

COMMUNITY STRUCTURE OF THE BIRDS OF TEHSIL DODA, JAMMU

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ABSTRACT

Community structure of avifauna was carried out of village Bari and its adjoining areas of Tehsil Doda (District Doda), J&K state. The area lies in the Lesser Himalaya range of North-West Himalaya and stretches between 33°12' north latitude and 75°31' east longitude with an elevation ranging from 1000m to 2200m. The average rainfall of the study area is 95cm per annum. The study area was divided into various types of habitats such as coniferous forest, quercus forest, agro-ecosystem and alnus forest. It was observed that agro-ecosystem showed the maximum avian diversity as compared to the other three. Besides, spatial and temporal distribution of birds was also studied in the study area. The avifauna was also classified on the basis of feeding habits in different types of habitats.

Key words: Community structure, Diversity, Himalaya, Avifauna, Habitat, Spatial and Temporal distribution.

INTRODUCTION

Birds are considered as the master of the air. This description is apt and precise and cannot apply to other animal group. These being the masters of the air have been viewed as the indicator of environmental quality. The birds also live in association with each other and also form large flocks. Thus, the concept of community structure came into existence in case of birds.

Community structure embodies various ways in which individual members of communities relate to and interact with one

another to produce patterns of resources allocation and spatial and temporal abundance among constituent species. As birds are highly mobile and highly seasonal and species composition of a particular area changes due to the influx of immigration and emigration. Even the resident birds shows the local migration at the time of unfavourable conditions.

Community ecology is concerned with identifying the patterns that characterize natural assemblages of species. What has caused these patterns and determining how general they are (Weins, 1989). The present study was carried out in the tehsil Doda of Jammu and Kashmir State which is a part of the lesser himalayan chain of N.W. Himalayas. As far as the knowledge of the present investigator is concerned, there is no such study made on the bird community structure in the J&K state so far. Thus, present study attempts to analyze the bird community structure of four different ecosystems (habitats) and emphasis is also on the temporal and spatial distribution, species composition, seasonal fluctuations and their relationship with vegetation.

STUDY AREA

The area chosen for the present study of the bird community structure of tehsil Doda (District Doda) was village Barri and its adjoining areas. The area lies in lesser himalayan range of N.W. Himalaya and stretches between 33°12' north latitude and

75°-31' east longitude with an elevation ranging between 1000m and 2200m. The average rainfall of the study area is 95cm per annum. The mean maximum and minimum temperature from June to September ranges from 36°C and 14.7°C respectively where as during December to February, mean maximum and minimum temperature ranges between 6.9°C and -2.1°C respectively (Singh *et al.*, 2002). The soil found in this region is podosolic type of soil. The study area was divided into four different ecosystems as *Coniferous* forest, *Quercus* forest, *Alnus* forest and Agro-ecosystem.

Vegetation Structure

The forest is of temperate type. The predominant deciduous tree species comprises *Alnus nitida*, whereas predominant evergreen tree species comprises *Pinus roxburgii*, *Cedrus deodara* and *Quercus* species. The *Coniferous* and *Quercus* forests are evergreen, whereas *Alnus* forest is deciduous. The tree species of coniferous forests are *Pinus roxburgii*, *Cedrus deodara*, *Quercus leucotricophora*, *Xanthoxylum alatum*, whereas shrubs found in the coniferous forests are *Berberis lycium*, *Rhododendron arboreum*, *Pyrus poshia*, *Princepia utilis*, *Casia aphead*, *Rosa burnoniana*. The tree species found in the *Quercus* forests are *Quercus semicarpifolia*, *Quercus floribunda*, *Quercus leucotricophora* where shrubs found in the *Quercus* forest are *Berberis lycium*, *Rhododendron arboreum*, *Rubus elliptus*, *Rosa burnoniana*, *Hypercium species*, *Punica generatum* and *Pyrus pashia*. The tree species of *Alnus* forests are mainly comprises of *Alnus nitida*, *Quercus leucotricophora* whereas shrubs in *Alnus* forest are *Berberis lycium*, *Principia utilis* and *Punica gernatum* are the main shrubs

METHODOLOGY

In order to record the community structure of the birds Line Transect Method and Point Count Method were applied. Census was carried out from Dec. 2002 to Dec. 2003. In the study area permanently 2 Km long transect was used in each habitat. The width of the sampling area was fixed to 100 (50m on each side) along the transect. The line transect survey was conducted in early hours of morning and then afternoon. Some times irregular timings were also used. All the birds sighted and heard were recorded while sampling the birds. However, no data was collected, when climatic factors like rain and mist restricted the visibility considerably. The height at which birds were sighted was recorded with visual estimation.

