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COMMUNITY STRUCTURE OF BIRD FAUNA OF TEMPREATE FOREST OF NORTH WEST HIMALAYA

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ABSTRACT

Frequent surveys from March 2023 to May 2024 in temperate forest of Nagdev reserve forest, located in Pauri district of Uttarakhand (29^0 07' N and $78^0$05'E) 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 variation was 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 birds species on the east and west aspects were noticed almost identical over the year and show seasonal variation.

Key Words: Temperate forest, Sub-continental 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 80ºN and the Antarctic. They range from the sea level to over 6,400 meters altitude on Mount Everest (Singh and Basker 2003). Their wide occurrences are due to their power of flight, which enables them to reach places in-accessible to other animals. Birds are of great importance as food, pets, scavengers, pollinators, predators, seed dispersers, messengers, indicators etc. Presently, some 9040 species of birds are known to occur in the world and out of these 1253 species (13% or 1/6 of the total birds) including 69 endemic and 55 endangered species are found in India (Ali & Ripley, 1983, Saxena, 2003).

But over hunting in the past and habitat destruction caused decline of population of many species. As a result, we have already lost the Pink-headed duck *Rhodonessa caryophyllacea* and the Mountain quail *Ophrysia superciliosa*. Conservation of these flying animals is possible only at landscape or habitats level which needs the scientific data on species richness, diversity, seasonal occurrences and density etc. Such information is little on the Himalayan avifauna including Cheer pheasant *Catreus wallichii*, Western tragopan, *Tragopan melanocephlaus*, Monal *Lophophorus impejanus*, etc.

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 400m to 7817m (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 *Rododendron* forests, coniferous Deodar forest and sub-alpine forest. But very little is known about the bird fauna of these habitats. Information's concerning community structure of birds are derived from studies conducted at high latitude (Mac Arthur 1959, Hilden, 1965, James, 1917) 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 (Khan *et al*. 1993). The study of community structure and dynamics of birds across the seasons to investigate the impact of changing natural habitat is also required (Jose & Jacharias 2003). Therefore in present study, we described status and species diversity of birds of the North West temperate forest in Garhwal, Uttarakhand.

MATERIAL AND METHODS

The study for one year was conducted in Nagdev reserve forest, located in Pauri district of Uttarakhand (29^0 07' N and $78^0$05'E). The area was spread behind the Pauri town and ranging from 1600m to 1850m altitude. The survey area was comprised of evergreen deciduous and coniferous temperate forests At the morning and evening from 8:00 to 10:00 am and from 4:00pm to till twilight, survey was conducted for 5 to 7 days every month for the information on bird occurrences and relative abundance. The transect walk, point count, calls count methods were followed to record the bird species richness, diversity and relative abundance (Faaborg & Champion 1988, Barham 1981, Javed & Kaul 2002, Gaston 1973) in relation to climate, seasons, vegetation, anthropogenic activities etc. Mostly, transects of 0.5 to 1.0km. length was silently walked and all birds were counted. The bird flying 20 to 30 meter above the ground level were also recorded. Data was analyzed by various statistical formulas.

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.

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). 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 single order Passeriformes has the maximum bird composition (73.49) followed by Faloniformes (7.228), Piciformes (6.024), Columbiformes (4.819), Psittaciformes (3.614), and Galliformes and Coraciformes show the minimum (2.409) species composition. The family Turdidae was recorded with maximum bird species (13.25), followed by Trimalliidae (8.433), Accipitridae and Muscicapdae (6.024), Columbidae, Picidae, Sylviidae, and Fringllidae (4.819), Psittacidae, Sturnidae and Pycunonotidae (3.614), Phasinidae (2.409) and Coraccidae, Upupidae, Capitonidae, Hirundinidae, Alaudidae, Dicruridae, Conpephagdae, Sitridae, Certhidae, Zosteropidae and Palceidae showed minimum bird species composition (1.204). The maximum no. of 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 maximum species was noted in the month of April (67) followed by June (66), March (64), February (49), May (46), August (45), September (42), October (40), November (39), January (38) and December with minimum number of (36). Similarly, the average species diversity was recorded (Table). Slaty headed parakeet was recorded with maximum diversity (70.25), followed by Black drongo (60.01), White wagtail (46.21), Black kite (42.66), White browed fantail (42.50) and Grey hooded warbler with minimum average diversity (7.793) was recorded. The sub-continental status based previous study (Kazmierczak 2000, Birdlife International 2001, Grimmett *et al*. 1999) was compared with study's results residential and current status based on average relative abundance and birds seen in number of months.

