



## ORNITHOLOGICAL ASSESSMENT OF MANIBUGH WETLAND OF KASHMIR HIMALAYAS

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### ABSTRACT

*Very few studies have been conducted on avifauna of wetlands of Jammu and Kashmir. The avifauna of only few major wetlands such as Hokarsar, Shallbugh, Mirgund and Gharana wetlands has been documented so far. The avifaunas of many other wetlands like Manibugh Wetland have not been documented till date. The present investigation was carried out in Manibugh wetland with an objective to explore its avifauna during Spring-summer and Fall-winter months and compare avifaunal diversities of two periods. The findings may prove helpful in evaluating its importance as bird habitat, thereby ensuring its conservation as potential avian repository. A total of about seventeen (17) species of birds were recorded during the period of investigation. Eleven (11) species of birds utilized the available resources of wetland during Spring-summer period while as twelve (12) species of avifauna were detected during Fall-winter period. Six species of birds were recorded as common species during both periods. Moorhen (*Gallinule chloropus*), Whiskered Tern (*Chlidonias hybridus*) and Dabchick (*Tachybaptus rufficollis*) were three major contributors of Spring-summer avifauna with an importance value Indices (IVI) of 97.24, 78.52 and 29.65 respectively while as Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*) and Gadwall (*Anas strepera*) with IVI of 139.46, 56.59 and 35.03 respectively were recorded as main species of birds during Fall-winter period. Avian diversity during Spring-summer period ( $H_{\beta} = 1.84$ ) was found to be higher than that of Fall-winter*

period ( $H_{\beta} = 1.54$ ). Avian diversities of two periods differed significantly from each other ( $t = 3.86, df = 1013.6, p < 0.001$ ).

**Key words:** Wetlands, Manibugh, Habitat, Importance value index, Avian Diversity

## INTRODUCTION

Bird assemblages are considered as reliable indicators of ecological health and environmental quality of ecosystem (Bryce *et al*, 2002). The wetlands of J&K provide important habitats for a variety of avifauna including resident as well as migrant species for many centuries. Till date forty-two (42) wetlands have been identified in J&K state. However, only few wetlands such as Hokarsar, Haigam, Mirgund, Shallabugh etc. are being managed by State Department of Wildlife. Most of remaining wetlands such as Manibugh wetland are being neglected by State authorities. These valuable water bodies suffer from illegal encroachment, siltation, drainage, pollution, indiscriminate macrophyte harvesting and other anthropogenic pressures. These wetlands besides supporting a variety of invertebrates, vertebrates such as avifauna also harbour a rich gene pool both at planktonic level as well as at vascular plant level. A number of hydrophytes contained in them are used as food, fodder and other economic purposes. Birds, being most conspicuous of all vertebrates, use them as foraging, breeding, overwintering grounds or stopover sites during various seasons of the year. Some species of birds utilize the resources of these wetlands during summer for feeding, breeding or roosting while as some use them as foraging and wintering grounds during winter season

## STUDY AREA

It is a small shallow freshwater marsh ( $34^{\circ}, 01', 06$  N. lat. and  $74^{\circ}, 55', 47$  E. long.) with an area of about fourteen (14) hectares. This wetland is situated at a distance of about forty one (41) kilometers from Anantnag city near village Gallander. More than half of the area of wetland bears free open water areas amongst vegetation patches dominated by cattails (*Typha angustata*). North eastern portion of wetland bears a large patch of emergents dominated by *Phragmites communis*. Open water areas of wetland contain abundant coontail (*Ceratophyllum demersum*) as principal submergent. These areas also harbour floating vegetation in the form of *Nymphaeoidspeltata*, *Lemna gibba*, *Lemna trisulca* and *Potamogeton natans*. The eastern and western boundaries of wetland adjoin two separate karewas. The wetland is fed by a small irrigation channel lying on its western border. This channel itself arises from a distant irrigation

canal constructed for paddy irrigation on croplands situated towards the southern side of wetland. The wetland also receives run off from adjacent karewas during precipitation.

