

Research Article

**SUB-CONTINENTAL STATUS AND AVIAN DIVERSITY OF
MANDAL VALLEY, GARHWAL HIMALAYA WITH
SPECIAL REFERENCE TO ECO-TOURISM**

Manish Kukreti*, Surman Arya, S.P. Uniyal and Sandeep Kumar

Department of Zoology, Govt. P.G. College,
Gopeshwar, Chamoli, Uttarakhand 246 401, India

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ABSTRACT

Frequent surveys from August 2012 to July 2013 in temperate forest of Mandal valley of district Chamoli resulted in identification of 83 bird species belonging to 59 genera, 26 families and 7 orders. Order Passeriformes dominates all other orders by representing 18 families. Marked variations were observed in seasonal species occurrence. The maximum number orders observed in the month of February, March, April and June (7 orders in each) followed by January, July, August, September, October and November (6) and December with minimum (4). Sub-continental and current status also observed during study period. Species diversity and relative abundance of bird species on the east and west aspects were noticed almost identical over the year and show seasonal variation.

Keywords: Temperate forest, sub-continental status, current status, species diversity.

INTRODUCTION

Birds are a group of feathered, biped, warm blooded animal whose body temperature remains more or less constant and independent of the surrounding temperature. These belong to the class *Aves*. We are very familiar with these animals as they are active by day time and visit every house, field and garden. They are found in all continents, seas and islands penetrating the Arctic beyond 80°N and the Antarctic. They range from the sea level to over 6,400 meters altitude on Mount Everest (Singh and Basker 2003). Birds are of great importance as food, pets, scavengers, pollinators, predators, seed dispersers, messengers, indicators etc. Birds caught for food includes ducks, geese, water fowls, pheasants, partridges, quails, doves, pigeons and etc. Birds used as pets or ornamental include canaries, parakeets, hill myna, munias, etc. Parakeets may be the Rose-ringed *Psittacula krameri*, the Alexandrine *Psittacula eupatria*,

the Blossom-headed *Psittacula cyanocephal* and the Red-breasted *Psittacula alexandri*. The common munias are the Red munia *Estrilda amandava*, the spotted munia *Lonchura punctulata*, the White throated munia *Lonchura malabarica* and the White rumped munia *Lonchura striata*. Large and colorful birds such as hornbills, flamingoes, storks, pheasants, cranes, ducks etc., are maintained in the zoo. Garhwal Himalaya as a part of the Western Himalaya is rich for its habitat diversity and bird species richness. Due to its unique position between the Indo-Chinese and Palaerctic line and great altitudinal variation from 400 m to 7817 m (Nanda Devi Peak-II) (Fleming *et al.* 1979; Ali 1981). The area represents a variety of habitats especially in temperate zone. Along altitudinal gradient, the area has rich diversity of forests viz. Pine mixed oak forest, Oak mixed *Rhododendron* forests, coniferous Deodar forest and sub-alpine forest. But very little is known about the bird

*Corresponding author e-mail: manishkukreti15@gmail.com

fauna of these habitats. Information's concerning community structure of birds is derived from studies conducted at high latitude and almost nothing is known about birds of the temperate forests of sub-tropics. Study of birds at community level in the Indian sub-continent is essential as large scale changes have been taking place in natural habitats). The study of community structure and dynamics of birds across the seasons to investigate the impact of changing natural habitat is also required (Jose and Jacharias, 2003).

MATERIAL AND METHODS

The present study was conducted in the Mandal valley, Chamoli district of Uttarakhand from August 2012 to July 2013, which is a hill state of India with its two main geographical division-Garhwal and Kumaun. The Himalaya which lies in the Garhwal region is known as Garhwal Himalaya lying between 29° 26' to 31° 28' N to 77° 49' to 80° 6' E and comprises Chamoli, Rudraprayag, Pauri, Uttakashi, Dehradun and Haridwar districts. Garhwal Himalaya enjoying a wide range of altitude expending from about 325 m in the Bhabar tract to the height of about 7,817 m (Nanda Devi Peak-II). Its diverse land form, climatic variation, vegetation, snow fall and geographical contiguity with biologically rich surrounding provide luxuriant faunastic and floristic diversity. According to Champion and Seth (1968) India has 200 types of forest and out of which more than 50 types are found in Garhwal Himalaya, so in a short distance various types of forest are found.

