

ECOLOGICAL STATUS AND DIVERSITY OF AVIAN SPECIES IN BUNDELKHAND REGION, INDIA

Niket Mishra¹, S.V.S. Rana² and Amit Pal¹

¹*Institute of Environment & Development Studies, Bundelkhand University, Jhansi, 284128,*

²*Former Vice-Chancellor, Bundelkhand University, Jhansi – 284 128, India*

Abstract - Avian fauna are among the best known parts of the Earth's biodiversity and important component of forest ecosystem. An extensive survey on Avian Biodiversity of Bundelkhand Region was carried out from December - 2015 to November - 2017. It included population ecology, feeding, breeding and nesting behavior. Seasonal variation has also been studied. During the study period, 81 species belonging to 34 families and 15 orders were recorded from the study area. Out of 81 species of birds, four species are globally threatened, two were critically endangered, one endangered and one vulnerable species. Water scarcity, reduced food availability, climatic conditions and other anthropogenic disturbances are responsible for their declining status. Immediate efforts for their conservation are needed.

Keywords: Avian fauna, Biodiversity, Bundelkhand region, Threatened species, Conservation.

I. INTRODUCTION

Birds are an important component of any ecosystem. They are best indicators of biodiversity and good environmental quality and health [1], [2]. Birds provide ecological services i.e., pollination, seed dispersal and natural scavengers. They help in maintaining the ecosystem structure and function through trophic relationships [3], [4], [5], [6], [7], [8]. India as one of 17 mega biodiversity centers of the world is the home for 1300 species of the birds. 13% of the entire population of birds is found in India [9]. In recent years, anthropogenic activities viz: urbanization, industrialization, habitat destruction and climate change have adversely affected the avian fauna throughout the globe. The Bundelkhand region of India offers a wide range of habitats for birds. However, due to compelling stress of food shortage, water scarcity, pollution, nesting failures, stone crushing, other mining activities, climate change and deforestation etc. which leads their population declining very fast. Cumulative effect of all these factors on their ecology and diversity needs a scientific appraisal of the problem. With this approach a detailed study has been carried out in 5 district of Bundelkhand region. Some of these results are deserved in this communication.

II. Materials and methods

2.1. Study area

The Bundelkhand is a geographic region (semi-arid plateau) of central India. It is located between 23⁰20' and 26⁰20' N latitude and 78⁰20' and 81⁰40' E longitude bounded by the Yamuna in the North, the Chambal in the North west, erupted ranges of the Vindhya plateau in the South East. The whole Bundelkhand region covers seven districts in Uttar Pradesh and six districts in Madhya Pradesh. The present study area included Jhansi, Jalaun, Hamirpur, Mahoba districts of Uttar Pradesh and Orcha in Tikamgarh district of Madhya Pradesh (Figure 1).

2.2. Climatic conditions

The climate of Bundelkhand region is hot and semi-arid. There are three distinctive seasons viz. cold winter, dry summer and rainy season respectively. High temperature (46.7°C) in Jhansi is generally recorded in summer months (May-June) while lowest temperatures (3°C) in Hamirpur has been recorded during winter months (December-January). The average rainfall is 900, 862, 1050, 864 and 1016 mm per annum is recorded for Jhansi, Jalaun, Hamirpur, Mahoba and Tikamgarh district respectively. The metrological parameter of study area of Bundelkhand region is given in Table 1.

