Parakeet	*Psittacula krameri*	LC	Psittacidae	Uncommon	WR
62	Black-crested Bulbul	*Pycnonotus flaviventris*	LC	Pycnonotidae	Uncommon	R
63	Red-vented Bulbul	*Pycnonotus cafer*	LC	Pycnonotidae	Common	R
64	Great Barbet	*Megalaima virens*	LC	Ramphastidae	Common	R
65	Blue-throated Barbet	*Megalaima asiatica*	LC	Ramphastidae	Common	WR
66	White browed fantail	Rhipidura aureola	LC	Rhipiduridae	Common	SV
67	Chestnut-bellied Nuthatch	*Sitta cinnamoventris*	LC	Sittidae	Common	WR
68	Velvet fronted Nutchthutch	*Sitta frontalis*	LC	Sittidae	Common	R
69	White Tailed Nuthatch	*Sitta himalayensis*	LC	Sittidae	Un common	OV
70	Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*	LC	Stenostiridae	Common	WV
71	Asian Barred Owlet	*Glaucidium cuculoides*	LC	Strigidae	Common	OV
72	Common Hill Myna	*Gracula religiosa*	LC	Sturnidae	Common	WR
73	Common Myna	*Acridotheres tristis*	LC	Sturnidae	Common	WR
74	Rusty-cheeked Scimitar Babbler	*Pomatorhinus erythrogenys*	LC	Timaliidae	Common	SV
75	Jungle Babbler	*Turdoides striata*	LC	Timaliidae	Uncommon	WR
76	Greater Necklaced Laughingthrush	*Pterorhinus pectoralis*	LC	Timaliidae	Uncommon	WV
77	Grey winged Black Bird	*Turdus boulboul*	LC	Turdidae	Uncommon	OV
78	Dollarbird	*Eurystomus orientalis*	LC	Upupidae	Uncommon	PM
Abbreviations used:						
PM-Partial Migratory, R=Regional, WV-Winter Visitor, SV=Summer Visitor, OV=Occasional Visitor, Wide Range (WR)						

Material and Methods

At an elevation of 91–3000 meters, the Kalimpong district of West Bengal features terraced hills broken up by spring-patched forest. The sampling of birds was carried out from Delo hill to Lava via Rishyap and Maria Khasmahal covering the distance of around 40km. Due to their diverse habitat and fauna, these places are gaining popularity among both local and foreign bird watchers. The semi urban forest area from Delo hill to Algarah are fragmented by residential, Commercial building & cottages (hotel and home stay) and roads. From Algarah to lava has a wide range of vegetation, including untouched forest sections that are ideal for wild bird habitat. The research regions' vegetation and elevation vary slightly, giving birds distinct habitats. Because changes in vegetation composition may have an effect on the amount and quality of bird habitat, including food, water, and cover, which may have an additional impact on bird diversity, abundance, and distribution (Bhutia et.al., 2020) [3]. Figure 1 shows the study areas' locations.

For a year, from January 2024 to December 2024, extensive avian surveys were carried out in the research region using the usual techniques, such as the point count method. Point-counting technique: Using this method, the observer will spend five minutes recording the species of birds they see and hear within a 50-meter radius while standing in a randomly selected location. This observation is made again at a different location that is at least 300 meters away. Additionally, while traveling inside the research area, opportunistic bird sightings were made (Nautiyal et. Al., 2015) [14]. Twice daily, during the times when avifauna was often most active, surveys and observations were conducted (05:00 am to 11 am and 04:00 pm to 6:00 pm). With the aid of an Cason 10x X50mm. (Objective Lens 50mm and Magnification 10x) binocular and pictures captured with a Nikon D500. (Lenses: Nikon AF-S 200-500/5.6 E VR, Nikon 50 mm), birds were sighted. Bird calls were occasionally used to identify birds. Along with camera and binocular, GPS device was also used during field survey for location record, evidence and identification. In addition to firsthand field experience, the reference book "Birds of Indian subcontinent" second edition by Grimmet *et al*. (2011) was utilized to identify the bird species. Additionally, a number of light levels and other relevant literature were examined.