## METHODOLOGY

Due to lack of previous information on study site, a preliminary survey of wetland was carried out to identify its avifauna. The birds, their eggs and nests were identified with the help of identification keys given by Bates and Lowther (1952), S. Ali (1979) and Fleming *et al.* (1979). Monthly surveys of avifauna was conducted in the wetland, using fixed radius point count method (Buckland *et al.*, 2008., Ralph *et al.*, 1995., Bibby *et al.*, 1998). Permanent fixed radius point count stations were established inside wetland using systematic sampling procedure. Point count stations were spaced at a distance of about 150 meters from each other in order to ensure sample independence between sample plots, thereby reducing likelihood of double counting. At each point count station, birds were detected either visually using field binoculars (12/50, super zenith) or through auditory cues involving vocalization, within a circular plot of 38 metres radius around point count station. The surveys were conducted early in the morning between 6.a.m to 9.am on days when weather conditions were conducive for surveying (i.e good visibility, no precipitation or strong winds). A fifteen (15) minute sampling period was used at each point count station for recording birds. After initial three minutes quiet settling time, all birds seen or heard within a 38 metres radius were recorded on data sheets. Similarly birds that flushed out from within the circular plot, during my entry into the sample survey plot, were also recorded. In addition to this, all those aerial foragers whose flight originated from within the sample plot were also recorded in data sheets.

The data obtained from point count stations was pooled to obtain density and abundance of each species/unit area using following equation given by Buckland *et al.*, (2008).

$$(i) \text{ Density/hectare 'D'} = n/k\pi w^2$$

Where n = Total Number of birds detected at all point count stations in a study area

W = fixed radius of sample plot

K = Number of point count stations surveyed

$$(ii) \text{ Abundance 'N'} = AD$$

Where 'A' = Area of study region/wetland

Frequency (%) of each species of bird was computed using following equation.

Frequency (%) = (Total number of sample plots in which a species occurred / Total number of plots surveyed) x 100

Later monthly data was summed up to obtain mean density, mean abundance of each species per hectare. In order to determine the relative contribution of each species of avifauna to the entire community, relative frequency, relative abundance and relative density of each bird species was computed separately. These values were summed up to obtain Importance value index (I.V.I) of each species of bird. For the sake of convenience and on the basis of their stay in the study area, avifauna was categorized into two groups viz. Spring summer avifauna and Fall winter avifauna. Spring summer avifauna comprised of those birds which utilized the resources of wetland from April 2009 to September 2009 while as Fall winter avifauna included birds detected during October 2009 to March 2010.

Later Brillouin's diversity metric ( $H_p$ ) given by Brillouin (1962) was used to determine bird species diversity during Spring-summer and Fall-winter periods as it possesses better discriminating ability than other diversity metrics and does not require randomness of the sample collected. Hutcheson's diversity 't' test was used to compare avian diversities of two periods (Hutcheson, 1970).

## RESULTS AND DISCUSSION

During one year of investigation seventeen (17) species of birds belonging to ten (10) families were recorded in the wetland. Family Anseriformes and Passeriformes and Alcedinidae were three major contributors of avifauna of wetland, each with a share of three (3) species followed by Passeriformes and Rallidae each with two (2) species respectively (table 1). Spring summer avifauna comprising of eleven (11) species of birds belonging to nine (9) families (table.2) were noticed during Spring-summer period while as twelve (12) species belonging to seven (7) families were recorded during Fall- winter period (table.3). Six (6) species of birds were detected during both periods under investigation. Existence of less number of species may be attributed to the occurrence of large number of monospecific patches of Cattail (*Typha angustata*) as bird species diversity is related to both plant species diversity and richness (MacArthur and

