



RESEARCH PAPER

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A preliminary study of Ichthyofauna of Garhi Usmani Khel stream and Meherdy stream at Dargai District Malakand, Khyber Pakhtunkhwa Pakistan

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Abstract

Based on the importance and crucial role in biosphere, studying fish is a debatable issue. Among animal research its study is as prominent as bright day light. Biodiversity refers to the number of different species living in an ecosystem. The current study was carried out from May 2016 to August 2016 to find out Ichthyofauna of Garhi Usmani Khel Stream and Meherdy Stream at Dargai District Malakand, Khyber Pakhtunkhwa Pakistan. The fish specimens were then identified by studying various morphometric measurements and meristic counts. This study included eight species; *Barilius pakistanicus*, *Puntius chola*, *Channa punctata*, *Channa gachua*, *Acanthocobitis botia*, *Crossocheilus diplocheilus*, *Mastacembelus armatus* and *Ompok pabda* belonging to four orders (Cypriniformes, Channiformes, Mastacembeliformes, Siluriformes) and five Families (Cyprinidae, Channidae, Nemacheilidae, Mastacembelidae, Siluridae). Cyprinidae was the most dominant family comprised of three species; *Barilius pakistanicus*, *Puntius chola* and *Crossocheilus diplocheilus*. The family Channidae included two species i.e. *Channa punctata* and *Channa gachua* while Nemacheilidae, Mastacembelidae and Siluridae were represented by only one species each, *Acanthocobitis botia*, *Mastacembelus armatus* and *Ompok pabda* respectively. It was concluded that *Ompok pabda* is strictly endangered in River Swat and especially in Garhi Usmani Khel Stream and Meherdy Stream. It is strongly recommended to conserve this species (*Ompok pabda*).

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Introduction

Fish are one of the largest groups of Phylum vertebrata and can be found in almost every part of aquatic life. It is the most abundant and ancient class of vertebrate (Jayaram, 1999). There are approximately 28,000 living species of fish are known. Moreover, 27,000 species belong to Osteichthyes, 108 to Agnathans and 970 to Chondrichthyes (Ali and Narejo, 2009). Fish shows much more diversity in their body morphology and physiology due to their habit and habitat. Biodiversity refers to the number of different species living in an ecosystem (Lipinski, 2003).

Based on the importance and crucial role in biosphere, studying fish is a debatable issue. Among animal research its study is as prominent as bright day light. Fish play key role in the economic (Ahmad and Hasan, 2011), nutritional and medicinal aspects of a country (Ullah and Ahmad, 2014). Fish are vital for economy because they have been constantly using as a food resource in the diet of many people. It provides proteinaceous meat as a food and a variety of by products like fish oil, fish rye, fish meal, etc (Akhtar *et al.*, 2015). Hundreds and thousands of people are employed in fisheries sector throughout the world (Nagabhshan and Hosetti, 2010). According to Delgado *et al.* (2003), aquaculture provides more than 30% of fish production for consumption in developing countries. Fish is much more medicinally important because fish oil is used medicinally (Khawaja *et al.*, 2012). Fish oil are effective in pregnancy and its complications (Dunsten *et al.*, 2004; Olsen *et al.*, 2000), heart transplant surgery (Holm *et al.*, 2001), etc. Beside a source of food, medicine and economic value it also plays a critical role in the second trophic level of the aquatic life (Dubey *et al.*, 2012).

Throughout the world especially in Pakistan, fish fauna has been extensively studied. Identification of various fish species is mainly carried out while taking different Morphometric measurements. These morphometric measurements are highly variable from species to species.

These may be constant and variable. Mostly, the constant ratios are used for identification purposes. However, various biotic and abiotic factors may cause changes in various parts of the body (Muhammad *et al.*, 2014).

Large numbers of studies have been performed on Ichthyofauna from various freshwater bodies of Pakistan. However, the current study is the preliminary study on Ichthyodiversity of Garhi Usmani Khel Stream and Meherdy Stream at District Malakand, Khyber Pakhtunkhwa Pakistan. Therefore, this study was performed with the aim to find the diversity of fish species Garhi Usmani Khel Stream and Meherdy Stream at Malakand District.