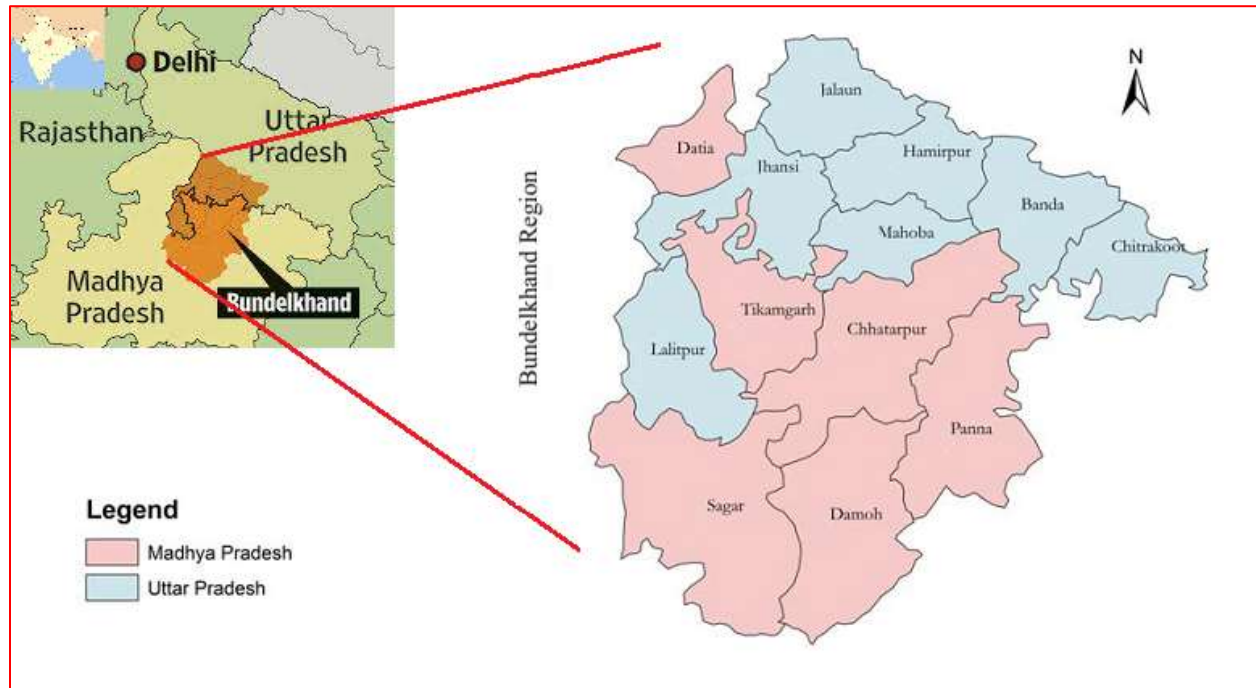


Figure.1. Shows location of study area.

Table 1. Shows the average Temperature and Rainfall of study area.

District of Bundelkhand	Temperature		Average Rainfall (mm)
	Max.	Min.	
Jhansi	46.7°C	4°C	900 mm
Jalaun	41°C	8°C	862 mm
Hamirpur	43°C	3°C	1050 mm
Mahoba	48.2°C	4.1°C	864 mm
Tikamgarh	43°C	5°C	1016 mm

2.3. Methodology

Species population their habitat, breeding season and feeding behavior were recorded from December -2015 to November-2017 covering all the seasons i.e. summer, monsoon and winter. Surveys were conducted every weekend in the selected sites early morning from 6.00–9.30 and every evening from 3.00–6.30 using line transects method and point count method [10], [11]. Observations were recorded using binoculars for bird watching and 10x optical zoom 16.1 mega pixels digital camera (Sony, DSE-W690) for photography. Birds were photographed and were subsequently identified using “A pocket guide of the birds of the Indian subcontinent” [12]. Different location in the study area was visited either by vehicles or on foot. Observations regarding classification of the bird species and their status are based on Bird Life International’s assessments for the 2013 (IUCN, 2013 Red Data List).

III. RESULTS AND DISCUSSION

The Avifauna of bundelkhand region is rich and varied. During present investigation, a total number of 81 bird species belonging to 34 families and 15 orders has been observed. Table 2 shows the complete taxonomic checklist of avifauna of Bundelkhand region. Out of 81 species of birds, 8% species were frugivorous, 21% omnivorous, 11% piscivorous, 6% granivorous, 11% carnivorous and 43% species were insectivorous.