MacArthur, 1961). Studies conducted by Weller (1974), Harris *et al* (1983), Rafeet *al* (1985) have demonstrated that diversity of habitats stand more attractive to nesting and foraging birds than homogenous expanses of a single habitat type. Common Moorhen (*Gallinule chloropus*) recorded highest mean density of 16.92 birds / hectare of wetland followed by Whiskered Tern (*Chlidonias hybridus*) and Dabchick (*Tachibaptus rufficollis*) having density of 12.69 and 2.89 birds / hectare respectively during Spring- summer seasons. Marsh Harrier (*Circusaeroginosus*) was found to have lowest mean density of 0.175 birds per hectare of wetland (table 4). Three species of water birds comprising of Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*) and Gadwall (*Anas strepera*) were found to contribute a major share to the Avifauna during Fall-winter season. Mallard (*Anas platyrhynchos*) recorded highest mean density of 20.87 birds per hectare followed by Common Teal (*Anas crecca*) and Gadwall (*Anas strepera*) with mean densities of 7.36 and 4.03 birds per hectare respectively (table 5). Central Asian blue Kingfisher (*Alcedoattathis*) and White breasted Kingfisher (*Cerylerudis*) recorded mean densities of 0.087 birds per hectare each. Determination of Importance Value index (I.V.I) of each species from the data obtained indicated that Manibugh wetland served as an important habitat for Moorhen (*Chloropus gallinule*), Whiskered Tern (*Chlidonias hybridus*), Dabchick (*Tachibaptus rufficollis*) and Great Reed Warbler (*Acrocephalus arundinaceus*) during Spring –summer season. These species recorded I.V.I values of 97.24, 78.52, 29.65 and 25.57 respectively (table 6). Besides foraging, these four species of birds also used this wetland as breeding site. During Fall-winter period the wetland appeared as a favorable habitat for some winter migrants on their arrival from Palearctic region in Europe and Siberia. These birds included dabblers like Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*) and Gadwall (*Anas strepera*) recording Importance value indices of 139.46, 56.59 and 35.03 respectively (table 7). The avifauna of Spring-summer period was more diverse ( $H' = 1.84$ ) than that of Fall-winter avifauna ( $H' = 1.54$ ). When abundance data of avifauna of two periods was compared using Hutcheson's diversity "t" test, the difference in their diversities was found to be significant ( $t = 3.86$ ,  $df = 1013.6$ ,  $p < 0.001$ ). Findings revealed that smaller wetlands like Manibugh wetland are preferred by dabblers like Mallard (Dzubin, 1969). Open water areas of such wetlands contain abundant submergent vegetation which in turn produce waterfowl foods such as seeds, tubers etc. Submergent vegetation also provides necessary habitat for invertebrate populations which attract water birds like Moorhen, Mallard etc. (Krull 1970). As most part of the wetland contains isolated monospecific stands of Cattail (*Typha angustata*), it looks less attractive to diverse species

of Avifauna. Only diverse habitat meets the needs of greatest variety of species (Sugden ,1973).Bird diversity and abundance of Fall-winter period differed from that of Spring-summer period due to change in physical characteristics of wetland such as decline and change in vegetation cover provided by emergents, decline in macroinvertebrate fauna and floristic composition of wetland. The occurrence of Coot (*Fulicaatraatra*) can be explained on the basis of the fact that it is a generalist using all types of wetlands (Sugden ,1979).Three species of kingfishers owe their occurrence to availability of multiple open water areas harbouring fish amongst submergent vegetation. The avifauna of Spring-summer period is more diverse than that of Fall-winter avifauna because ideal environmental conditions such as availability of abundant food, ideal nesting sites and vegetation cover exist in the wetland during Spring-summer period.

## CONCLUSIONS

The research findings revealed that Manibugh wetland serves as an important habitat for Moorhen (*Gallinule chloropus*), Whiskered Tern (*Chlidonias hybridus*), Great Reed Warbler (*Acrocephalus arundinaceus*), Little Grebe or Dabchick (*Tachibaptus rufficollis*) and Mallard (*Anas platyrhynchos*) during Spring-summer period while as Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*), Gadwall (*Anas strepera*) and Pipit (*Anthus novaeseelandiae*) are principal users of this wetland during Fall-winter period. Avifauna of Spring-summer period was recorded to be more diverse than that of Fall-winter period.

