

Diversity, Abundance, and Threats to Birds in Bhimdatta Municipality, Kanchanpur, Nepal

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Research Article

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ABSTRACT

The avifaunal survey was conducted in Wards 15, 18, and 19 of Bhimdatta Municipality, Kanchanpur, Nepal, from February 2022 to May 2023 using the Point Count Method. Fixed observation points were established across croplands, rangelands, and urban areas, where birds were recorded within a 50-meter radius during a 10-minute observation period at each point. Bird identification was carried out with the assistance of experts from Bird Conservation Nepal (BCN) and using the revised edition of *Birds of Nepal* (2022) as a reference. Data were systematically documented, including species, and threats characteristics. This study recorded 29 bird species across 11 orders and 23 families. The order Passeriformes exhibited the highest species richness, with 15 species from 11 families, followed by Galliformes and Coraciiformes, each with four species. Psittaciformes, Accipitriformes, Ciconiiformes, Pelecaniformes, and Strigiformes were the least represented orders, with only one species each. The Black-necked Stork was the sole near-threatened species identified, while the remaining 28 species were classified as least concern according to the IUCN Red List. Threats to avifauna, including habitat loss, urban expansion, and poaching, were identified through field observations and consultations with local stakeholders, emphasising the need for targeted conservation interventions.

1. INTRODUCTION

Birds play a vital role in maintaining ecological balance. The highest concentrations of bird species are found in the tropical and subtropical forests of Southeast Asia, with a gradual decline towards the poles [1]. Birds serve as reliable indicators of environmental health, influencing agricultural productivity and contributing to soil formation [2,3,4]. However, global declines in avian diversity and abundance, driven by habitat destruction, climate change, and anthropogenic pressures, pose significant concerns for biodiversity conservation [5]. These declines threaten avian populations and disrupt critical ecological processes, upon which both human and natural systems depend.

At a global scale, habitat loss due to deforestation, agricultural expansion, and urbanization remains the most significant driver of avian population declines [6] emerging infectious diseases, such as avian influenza and Newcastle Disease Virus (NDV), exacerbate population declines by causing substantial mortality among bird species [7].

Nepal is fortunate to harbour an extraordinary diversity of bird species. This richness is primarily attributed to the country's unique climatic and topographical variations, which have fostered the development of diverse forest ecosystems and habitats [8]. Despite its small size, Nepal's birdlife is among the richest in Asia [9], largely due to its varied physiographic zones, which support a high diversity of fauna and flora [10]. Furthermore, due to its location at the biogeographical intersection of the Palearctic and Oriental regions, it is globally recognized for its remarkable avian diversity, with approximately 892 recorded species [11]. The country's strategic location along the Central Asian migratory flyway further enhances this diversity, attracting migratory species from Siberia, China, and Southeast Asia [12]. Despite this rich biodiversity, Nepal faces considerable conservation challenges. The country has identified 37 Important Bird and Biodiversity

Areas (IBAs), with 19 located within protected areas, while the remaining IBAs lie outside formal conservation networks [13]. Among the bird species, 42 bird species are classified as globally threatened and 168 species are listed as nationally threatened, including 67 critically endangered, 39 endangered, and 62 vulnerable species [14]. Nearly one in five bird species in Nepal is considered endangered, and over 100 species are nearing extinction [15].

Habitat degradation remains the dominant threat to avian populations in Nepal, driven primarily by deforestation, agricultural intensification, and urban expansion [16, 17]. Anthropogenic activities, including infrastructure development, road construction, and dam building in wetlands, along with pollution, habitat encroachment, and degradation caused by invasive species, have significantly impacted bird habitats in forests, wetlands, grasslands, and shrublands [18]. Furthermore, food and water scarcity, overgrazing, pesticide use, and pollution from household waste, industrial discharges, and agricultural runoff are severely degrading bird habitats, posing significant threats to bird populations in Nepal [19]. Similarly, the widespread use of veterinary pharmaceuticals, such as diclofenac, has led to catastrophic declines in vulture populations due to kidney failure from consuming contaminated carcasses [20].

Although Nepal has implemented significant legislative measures, including the National Parks and Wildlife Conservation Act of 1973, enforcement challenges, outdated policies, and gaps in research and public awareness persist [21]. These issues are particularly pronounced at the local level, where anthropogenic pressures and limited conservation resources exacerbate threats to avian populations.

