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Vertebrate fauna of Hokarsar wetland, Kashmir

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Abstract
The present communication deals with the diversity, resident/migrant status, abundance and habitat used by vertebrate fauna which is dominated by Avifauna in Hokarsar wetland. During the present study a total of 8477 birds were recorded. Among them 15.09% belonged to resident community, 11.41% were summer migrants and 73.48% were the winter migrants. A total of 37 bird species belonging to 40 families under 9 orders were observed. Three species of fishes belonging to single order were procured from the wetland. The scale carp *(Cyprinus carpio communis)* contributed 49 Kg's to a total yield followed by mirror carp *(Cyprinus carpio specularis)* which contributed 11.5 Kg's and *Schizothorax niger* contributed least with 2.1 Kg. to the total fish catch. The absence of Amphibians (except few toads) from the study site was attributed to nutrient input, high turbidity, hypoxic conditions, thick mats of noxious weeds together with anthropogenic pressure and habitat destruction.

Keywords: Abundance, Avifauna, Fish fauna, Habitat destruction

Introduction
As a part of biological characteristics, wetlands harbor rich gene pool both at planktonic level as well as vascular plant level. A number of aquatic vascular plants contained in them are used for food, fodder and other economic purposes. Besides these resources wetlands provide suitable habitat for a large number of birds, fishes, amphibians, reptiles and mammals. The major biological influence in wetlands is the rich nutrient laden water that helps dense growth of diverse vegetation, which in turn capture sunlight to build up biomass that slows down the water movement induces setting of particulate matter, silt and other runoff that produces the depth of basin and such wetlands witness constant changes in the water level, composition and structure of plant and animal communities, primary and secondary productivity and therefore the value and functions of wetlands from time to time. They are therefore viewed as transit stages of either terrestrial or aquatic ecosystem (Jampanen, 1976; Kaul *et al.*, 1978) [5, 6].
The valley of Kashmir has always been considered rich in floral and faunal biodiversity. The aquatic habitat in the valley support more than 250 species of macrophytes, 150 to 200 species of phytoplankton, about 300 taxa of periphytic algae and over 50 species of peripytic rotifers (Zutshi and Gopal, 2000) [15]. About 187 species of birds belonging to 46 families under 16 orders have been reported from Kashmir. 37 species of fishes are known to occur in various aquatic systems of Kashmir Himalayas (Yousuf, 1996) [14]. A total of 76 mammalian species, belonging to 20 orders have been reported from Kashmir valley (Dar *et al*, 2002) [3]. The amphibians and reptiles of this region are mainly represented by frogs, toads, lizards and snakes (Sahi and Duda, 1989) [12]. The important chain of wetlands of western Himalayas are found in the valley of Kashmir, some of them are Haigam, Hokarsar, Mirgund, Malgam, Nowgam, Shalbagh, Narkara, etc. the concern over the habitat destruction and overall deterioration of the wetland stimulated the need to carry out the present study. The main purpose of study was to work out the current status of vertebrates associated with this important wetland.

Materials and Methods
For the purpose of present investigation study area was divided into four study units of 100sq. meter each, primarily on the basis of characteristics of vegetation and depth of water column. Visual census method was used for the estimation of bird population. Visual counting was made with the help of high power field binocular (20×50X) from respective vantage points. Observations were made twice in a month.

Identification of birds was done in accordance with identification keys evolved by Bats and Lowther (1995) [1]. Fishes were procured from 4 study sites twice in a month with the help of local fisherman. The fishes were preserved in solution of 10% forma line and brought to laboratory for identification. Usually the fishing was done with the help of cast nets. The census of amphibian, reptilian and mammalian population was done by visual counting method.

Results and Discussion

Vertebrate fauna observed in the wetland were dominated by avifauna which was followed by icthyofauna and amphibians were represented only by few toads. During the present investigations a total of 8,477 birds were recorded from study area. Among them 6229 (73.48%) were the winter migrants. 1280 (15.09%) belonged to resident community, 968 (11.41%) were the summer migrants. In total 37 bird species belonging to 20 families, under 9 orders were observed at four study sites, 351 (13.34%) were summer migrants and 2,158 (76.82%) were the winter migrants. Among the four study sites, at site-I maximum numbers of birds were observed with a total of 2809 (33.13%) of total no. At site-II a total of 2630 (31.02%) of the total were observed, among which 521 (19.80%) were residents, 351 (13.34%) were summer migrants and 1778 (66.80%) were winter migrants. At site-III a total of 1046 (12.33%) of the total were observed, of which 151 (14.43%) were residents, 71 (6.78%) were summer migrants and 824 (78.77%) were winter migrants. At site-IV a total of 1992 (23.49% of the total) were recorded of which 289 (14.74) were residents, 214 (10.74%) were summer migrants and 1489 (74.74%) were the winter migrants.

Large populations of birds were observed at the site-I,II and IV and less number of them were recorded at site-III during the course of present investigation. This is primarily because of availability of food, nesting and resting sites. A large of number of macrophytes (floating submerged and emergent) were observed at these three sites (site-I, II and IV). These macrophytes provide food and places for resting and nesting purposes. Areas having dense vegetation of emergent macrophytes are preferred by Mallards, where as Pochards, coot, Gadwall and Geese prefer open waters (Qadri, 1989) [10]. *Trapa* sp. Provide the best food for various bird species, while as *typha* sp., *phragmites* sp. And some other emergent macrophytes provide the food and best places for nesting, resting and breeding purposes. Most of the water fowl species showed significant preferences of such habitat that possess maximum number of macrophytes and other plant species (Shah, 1984 and Qadri, 1989) [13, 10]. Less number of bird species was observed at site-III of which very less number of birds was seen in summer season, this might be because of the fact that summer migrants usually arrive at the wetland mainly for the purpose of breeding (Qadri, 1989) [10]. As the site-III is characterized by open deep waters, almost absence of emergent macrophytes, which might have provided the places for nesting and breeding purposes. In contrast during winter months the large numbers of birds were recorded at this site because most of the winter migrants like Coot, Gadwall and common Teal prefer the open waters habitat (Qadri, 1989) [10].

