INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print) 2222-5234 (Online)
http://www.innspub.net
Vol. 3, No. 12, p. 65-72, 2013

RESEARCH PAPER OPEN ACCESS

Fish diversity of Indus river at Beka Swabi, Khyber Pakhtunkhwa, Pakistan

Ali Muhammad Yousafzai*, Ahsan Khan

Zoology Department, Islamia College Peshawar (Public Sector University), Khyber Pakhtunkhwa, Pakistan

Key words: Fish diversity, Indus River, Beka Swabi, Fish Species.

doi: http://dx.doi.org/10.12692/ijb/3.12.65-72 Article published on December 09, 2013

Abstract

The Present study deals with fish diversity of Indus River at Beka Swabi. The main aim of this study is to know whether this area of Indus river is rich in fish fauna or not. Present study was conducted for four months that was from November 2012 to February 2013. In this duration 14 species were reported, in which, 04 species were reported in November, 02 species were reported in December, 02 species were reported in January and 06 species were reported in February. These 14 species belong to 05 orders, 05 families, and 11 genera. Orders were Cypriniformes, Siluriformes, Beloniformes, Mastecembeliformes and Channiformes. Families were Cyprinidea, Bagridae, Belonidae, Mestacembelidae and Channidae. Genera were Rasbora, Cyprinus, Labeo, Catla, Tor, Channa, Mystus, Ompok, Xenentedon and Mastacembelus. Species were *Rasbora daniconius, Cyprinus carpio, Carassius auratus, Labeo rohita, Catla catla, Tor putitora, Channa punctatus, Channa gachua, Mystus vittatus, Mystus bleekeri,Ompok pabda, Xenentedon cancila and Mastacembelus armatus*. According to this survey of fish diversity of Indus River at Beka Swabi, the family Cyprinidea was richest family which consists of 07 species, while second richest family was Bagridae which consist of 03 species, third richest family was family Channidae which consist of 02 species and remaining each family consist of single species. It's also concluded from such study that present area of Indus river is rich in fish fauna.

* **Corresponding Author:** Ali Muhammad Yousafzai ✉ Alifishzoology@yahoo.com

Introduction

The word Indus is derived from the Sanskrit word "Sindhu" Greek "Sinthos" and Latin "Sindus" which means divider, keeper of defender. (Gulhati, 1968). In Urdu, the official language of Pakistan, the Indus is known as " Darya -e- Sindh". The Indus river is ranked 23rd biggest river of the world on the basis of annual discharge which is 5.6*1000 m^3 sec^{-1} and 31st on the basis of length which is 11,65,500 km^2 (Wellcome, 1985). The river rises in the southwestern Tibet Autonomous Region of China at an elevation of about 18,000 feet (5,500 meters). For about 200 miles (320 km) it flows northwest, crossing the southeastern boundary of the disputed Kashmir region at about 15,000 feet (4,600 meters). A short way beyond Leh, in Ladakh (in the Indian-administered state of Jammu and Kashmir), it is joined on its left by its first major tributary, the Zaskar River. Continuing for 150 miles (240 km) in the same direction into the Pakistani-administered Northern Areas of the Kashmir region, the Indus is joined by its notable tributary the Shyok River on the right bank. Below its confluence with the Shyok, as far as the Kohistan region, it is fed by mighty glaciers on the slopes of the Karakoram Range, the Nanga Parbat massif, and the Kohistan highlands. The Shyok, Shigar, Gilgit, and other streams carry the glacial melt water into the Indus. The Shigar River joins the Indus on the right bank near Skardu in Baltistan. Farther downstream the Gilgit River is another right-bank tributary, joining it at Bunji. A short distance downstream the Astor River, running off the eastern slope of Nanga Parbat, joins as a left-bank tributary. The Indus then flows west and turns south and southwest to enter the Khyber Pakhtunkhwa Province of Pakistan, in the process skirting around the northern and western sides of the Nanga Parbat massif (26,660 feet [8,126 meters]) in gorges that reach depths of 15,000 to 17,000 feet (4,600 to 5,200 meters) and widths of 12 to 16 miles (19 to 26 km). Trails cling grimly to precipitous slopes overlooking the river from elevations of 4,000 to 5,000 feet (1,200 to 1,500 meters).After emerging from this highland region, the Indus flows as a rapid mountain stream between the Swat and Hazara areas in Khyber Pakhtunkhwa Province until it reaches the reservoir of Tarbela Dam.On its eastern bank it receive several other Himalayan rivers viz, Sutlej, Ravi, Chenab, Jhelum, Poonch and Soan.On the western bank the significant river is the Kabul receive from Afghanistan and beside this various rivers receives like Swat, Panjkora, Khiyali, Chitral and number of small streams in KPK. The other rivers draining the mountains west of the Indus plain are the Kurram, Gomal, Zhob, Tochi, Nari, Bolan, Mula, Gaj and Chakar.Near Tatta the Indus branches into distributaries that form a delta and join the Arabian sea at various points south-southeast of Karachi. The delta covers an area of 3,000 square miles (7,800 square km) or more (and extends along the coast for about 130 miles (210 km). The uneven surface of the delta contains a network of existing and abandoned channels. The coastal strip, from about 5 to 20 miles (8 to 32 km) inland, is flooded by high tides. The Indus delta has elongated protruding distributaries and low sandy beaches. The flow of Indus River through Pakistan is shown in Fig.1.