Binocular (Bushnell 7 x 50 USA made) were also used to record the observation from a distance to avoid any disturbance to the birds. Photography was done by making sue of Canon T-70 camera with 210mm & 300mm lenses. Identification of the bird was done from Ali & Ripley (1949) and final confirmation was done from Birds of Indian subcontinent by Grimmet *et al.*, (1998).

OBSERVATION

Community structure was studied in different types of habitat i.e. *Coniferous* forests, *Quercus* forests, *Alnus* forests and Agro-ecosystem. The *Alnus* forest is found around the stream and thus constitute a small ecosystem in the study area.

For our convenience, these different types of habitat were coded as under:

1. *Coniferous* forests Site A
2. *Quercus* forests Site B
3. Agro-ecosystem Site C
4. *Alnus* forests Site D

From the table Fig. No. (1) diversity of birds in different types of habitat is shown in decreasing order as: Agro-ecosystem > *Quercus* forests > *Alnus* forests > Coniferous forests.

Birds are highly mobile and as a result can use different types of habitat. However some birds remain restricted to one type of habitat in the study area. The birds which are present in coniferous forests are Monal pheasant and European hoopoe. No bird was recorded restricted to *Quercus* forest. The birds which are present only in Agro-ecosystem was Blue rock Pigeon. The birds present in the *Alnus* forests are Large Pied Wagtail, White Capped Redstart, Brown Dipper and Lesser Golden Backed Woodpecker. Northern Tree Pie and Spotted Dove, Black Drongo, White Cheeked Bulbul, Black Bulbul, Rose Ringed Parakeet, Chukar, Veridator Fly Catcher, Red Rumped Swallow, Rufous Turtle Dove, Ring Dove and Yellow Wagtail use *Quercus* forest and Agro-ecosystem both as their habitat.

Bared Jungle Owlet and Spotted Owlet shared *Quercus* forest and *Alnus* forest as habitat. Long Tailed Minivet and Rufous Backed Shrike use *Coniferous* forest and Agro-ecosystem as their habitat, whereas Long Billed Vulture and Yellow Sunbird share *Coniferous* forest and *Quercus* forest as habitat. Birds which share the habitat of *Coniferous*, *Quercus* and Agro-ecosystem are Jungle Babblers, White Wagtail, Grey Tit and Jungle Crow. However, Yellow Billed Blue

Magpie, Khalij Pheasant, Himalayan Whistling Thrush, Lorikeet, Blossomheaded Parakeet share the habitat of *Quercus* forest, Agro-ecosystem and *Alnus* forest.

Distribution

Birds are found to distribute spatially and temporally among themselves. They get adopted to specific zones and specific seasons. Thus, they prefer different types of habitat in different seasons.

Spatial Distribution

Black Drongo, Long Billed Vulture were sighted in the top periphery of the canopy. Barbets, Minivet were observed at the middle canopy periphery. White Cheeked Bulbul was also sighted in the middle canopy periphery and in the bush periphery. Black Bulbul was sighted at the tree top. Sun Birds were frequently sighted in the bush periphery. Babblers, Himalayan Whistling Thrush, Monal Pheasant, Khalij Pheasant, Pigeons, Doves, Wagtails, Brown Dipper, White Capped Redstart and Chukar were mostly recorded from the ground. Woodpeckers were mostly sighted in the middle canopy. Varidator Flycatcher was recorded at the top of the tree. Parakeets were frequently sighted in the middle periphery canopy. However, birds such as Yellow Billed Blue Magpie, House Sparrow, Common Myna and Jungle Crow were sighted on the ground as well as on the trees.