Bhimdatta Municipality in far-western Nepal also suffer these challenges. Its diverse forest, wetland, and grassland habitats support a wide array of resident and migratory bird species. However, anthropogenic activities, such as livestock

grazing, habitat encroachment, and unsustainable agricultural practices, have significantly impacted bird diversity and community composition [6].

This study aims to assess the diversity, abundance, and threats to bird species in Bhimdatta Municipality, Kanchanpur. By integrating field-based observations with conservation frameworks, this research seeks to inform strategies that address local conservation challenges.

2. MATERIALS AND METHODS

2.1 Study area

The present study was conducted in three wards (Ward no. 15, 18 and 19) of Bhimdatta Municipality, located in Kanchanpur District, Nepal. The municipality lies between the latitudes of 28°32' to 29°08'N and the longitudes of 80°03' to 80°33'E, covering a total area of 171.24 km². Geographically, the municipality is situated in the Terai region, although the northern part of the district features elevated terrains, with the

highest point reaching approximately 1,528 meters and the lowest at around 176 meters [22]

The climate of the study area is characterized by three distinct seasons: winter, summer, and monsoon. The winter season lasts from November to February, characterized by moderate daytime temperatures and very cold nights. The summer season extends from March to June, during which temperatures can soar to a maximum of 44°C. The monsoon season occurs from July to September, bringing significant rainfall to the region. The climate of this area is humid subtropical, with seasonal temperatures typically ranging from 10°C in winter to 30°C in summer. Average maximum temperatures reach up to 43°C in summer and drop to a low of 24°C, while winter temperatures range from a high of 19°C to a low of 2°C [23]. The area's forests predominantly consist of low tropical *Shorea robusta* (Sal) along with mixed hardwood species. These forests exhibit strong natural regeneration and diverse tree composition, with moisture availability varying according to changes in slope and aspect [22].

Study area

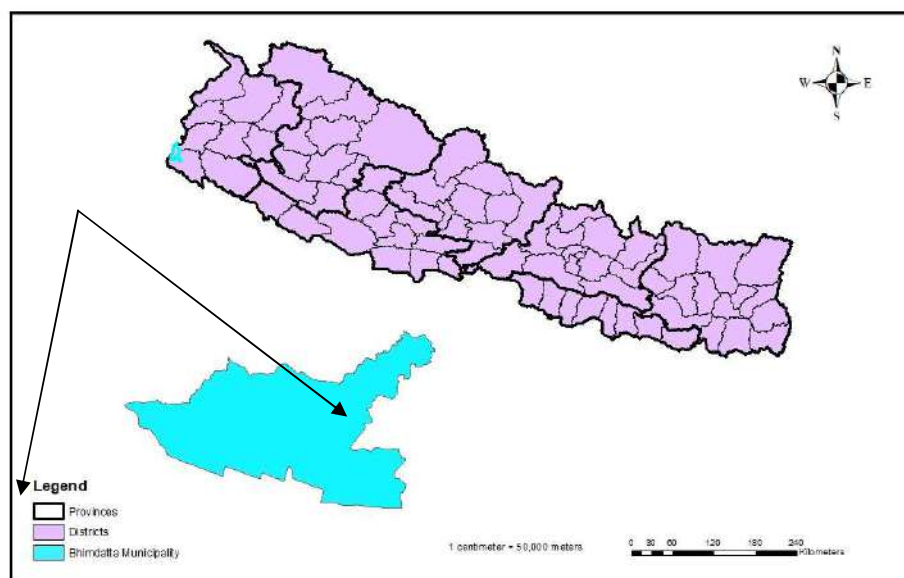


Fig. 1: Map of Bhimdatta Municipality.

2.2 Methodology

The avifaunal survey in Wards 15, 18, and 19 of Bhimdatta Municipality, Kanchanpur, Nepal, was conducted from February 2022 to May 2023 using the Point Count Method. This method involved observing and recording birds from fixed points within a 50-meter radius for 10 minutes per point, strategically covering diverse habitats like wetlands, forests, and urban areas to capture a comprehensive species inventory. Surveys were conducted in winter (February to April) and summer (May to September) to account for seasonal variations. Birds were identified with the assistance of ornithologists from Bird Conservation Nepal (BCN) and the revised edition of Birds of Nepal (2022), ensuring accurate identification. Data on species characteristics were recorded. Additionally, threats such as habitat loss, urban expansion, and

poaching were identified through visual field observations that provided vital insights into the conservation needs of Bhimdatta Municipality.