The above descriptions of the Indus are found in surveys of the corresponding regions, such as (Lambrick 1975, Peter 1995, Kureshy 1977, Fairley 1975, Michel 1967, Ahmad and Chaudhry 1988).

A fish is any member of a paraphyletic group of organisms that consist of all gill-bearing aquatic craniate animals that lack limbs with digits. Included in this definition are the living hagfish, lampreys, and cartilaginous and bony fish, as well as various extinct related groups. Most fish are ectothermic ("cold-blooded"), allowing their body temperatures to vary as ambient temperatures change, though some of the large active swimmers like white shark and tuna can hold a higher core temperature. (Goldman 1997 and Carey 1973). Fish are abundant in most bodies of water. They can be found in nearly all aquatic environments, from high mountain streams (e.g. *char and gudgeon*) to the abyssal and even haydal depths of the deepest oceans (e.g. *gulpers* and *anglerfish*). Unlike groupings such as birds or mammals, fish are not a

single clade but a paraphyletic collection of taxa, including hagfish, lampreys, sharks and rays, ray-finned fish, coelacanths, and lungfish. (Helfman *et al*, 1997). There are almost 28,000 known extant species, of which almost 27,000 are bony fish, with 970 sharks, rays, and chimeras and about 108 hagfish and lampreys. (Nelson 2006). A third of these species fall with in the nine largest families; from largest to smallest, these families are Cyprinidae, Gobiidae, Cichlidae, Characidae,Loricarii dae, Balitoridae, Serranidae, Labridae, and Scorpaenidae. About 64 families are monotypic, containing only one species. The final total of extant species may grow to exceed 32,500. (Nelson 2006). There is 10,000 times more saltwater in the oceans than there is fresh water in the lakes and rivers. However, only 58 percent of extant fish species are saltwater. A disproportionate 41 percent are freshwater fish (the remaining one percent is anadromous). (Cohen 1970). This diversity in freshwater species is, perhaps, not surprising, since the thousands of separate lake habitats promote speciation. (Bone and Moore 2008).

Fish are found in nearly all natural aquatic environments. (Bone and Moore 2008). Most fish, whether by species count or abundance, live in warmer environments with relatively stable temperatures. (Bone and Moore 2008). However, some species survive temperatures up to 44.6 °C (112.3 °F), while others cope with colder waters; there are over 200 finfish species south of the Antarctic Convergence. (Hogan 2011). Some fish species tolerate salinities over 10 percent. (Bone and Moore 2008).

The total number of fish species found in the Indus drainage is 189 of which 177 are recorded from the basin of Pakistan including 12 exotic species. Among the total fish fauna of this drainage, 65 species are found endemic of which 38 species are exclusively endemic to Pakistan. (Rafique 2000).

Swabi lies between the Indus River and Kabul River, in Khyber Pakhtunkhwa (KPK) Province of Pakistan. Its residents are referred to as Swabiwaals. Swabi is the fourth most populous district of the KPK. The Yousafzai clan of Pakhtoons is the district's predominant clan.

Beka Swabi is a town and Union Council of Swabi District in the Khyber Pakhtunkhwa of Pakistan. It is part of Lahor Tehsil. The present-day Beka was founded approximately 300 years ago as a result of the diversion a river, the Indus, which flows through the town.

