

BIODIVERSITY AND DISTRIBUTION OF FISH FAUNA IN DERA GHAZI KHAN CANAL

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ARTICLE INFORMATION

Article History:

Received: 13th July 2022

Accepted: 28th August 2022

Published online: 4th October 2022

Author's contribution

BR designed the study, IM carried field survey, RA analysis and drafted data.

Key words:

Fish, Dera Ghazi Khan, Fauna, Biodiversity, Distribution, Ichthyofauna, Protein.

ABSTRACT

The DG Khan canal is a vast canal starting from Taunsa Barrage and flowing through different areas of the DG Khan District. In some places, its water is restricted and has many fish species. The present study was intended to examine the fish fauna of DG Khan district from the Taunsa dam at DG Canal to the boundary line of DG Khan District with Rajanpur District. During present study, about 16 species including: *Gudusia chapra* (Hamilton, 1822), *Notopterus notopterus* (Pallas, 1769), *Labeo gonius* (Hamilton, 1822), *Labeo rohita* (Hamilton, 1822), *Cirrhinus mrigala* (Bloch, 1795), *Catla catla* (Hamilton, 1822), *Puntius ticto* (Hamilton, 1822), *Puntius sophore* (Hamilton, 1822), *Securicula gora* (Hamilton, 1822), *Cyprinus carpio* (Linnaeus, 1758), *Mystus cavasius* (Hamilton, 1822), *Mystus bleekeri* (Day, 1877), *Wallago attu* (Day, 1878), *Channa marulius* (Hamilton, 1822), *Oreochromis niloticus* (Linnaeus, 1758) and *Mastacembelus armatus* (Lacepède, 1800), were recorded in the DG canal of DG Khan district. Taunsa barrage was also explored in which fishes *C. chitala*, *C. catla*, *L. gonius*, *L. rohita*, *C. mrigala*, *L. calbasu*, *L. bogga*, *L. dyocheilus*, *C. reba*, *L. boggut*, *H. molitrix*, *C. idella*, *C. carpio*, *O. mossambicus*, *O. aureus*, *O. niloticus*, *C. punctata*, *C. striata*, *C. marulius*, *M. pancalus*, *M. armatus*, *O. bimaculatus*, *W. attu*, *S. seenghala*, *E. vacha*, *B. bagarius*, *R. rita*, *G. manminis* and *R. macracanthus* were recorded. It shows their rice diversity in this channel.

1. INTRODUCTION

Fish form the largest group of animals used for animal food production. In the marine fish and freshwater fish worldwide, many of the other items eaten as foodstuffs and include fishmeal, fish meal, fisheries silage, fish soluble, fish glue etc. Not only a major source of high-quality proteins, freshwater fishes also have nutritionally important minerals, vitamins and high concentrations of polyunsaturated acids (Hussain et al., 2015).

Pakistan is an agriculturally based country found in sub-continent linked with Arabian Sea and having the best canal system of the world mainly because of its high-top glaciers leading to different rivers, lakes, stream and canals. Pakistan possesses huge aquatic resources for both marine water and freshwater.

As far as freshwater fisheries resources are concerned, Pakistan is rich with rivers, canals, streams and lakes. Pakistan also possesses tremendous man-made fresh water reservoirs like big dams and huge barrages. River Indus, which flows through different countries neighboring Pakistan, is a big source of financial income for a massive world population as these countries are the world leaders in human population. For Pakistan, the importance of Indus River is immortal as majority of Pakistanis are directly or indirectly associated with it financially. The river Indus has such a huge importance for Pakistan as it is considered as the "life line" of Pakistan due to this fact that approximately 80 % agriculture of Pakistan and majority of Pakistan food production is because of this river (Meadows & Meadows, 1999).

Pakistan is famous across the globe for its aquatic diversity as it has big rivers with their tributaries, beautiful lakes,

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big reservoirs, multiple ponds, various natural depressions, wide canals, different water-logged territories, many pools, and abundant numbers of streams. Statistically, it is known that there are over 186 species of freshwater fish in Pakistan (Source Fisheries Manual), which have commercial importance, grown in Pakistani rivers. Commercially central inland and instinctive fish wildlife of Pakistan includes approximately more than 30 commercially important fish species are found in Pakistan and their examples are: *Notopterus notopterus*, *Tenualosa ilisha*, *Sperata sarwari*, *Wallago attu*, *Bagarius bagarius*, *Rita rita*, *Clupisoma nazirri*, *Labeo rohita*, *Cirrhinus reba*, *Channa marulius*, *Tor putitora*, *Channa straitus*, *Schizothorax*, *Cirrhinus mrigala* and *Gibelion catla* (Meadows & Meadows, 1999).

