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Assessment of the diversity and ethno-medicinal uses of the carps in Punjab, Pakistan

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ABSTRACT

Introduction: Punjab has extensive irrigation system, fertilized by five rivers flowing through it. It consists of canals, water ways, dams and barrages. Some of the large barrages are Qadirabad, Taunsa, Rasul, Chasma, Marala and Sukhar. So Punjab is also rich in aquatic biodiversity. Fish is the dominant organism of aquatic ecosystem. The main objective of study was to determine diversity of carps of Punjab, Pakistan.

Materials and Methods: the data were from the different sites from the Rivers of Punjab i.e. Rasul Barrage (Jhelum), Baloki Headwork (Ravi), Head Qadirabad (Chenab) and Head Islam (Sutlaj) representing the fish data from all the rivers of the Punjab Pakistan. Diversity indices were calculated by using the computer aided program Past (version 3.18).

Results: During the surveys noted that highest dominance at Qadirabad head work as 0.345 at Qadirabad Barrage; 0.4743 at Rasul Barrage; 0.2734 at Balloki Headwork; 0.2622 at Islam Headwork and 0.24 at Taunsa Barrage.

Conclusion: During the research noted that high diversity of carps are present at all the selected sites of River Chenab.

Key words: Islam, Barrage, Index, Ravi, Chenab

INTRODUCTION

Punjab has extensive irrigation system fertilized by five rivers flowing through it. It consists of canals, water ways, dams and barrages. Some of the large barrages are Qadirabad, Taunsa, Rasul, Chasma, Marala and Sukhar (CBD, 2000). Pakistan has huge canal system of the world with 225 wetlands. Combined area of Pakistan wetland is 0.78 Million hectares having 74% freshwater resources and 26% coastal water areas with 19 Ramsar Sites (IUCN, 1989; Altaf *et al.*, 2014). Water is essential element of humans and other biological fauna. It is routinely used in breeding, drinking, chemical reaction, agriculture and domestic (Bartram and Ballance, 1996). Living organisms have deep association with water, without water life on earth could not exists (Gleick *et al.*, 2002). Water has been major part of all civilization throughout history. Almost all civilizations and societies were built near plenty of water resource (Gupta and Gupta, 2006).

Analysis of water quality is equally important for humans and animals. Quality of water is becoming poorer day by day by human activity. Main causes of this poor and polluted water are chemicals generated by fertilizers and pesticides, urbanizations and industrialization. Heavy metals are very harmful pollutants, negatively affecting the living organisms. Even minor quantity of heavy adversely affects the biological fauna (Singh *et al.*, 2007; Majagi *et al.*, 2008).

Different diversity indices used to calculate the biological diversity and each has its own importance i.e. Shannon and Simpson indices (i.e. values increases with the increase of specie numbers and population), Evenness (Value increases as maximum species show higher similarities), Richness (i.e. value increases with the increase in population number), Dominance (i.e. value increases when number of individuals in population increase) (Pullin, 2002; Altaf, 2016). There are about 27,977 species of fish identified in world. Pakistan has about 171

freshwater fish species (Mirza, 2004; Helfman *et al.*, 2009) and more than 1000 marine fish species (Ali, 1998).

Abundance of fish species all over of the world is due to its breeding area, nesting and climatic conditions. Asiatic region has greater production of fish because of very favorable climatic conditions and large nesting area. Anthropogenic manipulation and natural haphazard are altering the nesting area and production of the fish (Thorp *et al.*, 2010). This alteration is impacting the fish on genetic and morphological levels (Taylor *et al.*, 2006). Major purpose of this study was to determine the current status of carp's diversity in Punjab, Pakistan.

MATERIALS AND METHODS

Study Area*:* Sampling was done at five different sites from Indus Riverine System of Pakistan. Five sites Qadirabad Barrage (River Chenab), Head Baloki Headwork (River Ravi), Rasul Barrage (River Jhelum), Taunsa Barrage (River Indus) and Islam Headworkers (Sutlaj) are selected as shown in figure1 and table 1. Pakistan climatic is mainly consisting of summer (Upto 45^{o}C), autumn, winter (upto 3^{o}C) and spring.

Sample Collection: Information about fish species was collected by using direct and indirect methods. Direct methods including dip net, cast net and hand nets etc. and indirect methods including questionnaire from fish anglers and pictures are used during collection. Duration of research was November 2015 to November 2016. Samples were preserved in lab of fisheries and aquaculture department in University and animal sciences.

Ethno-medicinal data: The data collected through questionnaire about the medicinal uses of the fishes from the inhabitants of the selected sites of the Punjab.