2.3 Data Analysis

The data collected during the avifaunal survey was systematically entered into a Microsoft Excel spreadsheet. This process involved categorizing bird species based on their taxonomic order, family, and residential status, as well as their International Union for Conservation of Nature (IUCN) Red List status. The species composition was visualized through charts and graphs, which illustrated the proportion of species within each order and family, helping to identify the most and least dominant groups.

Qualitative data on threats from field observations were enlisted. This qualitative information was categorized into major threat types, such as habitat loss, poaching, urban development, and agricultural encroachment.

3. RESULTS AND DISCUSSION

3.1 Results: Bird Species Composition

In total, 250 individuals representing 29 bird species across 11 orders and 23 families were recorded in the study area. Among these, the order Passeriformes was the most

dominant, comprising 15 species from 11 families. This was followed by four species each from the orders Galliformes and Coraciiformes, and three species from Anseriformes. In contrast, the least represented orders were Psittaciformes, Accipitriformes, Ciconiiformes, Pelecaniformes, and Strigiformes, each represented by a single species. At the family level, Passeriformes included the highest diversity, with 11 families, while Coraciiformes contributed three families. 26 of the birds were resident breeding birds, while the remaining three were winter migratory birds.

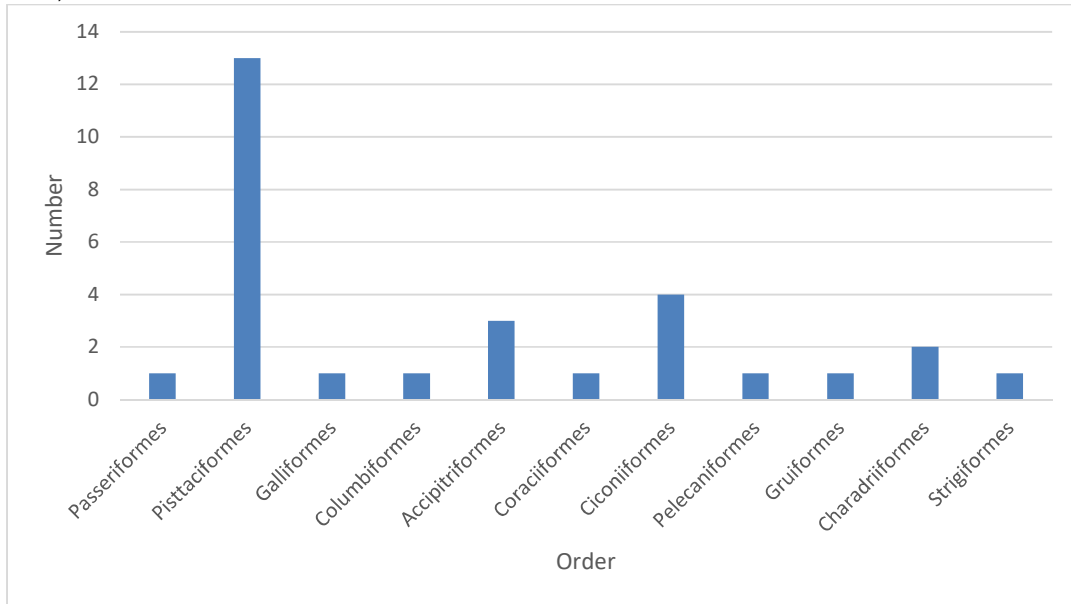


Fig. 2: Bird Species Composition based on Order

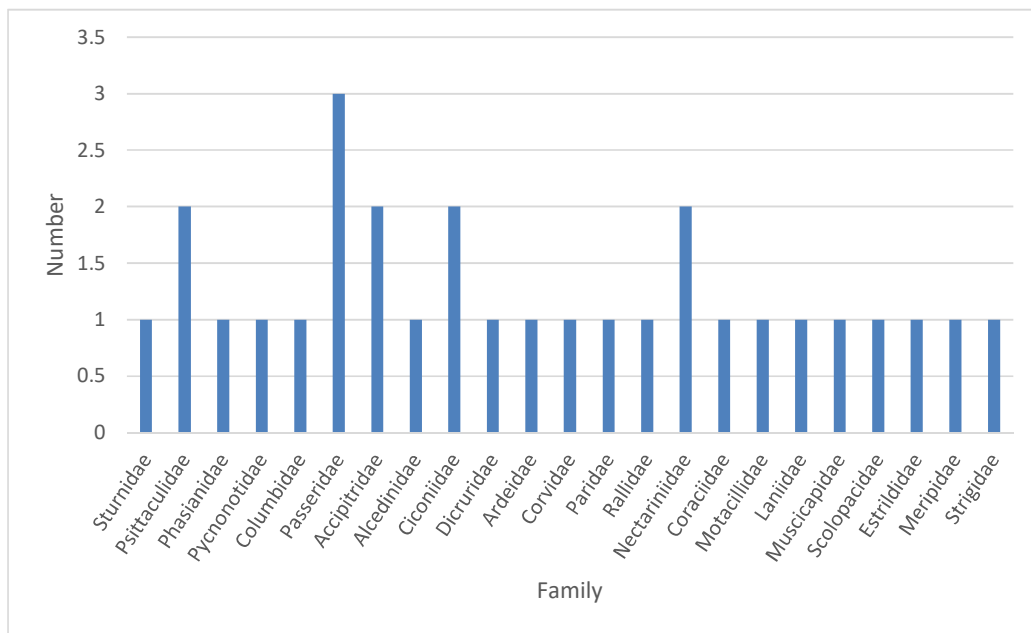


Fig. 3: Bird Species Composition based on Family.

Table 1: Checklist of birds of the Bhimdatta municipality, with their residential status and IUCN Red List status.

SN	Name of birds	Scientific Name	Order	Family	IUCN Status	Status
1	Common Myna	<i>Acridotheres tristis</i>	Passeriformes	Sturnidae	LC	R
2	Rose-ringed parakeet	<i>Psittacula krameria</i>	Pittaciformes	Psittaculidae	LC	R
3	Indian peafowl	<i>Pavo cristatus</i>	Galliformes	Phasianidae	LC	R
4	Red-vented bulbul	<i>Pycnonotus cafer</i>	Passeriformes	Pycnonotidae	LC	R
5	Indian pied myna/Asian pied Starling	<i>Gracupica contra</i>	Passeriformes	Sturnidae	LC	R