At least 31 species are of particular economic importance in Pakistan. The main component of economically important species in the Indus Plain is the warm sea fish fauna and 8 species *Salmo trutta fario*, *Ptychobarbus conirostris*, *Oncorhynchus mykiss*, *Diptychus maculates*, *Schizothorax plagiostomus*, *Schizopyge esocinus* and *Racoma labiata* are present in the cold water of Himalayas, Karakoram and Hindukush. Some of the domestic commercially significant species are harvested in aquaculture, such as *Cirrhinus mrigala*, *Labeo Rohita* and *Gibelion catla*, while all tradeably important fishes which are exotic species in Pakistan belongs to fish aquaculture (Rafique, 2001).

Interestingly, majority of these economically important fish fauna of Pakistan are the inhabitants of warm water and found predominantly in the Indus Plains. Some fish species which are economically important are also the inhabitants of cold water of Karakoram, Hindukush and Himalayas regions of Pakistan and their well-known examples are *Ptychobarbus conirostris*, *Schizopyge esocinus*, *Schizothorax plagiostomus*, *Diptychus maculates*, *Racoma labiate*, *Salmo trutta fario* and *Oncorhynchus mykiss*. For fish aquaculture, local fish species which have significant commercial values are utilized and their well-known examples are *Cirrhinus mrigala*, *Gibelion catla* and *Labeo rohita*. Moreover, in case of exotic fish species present in Pakistan which do have significant commercial values, it is a fact that these fishes are utilized in aquaculture fish industry of country (Khan et al., 2008).

In the Taunsa barrage there are 53 weir bays, while 7 and 4 are found in the right side and left side under sluices. There is 4346 ft of dam width and a wide waterway of 3862 ft. The weir and subdued parts of the dam are bifurcated by two dividing walls. Two fish ladders are placed in the left side and other right side under sluices onward the dividing walls. Taunsa dam, in both its right side and left side under sluices, includes the 22 feet of

wide navigational bay and silt exclusion network. The dam is planned to flood ten lac cusecs, but a super-flow of twelve lac cusec will pass without breaching the dam. A weir also has been built along the subsides bottom of the dam to increase the water level of the neck (Chaudhry, 2010). The aim of this research was to identify the fish biodiversity in DG Canal of Dera Ghazi Khan District.

2. MATERIALS AND METHODS

Site selection

DG Khan canal was selected as research site to explore fish biodiversity due to these peculiarities. The DG Khan canal is a vast canal containing and sustaining a diverse ichthyofauna. It is originating from Taunsa Barrage and passing through the West of DG Khan and is parallel to the Indus River and Indus highway passing through District DG Khan and Rajanpur. D.G Khan canal area of 65.5 kilometers from Taunsa Beraj to DG Khan (Latitude: 30°1'4.18" Longitude: 70°36'8.15"). It bifurcates from the "headwork zero". But in summer season plentiful water floods emerging from some hill torrent falls and feed into it to some extent in Rajanpur District. Water is restricted and has many fish species. This impelled me to explore its fish fauna in District D.G.Khan.

Location

DG Khan canal area of 65.5 kilometers from Taunsa Barrage to Dera Ghazi Khan (Latitude: 30°1'4.18" Longitude: 70°36'8.15").

Collection and Preservation of fishes

The fishes were collected by means of gill and scoop, drag and cast nets having the mesh size of around 1 cm with help of the local fishermen and the fisheries department of Rajanpur. Fish samples were also tangled with the help of simple hooks from different ditches in canal. Fish samples were captured from stagnant water from ditches during period of close as well as from running water. Each catch was dealt with independently and masterminded by species and checked. Immediately fishes were preserved in ice and after that brought to the research center in plastic packs and containers. Samples were brought to the research center and photos were taken before conservation in 10% formalin because this chemical decolorize the shadings of the fish on significant time-frame protection. Briefly tests were protected in 10% formalin and after that for all time in 70% liquor.