Table 2. Avian species of Bundelkhand region found during the study period

S. No.	Species Name	Common Name	Family	Category	Breeding season	Feeding Habit
Order: Galliformes						
1.	<i>Pavo cristatus</i>	Indian Peafowl	Phasianidae	LC	September	OM
2.	<i>Gallus gallus</i>	Red Junglefowl	Phasianidae	LC	March to June	OM
3.	<i>Gallus sonnerati</i>	Grey Junglefowl	Phasianidae	LC	March to June	OM
4.	<i>Francolinus pondicerianus</i>	Grey Francolin	Phasianidae	LC	April to September	OM
5.	<i>Francolinus pictus</i>	Kala Teetar	Phasianidae	LC	June to October	OM
Order: Piciformes						
6.	<i>Micropternus brachyurus</i>	Rufous Woodpecker	Picidae	LC	Winterseason	IN
7.	<i>Dendrocopos mahrattensis</i>	Yellow-crowned Woodpecker	Picidae	LC	Winterseason	IN
8.	<i>Psilopogon haemacephalus</i>	Coppersmith Barbet	Capitonidae	LC	February to April	FR
Order: Bucerotiformes						
9.	<i>Oceyceros birostris</i>	Indian Grey Hornbill	Bucerotidae	LC	April To June	FR
Order: Upupiformes						
10.	<i>Upupa epops</i>	Hoopoe	Upupidae	LC	February to April	IN
Order: Coraciiformes						
11.	<i>Merops orientalis</i>	Little Green Bee-eater	Meropidae	LC	March to June	IN
12.	<i>Merops philippinus</i>	Blue-tailed Bee-eater	Meropidae	LC	March to June	IN
13.	<i>Alcedo coerulescens</i>	Small Blue Kingfisher	Alcedinidae	LC	Onset Monsoons	PV
14.	<i>Alcedo atthis</i>	Common Kingfisher	Alcedinidae	LC	Onset Monsoons	PV
15.	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Halcyonidae	LC	Onset Monsoons	PV
16.	<i>Coracias benghalensis</i>	Indian Roller	Coraciidae	LC	March to June	IN
Order: Cuculiformes						
17.	<i>Eudynamys scolopaceus</i>	Asian Koel	Cuculidae	LC	March to August	FR
Order: Psittaciformes						
18.	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	Psittacidae	LC	December to April	FR
19.	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Psittacidae	LC	December to May	FR
Order: Strigiformes						
20.	<i>Strix ocellata</i>	Mottled Wood Owl	Strigidae	LC	February to April	CR
Order: Columbiformes						
21.	<i>Streptopelia chinensis</i>	Spotted Dove	Columbidae	LC	Summer season	GR
22.	<i>Streptopelia decaocto</i>	Eurasian Collared- dove	Columbidae	LC	Summer season	GR
23.	<i>Stigmatopelia senegalensis</i>	Laughing Dove	Columbidae	LC	September to November	GR
24.	<i>Columba livia</i>	Common Pigeon	Columbidae	LC	Summer season	GR
Order: Guriformes						
25.	<i>Grus antigone</i>	Sarus Crane	Gruidae	VU	During Monsoons	OM
Order: Charadriiformes						
26.	<i>Vanellus indicus</i>	Red-wattled Lapwing	Charadriidae	LC	March to August	IN
27.	<i>Ardeola grayii</i>	Indian Pond-heron	Ardeidae	LC	Prior Monsoons	PV
28.	<i>Casmerodius albus</i>	Great Egret	Ardeidae	LC	Colder winters	PV
29.	<i>Egretta garzetta</i>	Little Egret	Ardeidae	LC	Onset monsoon	PV
30.	<i>Mesophoyx intermedia</i>	Intermediate Egret	Ardeidae	LC	June to February	PV