The present study deals with fish diversity of Indus River at Beka Swabi. The main aim of this study is to know whether this area of Indus river is rich in fish fauna or not. At this site of Indus River previously no work has been reported. It was the first time to report the fish diversity of Indus River at this site, so that's why it was the need to know that whether this area of Indus river have great diversity of fish or not, so to know about fish diversity of this area, the present work was carried out.

Materials and methods

Fish collection

The fish were collected from part of Indus River at Beka Swabi. The fish were collected by using small meshed cast nets, by hooks, by fishing rods, and also we take the help of scoop net. Nets were set up at random throughout the study areas.

Fig. 1. Showing flow of Indus River through Pakistan.

Fish Preservation

After collection, the fish were preserved in 10% formalin while large specimen was injected with 10 % formalin in the abdominal cavity.

Fish Identification

After collection fish were identified up to species level by using keys of Mirza and Sandhu,(2007) and Jayaram(1999), Talwar and Jhingran(1999, 1981).

Fish Marphometric Measurements

In the laboratory, a total of 10 morphometric measurements were recorded for each fish by using ordinary ruler. The morphometric measurements included, Total length, Forked length, Standard length, Post orbital length, Head length, Head width, Body width, Caudal peduncle length, Caudal peduncle height and Eye diameter.

Results and discussion

During the four months (From November 2011 to February 2012) survey of fish fauna of Indus River at Beka Swabi, 14 species were reported. 03 species were reported in November, 02 species were reported in December, 02 species were reported in January and 06 species were reported in February. These 14 species belong to 05 Orders, 05 Families, and 11 Genera. Orders were Cypriniformes ,Siluriformes Beloniformes , Mastecembeliformes and Channiformes. Families were Cyprinidae Bagridae, Belonidae, Mastacembelidae Channidae. Genera were Rasbora, Cyprinus, Carassius, Labeo, Catla, Tor, Channa, Mystus, Ompok, Xenentedon, Mastacembelus. Species were *Rasbora daniconius, Cyprinus carpio, Carassius auratus , Labeo calbasu* **,** *Labeo rohita***,** *Catla catla, Tor putitora, Channa punctatus , Channa gachua, Mystus vittatus, Mystus bleekeri, Ompok pabda, Xenentedon cancila, Mastacembelus armatus* . *Rasbora daniconius* was greenish yellow above, silvery at the sides with black lateral streaks, fins pale orange and caudal lobes tipped gray. *Cyprinus carpio* was greenish brown to golden and even reddish and show great variation under domestication. *Carassius auratus* Grayish brown in the wild state, becomes golden, orange, red etc under domestication. *Labeo calbasu* are slaty on the dorsal side becoming lighter on the ventral side scales with scarlet center. *Labeo rohita* in life bluish along back, becoming silvery on the sides and beneath. Rims of iris are red. Fins grayish or dark. When preserved in formalin, the back black, sides became brownish. Fins dusky. Each scales edge has a deep brown tinge. *Catla catla* are dirty green on back, silvery beneath, fins black with lighter bases. *Tor putitora* are greenish above with light pink sides and silvery white abdomen, fins reddish yellow. *Channa punctatus* are greenish gray above becoming yellowish below, a dark stripe along side of the head and several short cross bands from back to middle of body, fins spotted. *Channa gachua* have dorsal surface greenish-gray, under surface bluish, dorsal anal and caudal fins slate colored fringed with orange, pectoral with black base, transversely barred, with orange margin. *Mystus vittatus* are golden above and lighter beneath, a shoulder spot and five longitudinal silvery streaks on each side, fins usually edged black. *Mystus bleekeri are* brownish gray with two light longitudinal streaks one above the other, a dark shoulder spot, a dark band at the middle of the anal. *Ompok pabda* are silvery with one shoulder spot and another close to the base of tail, longitudinal stripes of dark color often present on the sides of the body. *Xenentedon cancila are* greenish white fine black spots above and whitish below, a dark edged silvery streak extending from above pectoral to base of caudal on the sides. *Mastacembelus armatus* are brown with dark brown spots or bars on dorsal surface and sides, under surface yellow white, fins usually spotted. According to this survey of Fish Diversity of Indus River at Beka Swabi, the Family Cyprinidea was the richest Family which consists of 07 species, While second richest Family was Bagridae which consist of 03 species and third richest Family was family Channidae which consist of 02 species and remaining each Family consist of single species. The fish diversity of Indus River at Beka Swabi is rich and consisting of different number of species which is used as a food source as well as used for the economical importance. Species like the *Cyprinus carpio, Channa punctatus, Channa gachua, Carassius auratus, Labeo rohita* etc are used as a

