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## Current status of fish fauna, catch composition of Hokersar Wetland, Kashmir

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### Abstract

Wetlands, natural and manmade, freshwater or brackish, provide numerous ecological services. Hokersar, the Queen of wetlands in Kashmir Himalaya, is a natural perennial wetland (34°05'N- 34°06'N latitude and 74°8-74°12'E longitude) located 12 km to the west of Srinagar on Srinagar – Baramullah Highway in the northern most part of Doodhganga catchment. The present study was carried out for a period of twelve months from December 2017 to November 2018 at six different sites of the Hokersar Wetland, Kashmir. A total of two species of fishes were collected from the lake which include *Cyprinus carpio* var. *communis* (Punjaeb Gad), *Cyprinus carpio* var. *specularis* (Punjaeb Gad) and *Schizothorax niger* (Ale gad). Overall contribution of the common carp was recorded as 68.4% by biomass and 69.1% by number. Among Schizothoracids, *S. niger* was the only snow trout found in the wetland. It contributed the catch of 33.8% by biomass and 33.9% by number. Maximum catch composition (by biomass) was recorded in the month of March from Site 3 and minimum in the month of April from Site 3.

**Keywords:** Hokersar wetland, catch composition, biodiversity

### Introduction

The word “wetland” is derived from the combination of two independent words -‘wet’ and ‘land’ which primarily gives the idea of a land saturated with water, that may house certain plants and animals. Wetland ecosystems are beauty of nature and wealth for future. These are diverse ecosystems that link people, wildlife and environment in special and interdependent ways through the essential life-support functions of water (Maltby and Barker, 2009) [13]. Wetlands have been identified as one of the key life support systems on this planet in concern with agricultural lands and forests. Wetlands are known to trap pollutants, decompose various wastes and are aptly regarded as the ‘Kidney of Nature’ for the function they perform (Mistch and Gosselink, 1986) [16]. According to the National Wetland Atlas of J&K, Ministry of Environment and Forests, 2010, a variety of wetland types are observed in Jammu and Kashmir state and most of them are of glacial origin and mainly associated with riverine system. The total number of wetlands mapped in the J&K are 1411 with an area of 3,89,261 hectares. In addition, 2240 small wetlands (Area<225 hectares) were demarcated as point features which are mainly high altitude wetlands. The natural wetlands are in dominance in the state occupying around 93 percent area. Apart from Rivers and streams, 1,143 high altitude wetlands with an area of 1, 09, 170 hectares were mapped. Besides, there are 36 ponds/lakes (3.5 per cent). The major man- made wetland types are the reservoirs. In the whole state, there are only 4 of this type with an area of 25,132 hectares (6.4 per cent). The important chain of wetlands found in the valley of Kashmir, are Haigam, Hokersar, Mirgund, Malgam, Nowgam, Shalbagh, Narkara etc. Among the wetlands Hokersar assumes greater significance as it is recognized as one of the “Ramsar Site”, Wetland of International Importance. Hokersar, the Queen of wetlands in Kashmir Himalaya, is a natural perennial wetland (34°05'N- 34°06'N latitude and 74°8-74°12'E longitude) located 12 km to the west of Srinagar on Srinagar – Baramullah Highway in the northern most part of Doodhganga catchment. The wetland, situated at an altitude of 1,584 m A.M.S.L, was once spread over an area of 18.75 km<sup>2</sup> in 1969 and has got reduced to about 13.00km<sup>2</sup> in 2008 (Romshoo and Rashid 2012) [17]. According to Ahmed *et al.*, (2014) the wetland has presently got reduced from 13.26 sq.km to about 7.5 sq.km. Hokersar, despite being a wetland of International importance is rapidly shrinking mainly due to siltation and encroachment that has led to water quality deterioration and loss of

flora and fauna. The anthropogenic activities have resulted in heavy inflow of nutrients into lakes from the catchment areas (Romshoo and Rashid, 2012) [17]. These anthropogenic influences not only deteriorate the water quality, but also affect the aquatic life in the lakes, as a result of which the process of aging of these lakes is hastened. As a consequence, most of the lakes in the Kashmir valley are exhibiting eutrophication. Thus it is important to determine the current fish catch distribution pattern as well as the fish biodiversity of the Hokersar wetland so that the exploited natural resources are recovered to its natural community structure.

## Materials and Methods

### Sampling Sites

A total of 6 sites were selected in Hokersar wetland for sampling:

**Site I:** Is located near the entry gate adjacent to the bird observatory on the north-eastern side of the wetland. There is profuse growth of macrophytes.

**Sites II:** Is situated near the center of the wetland. It can also be treated as open water site.

**Sites III:** It is situated on the eastern side of the wetland towards the Zainkot village. This site experiences very high anthropogenic pressure from the Zainkot village.

**Site IV:** Is located towards the western side of the wetland near Hajibagh village. This site has very sparse growth of macrophytes.