31.	<i>Bubulcus ibis</i>	Cattle Egret	Ardeidae	LC	Onset of monsoons	IN
Order: Ciconiiformes						
32.	<i>Actitis hypoleucos</i>	Common Sandpiper	Scolopacidae	LC	Summer season	IN
33.	<i>Actitis macularius</i>	Spotted Sandpiper	Scolopacidae	LC	Summer season	IN
34.	<i>Calidris temminckii</i>	Temminck's Stint	Scolopacidae	LC	Summer season	IN
Order: Falconiformes						
35.	<i>Gyps indicus</i>	Indian Vulture	Accipitridae	CR	November to March	CR
36.	<i>Ictinaetus malayensis</i>	Black Eagle	Accipitridae	LC	Winter to Spring	CR
37.	<i>Gyps bengalensis</i>	White backed vulture	Accipitridae	CR	November to March	CR
38.	<i>Haliaeetus albicilla</i>	White-tailed Eagle	Accipitridae	LC	Winter to Spring	CR
39.	<i>Pernis ptilorhynchus</i>	Crested Honey Buzzard	Accipitridae	LC	Winter to Spring	CR
40.	<i>Milvus migrans govinda</i>	Small Indian kite	Accipitridae	LC	Winter to Spring	CR
41.	<i>Neophron percnopterus</i>	Egyptian Vulture	Accipitridae	EN	Springseason	CR
42.	<i>Spilornis cheela</i>	Crested Serpent Eagle	Accipitridae	LC	Winter to Spring	CR
Order: Suliformes						
43.	<i>Phalacrocorax carbo</i>	Great Cormorant	Phalacrocoracidae	LC	July to February	PV
44.	<i>Microcarbo niger</i>	Little Cormorant	Phalacrocoracidae	LC	July to February	PV
Order: Passeriformes						
45.	<i>Lanius cristatus</i>	Brown Shrike	Laniidae	LC	Late May or June	IN
46.	<i>Lanius schach</i>	Long-tailed Shrike	Laniidae	LC	Rainy season	IN
47.	<i>Lanius vittatus</i>	Bay-backed Shrike	Laniidae	LC	March to September	IN
48.	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Corvidae	LC	April to June	OM
49.	<i>Corvus splendens</i>	House Crow	Corvidae	LC	March to April	OM
50.	<i>Corvus culminatus</i>	Indian Jungle Crow	Corvidae	LC	March to April	OM
51.	<i>Pica pica</i>	Black-billed Magpie	Corvidae	LC	March to July	OM
52.	<i>Pericrocotus cinnamomeus</i>	Small Minivet	Campephagidae	LC	April to June	OM
53.	<i>Dicrurus macrocercus</i>	Black Drongo	Dicruridae	LC	February to March	CR
54.	<i>Phoenicurus ochruros</i>	Black Redstart	Muscicapidae	LC	Winter season	IN
55.	<i>Saxicoloides fulicatus</i>	Indian Robin	Muscicapidae	LC	December to September	IN
56.	<i>Copsychus saularis</i>	Oriental Magpie-Robin	Muscicapidae	LC	March to July	IN
57.	<i>Saxicola ferrea</i>	Grey Bushchat	Muscicapidae	LC	April to the end of July	IN
58.	<i>Oenanthe picata</i>	Variable Wheatear	Muscicapidae	LC	Before the Monsoons	IN
59.	<i>Cercomela fusca</i>	Indian Chat	Muscicapidae	LC	Spring to summer	IN
60.	<i>Acridotheres ginginianus</i>	Bank Myna	Sturnidae	LC	May and June	OM
61.	<i>Gracupica contra</i>	Asian Pied Starling	Sturnidae	LC	March to September	OM
62.	<i>Acridotheres tristis</i>	Common Myna	Sturnidae	LC	April to June	OM
63.	<i>Sturnia pagodarum</i>	Brahminy Starling	Sturnidae	LC	March to September	OM
64.	<i>Parus major</i>	Great Tit	Paridae	LC	Summer season	IN
65.	<i>Parus xanthogenys</i>	Yellow cheeked tit	Paridae	LC	Summer season	IN
66.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Pycnonotidae	LC	June to September	FR
67.	<i>Acrocephalus dumetorum</i>	Blyth's Reed-warbler	Sylviidae	LC	Winterseason	IN