food source as well as used for the economical importance. In this part of Indus River on food behavior different type of fishes are present like it may be Carnivore, or it may be Omnivores, or it may be Herbivores, which Reflect the a good ecosystem of the water of Indus river. During the study period it is also noted that the temperature in November and February was warmer than the temperature in December and January. So in month November and February more species were reported as compare to month December and January which shows that in Indus River at Beka Swabi more species are found in warmer temperature as compared to colder temperature, and it also clear that Indus river at Beka Swabi mostly contain fishes of warm water as compared to cold water. The fish diversity at this study area along with Orders, Families and Genus are shown in table.1. The marphometric measurement of each fish specie are shown in table .2 and 3. The fish species according to families are shown in Fig.2. Beside this all of the fish species are shown in Fig.3 to16.

Table 1. Showing fish species along with Orders, Families and Genus.

S.No	Orders	Family	Genus	Species
1	Cypriniformes	Cyprinidae	Rasbora	*Rasbora daniconius*
2			Cyprinus	*Cyprinus carpio*
3			Carassius	*Carassiusauratus*
4			Labeo	*Labeo calbasu*
5				*Labeo rohita*
6			Catla	*Catla catla*
7			Tor	*Tor putitora*
8	Siluriformes	Bagridae	Mystus	*Mystus vittatus*
9				*Mystus bleekeri*
10			Ompok	*Ompok pabda*
11	Channiformes	Channidae	Channa	*Channa punctatus*
12				*Channa gachua*
13	Beloniformes	Belonidae	Xenentedon	*Xenentedon cancila*
14	Mastecembeliformes	Mastacembelidae	Mastacembelus	*Mastacembelus armatus*

Table 2. Showing different Marphometric measurement of fish species.

Fish Species	Total Length	Forked Length	Standard Length	Post Orbital Length	Caudal Peduncle Length
Rasbora daniconius	07cm	06cm	05.8cm	06.6cm	0.6cm
Cyprinus carpio	15cm	12.5cm	11.5cm	13cm	02cm
Carassius auratus	12cm	9.8cm	9.5cm	11cm	1.2cm
Labeo calbasu	11.5cm	9.5cm	9cm	10cm	0.6cm
Labeo rohita	12cm	10.2cm	10cm	11cm	1cm
Catla catla	9cm	7cm	6.8cm	8cm	0.5cm
Tor putitora	12cm	11.5cm	9.8cm	11.2cm	1cm
Mystus vittatus	9.5cm	8cm	7.8cm	8.2cm	1.5cm
Ompok pabda	11.5cm	10.5cm	10cm	11cm	0.2cm
Mystus bleekeri	11.5cm	9.5cm	9cm	10.2cm	1.5cm
Channa punctatus	16.5cm	14cm	13.5cm	15cm	1.5cm
Channa Gachua	12.5cm	10.8cm	10.4cm	11.5cm	0.4cm
Xenentedon cancila	24cm	23.2cm	23cm	19cm	0.5cm
Mastacembelus armatus	35cm	32cm	33cm	34cm	_

Table 3. Showing different Marphometric measurement of fish species.

Fish Species	Head Length	Head Width	Body Width	Caudal Heigth	Eye Diameter
Rasbora daniconiu	01cm	0.8cm	1.2cm	06.6cm	0.3cm
Cyprinus carpio	3.5cm	2.5cm	04cm	1.5cm	0.5cm
Carassius auratus	2.4cm	2.2cm	3.8cm	1.8cm	0.6cm
Labeo calbasu	02cm	1.5cm	2.4cm	1cm	0.5cm
Labeo rohita	1.2cm	1.4cm	02cm	01cm	0.4cm
Catla catla	02cm	1.8cm	2.5cm	01cm	0.4cm
Tor putitora	2.2cm	1.8cm	2.2cm	1.2cm	0.5cm
Mystus vittatus	1.5cm	01cm	1.8cm	01cm	0.4cm
Ompok pabda	01cm	1.2cm	2.5cm	0.7cm	0.3cm
Mystus bleekeri	02cm	1.4cm	2.5cm	01cm	0.5cm
Channa Punctatus	_	03cm	04cm	02cm	0.6cm
Channa gachua	_	2.5cm	2.4cm	01cm	0.4cm
Xenentedon Cancila	6.5cm	02cm	03cm	0.5cm	0.6cm
Mastacembelus armatus	_	02cm	2.5cm	_	0.4cm