**Site V:** Is located near doodhganga which is the main inlet of the wetland.

**Sites VI:** Is located near Sozieth which is the outlet of the wetland.

### Fish diversity

Random samples of fish were taken from operating gears for catch composition by weight, number and species. The collected catch was sorted species wise and identified with the help of standard taxonomic works (Day, 1878; Hora, 1936; Kullander *et al.*, 1999) [13, 7, 10]. The number of individual fishes of each species were counted & weighed to the nearest gm. Percentage composition of catch (by number & weight) was recorded on monthly basis. The collected samples were brought to FRM laboratory (FOFY) and were preserved in 10% formaldehyde solution for identification (Tilak 1987; Kullander 1999) [10].

## Qualitative and quantitative studies of fish

### Collection and preservation of fish

For the collection of fishes, random samples of fish were taken from each site using cast net. At each study site, sampling was carried out in the morning hours with the help of local skilled fishermen. Representative specimen of different fish species were preserved in 10% formaldehyde solution.

### Identification of fish

The fish specimens were identified to genus and species level using the standard taxonomical keys given by Day (1877) [10] and Kullander *et al.* (1999) [10].

## Statistical analysis

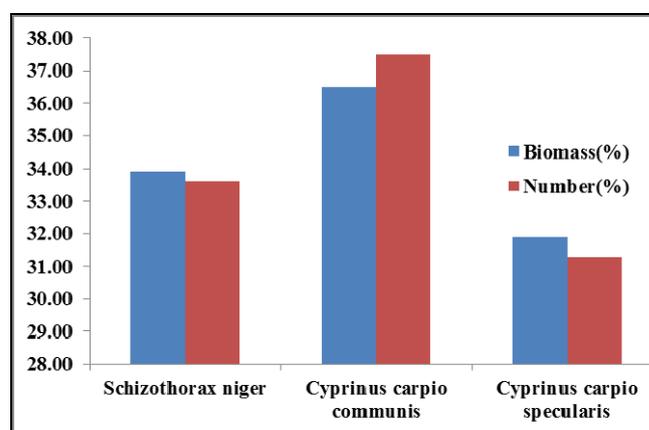
The results obtained were analysed with the help of the appropriate statistical methods using Microsoft Excel and SPSS for Windows.

## Results

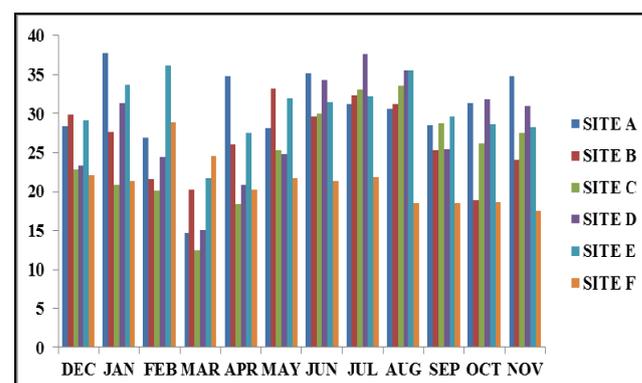
The present study was conducted on Hokersar wetland. The sampling technique was undertaken monthly for a period of one year from December 2017 to November 2018 at six different sites of the wetland. The main fishing gear used was cast net. Only two species of fishes were identified in the wetland which included *Cyprinus carpio* var. *communis* (Punjaeb Gad), *Cyprinus carpio* var. *specularis* (Punjaeb Gad) and *Schizothorax niger* (Ale gad). The dominant species in all the 6 sites of the by *Cyprinus carpio* var. *communis* contributed 36.5% by biomass and 37.5% by number. *Cyprinus carpio* var. *specularis* contributed 31.9% by biomass and 31.3% by number. Overall contribution of the common carp was recorded as 68.4% by biomass and 68.8% by number. Among Schizothoracids, *S. niger* was the only snow trout found in the wetland. It contributed the catch of 33.9% by biomass and 33.6% by number. Maximum catch composition (by biomass) was recorded in the month of March from Site 3 and minimum in the month of April from Site 3

**Table 1:** Percentage contribution of fishes by biomass and number

	Name of fish	Biomass (%)	Number (%)
1	<i>Schizothorax niger</i>	33.90	33.60
2	<i>Cyprinus carpio</i> var. <i>communis</i>	36.50	37.50
	<i>Cyprinus carpio</i> var. <i>specularis</i>	31.90	31.30