Table 1: Showing Distribution of Birds in Different Types of Habitats

S.No.	Name of the Species	Site A	Site B	Site C	Site D
01	Jungle Crow	+	+	+	---
02	Common Myna	---	---	+	---
03.	House Sparrow	---	---	+	---
04.	Yellow Billed Blue Magpie	---	+	+	+
05.	North Eastern Treepie	---	+	+	---
06.	Great Himalayan Barbet	---	+	---	+
07.	Mahratta Woodpecker	+	+	---	---
08.	Lontail Minivet	+	---	+	---
09.	Rufous Backed Shrike	+	---	+	---
10.	Jungle Babler	+	+	+	---
11.	Spotted Dove	---	+	+	---
12.	Black Drango	---	+	+	---
13.	Barred Jungle Owlet	---	+	---	+
14.	White Cheeked Bulbul	---	+	+	---
15.	Black Bulbul	---	+	+	+
16.	Rose Ringed Parakeet	---	+	+	---
17.	Long Billed Vulture	+	+	---	---
18.	White Wagtail	+	+	+	---
19.	Large Pied Wagtail	---	---	---	+
20.	White Capped Redstart	---	---	---	+
21.	Kalij Pheasant	---	+	+	+
22.	Chukar	---	+	+	---
23.	Grey Tit	+	+	+	---
24.	Yellow Sunbird	+	+	---	---
25.	Veridator Flycatcher	---	+	+	---
26.	Whistling Thrush	---	+	+	+
27.	European Hoopoe	+	---	---	---
28.	Rock Pigeon	---	---	+	---
29.	Blossom Headed Parakeet	---	+	+	+
30.	Spotted Owlet	---	+	---	+
31.	Red Rumped Swallow	---	+	+	---
32.	Rufous Turtle Dove	---	+	+	---
33.	Ring Dove	---	+	+	---
34.	Yellow Wagtail	---	+	+	---
35.	Spotted Munia	---	---	+	---
36.	Lorikeet	---	+	+	+
37.	Brown Dipper	---	---	---	+
38.	Lesser Golden Backed Woodpecker	---	---	---	+
39.	Monal Pheasant	+	---	---	---
40.	Baya Weaver Bird	---	---	+	+

Temporal Distribution

The birds show local movements as availability of the resources changes with the changing climate. This influence the seasonal occurrence of bird community and thus changes the occurrence pattern of birds. Migratory birds also influence the species occurrence pattern during winter and summer months.

In site A birds observed during winters are Monal pheasants. In site B there was also changes in community structure during winter because some of the birds migrated to the plains to avoid unfavorable winter conditions. i.e. Longtailed Minivets, Veridator flycatcher, Parakeets, Spotted Munia, Black Drongo, Rufous Backed Shrike, European Hoopoe, Black Bulbul, White Wagtail and Yellow Wagtail. In site C reduction in the birds was also observed, as both these habitats are found side by side. In site D no such effect was found as most of the birds remained there

throughout the year i.e. Large Pied Wagtail, White Capped Redstart, Brown Dipper, Whistling Thrush, Spotted Owlet and Barred Jungle Owlet.

It has also been observed that during summer season site B and C attains higher diversity as compared to site A and D. Thus this seasonal abundance of total birds indicate a temporary migration of birds from plains to hills during summer and from hills to plains during winter season. As different birds require different types of food. Some birds eat insects, some eat seeds, some suck flowers and other eat fruits. Birds which eat insects are called insectivores, seed eating are called gramnivores and nectar sucking are called nectivores and fruit eating are called frugivores birds. However, some birds take both seeds and insects such birds are referred to as omnivores birds.

Birds which are found in different types of habitat are presented as below

Table 2: List of the Recorded Gramnivore Birds

S.No.	Name of the Species	Site A	Site B	Site C	Site D
01.	Blue Rock Pigeon	---	---	+	---
02.	Spotted Dove	---	+	+	---
03.	Rufous Turtle Dove	---	+	+	---
04.	Ring Dove	---	+	+	---
05.	Himalayan Great Barbet	---	+	---	+

From the table (2) it was found that in the *Pinus* forest no gramnivorous bird was recorded. 30.10% birds were observed in the *Quercus* forest. 58% were recorded in the

Agro-ecosystem and 11% in the *Alnus* forest. This shows that highest percentage was observed from Agro-ecosystem due to availability of seeds.

Table 3: List of Omnivorous Birds

S.No.	Name of the Species	Site A	Site B	Site C	Site D
01	Kalij Pheasant	---	+	+	---
02.	Monal Pheasant	+	---	---	---
03.	Common Myna	---	+	+	---
04.	Jungle Crow	+	+	+	---
05.	Chukar	---	+	+	---
06.	Yellow Billed Blue Magpie	---	+	+	+
07.	Baya Weaver Bird	---	---	+	---

From the table (3) it was found that omnivorous birds form 5.77% of *Pinus* forest, 20% of *Quercus* forest, 55.88% of Agro-

ecosystem and 9.38% of the *Alnus* forest. Omnivory works as the buffer to the changing food availability.

Table 4: List of the Insectivorous Birds

S.No.	Name of the Species	Site A	Site B	Site C	Site D
01	Black Drango	---	+	+	---
02.	Rufous Backed Shrike	+	---	+	---
03.	Mahratta Woodpecker	+	---	---	---
04.	Lesser Golden Backed Woodpecker	---	---	---	+
05.	Red Rumped Swallow	---	+	+	---
06.	North Eastern Treepie	---	+	---	---
07.	Lontailed Minivet	+	---	+	---
08.	Black Bulbul	---	+	+	+
09.	White Cheeked Bulbul	---	+	+	---
10.	Jungle Babler	+	+	+	---
11.	Veridator Flycatcher	---	+	+	---
12.	Himalayan Whistling Thrush	---	+	+	---
13.	Grey Tit	+	+	+	---
14.	White Wagtail	+	+	+	---
15.	Large Pied Wagtail	---	---	---	+
16.	House Sparrow	---	---	+	---
17.	Spotted Munia	---	---	+	---
18.	White Capped Redstart	---	---	---	+
19.	Brown Dipper	---	---	---	+
20.	Yellow Wagtail	---	+	+	---
21.	European Hoopoe	+	---	+	---
22.	Barred Jungle Owlet	---	+	---	+