The present study was conducted in the Mandal valley, located in Chamoli district of Uttarakhand (29° 07' N and 78° 05'E) from August 2012 to July 2013. The area is spread behind the Gopeshwar town and ranging from 1500 m to 1850 m altitude. The survey area is comprised of evergreen deciduous and coniferous temperate forests. Evergreen deciduous forest occurs at range 1830-3050m altitude and is dominated by *Quercus spp.*

Rhododendron spp. *Myrica spp.* etc. Due to the better moisture retaining capacity these forests support great vegetation diversity both in species and structure, resulting in greater avifaunal diversity also. The temperate coniferous forests range from 1500–3000m and characterized by *Quercus semicarpifolia.*, *Abies sp.*, *Cedrus deodara* and *Cupressus sp.* etc.

RESULTS

Various factors like types of habitat surveyed, climate, time and seasons of survey, nature of particular bird's species and experience of the observer influence the records of bird fauna. However, one year study has resulted in the identification of 83 bird species belonging to 7 orders, 26 families and 59 genera (Table 1).

The maximum number Orders observed in the month of February, March, April and June (7 orders in each) followed by January, July, August, September, October and November (6) and December with minimum (4). The single order Passeriformes is comprised of 44 genera while other 6 orders have 15 genera only. Order Passeriformes dominates all other orders by representing 18 families followed by Piciformes and Coraciiformea (2 families each), Falconiformes, Galliformes, Columbiformes and Psittaciformes (1 family each). The maximum families were recorded in the month of March and April (24 families in each), followed by May and June (23), February and October (19) July, November and December (18) August (17) and January with minimum (16). The family wise bird's species composition was also checked out. The family Turdidae was recorded with maximum bird species, followed by Trimalliidae, Accipitridae and Muscicapidae, Columbidae, Picidae, Sylviidae, and Fringillidae, Psittacidae, Sturnidae and Pycunonotidae, Phasinidae and Coraciidae, Upupidae, Capitonidae, Hirundinidae, Alaudidae, Dicuridae, Conephagidae, Sitridae, Certhidae, Zosteropidae and Palceidae showed minimum bird species composition.

Table 1. Sub-continental, residential and current status of bird species of the temperate forest of North-West, Garhwal Himalaya.

S. No.	Common Name	Scientific Name	Sub continental status	Residential status	Current status	Average relative abundance	Average spp. diversity
Falconiformes							
Accipitridae							
1.	Himalayan Griffon	<i>Gyps himalayensis</i>	A	wiD	vC	0.053	14.23
2.	White rumped vulture	<i>G. bengalensis</i>	R,Th	faD	vC	0.052	29.17
3.	Red headed vulture	<i>Sarcogyps calvus</i>	R	faD	vC	0.041	26.07
4.	Black kite	<i>Milvus migrans</i>	RM	faD	vC	0.038	42.66
5.	Shikra	<i>Accipter badius</i>	RM	faD	uC	0.003	19.49
6.	Steppe eagle	<i>Aquila nipalensis</i>	W	faD	uC	0.003	36.71
Galliformes							
Phasianidae							
7.	Kalij Pheasant	<i>Lophura leucomelanos hamiltoni</i>	A	wiD	vC	0.041	9.343
8.	Black Partridge	<i>Francolinus francolinus</i>	R	reD	uC	0.005	2.52
Columbiformes							
Columbidae							
9.	Eurasian collared dove	<i>Streptopelia decaocta</i>	RA	reD	vC	0.001	36.15
10.	Oriental turtle dove	<i>S. orientalis</i>	RMW	wiD	C	0.022	17.22
11.	Spotted dove	<i>S. chinensis</i>	R`A	wiD	uC	0.013	18.17
12.	Emerald dove	<i>Chalcophaps indica</i>	R (w?)	faD	uC	0.006	30.80
Psittaciformes							
Psittacidae							
13.	Plum headed parakeet	<i>Psittacula cyanocephala</i>	E	wiD	C	0.021	14.91
14.	Rose ringed parakeet	<i>P. krameri</i>	R	wiD	vC	0.072	14.51
15.	Slaty headed parakeet	<i>P. himalayana</i>	RA	faD	vC	0.062	10.07
Coraciiformes							
Cociidaera							
16.	Indian roller	<i>Coracias benghalensis</i>	R`	reD	uC	0.005	34.59
Upupidae							
17.	Common hoopoe	<i>Upupa epops</i>	RBW	faD	uC	0.002	14.20

