

DIVERSITY OF CARPS IN RIVER CHENAB, PAKISTAN

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Abstract: In order to estimate the diversity of fresh water fish fauna of Pakistan numerous studies have been undertaken. The data presented in this paper was collected at Head Qadirabad and Head Khanki situated at River Chenab, from 2007-09. The data collected in the present study have revealed that the population of carps is decreasing gradually in river Chenab. The Shannon-Weiner Diversity Indices (H') for carps was calculated and presented in this paper.

Key words: Fresh water, fish fauna, Qadirabad, Khanki, Threats.

INTRODUCTION

River Chenab is an important wetland which is providing refuge to a variety of fishes, migratory and resident birds, amphibians, reptiles and mammals. One of the best known functions of wetlands was to provide a habitat for wildlife and fish. Unsustainable use of the most important natural resource like water has contributed to the decline of both quality and quantity of wetlands particularly in Pakistan and all over the globe in general. Hence, it is imperative to focus on the preservation, conservation and restoration of these endangered habitats to support continuity of life on earth through sustainability of the biological and ecological resources.

Pakistan has many of the world's significant climatic and vegetation zones. Extensive water management programs were initiated to ensure regular supply of water for agriculture and household consumption after independence of Pakistan in 1947. In this regard three water storage reservoirs, sixteen barrages, twelve interlink canals, two siphons and forty

three main channels were built to prosper the agro based economy of the country by IUCN (1989).

As regards the diversity of freshwater fish fauna of Pakistan various efforts have been undertaken by Butt and Nawaz, 1978; Butt and Mirza, 1981; Day, 1887; Mirza, 1990; Akhtar, 1992; Mirza, 1993 and Mirza, 1994 Mirza, 2003. Sharma (1989) have reported twenty eight species of snow trout in the Himalayan and sub-Himalayan regions observed including China and Pakistan. Menon (1954) observed the distribution of Himalayan fish. Sehgal (1988) have observed the diversity of mahseer in Jhelum, Beas, Sutlej and Yamuna rivers.

Extensive damming on river Chenab by Indian authorities in the upstream areas has decreased the flow of water downstream in the territorial jurisdiction of Pakistan. The decreasing amount of water may result in declining the overall fish diversity including economically important carps.

The present study has been undertaken to investigate the status of carps in the river stretch starting from Qadirabad downstream to the Head Khanki situated at the river Chenab.

MATERIALS AND METHODS

Study area

River Chenab Situated in India and Pakistan, The data was collected at the two important sites; Head Qadirabad (32°19'04 N, 073°41'36 E and elevation is 210 M) and Head Khanki (32°24'07 N, 073°58'39 E, elevation 219 M) at river Chenab. The data was collected in 3 successive years (2007-2009).

Climate

Climate of this area regarded as subtropical with seasonal variation of day length and temperature. Summer temperature remains as high as 45°C and in winter as low as 5°C.

Water Quality

Quality of water was slightly different at two sites, Head Qadirabad (pH 7.9-8.1) and Head Khanki (pH 7.1-8.1).

Sampling

Direct physical counts by netting, group questionnaire survey (indirect observations) and meetings with the fisherman (indirect observations). For identification of the collected fish “A key to fishes of the Punjab” (Mirza and Sharif, 2003) was followed.

Statistical Analysis

The diversity of fish fauna was analyzed through Shannon-Weaver, (1963) indices. The higher value of diversity index indicates the variability in the type of species and heterogeneity in the community where as the lesser values point to the homogeneity in the community.

Shannon-Weiner Diversity Index is denoted by H'.

$$H' = -[\sum P_i \ln P_i]$$

The Species richness was calculated by Margalef's (1958) richness index (R) given as:

$$R = S - 1 / \log N$$

Species evenness was measured using evenness index (E) given by Hill (1973).

$$E = H' / \ln(S)$$

Where,

P_i = proportion of the species relative to the total number of species

$\ln P_i$ = natural logarithm of this proportion

S = total number of species

N = total number of individual

RESULTS AND DISCUSSION

At Head Qadirabad during study period Shannon-Weiner Diversity Index (H') remained as, 1.396 for 2007; 1.36 for 2008 and 1.136 for 2009 as shown in Figure 1 and Table I. The evenness (E) was calculated as 1.396 for 2007; 1.360 for 2008 and 1.136 for 2009 as shown in Table III and

Figure 2. The Richness remained as 2.943 for 2007; 3.042 for 2008 and 3.188 for 2009 as shown in Table III and Figure 3.