In the present study it has been observed that the wetland is mostly visited by the winter migratory avifauna, it might be because of severe cold and non availability of food for their survival in Siberia and other cold areas. 37 species of water fowls were reported to breed in western Siberia and in winter in India. Of these 15 species of water fowls have been reported from Hokarsar (Shah, 1984) [13]. However during the course of present study only 10 species of winter migrants were observed. It is unfortunate that winter is a time of decreased opportunity for energy input via foraging owing to restricted food resources and when energy costs of thermoregulations are greatest in winter the habitat is thus critical and should be protected from human disturbances (Hartman, 1963) [4].

Monthly changes in the Fish Catch composition by number and weight (Site I, II, III & IV)

S. NO	Name of species	Number/Weight	Site - I				Site - II				Site - III				Site - IV			
			May	Jun	Jul	Total	May	Jun	Jul	Total	May	Jun	Jul	Total	May	Jun	Jul	Total
01	*cyprinus carpio communis*	Numbers	10	12	10	32	15	21	14	50	13	27	17	57	04	06	04	14
		Kg.	3.3	4.1	4.1	11.5	4.0	6.5	4.1	14.6	3.6	8.9	6.2	18.7	1.1	1.6	1.5	4.2
02	*Cyprinus carpio specularis*	Numbers	02	-	05	07	04	04	05	13	02	05	06	13	02	02	01	05
		Kg	0.8	-	1.9	2.7	0.8	0.9	2.0	3.7	0.7	1.1	1.4	3.2	0.6	0.8	0.5	1.9
03	***Schizothorax niger***	Numbers	-	-	-	-	-	02	-	02	-	-	01	01	-	-	-	-
		Kg	-	-	-	-	-	1.2	-	1.2	-	-	0.9	0.9	-	-	-	-

Bird Population fluctuation in Hokarsar wetland during the study period

Sites	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Site-I	99	205	203	113	445	500	646	598
Site-II	191	239	218	152	278	479	539	534
Site-III	33	64	39	59	153	186	271	241
Site-IV	79	153	138	111	233	412	467	399
Total	402	661	598	435	1109	1577	1923	1772

Peak Populations Estimates of Waterfowl in Hokarsar

S.NO.	Year	Date	Peak Population
1	1991-92	22nd Feb,1992	25,270
2	1992-93	18th Feb, 1993	33,919
3	1993-94	5th March, 1994	25,403
4	1995-96	3rd March, 1994	98,458
5	1996-97	2nd Jan. 1997	1,21,302
6	1997-98	1Ist Dec. 1997	94,394
7	1998-99	22nd Jan,1999	1,53,020
8	1999-00	29th Feb, 2000	1,78,510
9	2000-01	10th Feb. 2001	3,39,155
10	2001-02	12th Jan, 2002	3,37,832
11	2002-03	15th Jan 2003	4,10,645
12	2003-04	10th March 2004	4,31,538

A total of 194 (62.6 kg) fishes were procured from the study area, during the months (May-July 2005) of the present investigation. Among them 71 (22.8 kg) were collected from Site-III, 65 (19.5 kg) from Site-II. 39(14.2 kg) from Site-I and 19 (6.1 kg) from site-IV respectively. In total three species of fishes belonging to single family under single order were procured from the study area. Scale carp (*cyprinus carpio communis*) contributed 49 kg to the total yield at study area followed by Mirror carp (*Cyprinus carpio specularis*) which contributed 11.5 kg and *Schizothorax niger* contributed very less 2.1 kg to the total yield at four study sites.

Fish yield at site-III was highest as compared to the other study sites primarily because of greater depths and less number of macrophytes. Water at this site was observed to be transparent to light and less number of macrophytes indicate the presence of more dissolved oxygen necessary for the survival of fishes, dense population of macrophytes, less water depth which hampers the survival of fishes (Shah, 1984) [13]. During the course of present study thick mats of *Lemnasalvina* weed complex have been observed, which creates hypoxic condition below the water surface which in turn is detrimental to the fishes and other aquatic organisms (Pandit *et al*., 1978) [9]. Low water depth due to the slit load, which are being carried out by the flood channel from its upper reaches and deposited inside the wetland, increased input of nutrients (Nitrogen, Phosphorus) from agricultural fields situated around the wetland are some of the factors which are responsible for the decrease in the fish yield of the wetland (Pandit & Fotedar, 1982; Pandit, 1982) [7, 8].

The absence of Mammalia, Reptilia and Amphibia (except few toads) from the study area may be attributed to the increased nutrient input, high turbidity, hypoxic conditions, thick mats of noxious weeds, together with anthropogenic pressure and above all habitat destruction which continues unchecked and unabated growth (Berger & Rybacki, 1998; Rouse *et al*, 1999) [2, 11]. One of the important physical factors affecting seriously the biogeochemical characteristics of this wetland is the regular leasing out to the contractors for harvesting of macrophytes which brings about the large destruction of the habitat, other factors are different kinds of land uses in the catchment area and increase in the sediment load through the input of sediment laden water from the Doodganga flood channel into the wetland (Qadri, 1989) [10]. There is immediate need to take steps to manipulate the habitat and improve its quality so that it can support a variety of animal and plant species (biodiversity) which may in turn improve the well being of mankind.

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