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Bashir Ahmed
Govt. Degree College, Banihal, Jammu and Kashmir, India

Sudesh Kumar
Maulana Azad Memorial College, Jammu, Jammu and Kashmir, India

Corresponding Author:
Sudesh Kumar
Maulana Azad Memorial College, Jammu, Jammu and Kashmir, India

Status and Diversity of birds in and around Banihal, Ramban, Jammu and Kashmir

Bashir Ahmed and Sudesh Kumar

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Abstract
Birds constitute an important component of nature playing crucial roles in different ecosystems. Avifaunal inventories are valuable in species conservation and devising habitat specific conservation and management plans. We carried out organized surveys in and around Banihal, a sub-urban township in District Ramban in the UT of Jammu and Kashmir to understand the avifaunal diversity, composition and their abundance. The surveys were carried from June 2021 to July 2022. A total of 66 species belonging to 11 orders and 32 families were observed during the study period. Muscicapidae was found to be the dominant family with 10 species and insectivorous being the major trophic guild having 33 species. Based on the observations, 25 species were found migratory in the study area and two species were globally threatened. This baseline study will be useful in devising management strategies for species conservation in the region.

Keywords: Avifauna, Himalaya, distribution patterns, biodiversity, conservation, abundance

Introduction
Ecologically, birds constitute an important component of nature playing crucial roles in different ecosystems [1]. Understanding of the diversity and distributions of birds and other organisms is important in terms of understanding adaptability, survival and extinction rates of species and providing knowledge that can be used to protect particular species of birds and other components of biodiversity that are correlated with them [2]. Changes in the life histories, population and behavior, and reproductive patterns of birds have been used to examine the long-term effects of habitat degradation the study area [3]. Given the significance of birds for environmental assessments and conservation planning, there is a need for a better understanding of the ecological role of avian diversity patterns and community structure in conservation decision-making [4].
Of approximately 10,000 species of birds occurring in the world, 1341 have been reported from India [5]. The Northwestern Himalaya constitutes one of the significant ecological amplitudes in the Indian Himalayan Region [6-7] known for distinct physiography, climatic variability and rich biodiversity [8]. The Union Territory of Jammu and Kashmir, home to 552 bird species [9] forms a critical Endemic Bird Area (EBA 128) with 11 restricted-range species [10]. While the valley of Kashmir is home to many migratory as well as resident birds [11], the Jammu region holds a rich avifaunal diversity as well [12-17].
The aim of the present study is to explore diversity patterns (in terms of species composition, richness, abundance) and determine the migration and conservation status of birds in and around the Banihal town of District Ramban in the UT of Jammu and Kashmir.

Material and methodology
Study area
Banihal, also known as the "Gateway to Kashmir" is a small hill town located on the foothills of Pir-Panjal range in Ramban district in the Union Territory of Jammu and Kashmir. It is located at 33.42°N and 75.20°E with an average elevation of 1,666 m asl (Fig. 1). The climate of Banihal is moderate hot during the summer season and very cold during the winter season. The area becomes snow bound during the winter season. The maximum temperature goes up to 31.3 °C and minimum temperature -5.5°C in winters. The annual average rainfall is 748mm.

Bird surveys

The study area was surveyed for a period of one year from June 2021 to July 2022. The surveys, ranging from 1 – 2 hours, were mostly conducted during the morning and evening hours, every weekend. Surveys were avoided during the inclement weather conditions. The surveys were conducted using line transects and vantage points (point counts). The line transects (2 – 3 km) were walked on foot at least twice a month during the entire sampling period. The vantage sites were established in high locations to count flying birds within a radius of 1–2 km.