Insectivore birds constitute about 11.61% in the *Pinus* forest, 27.85% were recorded in the *Quercus* forest, 51% in the Agro-

ecosystem and 9.51% in the *Alnus* forest. This shows that diversity of insects and their location gives the bird a separate number of

niches to which they can segregate and reduce competition.

Miscellaneous

Parakeets which mostly eats fruits and are thus called as frugivorous birds and were observed in the study area only during the summer. Longbilled Vultures were observed in Site A and Site B and is of scavenger type.

Food as a Source of Limiting Factor

As the season changes there is a change in the both the quantity and quality of the food. Thus, fluctuation of these resources seems to influence the species composition and number of individual birds utilizing these sites and this results in seasonal migration of the birds.

In the pinus forest it was observed that during winter season Jungle crow, Monal pheasant show altitudinal migration due to the unfavourable climatic conditions. As Quercus forest and Agro-ecosystem lie side by side and also shows the change in community pattern of the birds. This is because of shortage of food as well as unfavourable conditions. AS Agro-ecosystem was having higher diversities (28 species) because of the availability of food in the form of crops, fruits and insects etc. However, in the Alnus forest no community structure was effected.

From this it seems that the abundance of food and its availability regulate the number of birds of the study area. The type, abundance pattern of availability of food resources in space and time have impact on the influence of bottom up factors and as a result in the success of species (Kare *et al.*, op cit.)

DISCUSSION

In India, community structure of the birds has been studied in tropical forest (Ramakrishnan 1983, Jayson and Mathew 2002, Robin and Priya Davidar 2002, Sharma and Mahabal 1997). This is far the first time that community structure was studied in detail in temperate forest in India & J&K state in

particular. In this study community structure was studied in four different habitats i.e. Pinus forest, Quercus forest, Alnus forest and Agro-ecosystem and it was observed that Agro-ecosystem was having more diversity then other three habitats. However, it was analyzed that temperate forest has less diversity as compared to tropical ones. Mac Arthur 1969 & Karr 1971 also reported that tropical areas have substantially greater diversities then the temperate one of the same size. In the study area, it was observed that bird species diversity (BSD) is co-related with vegetation structure and plant species composition. Mac-Arthur and Mac Arthur (1961) and Recher (1969) also discussed the factors that influence the vegetation diversity and assemblages of the birds. They also made the observation that bird species diversity (BSD) is co-related with vegetation structure and plant species composition.

A number of studies have shown that food resources can be a limited factor and that competition for food does occur and community patterns are effected (Minot 1981; Gant 1986; Rodenhouse 1986; Gustafson 1987 and martin 1987). This observation is concordant with the observation made in the study area. It was also analyzed that there was vertical stratification of birds (spatial distribution) with respect to the vegetation. Robin *et al.* (2002) also studied the vertical stratification of birds in mixed species flocks at Paramninulam, South India.

In vertical stratification (spatial distribution) of the birds in the study area, different birds occupy different positions with respect to vegetation structure e.g. Black Drongo. Long Billed Vulture were sighted in the top periphery of the canopy. Barbets, Minivets were observed at the middle canopy periphery and Black Bulbul was sighted at tree tops. Woodpeckers were mostly sighted in the middle canopy.

CONCLUSION

The present study of tehsil Doda (District Doda) of Jammu and Kashmir state documents 41 species. But the area where bird community structure was carried out recorded 40 species. The investigation was started with the aim of making a comparative analysis of pattern and process of avian communities situated in four different habitats. Census was carried out using two standard counting techniques namely Line transect method and Visual count method.

The bird species diversity was found to be maximum (i.e. 28 species) in agro-ecosystem, while minimum in the *Pinus* forests (i.e. 11 species).

The population of the birds fluctuates temporarily due to the change of climate as well as due to migration. Summer season attained higher species of birds than winter season. Agro-ecosystem and *Quercus* forest have 21 species of birds in common.

Food is the major resource and limiting factor which also control the pattern and process of bird community. The composition of different birds belonging to different guilds were also analyzed. Availability of food resource appeared to be very influential factor controlling the seasonal fluctuation of bird communities, the other being change of climatic conditions and consequent emigration and immigration.

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