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RECORD OF SPECIES DIVERSITY AND RELATIVE ABUNDANCE OF BIRD FAUNA IN TEMPERATE FORESTS OF DISTRICT PAURI GARHWAL, UTTARAKHAND

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Abstract

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The paper deals with species diversity and relative abundance of bird fauna in temperate forests of district Pauri Garhwal, Uttarakhand India. The field survey was conducted at three different sites namely, Raansi, Khirsu and Adwani from April 2015 to March 2016. Line transect and point count methods were used to record the bird species diversity and abundance. During this study, a total of 70, 66 and 75 species of birds were recorded at (Raansi, Khirsu and Adwani) respectively by line transect method and 64, 54 and 63 species were recorded by point count method. The birds diversity measured by Shannon wiener diversity index ranged from $H^{'}$ =2.4296 to 3.2229 at Raansi, H'= 1.945 to 3.245 at Khirsu and H'= 2.1375 to 3, 1254 at Adwani by line transect method and $H^{'}$ = 2.2214 to 3.1766, $H^{'}$ = 2.142 to 3.091 and $H^{'}$ = 1.9572 to 3.0390 by point count. The rich abundance of birds was recorded at Khirsu with highest abundance of white throated laughing thrush (0.352), kalij pheasant (0.188), grey headed parakeet (0.137), fire capped tit (0.121), black lored tit (0.1), black headed jay (0.088) and blue whistling thrush (0.075), and birds recorded with lowest abundance were Himalayan blue tail (0.006), tickells leaf warbler (0.003), spot breasted scimitar babbler (0.003), wedge tailed green pigeon (0.002) and scaly bellied woodpecker (0.001).

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INTRODUCTION:

Species diversity is an important component of the health of an ecosystem. Among animals, birds have an important place because they are visible and highly valued by humans. These are one of the most popular life forms on the planet and their diversity leads to a richness of life and beauty. Ecologically, birds are of tremendous importance as they are important pollinators and play a key role in seed dispersal. Therefore, the abundance and diversity of avian species in a specific habitat could serve as a useful barometer of the ecological status of that habitat. In the global scale, Himalayan regions are rich in biodiversity because these regions are surrounded with broad leaf mixed, dry deciduous, moist deciduous, chir pine mixed temperate and coniferous forest areas. In fact, Western Himalayan forests provide rich food sources, good shelter for animals to flourish and develop a productive ecosystem. These forests have large number of

endemic and threatened species also. There is growing need to manage forest ecosystem for biodiversity conservation. The avian fauna of Himalayan regions has been extensively documented by (Khan et al., 1993; Price et al., 2003; Safiq et.al., 1997; Sultana et.al., 2007) pioneering investigations to Ali and Ripley (1981) authoritative handbook while in Garhwal Himalaya, the survey or studies conducted so for not systematically on avian diversity, abundance and their residential status except few studies has been recently carried out on Kalij pheasant (Chandola-Saklani et al. 1988: Kumar et al. 2013), Himalayan monal (Bisht et.al., 1989) Chukar partridge (Kukreti et.al.,2005), Cheer pheasant (Bisht et.al.,2005 and Phurailatpum et.al., 2005), Avian diversity (Bhandari et al., 2015; Sudesh et al., 2015) and on community structure and relative abundance of birds of different forest habitats of Garhwal Himalaya (Bhandari and Bisht 2015). Therefore, the present study was designed to record the bird fauna of temperate forests of district Pauri Garhwal. Temperate forests are very important to animals, birds and humans because they provide life's essentials such as medicines, food, timber, shelter and oxygen. Temperate forest also helps to regulate the Earth's temperature, weather patterns and is well mapped for the purpose of gauging the sustainability of the forests as sources of paper products, and energy while continuing to provide wildlife habitats, watershed protection, and open space for public recreation and enjoyment.

MATERIALS AND METHODS:

The avian study was conducted in three different sites viz., Raansi (1850m), Khirsu (1700m) and Adwani (1750m) of district Pauri Garhwal, Uttarakhand **(Table 1).** Geographically, Pauri Garhwal is a Western part of Garhwal Himalaya lying between 29° 22'- 29° 75'N, 70° 10' – 78° 80'E along with the altitude of 500 - 3700m a.s.l. The habitat of study sites were comprised by temperate vegetations like *quercus, rhododendron, myrica, cedrus, abies, eupatorium, berberis* etc.

Line transect (Verner, 1985) and point count methods (Bibby et.al. 2000) were used to record the species richness of birds and their relative abundance. The field survey was conducted from April 2015 to March 2016 during the morning hours between 6:00am to10:00 am. Frequent surveys were made in the study area and birds were counted. Each bird was identified with the help of field binocular (8 x 30X), digital camera (20.1mp and 63Xzoom) and pictorial field guides (Gremmitt et.al. 2011 and Salim Ali, 2002). The field survey conducted during the harsh weather conditions and rainy season were not considered in the results. The bird diversity was calculated by using Shannon Wiener diversity index (1949).