Piciformes							
Capitonidae							
18.	Great barbet	<i>Megalaima virens</i>	A	wiD	C	0.022	11.42
Picidae							
19.	Greater yellownappe	<i>Picus flavinucha</i>	R	reD	uC	0.003	27.44
20.	Grey headed woodpecker	<i>P. canus</i>	R	wiC	uC	0.007	25.53
21.	Scaly bellied woodpecker	<i>P.squamatus</i>	R	wiD	uC	0.013	18.92
22.	Yellow crowned woodpecker	<i>Dendrocopos mahrattensis</i>	N	wiD	uC	0.010	19.31
Passeriformes							
Hirundinidae							
23.	Red - rumped swallow	<i>Hirundo daurica</i>	RAMW	reD	uC	0.009	35.72
Alaudidae							
24.	Oriental sky lark	<i>Alanda gulgula</i>	R`W	reD	uC	0.006	35.34
Dicruridae							
25.	Black drango	<i>Dicrurus macrocercus</i>	R`A	wiD	uC	0.017	16.01
Sturnidae							
26.	Common myna	<i>Acredothis tristis</i>	R	wiD	C	0.034	12.24
27.	Jungle myna	<i>A. fuscus</i>	R`	reD	vC	0.045	29.11
28.	Spot- winged starling	<i>Saroglossa spiloptera</i>	MP	reD	uC	0.12	26.16
Corvidae							
29.	Black headed jay	<i>Garrulus lanceolatus</i>	RA	wiD	vC	0.038	11.63
30.	Red billed blue magpie	<i>Urocissa erythrorhyncha</i>	RA	wiD	C	0.032	11.57
31.	Gray treepie	<i>Dendrocitta formose</i>	RA	wiD	uC	0.010	19.86
32.	Rufous treepie	<i>D. vagabunda</i>	R	wiD	C	0.019	20.70
33.	Large billed crow	<i>Corvus macrorhynchos</i>	RA	wiD	vC	0.048	9.623
Compephagidae							
34.	Scarlet minivet	<i>Pericrocotus flammeus</i>	RA	wiD	uC	0.009	7.95
Pycnonotidae							
35.	Himalayan bulbul	<i>Pycnonotus leucogenys</i>	R`	wiD	vC	0.056	14.50
36.	Red vented bulbul	<i>P.cafer</i>	R	wiD	vC	0.094	11.88