Name of bird species	Scientific name	Family
(1) Moorhen	<i>Gallinule chloropus indicus</i>	Rallidae
(2) Dabchick (Little Grebe)	<i>Tachibaptus rufficollis capensis</i>	Podicipididae
(3) Whiskered Tern	<i>Chlidonias hybridus</i>	Laridae
(4) Mallard	<i>Anas platyrhynchos</i>	Anseriformes
(5) Common Teal	<i>Anas crecca</i>	Anseriformes
(6) Gadwall	<i>Anas strepera</i>	Anseriformes
(7) Coot	<i>Fulicaatraatra</i>	Rallidae
(8) Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	Sylviidae
(9) Blue throat	<i>Erithacus vecicus</i>	Passeriformes
(10) Rufous backed Shrike	<i>Lanius schach</i>	Laniidae
(11) Hodgson's Yellowheaded	<i>Motacilla citreola calcarata</i>	Motacillidae

Wagtail		
(12) Marsh Harrier	<i>Cicusaeroginosus</i>	Accipitrinae
(13)Pipit	<i>Anthusnovaeseelandiae</i>	Passeriformes
(14)Central asian small blue kingfisher	<i>Alcedoatthis</i>	Alcedinidae
(15)Pied kingfisher	<i>Cerylerudis</i>	Alcedinidae
(16)White breasted kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae
(17)Great tit	<i>Parus major</i>	Paridae

**Table -1: List of Avifauna recorded in Manibugh wetland**

<b>Spring-summer Avifauna</b>	<b>Fall-winter Avifauna</b>
(1) Moorhen	(1)Mallard
(2)Whiskered Tern	(2)Common Teal
(3)Great Reed Warbler	(3)Gadwall
(4)Dabchick	(4)Dabchick
(5)Mallard	(5) Moorhen
(6)Common Teal	(6)Blue Throat
(7) Hodgson's Yellow headed Wagtail	(7)Great Tit
(8)Rufous backed Shrike	(8)Pipit
(9)Marsh Harrier	(9)Marsh Harrier
(10)Coot	(10)Pied Kingfisher
(11)Central Asian Blue Kingfisher	(11)Central Asian small Blue Kingfisher
	(12)White breasted Kingfisher

**Table- 2: List of Spring-summer and Fall-winter Avifauna**

Name of Species	Relative Density	Relative Abundance	Relative Frequency	Importance Index Value (IVI)
Moorhen	41.83	44.6	10.18	97.24
Whiskered Tern	31.37	33.64	13.51	78.52
Dabchick	7.14	7.65	14.86	29.65
Mallard	5.83	5.79	10.81	22.43
Great Reed Warbler	4.52	4.84	16.21	25.57
Common Teal	3.88	4.18	6.75	14.81
Coot	1.51	1.85	4.05	7.14
Central Asian Blue Kingfisher	1.00	1.1	6.75	8.85
Marsh Harrier	0.43	0.37	2.7	3.5
Rufous Backed Shrike	2.15	2.29	10.81	15.25
Yellow headed Wagtail	0.215	0.44	2.7	3.35

**Table- 3: Importance value index of Spring-summer Avifauna of Manibugh wetland**

Name of Species	Relative Density	Relative Abundance	Relative Frequency	Importance Index Value (IVI)
Mallard	57.95	57.70	23.81	139.46
Common Teal	20.38	20.34	15.87	56.59
Gadwall	11.19	11.15	12.69	35.03
Pipit	3.88	3.85	14.28	22.01
Moorhen	1.69	1.67	1.58	4.94
Great tit	1.21	8.66	6.34	9.26
Blue Throat	0.97	0.95	6.34	8.26
Marsh Harrier	0.97	0.69	7.93	9.59
Pied Kingfisher	0.72	0.95	6.34	8.01
Dabchick	0.48	0.49	1.58	2.55
Central Asian Blue Kingfisher	0.24	0.22	1.58	2.04
White Breasted Kingfisher	0.24	0.22	1.58	2.04

**Table- 4: Importance value index of Fall-winter Avifauna of Manibugh wetland**

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