At Head Khanki the Shannon-Weiner Diversity Index (H') remained as, 1.328 for 2007; 1.123 for 2008 and 1.094 for 2009 as shown in Figure 1 and Table II, while Evenness (E) was calculated as 0.741 for 2007; 0.63 for 2008 and 0.611 for 2009 as shown in Table IV and Figure 2. The richness remained as 2.8601 for 2007; 3.0244 for 2008 and 3.080 for 2009 as shown in Table III and Figure 3.

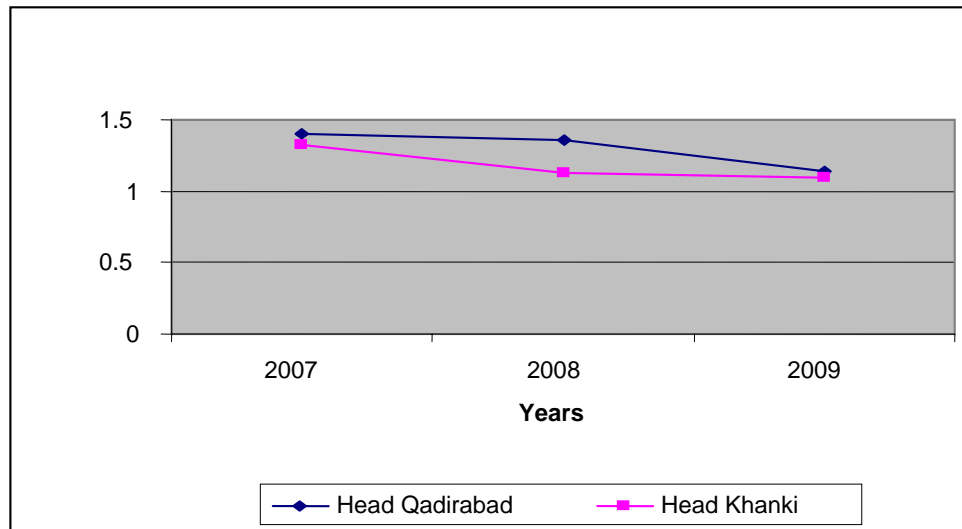


Figure 1. Carp diversity at Qadirabad and Khanki Heads in river Chenab.

Table I: Summary of carps data at Head Qadirabad

Head Qadirabad	2007		2008		2009	
	R.A.	PilogPi	R.A.	PilogPi	RA	PilogPi
<i>Labeo rohita</i>	0.34	-0.3668	0.364	-0.368	0.405	-0.366
<i>Cirrhinus mrigala</i>	0.40	-0.3665	0.409	-0.366	0.432	-0.363
<i>Gibelion catla</i>	0.08	-0.2021	0.068	-0.183	0.081	-0.204
<i>Cyprinus Carpio</i>	0.12	-0.2544	0.091	-0.218	0.081	-0.204
<i>Ctenopharyngodon idella</i>	0.02	-0.0782	0.023	-0.086	0	0
<i>Hypophthalmichthys molitrics</i>	0.04	-0.1288	0.045	-0.141	0	0
	1.00	-1.3968	1	-1.361	1	-1.136

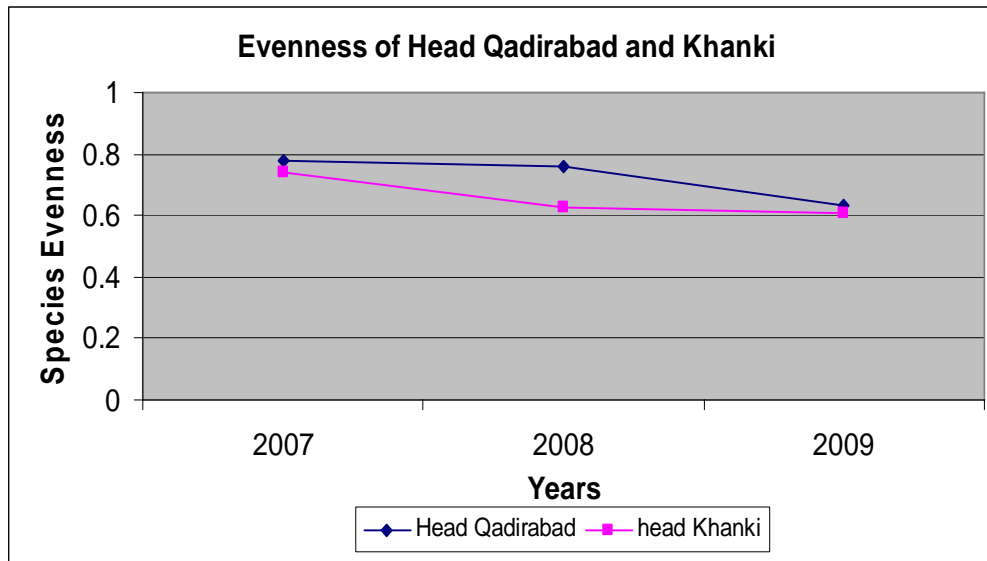


Figure 2. Carps Evenness at at Qadirabad and Khanki Heads in river Chenab.