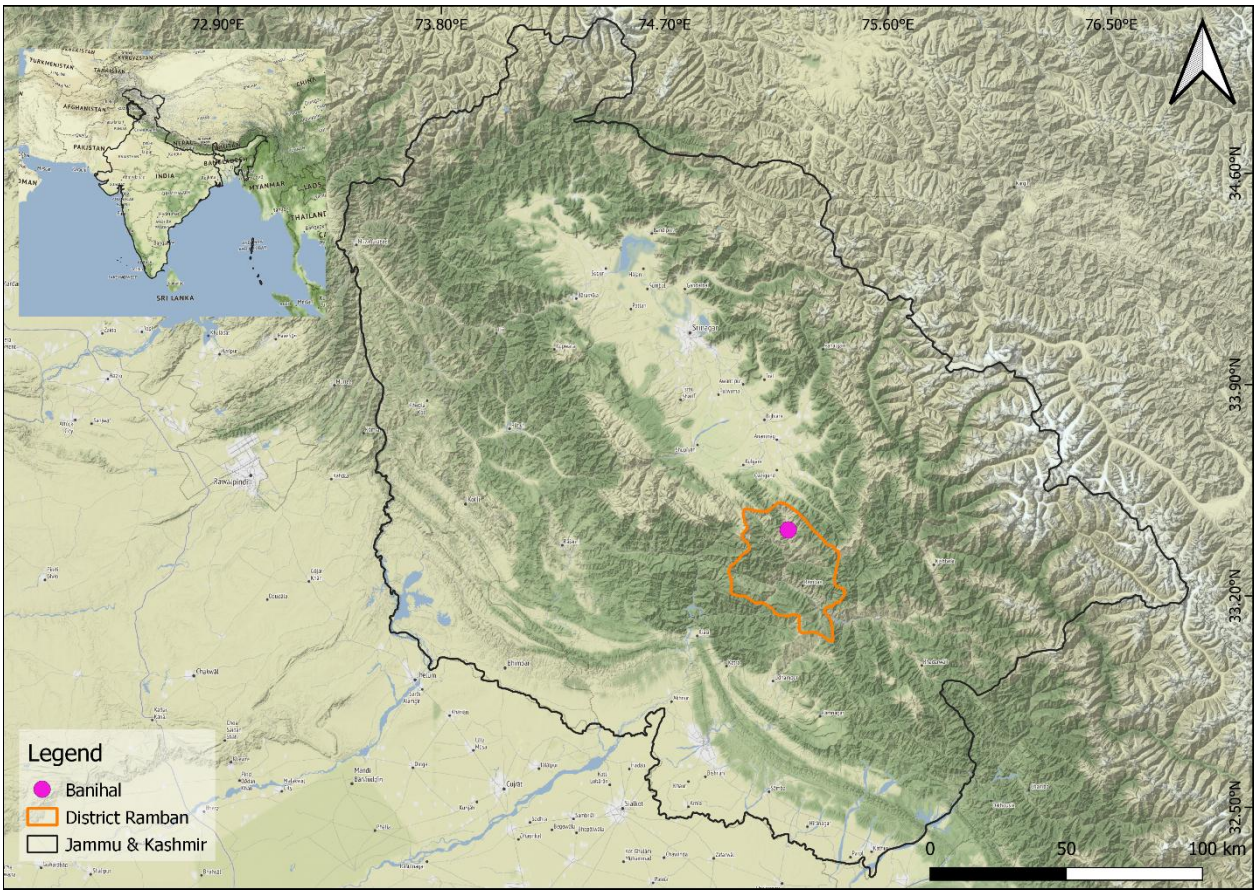

Fig 1: Map showing the location of study area

To prevent duplicate counting, the line transects were separated by at least 1 km. The sight observations included the species encountered, their location and abundance. Due precautions were taken to avoid any harm to the birds and damage to their habitats and nests. All the birds were identified up to species level by consulting the available field guide *viz*., Birds of Indian sub-continent [18].

Species richness was calculated as the number of species in the entire study area whereas Relative Abundance of the observed species was calculated by using the following formula;

$$RA = \frac{\text{Number of Individuals of one species}}{\text{Total number of Individuals of all species}} X\ 100$$

Based on foraging observations five classes of feeding guilds, *viz*., carnivorous, frugivorous, granivorous, insectivorous and omnivorous were identified in the study area. The carnivores included those feeding on large animals, their dead bodies / carcasses whereas insectivorous included those feeding on insects, earthworms, small crustaceans, arthropods *etc*. Omnivorous category included those birds which feed on both animals and plants or their products, granivorous feed exclusively on seeds and grains and frugivores included fruit-eating birds. The birds were assigned the migratory and threat status based on the field records and available literature [18-19].