Fishing Nets

During this research for sampling different kinds of fishing nets having mesh size of Approximately 02 cm2

were used i.e., gill nets, Scoop nets, drag nets, cast nets, Beach Seins, Hoop Nets, Fyke Nets & Trap Nets. following already published methodologies Mirza in 1975, 1990, Mirza and Sharif in 1996, Mirza and Sandhu in 2007, Jayaram in 1981 along with required modifications. For the collection of small fishes, nets of 01 cm² mesh size were used.

Identification

By using standard ordered keys, each fish tests were distinguished up to species level. The differences between these species were based primarily on the shading design, explicit marks or stamps at the outside of the body, body status, structure of various blades using deliberate and distinctive proof keys of Mirza in 1975 and in 1990, both Mirza and his companion Sharif in 1996, Mirza and his companion Sandhu in 2007 and Jayaram in 1981.

3. RESULTS AND DISCUSSION

Fish biodiversity of DG canal

From the DG canal, 16 species (*Gudusia chapra*, *Notopterus notopterus*, *Labeo gonius*, *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla*, *Puntius ticto*, *Puntius sophore*, *Securicula gora*, *Cyprinus carpio*, *Mystus cavasius*, *Mystus bleekeri*, *Wallago attu*, *Channa marulius*, *Oreochromis niloticus*, *Mastacembelus armatus*) were recorded. Fish fauna consisted of orders (*Clupeiformes*, *Osteoglossiformes*, *Cypriniformes*, *Siluriformes*, *Channiformes*, *Perciformes* and *Synbranchiformes*), 8 families (*Clupeidae*, *Notopteridae*, *Cyprinidae*, *Bagridae*, *Siluridae*, *Channidae*, *Cichlidae* and *Mastacembelidae*), 13 genera and 16 species. Order *Clupeiformes* with *Clupeidae* family was represented by *Gudusia chapra*. *Osteoglossiformes* with *Notopteridae* was shown by one species i.e., *Notopterus notopterus*. Order *Cypriniformes* had a family known as *cyprinidae*. Family *Cyprinidae* was illustrated by 6 genera and 8 species of fishes like *Labeo gonius*, *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla*, *Puntius ticto*, *Puntius sophore*, *Securicula gora* and *Cyprinus carpio*. Order *Siluriformes* had 2 families i.e. *Bagridae* and *Siluridae*. *Bagridae* family was demonstrated by 1 genus and 2 species such as *Mystus cavasius* and *Mystus bleekeri*. *Siluridae* family had 1 species such as *Wallago attu*. *Channiformes* with family *Channidae* showed 1 species *Channa marulius*. Order *Perciformes* consisted of 1 family i.e., *Channidae* and species *Paramba ssisranga*. Family *Cichlidae* was demonstrated by 1 species i.e., *Oreochromis niloticus*. Order *Synbranchiformes* with family *Mastacembelidae* confirmed only single species *Mastacembelus armatus*. Table 1.

DG canal of Dera Ghazi Khan contains a variety of fish biodiversity. Many of the fishes are edible so they are commercially important. In this study, DG canal has been explored to find out which fishes inhabit its water and how many of them are edible to provide the commercial advantage. So, we performed a detailed study of DG Khan canal area of District DG Khan specifically that runs an approximate distance of 65 Kilometers starting from Taunsa barrage till border line of District DG Khan and Rajanpur were under consideration.