6	Spotted dove	<i>Spilopelia chinensis</i>	Columbiformes	Columbidae	LC	R
7	House sparrow	<i>Passer domesticus</i>	Passeriformes	Passeridae	LC	R
8	Black kite	<i>Milvus migrans</i>	Accipitriformes	Accipitridae	LC	r
9	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Coraciiformes	Alcedinidae	LC	R
10	Common pigeon	<i>Columba livia</i>	Columbiformes	Columbidae	LC	R
11	Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	Ciconiiformes	Ciconiidae	NT	M
12	Black drongo	<i>Dicrurus macrocercus</i>	Passeriformes	Dicruridae	LC	R
13	True sparrow/Eurasian sparrow tree	<i>Passer domesticus</i>	Passeriformes	Passeridae	LC	R
14	Cattle egret	<i>Egretta garzetta</i>	Pelecaniformes	Ardeidae	LC	R
15	House crow	<i>Corvus splendens</i>	Passeriformes	Corvidae	LC	R
16	Cinereous tit/ Great tit	<i>Parus cinereus</i>	Passeriformes	Paridae	LC	R
17	Common pigeon	<i>Columba livia</i>	Columbiformes	Columbidae	LC	R
18	White-breasted waterhen	<i>Amaurornis phoenicurus</i>	Gruiformes	Rallidae	LC	R
19	Purple sunbird	<i>Cinnyris asiaticus</i>	Passeriformes	Nectariniidae	LC	R
20	Pied Kingfisher	<i>Ceryle rudis</i>	Coraciiformes	Alcedinidae	LC	R
21	Indian roller	<i>Coracias benghalensis</i>	Coraciiformes	Coraciidae	LC	R
22	White wagtail	<i>Motacilla alba</i>	Passeriformes	Motacillidae	LC	M
23	Long-tailed shrike	<i>Lanius Schach</i>	Passeriformes	Laniidae	LC	R
24	Pied bush chat	<i>Saxicola caprata</i>	Passeriformes	Muscicapidae	LC	R
25	Green Sandpiper	<i>Tringa ochropus</i>	Charadriiformes	Scolopacidae	LC	M
26	Scaly-breasted munia	<i>Lonchura punctulate</i>	Passeriformes	Estrildidae	LC	R
27	Grey-headed swamphen	<i>Porphyriopoliocephalus</i>	Gruiformes	Rallidae	LC	R
28	Green- Bee-eater	<i>Merops orientalis</i>	Coraciiformes	Meripidae	LC	R
29	Spotted owlet	<i>Athene brama</i>	Strigiformes	Strigidae	LC	R

Remarks: LC= Least Concern, NT= Near threatened, R=Resident, M=Migratory

3.2 discussions

A total of 250 individual birds representing 29 species, 11 orders, and 23 families were recorded in the study area, with Passeriformes being the most abundant order. The diversity of bird species was attributed to the presence of various habitat types offering different nesting and foraging sites. The major threats to bird populations included habitat loss,

deforestation, human disturbance, poaching, and land conversion for urban development.