Results and discussion

A total of 66 species of birds belonging to 11 orders and 32 families were recorded from the study area (Table 1). Muscicapidae was found to be the dominant family with 10 species followed by Accipitridae with 8 species. Species wise, the highest relative abundance (RA = 8.01) was found in case of Black Kite *Milvus migrans*, followed by Large-billed Crow *Corvus macrorhynchus* (RA = 7.28) and Common Myna (RA = 6.49), whereas Eurasian Kestrel *Falco tinnunculus* and Bar-tailed Treecreeper *Certhia himalayana* were observed only once during the entire study period with lowest relative abundance of 0.06 (Table 1). Five trophic guilds were identified among the bird species. Majority of the birds were found to fall under insectivorous category (n = 33), followed by carnivorous (n = 12), omnivorous (n = 11), granivorous (n = 7) whereas only three species were found to be frugivorous (Table 1, Fig. 2).

In terms of migration status, four species were winter visitor and 21 were found to be summer visitor to the study area. The rest of 41 species were resident (Table 1, Fig. 3). Two species were recognized as globally threatened [19], which included Egyptian Vulture *Neophron percnopterus* and Steppe Eagle *Aquila nipalensis*. One species (Himalayan Vulture *Gyps himalayensis*) was Near Threatened, while the least concern

group included 21 species (Fig. 4, Table 1)

Birds constitute a major part of all life forms and play number of ecological roles in different ecosystems. The diversity and distribution of birds depends on various factors, including quantity and quality of food available, perching, roosting and nesting sites [12]. The current study suggests that factors such as elevation, climate, topography and habitat heterogeneity have a noticeable influence on the diversity and distribution of birds in the study area.