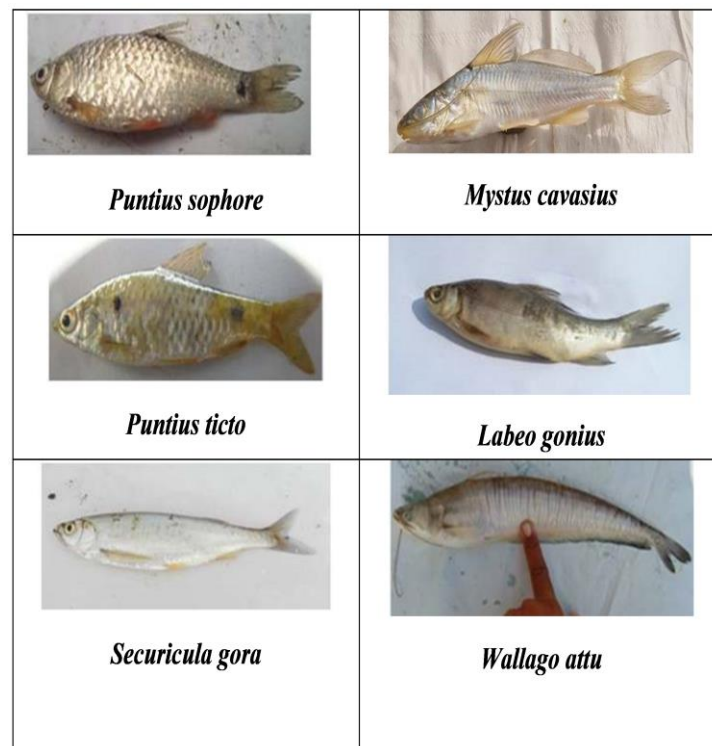


Figure 1. Various species of fish in DG Khan canal

Results indicated that ichthyofauna of DG canal is diverse in nature which includes edible and non-edible, economic and non-economic, scaly and non-scaly and culture able and non-culture able fishes of different sizes. Fish fauna of canal includes Carps, Loaches and Catfishes. Fishes explored were indigenous and exotic in origin. Collected specimens were *benthopelagic* and *potamodromous* fishes. Some live in Lentic or Lotic water bodies which breed in stagnant or running water, ornamental and non-ornamental, salinity and water-logged, running and stagnant water, herbivorous and carnivorous, bottom and surface or column feeders, detritivorous or carnivorous fishes are found.

In this study the taunsa barrage is also explored and it has been observed that the most diverse as well as most abundant fish family was *Cyprinidae* with twenty-seven species. Next family in this regard was *Bagridae* with 8 species followed by *Sisoridae* with 5 species. The catch at Taunsa barrage also included *Chandidae* and *Cichlidae* 2 exotic fish families with 3 species for each one. As for as the least abundant family was concerned, it found to be *Botiidae*. While in that regard, the least diverse families found to be were *Cobiidae*, *Mugilidae*, *Belonidae* and *Heteropneustidae* which had only 1 species. *Chitala chitala*, *Catla catla*, *Labeo gonius*, *Labeo rohita*, *Cirrhinus mrigala*, *Labeo calbasu*, *Labeo bogga*, *Labeo dyocheilus*, *Cirrhinus reba*, *Labeo boggut*, *Hypophthalmichthys molitrix*, *Ctenopharyngodon idella*, *Cyprinus carpio*, *O. mossambicus*, *O. aureus*, *O. niloticus*, *Channa punctata*, *Channa striata*, *Channa marulius*, *Macrognathus pancalus*, *Mastacembelus armatus*, *Ompok bimaculatus*, *Wallago attu*, *Sperata seenghala*, *Eutropiichthys vacha*, *Bagarius bagarius*, *Rita rita*. Interestingly, the fish catch of Taunsa barrage main site also included *Goanolia manminus* and *Rita macracanthus* were recorded. This study was more with the line of already conducted research at taunsa barrage by (Muhammad et al., 2016).

In their research 70 separate fish species from the locations of research have been collected. Total fish specimens collected were 2249 from eight locations. *Cyprinidae* family consists of twenty-seven fish species and next to *Cyprinidae* is *Bagridae* is numerically the largest and most varieties. *Sisoridae*, comprising five species in research field was the third most diverse family. Two exotic fish families described by *Chandidae* and *Cichlidae* each with three species. *Botiidae* were the least common family and *Cobiidae*, *Heteropneustidy*, *Belonidae* and *Mugilidy* were the least diverse families, each representing with only one species. *Labeo rohita*, *Cirrhinus reba*, *Puntius sophore*, *Gudusia chapra*, *Labeo gonius*, *Cirrhinus mrigala*, *Oreochromis mossambicus* and *Channa punctata* were most abundant species numerically in this region.