Bird Species Composition

In this study, a total of 250 individual birds from 29 species, 11 orders, and 23 families were recorded in the study area. Passeriformes were the dominant order, both in terms of

species diversity and abundance, while Ciconiidae represented the lowest. These findings are consistent with [16], who also identified Passeriformes as the most diverse order. Similarly, Passeriformes was also found to be the dominant order in the Karra River Basin in Hetauda [8], Butwal [23], and Biratnagar [24]. The dominance of Passeriformes in these areas can be attributed to similar landforms (lowlands). Passeriformes are known to frequent agricultural fields and open spaces where food sources, particularly grains, are abundant [23], and their large flocks often contribute to their success in such habitats.

The high species diversity in this region can likely be attributed to the variety of available habitats, which offer different nesting and foraging opportunities [25]. Similar findings have been observed in the Khata Corridor Forest [26] and Sani Bheri Valley [27], where Passeriformes were also the dominant order. The consistent dominance of Passeriformes across these areas may be linked to similar climatic conditions and the availability of favourable breeding, feeding, and nesting sites.

Threats

The primary threats to bird populations in the study area include habitat loss, deforestation, human disturbance, hunting, poaching, and land loss due to urban development. These threats are consistent with those identified in other studies, such as those conducted in the Karra River Basin [6, 8] and Biratnagar [24]. Habitat destruction, fragmentation, and degradation are particularly concerning, as they reduce the availability of critical resources for birds.

Human activities such as construction, land-use changes, and the depletion of wetlands further exacerbate these threats. However, unlike studies from the Barandabhar Corridor Forest in Chitwan [23], chemical pollution was not observed as a significant threat in the Bhimdatta municipality, possibly due to the absence of chemical industries. Despite this, disturbances from roads and other human activities have been shown to negatively impact bird diversity and abundance in similar lowland regions [28].

Moreover, factors like poaching, the overuse of pesticides, and the lack of public awareness about the importance of birds have contributed to the decline of bird populations in lowlands throughout Nepal [24]. Effective conservation efforts will need to address these threats through improved habitat protection, awareness programs, and stricter regulations on human activities that affect bird populations.

Therefore, our study strongly suggests that immediate and comprehensive conservation measures are essential to mitigate the threats to bird populations in Bhimdatta Municipality. These measures should include strengthening habitat protection, curbing deforestation, and reducing hunting and pesticide use, which are critical to ensuring the survival of local bird species. A detailed conservation action plan for these species must be developed and executed promptly. Additionally, further field-based scientific research is needed to gain a clearer understanding of the region's avifauna.

4. CONCLUSION

The exploration of bird diversity in Bhimdatta Municipality revealed that the order Passeriformes was the most dominant, followed by Galliformes and Coraciiformes. Conversely, Psittaciformes, Accipitriformes, Ciconiiformes, Pelecaniformes, and Strigiformes were the least represented.

Out of the 29 bird species identified, 28 were classified as least concern according to the IUCN Red List, while only one species fell into the near-threatened category.

This study highlights the importance of understanding bird diversity and abundance in Bhimdatta Municipality, situated in the Kanchanpur District of Nepal. Despite significant conservation efforts in surrounding regions, such as Shuklaphanta National Park, there remains a notable gap in research regarding the local avian populations in semi-urban and urban areas. The research presented underscores the need for targeted studies on bird species in Bhimdatta, especially considering the ecological pressures stemming from habitat destruction, urbanisation, and climate change.

The findings contribute to the broader conservation landscape by addressing the challenges faced by threatened species in Nepal, where 38 bird species are globally threatened, and many others face local extinction risks. This study will aid local conservation authorities in better understanding the avian communities of Bhimdatta Municipality, ultimately supporting more effective management strategies and conservation actions tailored to the region's unique ecological contexts. Future research should prioritize continued monitoring, habitat restoration efforts, and the implementation of conservation measures to mitigate the threats faced by both endemic and migratory bird species in this vital part of Nepal.

AUTHOR CONTRIBUTIONS

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by P. Joshi and S. Bista. The first draft of the manuscript was written by S. Bista and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

It is certified that all authors have contributed significantly, and all authors are in agreement with the content of the manuscript and have no conflicts of interest.

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