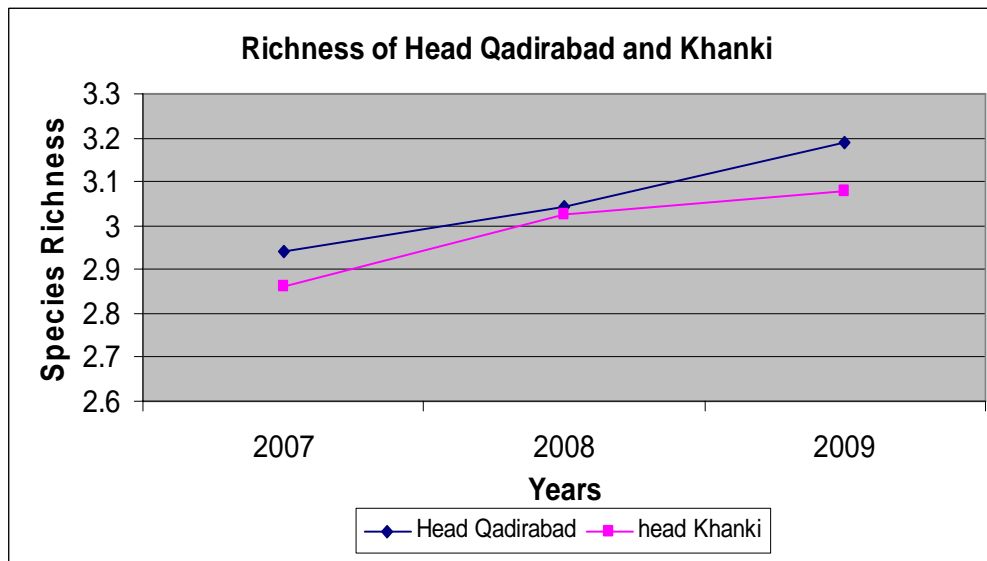


Figure 3. Species richness at at Qadirabad and Khanki Heads in river Chenab.

Table II: Summary of carps data at Head Khanki

Head Khanki	2007		2008		2009	
Scientific Name	R.A.	PilogPi	R.A.	PilogPi	R.A.	PilogPi
<i>Labeo rohita</i>	0.41	-0.365	0.444	-0.36	0.452	-0.359
<i>Cirrhinus mrigala</i>	0.38	-0.368	0.4	-0.367	0.405	-0.366
<i>Gibelion catla</i>	0.09	-0.216	0.089	-0.215	0.095	-0.224
<i>Cyprinus Carpio</i>	0.07	-0.188	0.067	-0.181	0.048	-0.145
<i>Ctenopharyngodon idella</i>	0.02	-0.072	0	0	0	0
<i>Hypophthalmichthys molitricis</i>	0.04	-0.12	0	0	0	0
	1.00	-1.328	1	-1.123	1	-1.094

Table III: Diversity and Evenness at Head Qadirabad river Chenab

Head Qadirabad	2007	2008	2009
Diversity (H')	1.3968	1.361	1.36
Evenness (E)	0.78	0.76	0.634
Richness	2.943	3.042	3.188

Table IV: Diversity and Evenness of Head Khanki

Head Khanki	2007	2008	2009
Diversity (H')	1.328	1.123	1.094
Evenness (E)	0.741	0.63	0.611
Richness	2.8601	3.0244	3.080

The results of the present study shows that freshwater fish fauna of the study sites is decreasing in terms of diversity indices. The carps are the major victim because of their economic and food value. The population of carps is gradually decreasing due to destruction of nesting and hatching sites and excessive hunting. Increasing toxicity due to fertilizers, pesticides in agro-forest land, gradual decrease in water level due to drought and

damming, illegal fishing, ineffective and redundant fish-ladders, and natural as well as anthropogenic destruction of feeding, breeding and nesting grounds are the major factors that contribute in the rapidly decreasing populations of the fish. The modifications of aquatic habitats by the exotic invasive species especially *Cyprinus carpio* and *Oreochromis* species are also negatively influencing the native fish populations of carps.

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