Table 1 Details of the study sites in district Pauri Garhwal

S.No.	Location	Biogeographic Zone	Altitude (m asl)	GPS Coordinates	Major vegetation
1	Raansi	Temperate	1850	29°, 22'N 70°, 10' E	*quercus, myrica, cedrus*
2.	Khirsu	Temperate	1700	30°, 17'N 78°, 86'E	*quercus, rhododendron*
3	Adwani	Temperate	1750	30°, 05'N 79°, 04'E	*quercus, rhododendron, myrica*

RESULT AND DISCUSSION:

A total of 70 species including 2688 individuals belonging to 7 order and 23 families were recorded at Raansi, 66 species 2681 individuals belonging to 7 order and 21 families at Khirsu and 75 species 2190 individuals belonging to 7 order and 19 families were recorded at Adwani by Line transect method. The resulted 64 species including 1509 individuals belonging to 7 order and 24 families at Raansi, 54

species 1798 individuals belonging to 7 orders, 19 families at Khirsu and 63 species 1392 individuals belonging to 7 order and 19 families at Adwani were recorded by Point count method. The birds diversity calculated by Shannon Wiener diversity index ranged from (H'=2.4296 to 3.2229 at Raansi, H'= 1.945 to 3.245 at Khirsu and H'= 2.1375 to 3, 1254) at Adwani by line transect method and (H'= 2.2214 to 3.1766, H'= 2.142 to 3.091 and H'= 1.9572 to 3.0390) by point count (Table 2). The birds recorded with highest abundance were white throated laughing thrush (0.352), kalij pheasant (0.188), grey headed parakeet (0.137), fire capped tit (0.121), black lored tit (0.1),black headed jay (0.088), blue whistling thrush (0.075), etc (Table 3a, 3b and 3c) and birds recorded with lowest abundance were Himalayan blue tail (0.006), tickells leaf warbler (0.003), spot breasted scimitar babbler (0.003), wedge tailed green pigeon (0.002), scaly bellied woodpecker (0.001) (Table 4a, 4b and 4c)

The food availability may be the main factors of variation in the birds' diversity. In the present study it was observed that the bird fauna of the study area was rich because flora of the study sites (Raansi, Khirsu and Adwani) was diverse consisting many fruits and nectar yielding plants. During the summer, flowering plants attract a variety of insect feeding birds like black headed jay, verditer flycatcher, parakeets etc. During this study it was also observed that human induced decline or extinction of many species is usually attributed to major threats, like habitat loss, overexploitation, hunting, fire and deforestation which results in the elimination of many species. Therefore, there is growing need to manage forest ecosystem for biodiversity conservation. The temperate forests are very important for mankind because these provide us very useful timber, fodder, flowers, fruits and water. These forests also considered as the lungs of nature" because the vegetations absorb carbon dioxide and release the oxygen. Thus the temperate forests maintain the hydrological cycle. A good health of this forest ecosystem depends on the natural process viz. enrichment of soil, recharge of water and oxygen level. The animals living in the forests also maintain the nature through pollination etc. Birds play a very important role in control of harmful animals, pollination and dispersal of seeds. Unfortunately, today the temperate forests are in danger because of high anthropogenic pressure in middle altitude. Therefore, the bird fauna along with temperate forest should be preserved.

Table 2: Bird species diversity index in district Pauri Garhwal

S.No	Sites	Range of diversity index (Line transect method)	Range of diversity index (Point count method)
1.	Raansi	H'=2.429 to 3.222	H'= 2.221 to 3.176
2.	Khirsu	H'= 1.945 to 3.245	H'= 2.142 to 3.091
3.	Adwani	H'= 2.137 to 3.125	H'= 1.957 to 3.039

Table 3(a) Birds recorded with highest abundance at Raansi.

S.No	Common name of bird species	Scientific name	Relative abundance
1	Grey headed parakeet	*Psittacula finschii*	0.169
2	White eared bulbul	*Pycnonotus leucotis*	0.161
3	Himalayan bulbul	*Pycnonotus leucogenys*	0.13
4	Fire capped tit	*Cephalopyrus flammiceps*	0.118
5	Streaked laughing thrush	*Garrulax lineatus*	0.118
6	Black lored tit	*Parus xanthogenys*	0.108

Table 3(b) Birds recorded with highest abundance at Khirsu.

S.No	Common name of bird species	Scientific name	Relative abundance
1	White throated laughing thrush	*Garrulax albogularis*	0.352
2	Kalij pheasant	*Lophura leucomelanos*	0.188
3	Grey headed parakeet	*Psittacula finschii*	0.137
4	Fire capped tit	*Cephalopyrus flammiceps*	0.121
5	Black lored tit	*Parus xanthogenys*	0.1
6	Black headed jay	*Garrulus lanceolatus*	0.088

Table 3(c) Birds recorded with highest abundance at Adwani.

S.No	Common name of bird species	Scientific name	Relative abundance
1	White throated laughing thrush	*Garrulax albogularis*	0.297
2	Kalij pheasant	*Lophura leucomelanos*	0.182
3	Grey headed parakeet	*Psittacula finschii*	0.128
4	Black headed jay	*Garrulus lanceolatus*	0.141
5	Fire capped tit	*Cephalopyrus flammiceps*	0.132
6	Black lored tit	*Parus xanthogenys*	0.058

Table 4(a): Birds recorded with lowest abundance at Raansi.