Table 2: The RDi (Relative diversity) of different families of bird in the

SN	Family name	Species	RDi	SN	Family Name	Species	RDi
1	Muscicapidae	14	17.9	19	Aegithinidae	1	1.3
2	Picidae	6	7.7	20	Certhiidae	1	1.3
3	Nectariniidae	4	5.1	21	Corvidae	1	1.3
4	Accipitridae	3	3.8	22	Estrildidae	1	1.3
5	Cuculidae	3	3.8	23	Eurylaimidae	1	1.3
6	Motacillidae	3		24	Falconidae	1	1.3
7	Paridae	3	3.8	25	Hirundinidae	1	1.3
8	Sittidae	3	3.8	26	Laniidae	1	1.3
9	Timaliidae	3	3.8	27	Leiothrichidae	1	1.3
10	Bucerotidae	2	2.6	28	Oriolidae	1	1.3
11	Campephagidae	2	2.6	29	Passeridae	1	1.3
12	Cisticolidae	2	2.6	30	Pellorneidae	1	1.3
13	Columbidae	2	2.6	31	Psittacidae	1	1.3
14	Dicruridae	2	2.6	32	Rhipiduridae	1	1.3

15	Phasianidae	2	2.6	33	Stenostiridae	1	1.3
16	Pycnonotidae	2		34	Strigidae	1	1.3
17	Ramphastidae	2	2.6	35	Turdidae	1	1.3
18	Sturnidae	2	2.6	36	Upupidae	1	1.3

Fig 3: Some of the bird species fround in the Kalimpong District of West Bengal, India, via Rishyap and Maria Khasmahal, from Delo Hill to Lava

With the aid of habitat type, the residential status of the bird population was determined and classified as Regional (R) if the species was found during the study period, Partial Migratory (PM) if the species was observed unevenly in the research area but is considered a resident species of India, Summer Visitor (SV): If the species was sighted in June to August; Winter Visitor (WV): If the birds were only detected from December to February; and Occasional Visitor (OV): If the species was discovered once or twice throughout the survey period. The avian communities' relative abundance was classified as follows: 'C' stands for Common and 'UC' stands for Uncommon. IUCN status was classified follows: Near Threatened as 'NT'; Venerable as 'VL' and Least Concerned as 'LC' (Harde, et. al., 2020) [10] The following formula was used to measure the relative diversity of the families (RDi).

RDi: The number of individual bird species within a family / the total number of bird species x 100.

Result and Discussion

A total of 79 bird species from 36 families were identified during the study period, including twenty-four uncommon (30.7%) and fifty-four common (69.2%) birds that were recorded. These findings underscore the high conservation importance of the study area. With 14 species, Muscicapidae (RDi=17.9) leads the field of study regions in terms of familial richness, followed by Picidae (RDi=7.7) with 6 species, Nectariniidae with 4 species (RDi=5.1), Accipitridae, Cuculidae, Motacillidae, Paridae, Sittidae, and Timaliidae with 3 species each (RDi=3.8).

Of the 78 species, 25.6% each were classified as resident (R) and wide range (WR), 21.8% as occasional visitor (OV), 10.3% as summer visitor (SV), 9% as partial migratory (PM), and 7.7% as winter visitor (WV). A comprehensive inventory of avian species encountered within the study sites is provided in Table XX & YY. This evidence points to the study area as a hotspot for avian species, showcasing a diverse range of bird life. Out of all the species, the Great Hornbill (*Buceros bicornis*) and the Mountain Hawk Eagle (*Nisaetus nipalensis*) are classified as "Vulnerable and Near Threatened," respectively, on the IUCN Red List (IUCN 2019). The current investigation has documented altogether twenty-one migratory birds (PM+WV+SV+OV), of which the Long-tailed Broadbill, Maroon Oriole, Grey-headed Canary Flycatcher, Streaked Spiderhunter, Himalayan Black Lored Tit, and White-tailed Nuthatch show local migration. Whereas the Rufous Woodpecker, large Cuckoo Shrike, Sultan tit, Rufescent Prinia, Rusty-cheeked Scimitar Babbler, Greater Necklaced Laughingthrush, Ashy Drongo, White-browed Fantail, Rufous-necked Laughingthrush, Grey-winged Blackbird, Common Hawk Cuckoo, and Mrs. Gould's Sunbird, Sikkim Tree Creeper, and Eurasian Wryneck, and Siberian.

Conclusion

This research provides the first scientific record of bird populations in the region under investigation, revealing a comparatively rich ecosystem. The essential information on avian species diversity and abundance patterns gathered from this study can serve as a foundation for future environmental evaluations and comparative analyses. This site offers significant opportunities for conducting comprehensive bird ecology research. Nevertheless, there are some anthropogenic disturbances in the study area, such as noise pollution, unplanned urbanization, human-generated garbage and livelihood, plant and branch cutting, etc., that have a detrimental impact on bird aggregation and biodiversity. Most of the avian species are concentrated on the garbage dumping site of the adjoining forest area, which may impact the natural behaviour of the species. There is no record of the White-rumped Vulture, Slender-billed Vulture, and Himalayan Griffon Vulture. A more thorough investigation might yield additional species and their distribution throughout various forest patches, as this study only included a small number of carefully chosen forest patches. More thorough research is also necessary to determine how anthropogenic activity and climatic variability affect bird diversity in Kalimpong, West Bengal.

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