DISSCUSSION

Knowledge of bird fauna of the Western Himalaya is still derived from the survey conducted in a few specific parts areas of different regions by Jerdon (1862), Hume &Marshall (1879), Lavkumar (1956), Reed (1979), Green (1986), Holmes & Parrs (1988), Osmastons and Sale (1989). Flemming *et al*. (1979); Ali & Ripley (1983) have described 600 bird species in Garhwal Himalaya. Bisht *et al*. 2004 conducted a survey in Garhwal Himalaya, at various sites along altitudinal gradient from foot hills of Terai to alpine region 3700m 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. Their study suggested that Garhwal Himalaya need special conservation strategies that are still lacking which otherwise 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 on the community structure of bird fauna of the temperate forest of Pauri Garhwal is an attempt which could serge as a benchmark for management point of view and further habitat level research investigation. The present study yielded 83 species of the bird in the temperate forest of Pauri Garhwal even in the presence of biotic pressure. If the temperate evergreen deciduous coniferous forests of the study area harbour 83 species of birds, this mean that more than 50 types of forests have been described in Garhwal Himalaya by Champion & Seth (1968) must have a good number of species of bird fauna. Bisht *et a*l. (2004) reported the 14 orders and 51 families and Passerriformes as the most crowded order. Their finding also showed Turdidae as the largest family presented by 32 species of bird fauna of different sites. Our results of study also described 7 orders, 26 families and Passerriformes as the most dominant order and Turdidae as the largest family with 11 species of bird. Among Galliformes- White-crested Kalij pheasant *Lophura luecomelana hamiltonii* was found abundantly in this type of habitat, which was mainly ground feeder and their presence in good number indicates good and healthy environment.

Findings of the present study also suggest that the bird community structure of the temperate forests of Garhwal Himalaya (Sub-tropic) also exhibit variations in time. In the high altitude temperate forests, seasonal variation in birds diversity is a function of the food as reported by Sabo and Holmes, 1983, Mac Arthur 1958, Holmes *et al*., 1986. During winter months from (December (36) to January (38)) low occurrence of bird species appears due to shift of birds to low altitude. With the onset of spring-summer, growth of vegetation and insects population, many birds namely Oriental skylark, Spot-winged starling, Blue caped rockthrush, Grey wagtail, Slaty blue flycatcher, Hume's warbler and Pink browed rose finch visit the study area. All these birds are insectivores in habit and haunts on the foliage of the temperate forests. Three species each of summer and two winter visitor, viz., Blue caped redstart, Grey headed canary flycatcher, Pink browed rose finch (summer visitor) and white wagtail and Yellow wagtail as reported by Grimmett *el al*. (2000) were found to occur in both summer and winter season and vice versa in the study area.

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Table7**: 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	*Gyps himalayensis*	A	wiD	vC	0.053	14.23
2.	White rumped vulture	*G. bengalensis*	R,Th	faD	vC	0.052	29.17
3.	Red headed vulture	*Sarcogyps calvus*	R	faD	vC	0.041	26.07
4.	Black kite	*Milvus migrans*	RM	faD	vC	0.038	42.66
5	Shikra	*Accipter badius*	RM	faD	uC	0.003	19.49
6.	Steppe eagle	*Aquila nipalensis*	W	faD	uC	0.003	36.71
	Galliformes						
	Phasianidae						
7	Kalij Pheasant	*Lophura leucomelanos hamiltoni*	A	wiD	vC	0.041	9.343
8	Black Partridge	*Francolinus francolinus*	R	reD	uC	0.005	2.52
	Columbiformes						
	Columbidae						
9	Eurasian collared dove	*Strepotopelia decaocta*	RA	reD	vC	0.001	36.15