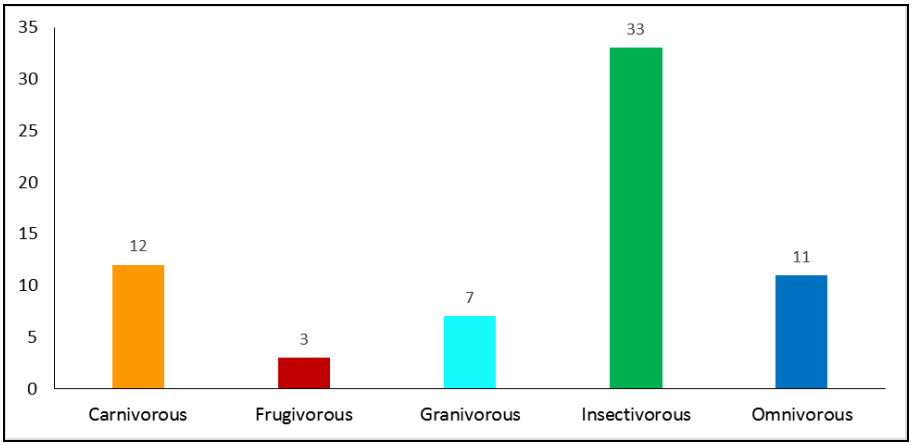

Fig 2: Birds in different trophic guilds in the study area

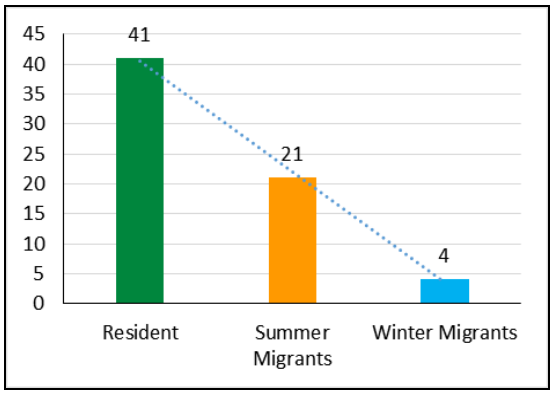

Fig 3: Migratory status of birds in the study area

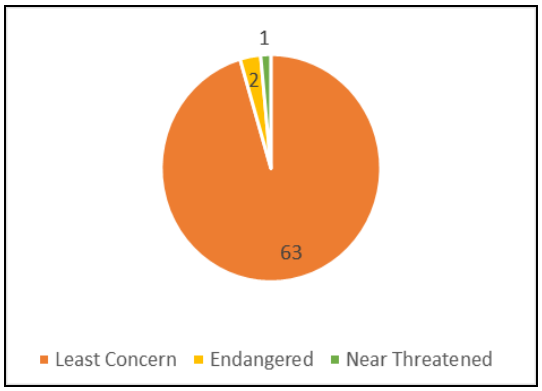

Fig 4: IUCN status of birds in the study area

We found Muscicapidae to be the dominant family in our study area as was observed by Sharma et al. [12]. Sohil and Sharma [14] in their study in mosaic landscapes of Jammu also found Muscicapidae as the dominant family followed by Accipitridae conforming with our current study. In terms of their food preferences, insectivorous birds dominated other feeding guilds and this, again is in conformity with numerous studies across the UT of Jammu and Kashmir [12-13, 15, 20-21]. In terms of migration status, more than half (n = 41) of the birds were found to be resident, while 25 species were found to be migratory with majority being summer migrants. Similar observations were recorded by Kait et al. [20] Ahmed et al. [22], Jan et al. [23], Kichloo et al. [13], Sharma et al. [12] and Sohil and Sharma [14] in their surveys in different parts of Jammu and Kashmir.

Conclusion

The present study emphasizes the critical role of urban and sub-urban areas in terms of species diversity and concluded that the Banihal area and its environs support a good diversity of birds which in turn can be considered a surrogate for broader species conservation and management. The bird species diversity and abundance varied in terms of their families as well as in different guild patterns. Being a preliminary study, it calls for more intensive surveys and investigations to establish the drivers of avian richness, diversity and distribution at a larger spatial scale and we firmly believe this study has significant implications for future efforts to conserve birds in the region.

Table 1: List of avian species recorded in the study area, their abundance, migration and conservation status.

Common Name	Scientific Name	RA	FG	MS	IUCN
Order: Galliformes Family: Phasianidae					
Chukar Partridge	*Alectoris chukar*	0.39	O	R	LC
Order: Columbiformes Family: Columbidae					
Rock Pigeon	*Columba livia*	4.50	G	R	LC
Spotted Dove	*Streptopelia chinensis*	1.58	G	R	LC
Order: Cuculiformes Family: Cuculidae					
Asian Koel	*Eudynamys scolopaceus*	0.79	F	S	LC

Lesser Cuckoo	*Cuculus poliocephalus*	0.26	I	S	LC
Order: Pelecaniformes Family: Ardeidae					
Cattle Egret	*Bubulcus ibis*	0.13	C	R	LC
Order: Accipitriformes Family: Accipitridae					
Egyptian Vulture	*Neophron percnopterus*	0.52	C	R	EN
Himalayan Griffon	*Gyps himalayensis*	1.72	C	R	NT
Booted Eagle	*Hieraaetus pennatus*	0.39	C	R	LC
Steppe Eagle	*Aquila nipalensis*	1.45	C	W	EN
Shikra	*Accipiter badius*	0.39	C	R	LC
Eurasian Sparrowhawk	*Accipiter nisus*	0.19	C	R	LC
Black Kite	*Milvus migrans*	8.01	C	R	LC
Himalayan Buzzard	*Buteo refectus*	0.13	C	R	LC
Order: Strigiformes Family: Strigidae					
Asian Barred Owlet	*Glaucidium cuculoides*	0.19	C	R	LC
Order: Bucerotiformes Family: Upupidae					
Eurasian Hoopoe	*Upupa epops*	0.99	I	S	LC
Order: Piciformes Family: Megalaimidae					
Great Barbet	*Psilopogon virens*	1.65	O	R	LC
Order: Piciformes Family: Picidae					
Himalayan Woodpecker	*Dendrocopos himalayensis*	0.39	I	R	LC
Scaly-bellied Woodpecker	*Picus squamatus*	0.13	I	R	LC
Order: Falconiformes Family: Falconidae					
Eurasian Kestrel	*Falco tinnunculus*	0.06	C	R	LC
Order: Psittaciformes Family: Psittacidae					
Slaty-headed Parakeet	*Psittacula himalayana*	1.19	F	R	LC
Order: Passeriformes Family: Oriolidae					
Indian Golden Oriole	*Oriolus kundoo*	0.13	F	S	LC
Order: Passeriformes Family: Dicruridae					
Ashy Drongo	*Dicrurus leucophaeus*	1.12	I	S	LC
Order: Passeriformes Family: Monarchidae					
Indian Paradise-Flycatcher	*Terpsiphone paradisi*	0.26	I	S	LC
Order: Passeriformes Family: Lanidae					
Long-tailed Shrike	*Lanius schach*	0.59	C	S	LC
Order: Passeriformes Family: Corvidae					
Black-headed Jay	*Garrulus lanceolatus*	0.26	O	R	LC
Yellow-billed Blue Magpie	*Urocissa flavirostris*	1.12	O	R	LC
House Crow	*Corvus splendens*	5.82	O	R	LC
Large-billed Crow	*Corvus macrorhynchos*	7.28	O	R	LC
Order: Passeriformes Family: Paridae					
Green-backed Tit	*Parus monticolus*	0.92	I	S	LC
Cinereous Tit	*Parus cinereus*	1.72	I	R	LC
Order: Passeriformes Family: Cisticolidae					
Himalayan Prinia	*Prinia crinigera*	0.39	I	R	LC
Order: Passeriformes Family: Hirundinidae					
Barn Swallow	*Hirundo rustica*	1.52	I	R	LC
Order: Passeriformes Family: Pycnonotidae					
Red-vented Bulbul	*Pycnonotus cafer*	0.52	O	S	LC
Himalayan Bulbul	*Pycnonotus leucogenys*	3.04	O	R	LC
Order: Passeriformes Family: Phylloscopidae					
Hume's Warbler	*Phylloscopus humei*	0.99	I	S	LC
Lemon-rumped Warbler	*Phylloscopus chloronotus*	0.86	I	S	LC