68.	<i>Phylloscopus sindianus</i>	Mountain Chiffchaff	Sylviidae	LC	Winterseason	IN
69.	<i>Turdoides striata</i>	Jungle Babbler	Timaliinae	LC	Winterseason	OM
70.	<i>Turdoides caudatus</i>	Common Babbler	Timaliinae	LC	Winterseason	IN
71.	<i>Turdoides affinis</i>	Yellow billed Babbler	Timaliinae	LC	March to April	IN
72.	<i>Turdoides malcolmi</i>	Large Grey Babbler	Timaliinae	LC	March to April	IN
73.	<i>Calandrella raytal</i>	Sand Lark	Alaudinae	LC	Summer season	IN,GR
74.	<i>Eremopterix nigriceps</i>	Black-crowned Finch Lark	Alaudidae	LC	February to September	IN,GR
75.	<i>Mirafra cantillans</i>	Singing Bushlark	Alaudidae	LC	Summer season	IN,GR
76.	<i>Cinnyris asiaticus</i>	Purple Sunbird	Nectariniidae	LC	April to June	IN,FR
77.	<i>Passer domesticus</i>	House Sparrow	Passeridae	LC	March to August	OM
78.	<i>Motacilla citreola</i>	Citrine Wagtail	Motacillidae	LC	Rainy season	IN
79.	<i>Motacilla flava</i>	Yellow Wagtail	Motacillidae	LC	Summer season	IN
80.	<i>Anthus rufulus</i>	Paddy field pipit	Motacillidae	LC	Mainly in the dry season	IN
81.	<i>Euodice malabarica</i>	Indian Silverbill	Estrididae	LC	Summer season	GR

*IUCN Red List category (2013): Critically endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Omnivorous (OM), Insectivorous (IN), Granivorous (GR), Frugivorous (FR), Piscivorous (PV)

The most abundant order of the birds in Bundelkhand region is Passeriformes belong to 15 (44%) families and 37 (46%) species of the total avifauna which are depicted in Figure 2 and 3. Out of 81 species of birds, 4 are globally threatened species among them two are critically endangered namely, Indian Vulture (*Gyps indicus*) and White rumped Vulture (*Gyps bengalensis*); Egyptian Vulture (*Neophron percnopterus*) is endangered; Sarus Crane (*Grus antigone*) is vulnerable and remaining 77 are least concern species in the IUCN Red List category.