S.No	Common name of bird species	Scientific name	Relative abundance
1	Grey hooded warbler	*Phylloscopus xanthoschistos*	0.003
2	Rufous sibia	*Malacias capistratus*	0.003
3	White wagtail	*Motacilla alba*	0.001
4	Black throated accentor	*Prunella atrogularis*	0.001
5	Hodgsons treecreeper	*Certhia hodgsoni*	0.001

Table 4(b) Birds recorded with lowest abundance at Khirsu.

S.No	Common name of bird species	Scientific name	Relative abundance
1	Himalayan blue tail	*Tarsiger rufilatus*	0.009
2	Spot breasyed scimitar babbler	*Pomatorhinius erythrocnemis*	0.004
3	Tickells leaf warbler	*Phylloscopus affinis*	0.003
4	Wedge tailed green pigeon	*Treron sphenurus*	0.002
5	Scaly bellied woodpecker	*Picus squamatus*	0.001

Table 4(c) Birds recorded with lowest abundance at Adwani.

S.No	Common name of bird species	Scientific name	Relative abundance
1	Wedge tailed green pigeon	*Treron sphenurus*	0.006
2	Thick billed warbler	*Phragamaticola aedon*	0.003
3	Tibetan black bird	*Turdus maximus*	0.003
4	Rufous sibia	*Malacias capistratus*	0.002
5	Black francolin	*Francolinus francolinus*	0.001

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REFERENCES:

Ali, S and Ripley, S.D (1981). *Handbook of the birds of the India and Pakistan*. 3: Oxford University press, Delhi.

Ali, S. (2002). The book of '*Indian birds*". 13th revised edition. Bomb. Nat. Hist Soc. Oxford University press.

Bhandari, S and Bisht, M.S. (2015). Community structure and relative abundance of bird fauna of different forest habitats of Garhwal Himalaya, Uttarakhand. India. International Journal of Science and Research.4:165-168.

Bhandari, S. Sudesh Kumar and Bisht M.S. (2015). Avian diversity of the Western Nayar Valley (Pauri Garhwal) Uttarakhand. J. Mountain Res., 10:13-19.

Bibby, C. J., Burgess N.D., Hill D.A and Mustoe S.H. (2000). *Birds census techniques*. London: Academic Press, 302.

Bisht, M.S., Lakhera. P. and Chandola-Saklani, A. (1989). The Monal pheasant: Current status and habitat utilization in Kedarnath sanctuary, Garhwal Himalaya, "Pheasant in Asia".Ed.D. A. Hill, World Pheasant Association.U.K. 205-208.

Bisht, M.S., Phurailatpam, S. and Kathait, B. S. (2005). Nesting Ecology and breeding success of Cheer pheasant *Catreus wallichii* in Garhwal Himalaya. India. J. Bom. Nat.Hist. Soc. 102(3): 287-289.

Chandola-Saklani, A., Lakhera, P. and Bisht, M.S. (1988). Current status and distribution of some endangered and wide spread animals of the Garhwal Himalaya. Proc,3rd Intnational range land congress, New Delhi, 2:435-437.

Grimmett, R., Inskip, C.and Inskip, T. (2011). *Birds of the Indian subcontinents*. 2nded. New Delhi: Oxford University, press. 591-615.

Khan, J.A., D.N. Khan and A. Ahmed. (1993). Preliminary investigations of bird community structure at Aligarh, India. Tropical Ecology 34: 217-225.

Kukreti, M., Phurailatpam, S. and Bisht, M. S. (2005). Ecology of Chukar Partridge *Alectoris chukar* in Garhwal Himalaya. *Proc. of 3rd Int. Galliformes Symp.* Dehradun. Eds.Fuller, R.A.and Browne, S.J., World Pheasant Association, Fording bridge U.K 195-198.

Kumar, S., Bisht, M. S., Bhandari, S. and Kukreti, M. (2013). Social behaviour of White crested kalij pheasant *Lophura leucomelanos hamiltonii* (Gray) in Garhwal Himalaya. Cheetal, 51 (1&2): pp20-28.

Safiq, T., S. Javed and J.A. Khan. (1997). Bird community structure of middle altitude oak forest in Kumaon Himalayas, India: a preliminary investigation. International Journal of Ecology and Environmental Sciences 23: 389-400.

Shannon, C.E and Wiener, W. (1949). The '*Mathematical theory of communication"* University of Illinois, Urbana, USA.

Sudesh Kuamr and Bhandari, S. (2015). Survey of bird fauna in temperate Nagdev reserve forest in district Pauri Garhwal Uttarakhand, India. J. Mountain Res., 10:55-50.

Sultana, A., Hussain, M.S and Khan, J.A (2007). Bird communities of the proposed Naina and Pindari Wildlife sanctuary in the Kumaon Himalaya UK, India. Bomb. Nat. His. Soc. *104:19-29.*

Verner, J. (1985). Assessment of counting technique.*Curr. Ornithol.*, 2: 247-463.

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