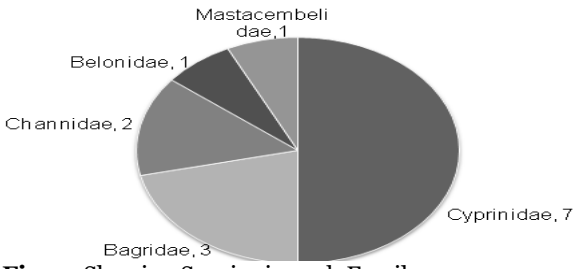

Fig. 2. Showing Species in each Family.

Fig. 3. *Rasbora danicon.*

Fig. 4. *Xenentedon cancila.*

Fig. 5. *Mastacembelus armatus.*

Fig. 6. *Mystus Vittatus.*

Fig.7. *Cyprinus carpio.*

Fig. 8. *Channa punctatus.*

Fig. 9. *Channa gachua.*

Fig. 10. *Ompok pabda.*

Fig. 11. *Carassius auratus.*

Fig. 12. *Labeo calbasu.*

Fig. 13. *Labeo rohita.*

Fig. 14. *Mystus bleekeri.*

Fig. 15. *Catla catla.*

Fig. 16. *Tor putitora.*

References

Ahmad N, Chaudhry GR. 1988. Irrigated Agriculture of Pakistan.

Bone Q, Moore RH. 2008. Biology of Fishes. 418–422, Taylor & Francis Group. ISBN 978-0-415-37562-7

Carey FG, Lawson KD. 1973. Temperature regulation in free-swimming blue fin tuna. *Comparative* Biochemistry and Physiology Part A: Physiology **44(2),** 375–392. http://dx.doi.org/10.1016/0300-9629(73)90490-8

Fairley J. 1975. The Lion River: The Indus. ISBN: 0381982726/9780381982720.

Goldman KJ. 1997. Regulation of body temperature in the white shark, *Carcharodon carcharias,* Journal of comparative physiology, Biochemical systematic and environmental physiology **167(6)**, 423-429. http://dx.doi.org/10.1007/s003600050092

Gulhati ND. 1968. The Indus and its tributaries in mountains and river of India. Edition B.C.Law. 348-355. National committee for Geography, Culeutta, 21st international Geography Congress, India.

Hogan MC. 2011. Ross Sea. Eds. P.Saundry & C.J.Cleveland. Encyclopedia of Earth. National Council for Science and the Environment. Washington DC.

Helfman G, Collette B, Facey D . 1997. The Diversity of Fishes. Blackwell Publishing. ISBN 0-86542-256-7.

Jayaram KC. 1981. The fresh water fishes of the India, Pakistan, Bangladesh, Burma and Srilanka. A hand book Zoological Survey of India, Calcutta.

Jayaram KC. 1999. The fresh water fishes of Indian region .Narendra publishing house, Delhi, India.

Kureshy KU. 1977. A Geography of Pakistan, 4th edition. ISBN: 0195772229 9780195772227.

Lambrick HT. 1975. Sind: A General Introduction, 2nd edition. ISBN: 0195772202 / 0-19-577220-2.

Mirza MR, Sandhu AA. 2007. Fishes of Punjab, Pakistan. First edition, Ploymer Publication. Rahat Market, Urdu Bazar, Lahore.

Michel AA. 1967. The Indus Rivers: A Study of the Effects of Partition. ISBN: 0300007701/ 9780300007701.

Nelson JS. 2006. Fishes of the World.4th edition. ISBN: 978-0-471-25031-9.

Peter RB. 1995. Pakistan: A Country Study, 6th edition. ISBN: 0844408344/978-0844408347.

Rafique M. 2000.Fish diversity and distribution in Indus River and its drainage system. Pakistan Journal Zoology **32(4),** 321-332.
http://dx.doi.org/0030/2000/0004-0332

Talwar PK, Jhingran AG, 1991. Inland fishes of India and adjacent countries, 02 volumes, Oxford and IBH Publishing Co. New Delhi, Bombay, Calcutta, India.

Wellcome RL. 1985. River Fisheries.FAO fisheries technical paper No: 262. Food and Agriculture organization of the United Nation, Rome.