ICHTHYOFAUNAL SURVEY OF SOME FRESH WATER RESERVOIRS IN PUNJAB

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ABSTRACT

Present study was conducted to analyze the overall status of ichthyofauna at Chashma (River Jhelum) and Taunsa (River Indus) freshwater reservoirs. Fish catches were overall dominated by native fishes along with exotic fishes like *Ctenopharyngodon idella, Hypopthalmichthys molitrix, Hypopthalmichthys nobilis, Cyprinus carpio, Carassius auratus, Oreochromis aureus, Oreochromis mossambicus, and Gambusia affinis.* Statistically values for richness was significantly high in the months of September and October for both the reservoirs, however diversity and evenness were comparable at both the reservoirs.

Keywords: Fish fauna, Freshwater, Taunsa, Chashma, Punjab

INTRODUCTION

There are more than 186 freshwater fish species described from freshwater bodies in Pakistan. Substantial quantities of commercially important fish are caught from rivers annually. The inland commercially important native fish fauna comprises about 30 species of which the economically significant species are: *Labeo rohita, Gibelion catla, Cirrhinus mrigala, Cirrhinus reba, Channa straitus, Channa marulius, Sperata sarwari, Wallago attu, Rita rita, Bagarius bagarius, Tenualosa ilisha, Notopterus notopterus, Tor putitora, schizothorax spp.* and *Clupisoma nazirri* (Peter, 1999).

Freshwater fish fauna is considered as highly diverse and representative of all the warm water fish fauna of Pakistan in the Indus plain (Rafique, 2000). Few comprehensive reports on the fish fauna of the Chashma and Taunsa reservoirs and adjoining areas are written by Mirza and Awan, 1976; Qureshi *et al*. 1988; Mirza and Abubakar, 1993; Mirza and Jan, 1993; Mirza and Bhatti, 1995; Rafique *et al.* 2003; Mirza, 2006. In the last four decades, Pakistan has introduced several alien exotic fish species e.g. grass carp (*Ctenopharyngodon idella*), bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), common carp (*Cyprinus carpio*), gold fish (*Carassius auratus*), three species of tilapia (*Oreochromis aureus, Oreochromis mossambicus, Oreochromis niloticus*) in warm waters and two trout species: the rainbow trout (*Onchorynchus mykiss*) and the brown trout (*Salmo trutta fario*) in colder regions for various purposes like sport fishing, yield enhancement for the biological control of aquatic weeds and mosquito. Provincial fisheries authorities of Baluchistan province have stocked approximately 1.0 million fingerlings of grass carp, silver carp, bighead carp (exotic carps) and other native carps in year July - August 2005 in natural freshwater bodies (Punjab Fisheries Department). Exotic carps have been found in three provinces in Pakistan: Punjab, Sindh, and North West Frontier Province. In recent survey specimen capture of exotic carps subsequently took place at locations in Lake Chashma, Taunsa, in Punjab. During the last two decades, several million fingerlings of exotic carps were released into the freshwater lakes and rivers of Pakistan for the purpose to increase the fish production.

MATERIALS AND METHODS

Taunsa Barrage (Lat: 30º 42'N Long: 70º50'E) was constructed in 1958 on River Indus (district Muzaffargarh); with a maximum design discharge of 750,000 cusecs. The length of the left and right guide bank is 8,327 ft. Chashma Barrage (Lat: 32° 26' 2 N, Long: 71° 22' 44 E) was constructed in 1971 on the River Indus near the village of Chashma. The river valley at Chashma is 6.5 miles wide. The barrage is 3,536 feet long with 3,120 feet of clear waterway and with a maximum design discharge of 1.1 million cusecs. The maximum flood level height of Chashma Barrage is 37 feet. The barrage has 52 bays, each 60 feet wide. The length of the left and right guide bank is 4,302 ft. These reservoirs provide a huge macro-habitat containing diverse microhabitats occupied by a variety of fish fauna. They provide shallow waters in the side streams and off shoots, deep waters in the reservoir areas, stagnant clear waters in dhands, fast flowing waters with high oxygen content, side waters with decomposing vegetation having low dissolved oxygen, seepage water on the sides, shallow waters with submerged vegetation, side pockets with typha and lotus (Rafique, 2005).