10	Oriental turtle dove	*S. orientalis*	RMW	wiD	C	0.022	17.22
11	Spotted dove	*S. chinensis*	R˙A	wiD	uC	0.013	18.17
12	Emerald dove	*Chalcophaps indica*	R (w?)	faD	uC	0.006	30.80
	Psittaciformes						
	Psittacidae						
13.	Plum headed parakeet	*Psittacula cyanocephala*	E	wiD	C	0.021	14.91
14.	Rose ringed parakeet	*P. krameri*	R	wiD	vC	0.072	14.51
15.	Slaty headed parakeet	*P. himalayana*	RA	faD	vC	0.062	10.07
	Coraciiformes						
	Cociidaera						
16.	Indian roller	*Coracias benghalensis*	R˙	reD	uC	0.005	34.59
	Upupidae						
17.	Common hoopoe	*Upupa epops*	RBW	faD	uC	0.002	14.20
	Piciformes						
	Capitonidae						
18.	Great barbet	*Megalaima virens*	A	wiD	C	0.022	11.42
	Picidae						
19.	Greater yellownape	*Picus flavinucha*	R	reD	uC	0.003	27.44
20.	Grey headed woodpecker	*P. canus*	R	wiC	uC	0.007	25.53

32.	Rufous treepie	*D. vagabunda*	R	wiD	C	0.019	20.70
21.	Scaly bellied woodpecker	*P.squamatus*	R	wiD	uC	0.013	18.92
22.	Yellow crowned woodpecker	*Dendrocopos mahrattensis*	N	wiD	uC	0.010	19.31
	Passeriformes						
	Hirundinidae						
23.	Red - rumped swallow	*Hirundo daurica*	RAMW	reD	uC	0.009	35.72
	Alaudidae						
24.	Oriental sky lark	*Alanda gulgula*	R˙W	reD	uC	0.006	35.34
	Dicruridae						
25.	Black drango	*Dicrurus macrocercus*	R˙A	wiD	uC	0.017	16.01
	Sturnidae						
26.	Common myna	*Acredotheris tristis*	R	wiD	C	0.034	12.24
27.	Jungle myna	*A. fuscus*	R˙	reD	vC	0.045	29.11
28.	Spot- winged starling	*Saroglossa spiloptera*	MP	reD	uC	0.12	26.16
	Corvidae						
29.	Black headed jay	*Garrulus lanceolatus*	RA	wiD	vC	0.038	11.63
30.	Red billed blue magpie	*Urocissa erythrorhyncha*	RA	wiD	C	0.032	11.57
31.	Gray treepie	*Dendrocitta formose*	RA	wiD	uC	0.010	19.86

Table continue…..

33.	Large billed crow	*Corvus macrorhynchos*	RA	wiD	vC	0.048	9.623
	Compephagidae						
34.	Scarlet minivet	*Pericrocotus flammeus*	RA	wiD	uC	0.009	7.95
	Pycnonotidae						
35.	Himalayan bulbul	*Pycnonotus leucogenys*	R˙	wiD	vC	0.056	14.50
36.	Red vented bulbul	*P.cafer*	R	wiD	vC	0.094	11.88
37.	Black bulbul	*Hypsipetes leucocephalus*	R˙A	wiD	C	0.028	13.24
	Timaliidae						
38.	Jungle babbler	*Turdoides straitus*	E	reD	vC	0.086	5.266
39.	Rusty cheeked scimitar babbler	*Pomatorhinus erythrogenys*	R	wiD	vC	0.062	13.75
40.	Scaly breasted wren babbler	*Pnoeyga albiventer*	A	reD	uC	0.007	21.91
41.	Streaked laughing thrush	*Garrulax lineatus*	A	wiD	vC	0.049	8.832
42.	White throated laughing thrush	*G. albogularis*	A	wiD	vC	0.0045	10.27
43.	Variegated laughing thrush	*G. variegatus*	A	reD	uC	0.004	2.545
44.	Rufous chinned laughing thrush	*G. rufogularis*	A	faD	uC	0.010	24.77
	Sittidae						
45.	Chestnul bellied nuthatch	*Sitta castanea*	R	wiD	uC	0.013	15.51
	Certhidae						