Statistical Methods: Diversity indices such as Dominance (D), Simpson index (S), Shannon (H), Evenness (E), Brillouin (B), Menhinick (M), Richness (R), Equitability (J), Fisher Alpha (F),

Berger Parker (B') were computed by using computer software Past (3.18 version) by Hammer *et al.* (2001).

Table 1: Coordinates of selected sites of the Punjab, Pakistan.

Sampling site	Coordinates		Elevation (ft)
Qadirabad Barrage	N	E	669
	32°20'16	73°68'48	
Balloki Headwork	31°22'22	73°85'89	623
Taunsa Barrage	30°51'28	70°84'95	443
Rasul Barrage	32°68'27	73°51'82	698
Islam Headwork	29°82'58	72°55'07	452

Figure 1: Selected sampling sites of Punjab, Pakistan.

RESULTS AND DISCUSSION

Aquatic ecosystem of the Pakistan is very diverse. Province of Punjab is fertilized by five rivers i.e. Chenab, Jhelum, Sutlaj, Ravi and indus. Diversity of fish species is varying with the passage

of time and various environmental factors i.e. pollution, anthropogenic are changing the overall structure of aquatic community population. So there is a need to monitor and analyze the status of the fish species.

Relative abundance of the major carps is given in table 2 and represented in figure 2. It indicates that Relative abundance of Exotic species. Relative abundance of *Cyprinus carpio* was 0.007463 at Qadirabad barrage, 0.009901 at Rasul Barrage, 0.109049 Balloki Headwork, 0.03413 at Islam Headwork and 0.061111 at Taunsa Barrage. *Hypophthalmichthys molitrix* relative abundance was 0.00995 at Qadirabad Barrage, 0.478548 at Rasul Barrage, 0.00232 at Balloki Headwork, 0.064846 at Islam Headwork and 0.203704 at Taunsa barrage. *Ctenopharyngodon idella* has the relative abundance 0.012438 at Qadirabad Barrage, 0.006601 at Rasul barrage, 0.081206 at Balloki Headwork, 0.047782 at Islam Headwork and 0.109259 at Taunsa Barrage. *Cirrhinus Mrigala* has 0.199005 at Qadirabad Barrage, 0.0033 at Rasul Barrage, 0.111369 at Balloki Headwork, 0.358362 at Islam Headwork and 0.240741 at Taunsa Barrage. *Catla catla* contain Relative abundance 0.323383 at Qadirabad barrage, 0.006601 at Rasul Barrage, 0.336427 at Balloki Headwork, 0.204778 at Islam Headwork and 0.033333 at Taunsa Barrage. *Labeo rohita* has relative abundance 0.447761 at Qadirabad barrage, 0.4950 at Rasul Headwork, 0.359629 at Balloki Headwork, 0.290102 at Islam Headwork and 0.351852 at Taunsa Barrage.

During the surveys different diversity indices were noted as; the Dominance (D) of fish species is 0.345 at Qadirabad Barrage, 0.4743 at Rasul Barrage, 0.2734 at Balloki Headwork, 0.2622 at Islam Headwork and 0.24 at Taunsa Barrage. Simpson Index (S) is observed more at Taunsa Barrage Which is 0.76, Balloki Headwork that is 0.7266 and Islam Headwork that is 0.7378 which indicates the greater number of fish diversity at these sites while at other sites

Simpson index 0.655 (Qadirabad Barrage), 0.5257 (Rasul Barrage) shows less diversified fish population respectively. Shannon (H') index is comparatively higher at Qadirabad Barrage (1.183) while 1.561 at Taunsa Barrage, 1.489 at Balloki Headwork, 0.8316 at Rasul Barrage. Species evenness (E) is greater at Taunsa Barrage (0.7936), while 0.7391 at Islam Headwork, 0.7023 at Balloki Headwork, 0.3828 at Rasul Headwork respectively. Brillouin index (B) is 1.534 at Taunsa Barrage, 1.156 at Qadirabad Barrage, 1.466 at Islam Headwork, 0.8046 at Rasul Headwork and 1.41 at Balloki Headwork. Menhinick (M) indix is 0.3447 at Rasul Barrage, 0.289 at Balloki Headwork, 0.2993 at Qadirabad Barrage, 0.2582 at Taunsa Barrage and 0.2479 at Islam Headwork. Richness (R) is 0.8751 at Rasul Barrage, 0.8338 at Qadirabad Barrage, 0.8243 at Balloki Headwork, 0.7845 at Islam Headwork and 0.7947 at Taunsa Barrage as shown in table 3.