**Fig 1:** Percentage contribution of fishes by biomass and number to total (mean) catch



**Fig 2:** Monthly catch composition by biomass at all the sites

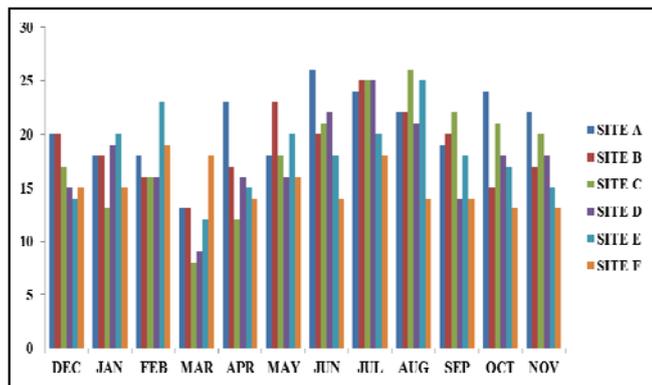


Fig 3: Monthly catch composition by number at all the sites

## Discussion

Catch composition of any fishing operation gives an idea about the varieties of fish availability in that region, which in turn helps in better understanding of the biodiversity. In addition to this type, fish quality and quantity landed by any gear play an important role in determining its economic viability. During the present study a total of two species of fishes were identified in the Hokarsar wetland which included *Cyprinus carpio* var. *communis* (Punjaeb Gad), *Cyprinus carpio* var. *specularis* (Punjaeb Gad) and *Schizothorax niger* (Ale gad), Out of these species of fishes *Cyprinus carpio* var. *communis* was found dominant. *Cyprinus carpio* var. *communis* seems to be well established and may pose a threat to the endemic lake dwelling species in competing for space and food. Mir *et al.* (2017)<sup>[14]</sup> reported three species of fishes belonging to single order from Hokarsar 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. Das and Pandey, (1978)<sup>[4]</sup> and Yousuf (1996) reported introduction of exotics like common carp have resulted in the decline of the catch as well as the diversity of indigenous fishes of Kashmir lakes. The introduction of exotic species have been reported to be the second leading cause, after habitat degradation, of species extinction in freshwater ecosystems (Hill *et al.*, 1997). Kullander (1999)<sup>[10]</sup> reported more than 15 species of fishes from the lakes of Kashmir. Balkhi (2007) worked on fish diversity of Jammu and Kashmir and reported 22 species of fish from Kashmir including Gurez and Ladakh. It was also reported that there was a decrease in fish species with respect to environmental degradation. 15 fish species were reported in Anchar lake by Bashir *et al.*, 2017<sup>[14]</sup>. Rumsya *et al.* (2012)<sup>[17]</sup> reported a total of 16 fish species from Wular lake. Javeed and Abubakr (2017)<sup>[8]</sup> reported 11 fish species from Ahansar lake. Fotedar and Qadri (1974)<sup>[5]</sup> considered *Cyprinus carpio* to present serious competition to local indigenous fishes like *Schizothorax niger*, *Schizothorax esocinus*, *Schizothorax curvifrons* and *Crossocheilus diplocheilus*, and seems to be one of the reason for the dwindling of these species. Das and Pandey, (1978)<sup>[4]</sup> and Yousuf, (1996)<sup>[20]</sup> reported introduction of exotics like common carp have resulted in the decline of the catch as well as the diversity of indigenous fishes of Kashmir lakes. The introduction of exotic species have been reported to be the second leading cause, after habitat degradation, of species extinction in freshwater ecosystems (Hill *et al.*, 1997)<sup>[6]</sup>. A survey of 31 studies of fish introductions in Europe, North America, Australia, and

New Zealand has reported that 77% of cases native fish populations were reduced or eliminated following the introduction of exotic fish. Khan *et al.* (2013)<sup>[9]</sup> reported that introduction of exotic fish species in freshwater ecosystems of Punjab and Pakistan is in great risk of decline due to their vigorous reproductive potential and feeding competitions with the native fish fauna. Leveque (2008)<sup>[12]</sup> also reported overexploitation, flow modification, destruction of habitats, and invasion by exotic species, pollution and eutrophication as major threats to fish biodiversity. Various authors have also reported that during the last few decades, fish biodiversity of India has declined rapidly due to environmental degradation and activities like damming, water abstraction and pollution which have subjected the natural water bodies in general, lakes and rivers in particular, to severe stress with devastating effects on fish diversity (Lakra and Pandey, 2009)<sup>[11]</sup>. Menon *et al.* (2000)<sup>[15]</sup> reported that the present declining trend of fisheries in Kashmir lakes may be attributed to their water pollution and eutrophication

Due to various factors such as human modifications to the environment, overexploitation, habitat loss, exotic species and others, fish fauna of the Wular Lake is greatly threatened. Ecosystems and species are important in sustaining human life and the health of the environment is disappearing at an alarming rate. In order to preserve these threatened areas and species for future generations, immediate action in the form of aquatic biodiversity conservation strategies are necessary. In general, aquatic conservation strategies should support sustainable development by protecting biological resources in ways that will preserve habitats and ecosystems. In order for biodiversity conservation to be effective, management measures must be broad based (Anon.).

Since maintenance of fish biodiversity along with other biotic resource has been viewed as prerequisite for the well-being of even human beings, it is essential to prevent further decline of fish resources by devising all possible measures of conservation and rehabilitation. The conservation policy should promote the management practices that maintain integrity of aquatic ecosystem, prevent endangerment and enhance recovery of the threatened species (Shabir *et al.*, 2013)<sup>[13]</sup>.

## Conclusion

From the present study it was obvious that the fish catch as well as the diversity has changed and apparently got reduced in the Hokarsar Wetland. Most probably the wetland ecosystem is not getting the adequate time to recover its natural community structure. Efforts need to be oriented to preserve this important fish habitat, which has tremendous economic and ecological significance.

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