Materials and methods

Sampling Area

District Malakand is located at the Longitude and Latitude of 34.5030° North and 71.9046° East respectively. It is geo-strategically more important as it plays a role of connection point for Bajaur, Swat, Lower Dir and Buner. Moreover, the Malakand pass connects Mardan to Swat and Dir. The two Streams (Garhi Usmani Khel Stream and Meherdy Stream) located in District Malakand, are the tributaries of River Swat.

Sampling and Data Analysis

Fish collection was performed from different locations of both the Streams. Sampling was done from May to August 2016. Various types of nets, scoop nets, hooks and mesh cloth were used. The samples were fixed in 10% formalin and then preserved in 70% alcohol so that to protect the samples from insect pest and oxidation. The samples were labelled giving serial number, name of locality, name of collector, date of collection, etc. The fish specimens were then identified by studying various morphometric measurements and meristic counts (Table 3) with the help of ruler and Vernier calliper. The sample's identification was made while using various taxonomic and identification keys, Fishes of the Punjab (Mirza and Sandhu, 2007), Freshwater fishes of the Indian Regions (Jayaram, 1999) and Inland fishes of the India and adjacent countries (Talwar and Jhingran, 1991).

Results

During the present study, a total of 338 fish specimens were collected comprising of eight species including; *Barilius pakistanicus*, *Puntius chola*, *Channa punctata*, *Channa gachua*, *Acanthocobitis botia*, *Crossocheilus diplocheilus*, *Mastacembelus armatus* and *Ompok pabda*.

These species belonging to four Orders (Cypriniformes, Channiformes, Mastacembeliformes, Siluriformes), five families (Cyprinidae, Channidae, Nemacheilidae, Mastacembelidae, Siluridae) and seven genera (Barilius, Crossocheilus, Puntius, Acanthocobitis, Channa, Mastacembelus, Ompok) (Table 1).

Table 1. Reported Fish species of Ghari Usmani Khel and Meherdy Streams at Dargai, Malakand.

SN	Order	Family	Genus	Species
1			<i>Barilius</i>	<i>Barilius pakistanicus</i>
2	Cypriniformes	Cyprinidae	<i>Crossocheilus</i>	<i>Crossocheilus diplocheilus</i>
3				<i>Puntius</i>	Puntius chola
4		Nemacheilidae	<i>Acanthocobitis</i>	<i>Acanthocobitis botia</i>
5	Channiformes	Channidae	<i>Channa</i>	<i>Channa punctata</i>
6					Channa gachua
7	Mastacembeliformes	Mastacembelidae	<i>Mastacembelus</i>	<i>Mastacembelus armatus</i>
8	Siluriformes	Siluridae	<i>Ompok</i>	<i>Ompok pabda</i>

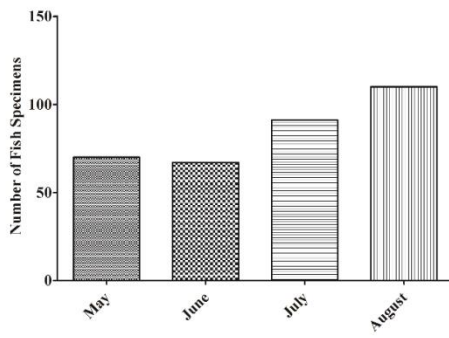
Table 2. Monthwise distribution of collected Fish specimens.

Species	May	June	July	August	Total
<i>Barilius pakistanicus</i>	22	19	23	25	89
<i>Crossocheilus diplocheilus</i>	3	2	7	15	27
<i>Puntius chola</i>	29	24	32	30	115
<i>Acanthocobitis botia</i>	3	5	8	13	29
<i>Channa punctata</i>	3	5	8	7	23
<i>Channa gachua</i>	2	5	4	3	14
<i>Mastacembelus armatus</i>	8	7	9	16	40
<i>Ompok pabda</i>	0	0	0	1	1
Total	70	67	91	110	338

Table 3. Morphometric measurements (cm) of reported Fish species.