46.	Eurasian tree creeper	*Certhia familiaris*	RA	wiD	uC	0.013	16.92
	Paridae						
47.	Black lored tit	*Parus xanthogenys*	EA	faD	C	0.020	15.70
48.	Green backed tit	*p. monticolus*	RA	wiD	C	0.019	12.81
49.	Great tit	*p. major*	RA	wiD	C	0.027	14.71
50.	Black throated tit	*Aegithalos concinnus*	R?	wiD	C	0.034	15.65
51.	Yellow browed tit	*Sylvipus modestus*	RWA	faD	C	0.020	7.888
	Turdidae						
52.	Blue whistling thrush	*Myiophonus caeruleus*	AM	wiD	C	0.027	12.51
53.	Blue capped rock thrush	*Monticola cinclorhynchus*	M	reD	uC	0.008	23.55
54.	Blue capped redstart	*Phoenicurus caeruleocephalus*	A	faD	uC	0.008	31.60
55.	White capped redstart	*Chaimarrornis leucocephalus*	A	reD	uC	0.005	19.27
56.	Spotted forktail	*Enicurus maculatus*	AR	reD	uC	0.002	28.99
57.	Common stone chat	*Saxicola torquata*	WAM	wiD	uC	0.014	16.37
58.	Grey bush chat	*S. ferrea*	AM	reD	uC	0.015	15.36
59.	Grey winged blackbird	*Turdus boulboul*	A	faD	uC	0.005	30.16
60.	Oriental magpie robin	*Copsychus saularis*	RM	reD	uC	0.005	31.86
61.	Plain prinia	*Prinia inornata*	R•	reD	uC	0.009	25.85
62.	Grey breasted prinia	*P. hogsonii*	R•	reD	uC	0.004	37.99
	Motacillidae						

63.	Grey wagtail	*Moticilla cinerea*	AMW	reD	uC	0.004	36.41
64.	White wagtail	*M. alba*	AMW	reD	uC	0.002	8.21
65.	Yellow wagtail	*M. flava*	BWP	faD	uC	0.005	32.69
66.	Paddyfield pipit	*Anthus rufulus*	R˙	reD	uC	0.005	34.78
67	Olive backed pipit	*A. hogsoni*	RA	reD	uC	0.003	30.05
	Muscicapidae						
68.	Asian paradise flycatcher	*Terpsiphone paradisi*	R˙MP	reD	uC	0.007	29.41
69.	Verditer flycatcher	*Eumyias thalassina*	MA	wiD	uC	0.010	18.51
70	Grey headed canary flycatcher	*Culicicapa ceylonensis*	RAM	faD	uC	0.007	17.99
71	White Browed fantail	*Rhiphidura aureola*	R˙	reD	uC	0.001	7.50
72	White throated fantail	*R. albicollis*	R˙A	reD	uC	0.006	27.26
73	Slaty blue flycatcher	*Ficedula tricolor*	AR	reD	uC	0.016	21.53
	Sylviidae						
74	Grey hooded warbler	*Seicercus xanthoschistos*	A	wiD	C	0.057	7.793
75	Ashy throated warbler	*Phylloscopus maculipennis*	A	wiD	C	0.025	8.296
76	Hume's warbler	*P. humei*	BW	reD	uC	0.016	12.02
77	Gold crest	*Regulus regulus*	RW	reD	uC	0.004	20.46
	Zosteropidae						
78	Oriental white eye	*Zosterops palpebrosus*	R˙	reD	uC	0.017	12.65
	Ploceidae						

79	Eurasian tree sparrow	*Passer montanus*	RA	wiD	uC	0.015	15.26
	Fringillidae						
80	Pink browed rosenfinch	*Carduelis rodochrous*	A	reD	uC	0.008	28.85
81	Yellow breasted greenfinch	*C.spinoides*	A	faD	uC	0.012	21.80
82	Common rosefinch	*Carpodacus erythrinus*	AM	reD	uC	0.009	26.03
83	Spot winged grosbeak	*Mycerbas melanozanthos*	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 lees 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