Commercially important fishes found at the main site of Taunsa Barrage included. *Chitala chitala*, *Catla catla*, *Labeo gonius*, *Labeo rohita*, *Cirrhinus mrigala*, *Labeo calbasu*, *Labeo bogga*, *Labeo dyocheilus*, *Cirrhinus reba*, *Labeo boggut*, *Hypophthalmichthys molitrix*, *Ctenopharyngodon idella*, *Cyprinus carpio*, *O.*

mossambicus, *O. aureus*, *O. niloticus*, *Channa punctata*, *Channa striata*, *Channa marulius*, *Macrognathus pancalus*, *Mastacembelus armatus*, *Ompok bimaculatus*, *Wallago attu*, *Sperata seenghala*, *Eutropiichthys vacha*, *Bagarius bagarius*, *Rita rita*. Interestingly, the fish catch of Taunsa barrage main site also included *Goanolia manminus* and *Rita macracanthus*.

A previous study on Taunsa barrage was conducted in which twenty-two fish species from the Taunsa water reservoir have been captured and described in this report. From most of the fish population *Oreochromis niloticus*, *Cyprinus carpio*, *Oreochromis aureus*, *Channa marulius*, *Rita rita*, *Labeo calbau*, *Wallago attu*, *Ctenopharyngodon idella* and *Notopterus notopterus* were dominated; while other *Mastacembelus armatus*, *Hypophthalmichthys molitrix*, *Labeo rohita* and *Gibelion catla* with minimum number were recorded (Khan et al., 2008).

It was observed that 16 species (*Gudusia chapra*, *Notopterus notopterus*, *Labeo gonius*, *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla*, *Puntius ticto*, *Puntius sophore*, *Securicula gora*, *Cyprinus carpio*, *Mystus cavasius*, *Mystus bleekeri*, *Wallago attu*, *Channa marulia* *Oreochromis niloticus* *Mastacembelus armatus*) belonging to 13 Genera, 6 orders (*Clupeiformes*, *Osteoglossiformes*, *Cypriniformes*, *Channiformes*, *Siluriformes*, *Perciformes* and *Synbranchiformes*) and 8 fish families (*Clupeidae*, *Notopteridae*, *Cyprinidae*, *Bagridae*, *Siluridae*, *Cichlidae*, *Channidae* and *Mastacembelidae*) were present in DG canals water.

These results were in line with the previous research conducted by the They also found thirteen genera of fishes from Dera Ghazi khan fish biodiversity. In their study fifteen species of 13 genera and 5 families from the lentic and lotic bodies of water of the mountainous region of Suleman, in the area of the Dera Ghazi Khan were recorded. There were 11 cyprinid and three catfish species. The most common specie belongs to the family *Cyprinidae* which were 11. And one from each *Nemachelidae*, *Siluridae*, *Sisoridae* and *Bagridae* were recorded in their study. At Hinglon Kutch, species richness was high and at Siri it was low. Seven species from Hinglon Kutch have been reported. Harand and Vehova recorded with six species. Study conducted by (Hussain et al., 2016) at the Dera Ghazi khan reigon showed the presence of 20 species of Actinopterygii of

sub-class of 3 orders (synbranchiiform, cypriniform and siluriform) belonging to five families (bagridae, cobitidae, cyprinidae, mastacembelidae and siluridae) with 16 genera.

4. CONCLUSION

In the DG canal, about 13 genera *Gudusia*, *Notopterus*, *Labeo*, *Cirrhinus*, *Catla*, *Puntius*, *Securicula*, *Cyprinus*, *Mystus*, *Wallago*, *Channa*, *Oreochromis*, *Mastacembelus* were recorded. *Cyprinus* was the most abundant genera. While *Cyprinus* was also found abundednt as compared to other 10 genera found in the Taunsa barrage.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table 1. Species found in DG Canal

Order	Family	Species
Clupeiformes	Clupeidae	<i>Gudusia chapra</i>
Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>
Cypriniformes	Cyprinidae	<i>Labeo gonius</i>
		<i>Labeo rohita</i>
		<i>Cirrhinus mrigala</i>
		<i>Catla catla</i>
		<i>Puntius ticto</i>
		<i>Puntius sophore</i>
		<i>Securicula gora</i>
		<i>Cyprinus carpio</i>
Siluriformes	Bagridae	<i>Mystus cavasius</i>
		<i>Mystus bleekeri</i>
	Siluridae	<i>Wallago attu</i>
Channiformes	Channidae	<i>Channa marulia</i>
Perciformes	Chandidae	<i>Paramba ssisranga</i>
Cichliformes	Cichlidae	<i>Oreochromis niloticus</i>
Synbranchiformes	Mastacembelidae	<i>Mastacembelus armatu</i>