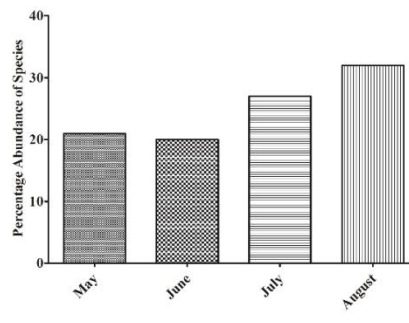
Species	T. L	F. L	S. L	Sn. L	H. L	E. D	Pr. L	Ps. L	Pr. VL	Ps. VL	Cp. L
<i>B.pakistanicus</i>	9.4	8.3	7.9	0.5	1.8	0.5	4.4	5.0	3.7	5.7	1.4
<i>P.chola</i>	9.8	9	7.8	0.7	2.4	0.4	3.9	5.5	3.3	6.1	1.2
<i>C.punctata</i>	15.2	....	12.7	0.9	4.6	0.5	5.1	0.6	5.2	3.7	0.8
<i>C.gachua</i>	10.4	....	8.9	0.6	2.2	0.4	3.4	0.4	3.4	2.8	0.6
<i>A.botia</i>	6.4	....	5.2	0.6	0.9	0.2	2.4	2.8	2.9	3.1	0.6
<i>C.diplocheilus</i>	8.7	7.9	7.2	0.6	1.6	0.3	3.3	4.2	3.8	4.5	0.7
<i>Ompok pabda</i>	14	....	12.5	0.7	3	0.4	3.6	11.4	5.5	1.7	....
<i>M.armatus</i>	32	....	28	1.1	2.8	0.4	14.5	....	....	....	....

T.L = Total Length, F.L = Forked Length, S.L = Standard Length, Sn. L = Snout Length, H.L = Head Length, E.D = Eye Diameter, Pr. L = Pre-dorsal Length, Ps. L = Post-dorsal Length, Pr. VL = Pre-pelvic Length, Ps. VL = Post-pelvic Length, Cp. L = Caudal peduncle length



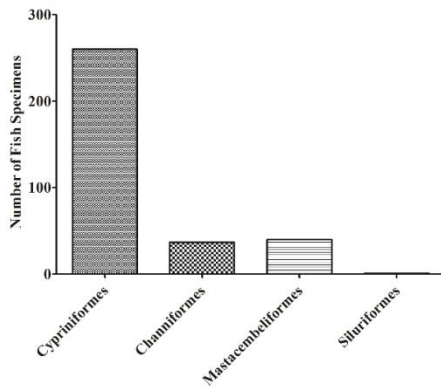
Monthwise Abundance of Fish

Fig. 1.



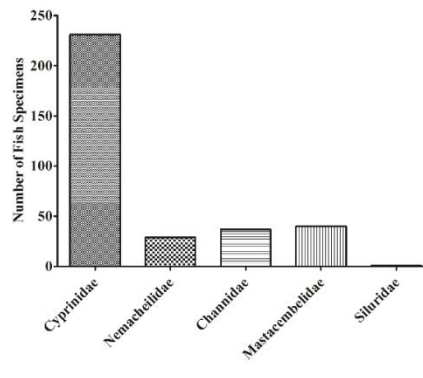
Percentage Abundance of Species

Fig. 2.



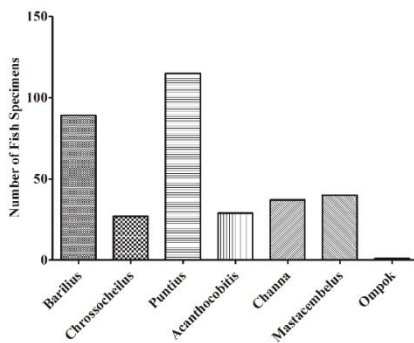
Orderwise Abundance of Fish

Fig. 3.