Fish specimens were collected from Chashma, and Taunsa fresh water lakes of River Indus, respectively by arranging monthly catch efforts through netting from

September 2005 through February 2006. The order of sampling of both lakes was random. The fishing effort was done by using gill nets with the same length (10 m) and height (1.6 m), but with meshes varying from 15 to 110 mm, knot to knot. Six samples with three replicates were taken from each reservoir. Fishes were preserved in 10 % formalin and then in 70 % alcohol for further studies in the laboratory. Specimens were identified to species level using appropriate identification keys (Mirza and Sharif, 1982 and Talwar and Jhingran, 1991). Computation of data for Richness, Diversity and Evenness of fish was found by using a computer-based program SPDIVERS-BAS.

RESULTS

Fish population analysis in Chashma water reservoir: At Chashma reservoir twenty different fish species were collected and identified. Overall catches revealed domination of Cyprinus *carpio, Oreochromis aureus, Labeo rohita, Labeo gonius, Notopterus notopterus, Clupisoma garua, Rita rita, Hypopthalmichthys molitrix, Ctenopharyngodon idella, Carassius auratus;* where as *Gibelion catla, Cirrhinus mrigala, Eutropiichthys vacha, Wallago attu, Sperata sarwari,* and *Mastacembelus armatus* with minimum richness (table 1).

Fish population analysis in Taunsa water reservoir: Twenty-two different fish species were captured and identified in this study from Taunsa water reservoir. The overall catches were dominated by *Oreochromis niloticus, Oreochromis aureus, Cyprinus carpio, Rita rita, Channa marulius, Wallago attu, Labeo calbau, Notopterus notopteru and Ctenopharynodon idella;* where as *Mastacembelus armatus, Hypopthalmichthys molitrix, Labeo rohita* and *Gibelion catla* with minimum number (table 2).

Table 1: Fish diversity observed in Chashma reservoir

Fish name	Sep	Oct.	Nov.	Dec.	Jan.	Feb.	Number. of fish collected total
Oreochromis aureus	19	15	7	14	8	6	69
Cyprinus carpio	19	6	13	1	7	6	52
Channa punctata	5	9	1	4	6	5	30
Clupisoma garua	8	4	6	3	4	3	28
Labeo rohita	3	8	4	7	0	3	25
Cirrhinus mrigala	9	7	2	4	1	0	23
Cirrhinus reba	7	9	4	0	1	1	22
Ctenopharynodon idella	1	4	0	7	3	4	19
Carassius auratus	4	7	4	0	3	0	18
Labeo gonius	1	5	1	6	1	4	18
Notopterus notopterus	4	1	3	4	2	3	17
Rita rita	4	0	2	3	0	7	16
Eutropiichthys vacha	2	0	3	0	7	2	14
Labeo calbasu	7	1	3	1	0	1	13
Hypopthalmichthys molitrix	4	0	1	2	2	3	12
Channa marulius	3	1	6	1	0	1	12
Mastacembelus armatus	1	6	0	1	0	3	11
Sperata sarwari	3	4	0	2	1	0	10
Wallago attu	2	1	0	5	2	0	10
Gibelion catla	2	0	3	1	0	0	6
Total no. of fish observed	**108**	**88**	**63**	**66**	**48**	**52**	**425**

DISCUSSION

Fish fauna at both the freshwater reservoirs (table; 1& 2) revealed a significant decline when compared to previously published report by Mirza and Abu-Bakar (1993). Statistical analysis of the fish population revealed a non-significant difference among the diversity and evenness of populations of different fish species (table; 3). Results of diversity indices show that diversity and richness was high in September and October in both the reservoirs; however there was a sequential and significant decrease in the richness of fish species during four months from November to February (table; 4) due to seasonal fishing. Presence of *Carassius auratus* was very interesting at Taunsa freshwater reservoir because its presence here has not been reported previously. A fisherman or some fisheries official from the nearby nursery administratively under the jurisdiction