37.	Black bulbul	<i>Hypsipetes leucocephalus</i>	R'A	wiD	C	0.028	13.24
	Timaliidae						
38.	Jungle babbler	<i>Turdoides straitus</i>	E	reD	vC	0.086	5.266
39.	Rusty cheeked scimitar babbler	<i>Pomatorhinus erythrogenys</i>	R	wiD	vC	0.062	13.75
40.	Scaly breasted wren babbler	<i>Pnoeyga albiventer</i>	A	reD	uC	0.007	21.91
41.	Streaked laughing thrush	<i>Garrulax lineatus</i>	A	wiD	vC	0.049	8.832
42.	White throated laughing thrush	<i>G. albogularis</i>	A	wiD	vC	0.0045	10.27
43.	Variiegated laughing thrush	<i>G. variegatus</i>	A	reD	uC	0.004	2.545
44.	Rufous chinned laughing thrush	<i>G. rufogularis</i>	A	faD	uC	0.010	24.77
	Sittidae						
45.	Chestnut bellied nuthatch	<i>Sitta castanea</i>	R	wiD	uC	0.013	15.51
	Certhidae						
46.	Eurasian tree creeper	<i>Certhia familiaris</i>	RA	wiD	uC	0.013	16.92
	Paridae						
47.	Black lored tit	<i>Parus xanthogenys</i>	EA	faD	C	0.020	15.70
48.	Green backed tit	<i>p. monticolus</i>	RA	wiD	C	0.019	12.81
49.	Great tit	<i>p. major</i>	RA	wiD	C	0.027	14.71
50.	Black throated tit	<i>Aegithalos concinnus</i>	R?	wiD	C	0.034	15.65
51.	Yellow browed tit	<i>Sylvipus modestus</i>	RWA	faD	C	0.020	7.888
	Turdidae						
52.	Blue whistling thrush	<i>Myiophonus caeruleus</i>	AM	wiD	C	0.027	12.51
53.	Blue capped rock thrush	<i>Monticola cinclorhynchus</i>	M	reD	uC	0.008	23.55
54.	Blue capped redstart	<i>Phoenicurus caeruleocephalus</i>	A	faD	uC	0.008	31.60
55.	White capped redstart	<i>Chaimarrornis leucocephalus</i>	A	reD	uC	0.005	19.27
56.	Spotted fork-tail	<i>Enicurus maculatus</i>	AR	reD	uC	0.002	28.99
57.	Common stone chat	<i>Saxicola torquata</i>	WAM	wiD	uC	0.014	16.37
58.	Grey bush chat	<i>S. ferrea</i>	AM	reD	uC	0.015	15.36
59.	Grey winged	<i>Turdus boulboul</i>	A	faD	uC	0.005	30.16

	blackbird						
60.	Oriental magpie robin	<i>Copsychus saularis</i>	RM	reD	uC	0.005	31.86
61.	Plain prinia	<i>Prinia inornata</i>	R'	reD	uC	0.009	25.85
62.	Grey breasted prinia	<i>P. hogsonii</i>	R'	reD	uC	0.004	37.99
	Motacillidae						
63.	Grey wagtail	<i>Motacilla cinerea</i>	AMW	reD	uC	0.004	36.41
64.	White wagtail	<i>M. alba</i>	AMW	reD	uC	0.002	8.21
65.	Yellow wagtail	<i>M. flava</i>	BWP	faD	uC	0.005	32.69
66.	Paddyfield pipit	<i>Anthus rufulus</i>	R'	reD	uC	0.005	34.78
67.	Olive backed pipit	<i>A. hogsoni</i>	RA	reD	uC	0.003	30.05
	Muscicapidae						
68.	Asian paradise flycatcher	<i>Terpsiphone paradisi</i>	R'MP	reD	uC	0.007	29.41
69.	Verditer flycatcher	<i>Eumyias thalassina</i>	MA	wiD	uC	0.010	18.51
70.	Grey headed canary flycatcher	<i>Culicicapa ceylonensis</i>	RAM	faD	uC	0.007	17.99
71.	White Browed fantail	<i>Rhiphidura aureola</i>	R'	reD	uC	0.001	7.50
72.	White throated fantail	<i>R. albicollis</i>	R'A	reD	uC	0.006	27.26
73.	Slaty blue flycatcher	<i>Ficedula tricolor</i>	AR	reD	uC	0.016	21.53
	Sylviidae						
74.	Grey hooded warbler	<i>Seicercus xanthoschistos</i>	A	wiD	C	0.057	7.793
75.	Ashy throated warbler	<i>Phylloscopus maculipennis</i>	A	wiD	C	0.025	8.296
76.	Hume's warbler	<i>P. humei</i>	BW	reD	uC	0.016	12.02
77.	Gold crest	<i>Regulus regulus</i>	RW	reD	uC	0.004	20.46
	Zosteropidae						
78.	Oriental white eye	<i>Zosterops palpebrosus</i>	R'	reD	uC	0.017	12.65
	Ploceidae						
79.	Eurasian tree sparrow	<i>Passer montanus</i>	RA	wiD	uC	0.015	15.26
	Fringillidae						
80.	Pink browed rosenfinch	<i>Carduelis rodochrous</i>	A	reD	uC	0.008	28.85
81.	Yellow breasted greenfinch	<i>C. spinoides</i>	A	faD	uC	0.012	21.80
82.	Common rosefinch	<i>Carpodacus erythrinus</i>	AM	reD	uC	0.009	26.03
83.	Spot winged grosbeak	<i>Mycerbas melanozanthos</i>	A	reD	uC	0.005	32.64