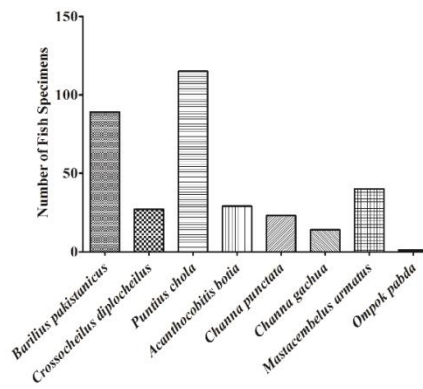
Familywise Abundance of Fish

Fig. 4.



Genuswise Abundance of Fish

Fig. 5.



Relative Abundance of Fish Species

Fig. 6.

Fig. 1. Monthwise collection of the total fish specimens from May-August 2016.

Fig. 2. Monthwise percentage abundance of total reported fish species from May-August 2016.

Fig. 3. Orderwise diversity of the total collected fish specimens.

Fig. 4. Familywise diversity of the total collected fish specimens.

Fig. 5. Genuswise diversity of the total collected fish specimens.

Fig. 6. Relative abundance of the total reported fish species from both Garhi Usmani Khel Stream and Meherdy Stream.

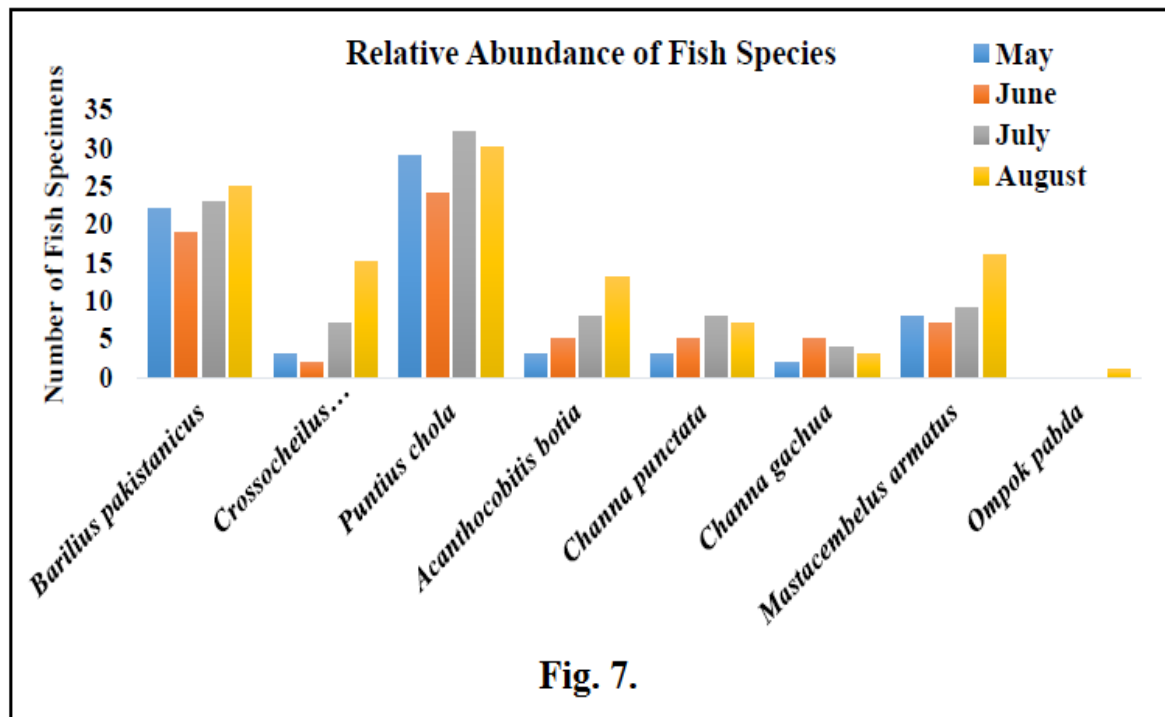


Fig. 7. Monthwise relative abundance of all the fish specimens of total reported species from May-August 2016.