Table-2: Fish diversity observed in Taunsa reservoir

Fish Name	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	No. of Fish caught total
Oreochromis mossambicus	7	1	11	5	1	4	29
Cyprinus carpio	2	9	4	1	2	4	22
Rita rita	5	1	4	1	3	18	32
Cirrhinus reba	4	1	3	5	3	2	18
Clupisoma garua	8	1	4	0	3	1	17
Wallago attu	1	1	4	3	1	5	15
Channa marulius	5	4	1	1	3	1	15
Labeo calbasu	1	7	0	1	5	1	15
Labeo gonius	1	7	4	1	1	1	15
Cirrhinus mrigala	2	1	3	1	5	1	13
Notopterus notopterus	3	1	0	5	3	1	13
Mastacembelus armatus	2	1	5	0	1	3	12
Eutropiichthys vacha	2	3	1	4	1	1	12
Ctenopharynodon idella	3	1	0	2	4	1	11
Hypopthalmichthys molitrix	3	1	3	0	1	0	8
Channa punctata	2	0	1	1	4	0	8
Sperata sarwari	2	1	3	0	0	0	06
Bagarius bagarius	3	1	1	0	1	0	6
Labeo rohita	1	0	2	0	0	2	05
Hybrid (*Labeo rohita & Gibelion catla*)	2	1	1	0	0	1	5
Gibelion catla	0	1	0	0	0	1	02
Carassius auratus	0	0	0	1	0	0	01
Total no of fish	**58**	**48**	**52**	**35**	**40**	**33**	**266**

Table 3: Comparison of diversity indices of Chashma and Taunsa reservoirs. (**P<0.001)**

Diversity Indices	Chashma Reservoir	Taunsa Reservoir
DIVERSITY (Simpson index)	0.37	0.48
RICHNESS (Margelf index)	3.18	3.63
EVENNESS (E5)	0.69	0.74

Table 4: Month wise analysis of diversity indices for Chashma and Taunsa Reservoirs

Diversity (P<0.05)	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
Chashma	0.54[a]	0.51[a]	0.43[a]	0.39[a]	0.41[a]	0.43[a]
Tauna	0.51[a]	0.49[a]	0.42[a]	0.35[a]	0.39[a]	0.38[a]
Richness (P<0.001)						
Chashma	3.17[b]	2.97[b]	2.61[a]	2.19[a]	2.15[a]	2.63[a]
Tauna	2.98[b]	2.74[b]	2.21[a]	1.97[a]	2.11[a]	2.25[a]
Evenness (P<0.05)						
Chashma	0.79[a]	0.69[a]	0.64[a]	0.71[a]	0.61[a]	0.68[a]
Tauna	0.76[a]	0.64	0.69[a]	0.64[a]	0.69[a]	0.68[a]

(a) Non significant, (b) significant

of the Punjab Fisheries department may have introduced the *Carassius auratus* into the reservoir. The present results for fish diversity at Chashma show an apparent decrease when compared to the previously reported fish diversity by Mirza and Abu-Bakar (1993). They reported a total number of thirty-six fish species from Chashma reservoir excluding *Hypopthalmichthys molitrix*, *Ctenopharynodon idella*, and *Oreochromis aureus*, while in the present survey total number of species recorded remains twenty. The apparent decrease in fish diversity

may be attributed to the limited catch effort in the present study.

In the present study *Oreochromis aureus* and *Oreochromis mossambicus* were the most abundant and most evenly distributed species, whereas richness and evenness of *Ctenopharynodon idella*, and *Hypopthalmichthys molitrix* are also comparable to the native fishes. Chashma fresh water reservoir is overall dominated by *Cyprinus carpio* (common carp) and *Oreochromis aureus* (tilapia). From the results of the present study (table; 1 and 2) it is apparently obvious that *Cyprinus carpio, Carassius auratus* and *Oreochromis aureus* at Chashma and *Cyprinus carpio* and *Oreochromis mossambicus* at Taunsa are potentially establishing feral populations.

The decline in fish diversity at both the reservoirs may be attributed to the environmental factors like drought, pollution etc. or over fishing or illegal poaching. However the exotic fishes like *Ctenopharyngodon idella, Hypopthalmichthys molitrix, Hypopthalmichthys nobilis, Cyprinus carpio, Carassius auratus, Oreochromis aureus and Oreochromis aureus* may also have their role in diversity decline of the native fish fauna due to their invasive behavior, as reported by Ortega *et al*. (2007) from Peru for the above mentioned introduced fishes. The dominance of common carp and tilapia is very important and may have serious implications for the native diversity of these water bodies. Both common carp and tilapia are considered as highly invasive and popular worldwide for decreasing the native fish diversity (Hume *et al*. 1983, Pallewatta, *et al*., 2003); however a comprehensive study is required for assessment of the overall fish fauna of major reservoirs in Pakistan and to analyze the role of exotic fishes if there is any towards the declining native fish diversity.

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