The nomenclature adopted here is after Grimmett *et al.* 2000 and sub-continental status after Kazmierczak (2000) and Bird life international (2001). The residential status of birds in the study area was assessed on an arbitrary frequency scale: Restricted distribution (reD) = sighted in less than in four months, fair distribution (faD) = sighted in 4-8 months, and wide distribution (wiD)= sighted in more than 8 months. The current status was assessed on the basis of average relative abundance: uncommon (uC)= having a relative abundance less than 0.018, common (C) = having a relative abundance of 0.018 and above but less than 0.036 and very common (vC)= having a relative abundance of 0.036 and above.

E- endemic to the Indian sub-continent, N-near endemic, R-resident, B- breeder, A- altitudinal migrant, M- migrates within sub-continent (breeds in the Himalaya and winters in southern India and/Sri Lanka), P-passage migrant, W-winter visitor, Th- threatened

with extinction, *-localised are patchily distributed (For example B*=breeds locally) and ` -subject to some (local) seasonal movement or nomadism.

DISCUSSION

In last few years, some studies on bird diversity have conducted at Andhra Pradesh by Majumdar (1984). Few investigations on bird fauna of protected areas (sanctuaries/ national parks) have also been carried out by Srinivasulu (2001) in Andhra Pradesh. Mishra (2001) made some study on conservation of migratory and local birds in Satpura hills of Madhya Pradesh and described that survival and existence of birds is highly threatened due to the impact of human activities on their habitat. Finding of his study also described that approximately 20 species of birds of study area are going to spoil by different prey. Stress to establish more and more protected areas (sanctuaries/ national parks) has put by him. Sahu and Dutta (2005) studied aquatic birds at 14 different water bodies in Orissa and suggested that poaching, hunting and trapping should be restricted. Mensing *et al.* (1998) studied anthropogenic affects on the biodiversity of riparian wetlands of Northern temperate landscape. Bisht *et al.* (2004) conducted a survey in Garhwal Himalaya, at various sites along altitudinal gradient from foot hills of Terai to alpine region 3700 m and reported 290 bird species, belonging to 14 different orders and 51 families with 3 threatened species of birds viz., *Gyps indicus*, *Gyps bengalensis* and *Catreus wallichii*, 17 endemic and 6 near endemic species of the Indian sub-continent.

CONCLUSIONS

Their study suggested that Garhwal Himalaya need special conservation strategies that are still lacking which other wise would further endanger important species as under population expansion pressure and habitat degradation continually

going on. In spite of these studies, no current report is available on community structure of bird fauna of temperate habitats. Our knowledge about bird fauna of this habitat is little till date. Present investigation is an attempt which could serve as a benchmark for management point of view and further habitat level research investigation.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest associated with this article.

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