Discussion

No research work has been done on Garhi Usmani Khel Stream and Meherdy Stream; the current study was the preliminary study. Few research surveys have been carried out on other water bodies in the nearby district's Rivers especially River Swat. As the above streams are the tributaries of River Swat, we will mostly compare our study with those studies that are carried out on River Swat.

A total of eight species were reported from Garhi Usmani khel Stream and Meherdy Stream. All these species belonging to four orders and five families. Cyprinidae was the richest family represented by three species. Moreover, August was the richest month represented by total collection of 110 fish specimens. Among the reported species, *Puntius chola* was the most abundant species with a total number of 115 specimens while *Ompok pabda* was the poorest with one specimen only (Table 2).

In the current study, five edible species i.e. *Barilius pakistanicus*, *Channa punctata*, *Channa gachua*, *Crossocheilus diplocheilus* and *Mastacembelus*

armatus were included from both the streams which are locally being used as a food. Hasan *et al.* (2013) studied Ichthyofauna of River Swat and collected 17 edible species i.e. *Carassius auratus*, *Tor macrolepis*, *Labeo diplostomus*, *Channa gachua*, *C. punctatus*, *Oncorhynchus mykiss*, *Cyprinus carpio*, *Salmo trutta fario*, *Crossocheilus diplocheilus*, *Racoma labiata*, *Schizothorax plagiostomus*, *Clupisoma garua*, *C. naziri*, *Mystus bleekeri*, *Eutropichthys vacho*, *Barilius pakistanicus* and *Mastacembelus armatus*. By comparing, only five edible species i.e. *Barilius pakistanicus*, *Channa gachua*, *C. punctatus*, *Crossocheilus diplocheilus* and *Mastacembelus armatus* were common in both studies. Similarly, *Ompok pabda* was absent in their study. However, only seven species were common to both studies as they identified fifty species while all other species were missing in our study. The reason might be the wide range of the site of collection as they collected fish sample in the area from Swat to Charsadda. Moreover, a river has more vegetation, large variety of food, large amount of water, habitats etc as compared to streams. Therefore, their study included wide range of species diversity.

Yousafzai *et al.* (2013) also conducted a study on fish fauna of River Swat at Charsadda and reported 38 species. By comparing both the studies, only six species were common i.e. *Barilius pakistanicus*, *Puntius chola*, *Channa punctata*, *Channa gachua*, *Crossocheilus diplocheilus* and *Mastacembelus armatus*. In addition, *Ompok pabda* was missing in their study. Similarly, Ishaq *et al.* (2014) worked on ichthyofauna of River Swat from Madyan to Chakdara and collected 18 species. Only five species; *Barilius pakistanicus*, *Channa punctata*, *Channa gachua*, *Crossocheilus diplocheilus* and *Mastacembelus armatus*. There is a great difference between the temperature range of Madyan (District Swat) and District Malakand as the former has low temperature which may be the reason that led to variation in the diversity.

Muhammad *et al.* (2014) reported eleven species from River Panjkora. This river joins the River Swat at Totakan, District Malakand. Comparing both works, only three species are common i.e. *Barilius pakistanicus*, *Crossocheilus diplocheilus* and *Channa punctatus*.

Conclusions and recommendations

Based on our results and discussion, it is concluded that *Acanthocobitis botia* is totally absent in almost all of the above described studies while *Ompok pabda* has never been reported recently as discussed above. Moreover, only one specimen of *Ompok pabda* was collected during the current study. This species is strictly endangered in River Swat and especially in Garhi Usmani Khel Stream and Meherdy Stream. It is strongly recommended to conserve this species (*Ompok pabda*). The species diversity of the concern streams can only be saved by proper monitoring of water quality parameters and fish fauna. Fishing during breeding season and non-marketable size should strictly be avoided. Adding new stocks of fish can improve the diversity of these streams.