Tickell's Leaf Warbler	*Phylloscopus affinis*	0.52	I	S	LC
Western Crowned Warbler	*Phylloscopus occipitalis*	0.39	I	S	LC
Grey-hooded Warbler	*Phylloscopus xanthoschistos*	1.05	I	S	LC
Brownish-flanked Bush Warbler	*Horornis fortipes*	0.52	I	R	LC
Order: Passeriformes Family: Aegithalidae					
Black-throated Tit	*Aegithalos concinnus*	1.58	I	W	LC
Order: Passeriformes Family: Zosteropidae					
Indian White-eye	*Zosterops palpebrosus*	1.65	I	S	LC
Order: Passeriformes Family: Leiothrichidae					
Streaked Laughingthrush	*Trochalopteron lineatum*	2.71	I	R	LC
Order: Passeriformes Family: Certhiidae					
Bar-tailed Treecreeper	*Certhia himalayana*	0.06	I	R	LC
Order: Passeriformes Family: Cinclidae					
Brown Dipper	*Cinclus pallasii*	0.39	I	R	LC
Order: Passeriformes Family: Sturnidae					
Common Myna	*Acridotheres tristis*	6.49	O	R	LC
Order: Passeriformes Family: Muscicapidae					
Dark-sided Flycatcher	*Muscicapa sibirica*	0.13	I	S	LC
Oriental Magpie-Robin	*Copsychus saularis*	0.13	I	S	LC
Verditer Flycatcher	*Eumyias thalassinus*	0.19	I	S	LC
Blue Whistling-Thrush	*Myophonus caeruleus*	2.84	I	R	LC
Spotted Forktail	*Enicurus maculatus*	0.13	I	R	LC
Ultramarine Flycatcher	*Ficedula superciliaris*	0.13	I	R	LC
Plumbeous Redstart	*Phoenicurus fuliginosus*	0.26	I	R	LC
White-capped Redstart	*Phoenicurus leucocephalus*	0.39	I	W	LC
Siberian Stonechat	*Saxicola maurus*	2.25	I	S	LC
Grey Bushchat	*Saxicola ferreus*	2.31	I	S	LC
Order: Passeriformes Family: Passeridae					
House Sparrow	*Passer domesticus*	5.16	G	R	LC
Russet Sparrow	*Passer cinnamomeus*	5.56	G	R	LC
Order: Passeriformes Family: Motacillidae					
Grey Wagtail	*Motacilla cinerea*	0.66	I	R	LC
White Wagtail	*Motacilla alba*	2.51	I	W	LC
Order: Passeriformes Family: Fringillidae					
Plain Mountain Finch	*Leucosticte nemoricola*	3.24	G	R	LC
Yellow-breasted Greenfinch	*Chloris spinoides*	1.72	G	R	LC
European Goldfinch	*Carduelis carduelis*	0.59	G	S	LC
Order: Passeriformes Family: Emberizidae					
Rock Bunting	*Emberiza cia*	2.11	O	R	LC
White-capped Bunting	*Emberiza stewarti*	2.38	O	W	LC

Conflict of Interest: Authors have declared that no competing interests exist.

Author contributions: Both BA and SK conceived and designed the study; BA collected the data; SK analyzed the data and both the authors wrote the manuscript.

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