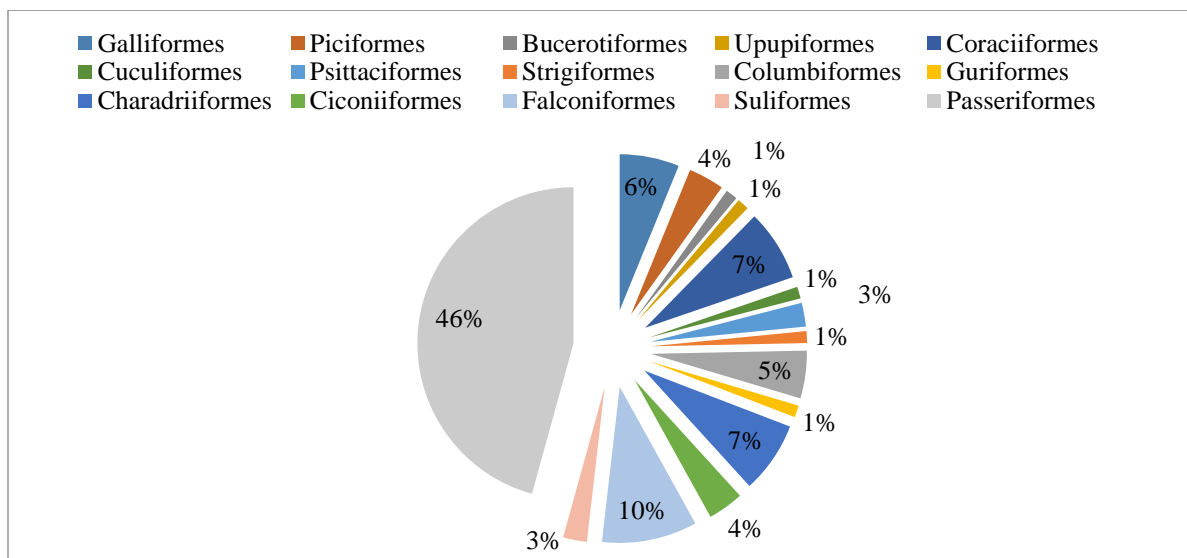


Figure.2. Percentage of Bird species belonging to different avian orders

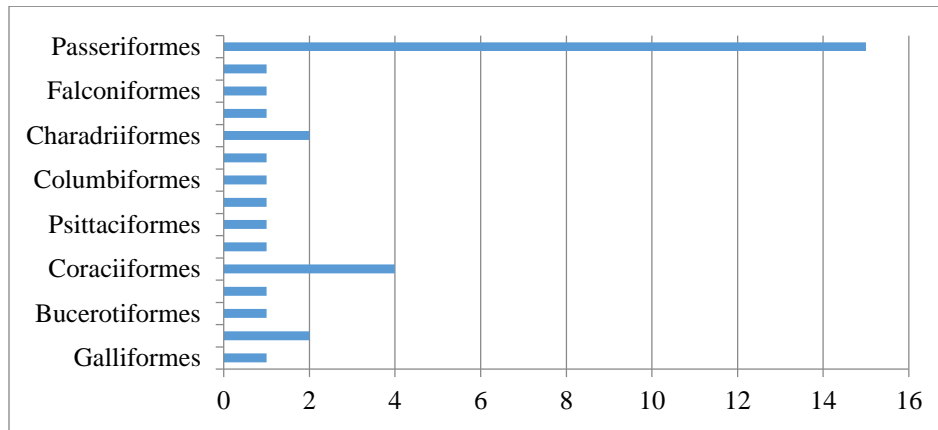


Figure.2. Number of Bird families belonging to different avian orders

Present study is a preliminary investigation. Although several studies have been done in India in recent past on diversity of avifauna, but Bundelkhand region have been ignored by earlier workers. Avian biodiversity of Sultanpur National Park was carried out by Kaushik and Gupta [13] and found 161 species of birds belonging to 16 orders and 47 families. Out of these 99 species were resident birds, 41 were winter migratory, 11 species were local migratory, 10 were summer migratory. According to Kushwaha *et al.* (2017) observation there were 51 bird species belonging to 18 families in and around Orchha of Madhya Pradesh which includes all kinds of birds namely granivores, frugivores, insectivores, nectarivores, omnivores and scavengers [14]. Maximum bird species belonged to family Passeridae (7), followed by Accipitridae (6), Sylviidae (6) and Corvidae (5). Manikandan and Balashubramanian (2016) investigate for bird diversity of Nilgiri Biosphere Reserve and found 158 species of birds belonging to 56 families [15]. They also observed that out of 158 species there were 110 residents birds, 33 were winter migrates and 15 birds were summer migrates. Kushwaha and Kanojiya (2015) worked on the declining status of Long-billed Vulture (*Gyps indicus*) in Bundelkhand region, which is critically endangered [16]. Gupta and Kanojiya (2012) studied the population status and their ecology of Eagles in Bundelkhand region [17]. The species is nearly threatened due to felling of high trees which are their habitat for nesting, changes in land use pattern, using pesticides in agriculture, etc. These studies are concentrated on single species but our approach is holistic and first kind of investigation in this region.

IV. CONCLUSION

Birds are among the best bioindicator or biomonitor of environmental health and have been used to monitor pollution in areas of aquatic as well as terrestrial environment. But the future of this avian fauna is in danger mainly due to deforestation, hunting, habitat destruction, stone crushing industry, contaminated water of the study area and requires attention for appropriate management strategies. The Bundelkhand region should be given first priority for conservation of globally threatened species. Our study may helpful in making plans for the conservation of the endangered species in this region. These types of studies are not only helpful in knowing the biodiversity, population and abundance status of any species in that particular area but to create the awareness for their conservation and form a useful tool for further studies.

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