References

Akhtar N, Saeed K, Khan S, Rafiq N. 2015. Exploring the Ichthyofaunal Diversity of River Chagharzi District Buner, Khyber Pakhtunkhwa Pakistan. *World* **7(4)**, 228-36.

Ali SS, Narejo NT. 2009. Fundamentals of Ichthyology. First edition, Department of freshwater biology and Fisheries, University of Sindh, Jamshoro, Sindh, Pakistan.

Delgado CL, Wada N, Rosegrant MW, Meyer S, Ahmad, M. 2003. Outlook of fish to 2020: Global Demand. Report of the International Food Policy Research Institute.

Dubey AK, Shukla SK, Verma H. 2012. Ichthyo-Diversity of Banisagar Dam at Chhatarpur, Madhya Pradesh, India. *International Journal of Fisheries and Aquatic Sciences* **2**, 157-61.

Dunstan JA, Mori TA, Barden A, Beilin LJ, Holt PG, Calder PC, Taylor AL, Prescott SL. 2004. Effects of n-3 polyunsaturated fatty acid supplementation in pregnancy on maternal and fetal erythrocyte fatty acid composition. *European Journal of Clinical Nutrition* **58(3)**, 429-37.

Hasan Z, Ahmad I, Yousuf M, Rehman L, Khan J. 2013. Fish Biodiversity of River Swat. *Pakistan Journal of Zoology* **45(1)**, 283-289.

Holm T, Andreassen AK, Aukrust P, Andersen K, Geiran OR, Kjekshus J, Simonsen S, Gullestad L. 2001. Omega-3 fatty acids improve blood pressure control and preserve renal function in hypertensive heart transplant recipients. *European heart journal* **22(5)**, 428-36.

Ishaq M, Khan S, Khan J, Akhtar N, Saeed K. 2014. Study on Ichthyofaunal biodiversity of River Swat. *World Journal of Fish and Marine Sciences* **6(4)**, 313-8.

Jayaram KC. 1999. Freshwater Fishes of the Indian Region. Narendra Publishing House, Delhi, India.

Khan MA, Hasan Z. 2011. A preliminary survey of Fish fauna of Changhoz Dam, Karak, KPK, Pakistan. *World Journal of Fish and marine sciences* **3(5)**, 376-8.

- Khawaja O, Gaziano JM, Djoussé L.** 2012. A meta-analysis of omega-3 fatty acids and incidence of atrial fibrillation. *Journal of the American College of Nutrition* **31(1)**, 4-13.
- Lipinski S, Tweed.** 2003. *Environmental Science*. Scott Foresman, Addison Wesley New York.
- Mirza MR, Sandhu IA.** 2007. *Fishes of the Punjab*. Polymer Publications Lahore.
- Muhammad I, Hasan Z, Ullah S, Ullah W, Ullah H.** 2014. A preliminary survey of fish fauna of River Panjkora at District Upper Dir, Khyber Pakhtunkhwa Pakistan. *Journal of Biodiversity and Environmental Sciences* **5(1)**, 362-8.
- Nagabhushan CM, Hosetti BB.** 2010. Diversity of ichthyo-fauna in relation to physico-chemical characters of Tungabhadra Reservoir, Hospet. *Wetlands, biodiversity and climate change* pp.1-9.
- Olsen SF, Secher NJ, Tabor A, Weber T, Walker JJ, Gluud C.** 2000. Randomised clinical trials of fish oil supplementation in high risk pregnancies. *BJOG: An International Journal of Obstetrics & Gynaecology* **107(3)**, 382-95.
- Talwar PK, Jhingran AGK.** 1991. *Inland fishes of India and adjacent countries*. Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
- Ullah S, Ahmad T.** 2014. Nutritional and Medicinal Importance of Fish: A Mini Review. *Review of Progress*. Accepted for Publication.
- Yousafzai AM, Khan W, Hasan Z.** 2013. Fresh records on water quality and ichthyodiversity of River Swat at Charsadda, Khyber Pakhtunkhwa. *Pakistan Journal of Zoology* **45(6)**.