Labeo rohita, Cirrhinus mrigala and *Catla catla* are commercially important indigenous fish species of Pakistan (Peter, 1999). While other are Exotic species introduced in the Rivers of Pakistan including *Ctenopharyngodon idella, Cyprinus carpio* and *Hypophthalmichthys molitrix* (Khan *et al.*, 2011). Altaf *et al.* (2011a), Altaf *et al.* (2011b), Altaf *et al.* (2015) and Hussain *et al.* (2015) recorded carps from river Chenab and Ravi respectively i.e. grass carp, common carp, Mori, Rohu and Silver carp.

These species also have medicinal values. During the surveys noted that all carps are used in medicine against different diseases i.e. enhance sexual power, energy and against cold as shown in table 4.

Conclusion: During the research noted that high diversity of carps are present at all the selected sites of River Chenab. These species also have medicinal values. During the surveys noted that all carps are used in medicine for enhance sexual power, energy and against cold.

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Availability of data: We have included all data in the manuscript that were collected during the field survey.

Authors' contributions: Muhammad designed this study and also performed the research; Umair and Khan write this article; Abbasi, Khan, Khan and Awan critically analysis article and approved as final manuscript.

Table 2: Relative abundance of the Carps species in selected sites of Punjab.

Scientific Name	Common Name	Qadirabad Barrage	Rasul Barrage	Balloki Headwork	Islam Headwork	Taunsa Barrage
Labeo rohita	Rohu	0.447761	0.49505	0.359629	0.290102	0.351852
Catla catla	Thaila	0.323383	0.006601	0.336427	0.204778	0.033333
Cirrhinus Mrigala	Mori	0.199005	0.0033	0.111369	0.358362	0.240741
Ctenopharyngodon idella	Grass carp	0.012438	0.006601	0.081206	0.047782	0.109259
Cyprinus carpio	Common carp	0.007463	0.009901	0.109049	0.03413	0.061111
Hypophthalmichthys molitrix	Silver carp	0.00995	0.478548	0.00232	0.064846	0.203704

Table 3: Diversity Indices of the carps of selected sites of river Chenab.

Indices	Qadirabad Barrage	Rasul Headwork	Baloki Headwork	Islam headwork	Taunsa Headwork
Species	6	6	6	6	6
Dominance (D)	0.345	0.4743	0.2734	0.2622	0.24
Simpson (S)	0.655	0.5257	0.7266	0.7378	0.76
Shannon (H')	1.183	0.8316	1.438	1.489	1.561
Evenness (E)	0.5441	0.3828	0.7023	0.7391	0.7936
Brillouin (B)	1.156	0.8046	1.41	1.466	1.534
Menhinick (M)	0.2993	0.3447	0.289	0.2479	0.2582
Richness (R)	0.8338	0.8751	0.8243	0.7845	0.7947
Equitability (J)	0.6603	0.4641	0.8028	0.8313	0.871
Fisher Alpha (F)	1	1.06	0.9865	0.9307	0.9449
Berger Parker (B')	0.4478	0.495	0.3596	0.3584	0.3519

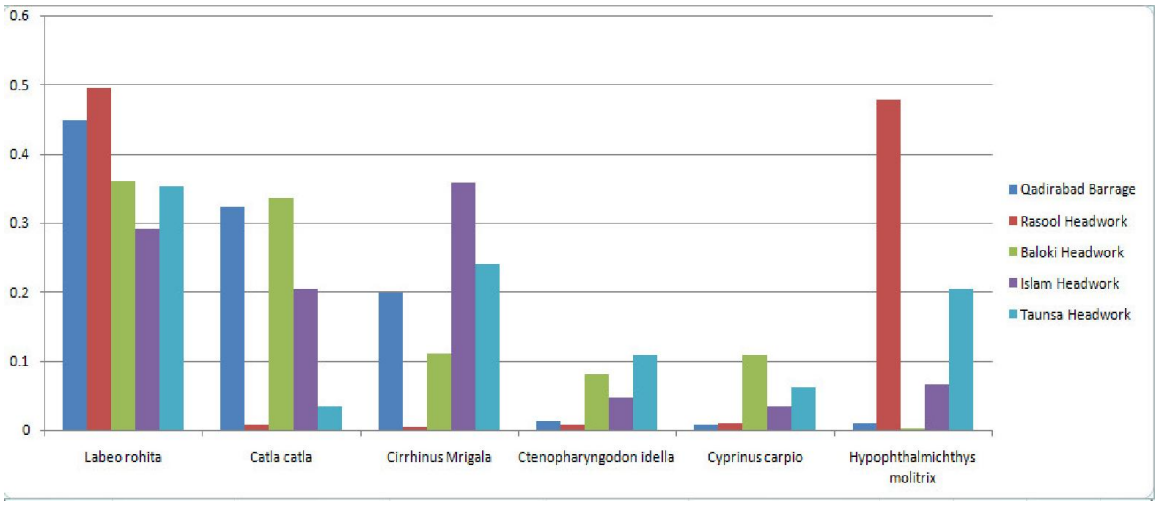

Figure 2: Relative abundance of the carps from the sampling sites.

Table 4: Medicinal uses of carps in the study areas.

Common Name	Medicinal use
Rohu	Meat is used orally to enhance energy.
Thaila	Meat is used orally against cold.
Mori	Meat is used orally to reduce weight.
Grass carp	Meat is used orally against cold.
Common carp	Meat is used orally to enhance memory.
Silver carp	Meat is used orally to enhance sexual power and energy.

REFERENCES

Ali, S.S. 1998. Zoogeography Palaeontology and Wildlife Management. Nasseem Book Publisher.

Altaf, M. 2016. Assessment of Avian and Mammalian Diversity at Selected Sites along river Chenab University of Veterinary and Animal Sciences, Lahore-Pakistan.

Altaf, M., A. Javid, A. Khan, A. Hussain, M. Umair, Z. Ali. 2015. The Status of fish diversity of river Chenab, Pakistan. Journal of Animal and Plant Sciences. 25: 564-569.

Altaf, M., A. Javid, M. Umair. 2014. Biodiversity of Ramsar sites in Pakistan. LAP.

Altaf, M., A.M. Khan, M. Umair, S.A. Chattha. 2011a. Diversity of Carps in River Chenab, Pakistan. Punjab University J. Zool. 26: 107-114.

Altaf, M., A.M. Khan, M. Umair, M. Irfan, M. Munir, Z. Ahmed. 2011b. Ecology and diversity of freshwater fishes of head Qadirabad, Gujranwala. Punjab Univ J Zool. 26: 1-7.

Bartram, J., R. Ballance. 1996. Water quality monitoring: a practical guide to the design and implementation of freshwater quality studies and monitoring programs. World Health Organization.

CBD. 2000. First National Report on Biodiversity, Pakistan. Ministry of Environment Protection and Climate Change. Pakistan.

Gleick, P.H., W. Burns, E. Chalecki, M. Cohen, K. Cushing, A. Mann, R. Reyer, G. Wolff, A. Wong. 2002. The World's Water 2002-2003. Island Press. Washington.

Gupta, S., P. Gupta. 2006. General and applied ichthyology:(fish and fisheries). Chand.

Hammer, O., D.A.T. Harper, P.D. Ryan. 2001. Past: Palaeontological statistical software package for education and data analysis. Palaeontologica Electronica. 4: 9.

Helfman, G., B.B. Collette, D.E. Facey, B.W. Bowen. 2009. The diversity of fishes: biology, evolution, and ecology. John Wiley and Sons.

Hussain, A., M. Ashraf, M. Altaf, W.A. Khan, M. Akmal, J. Qazi. 2015. Relative diversity and threats to commercially important fishes of the Ravi, Pakistan. Biologia. 145-149.

IUCN. 1989. Pakistan Fact Sheet Water. IUCN-Pakistan.

Khan, A., Z. Ali, S. Shelly, Z. Ahmad, M. Mirza. 2011. Aliens; a catastrophe for native fresh water fish diversity in Pakistan. J. Anim. Plant Sci. 21: 435-440.

Majagi, S., K. Vijaykumar, M. Rajshekhar, B. Vasanthkumar. 2008. Chemistry of groundwater in Gulbarga district, Karnataka, India. Environmental Monitoring and Assessment. 136: 347-354.

Mirza, M.R. 2004. Fresh water Fishes of Pakistan. Urdu Science Board. Pakistan.

Pullin, A.S. 2002. Conservation Biology. Cambridge University Press.

Singh, R.K., S.L. Chavan, P.H. Sapkale. 2007. Heavy metal concentrations in water, sediments and body tissues of red worm (Tubifex spp.) collected from natural habitats in Mumbai, India. Environmental Monitoring and Assessment. 129: 471.

Taylor, B.W., A.S. Flecker, R.O. Hall. 2006. Loss of a harvested fish species disrupts carbon flow in a diverse tropical river. Science. 313: 833-836.

Thorp, J.H., M.C. Thoms, M.D. Delong. 2010. The riverine ecosystem synthesis: toward conceptual cohesiveness in river science. Elsevier.