JAPR

Vol. 02, Issue, 02, pp. 40-45, 10 *June, 2025*

RESEARCH ARTICLE

Identification and Diversity of Ichthyofauna in Gomal Zam Dam, Shin Kach Dam and Various Water Bodies of District Tank

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ARTICLE INFO

Article History:
Received 10 May, 2025
Received in revised form 25 May, 2025
Accepted 30 May, 2025
Published online 10 June, 2025

Keywords:
Ichthyofauna
Gomal Zam dam
Sheen Kach Dam
Water bodies
Water quality

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ABSTRACT

Ichthyodiversity refers to the diversity of fish species, it may also refer to alleles or genotypes within fish populations. Fish diversity has significantly contributed to the global economy, balancing the ecosystem, as a food and products etc. The present study was conducted to explore the ichthyofauna of Gomal Zam Dam, Shin Kach Dam, and different water bodies of District Tank Khyber Pakhtunkhwa. A total of 200 samples were analyzed during the periods February to July 2024. Our data showed that 25 fish species were belonged from different 04 orders, 08 families, and 19 different genera. Out of 25 fish species, 11 were collected from Gomal Zam dam, 1 specie from Sheen Kach dam, and 13 species from different water bodies of district Tank. Among them family Cyprinidae was the most abundant family and represented by 11 species viz, *Labeo cylindricus, Chrosochielus diplochylus, Cyprinus carpio, Baralius vagra, Gara gotyla, Gara rhengensis, Gara dengba, Labeo rohita, Chrosochielus latius, Labeo charelus, Notropis photogensis, and Tor putitor*. Family Channidae, mastemechilidae, Botidae, and Bagridae were the least abundant represented by only one species named *Channa punctiuta, Mastacembalus armatus, Botia almorhae, and Mystus nigrecep* respectively. This result suggests that the water quality and environmental factors may be favorable to the specific family Cyprinidae and also might be support the other reported families.

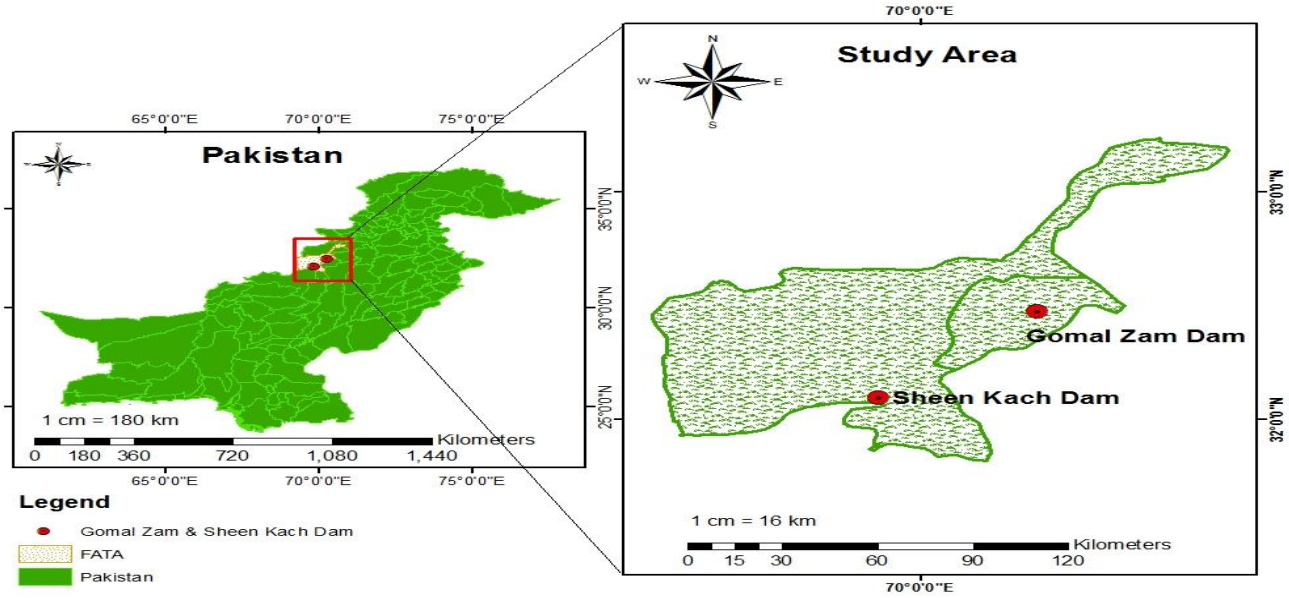
1. Introduction

Fish is one of the most vital nutritional components for humans due to its offers of rich, high-quality protein, fats, vitamins, minerals, and necessary amino acids and upkeep healthy human body and avoids several nutritional problems in health [1]. Additionally, fish are vital for the second trophic level of the aquatic ecosystem and are a valuable source of food, medicine, and economic value [2]. The maintenance of biodiversity and preservation of all environmental quality is vital for understanding the naturally occurring activities of all worldly organisms. Fish biodiversity acts as a representation of the variety and quantity of fish fauna. A wide range of fish species that are conserved in water bodies sustain commercial fisheries [3]. Determining the fish variety of a given area is important for both the conservation strategies and proper management of the ichthyofauna within that area [4]. The diversity and abundance of fish in a water body are mostly represented by its fish biodiversity and supporting the commercial fishing industry [5].

Pakistan boasts an abundant freshwater fish biodiversity, with over 193 different species [6]. Pakistan vast and diverse range of fish species makes it a highly promising area for fishing enthusiasts. The analysis of its freshwater species is pivotal in understanding the factors that influence fish community structure [7]. Most fish in Pakistan belong to the family Cyprinidae, which are found in the aquatic habitat. Fish of the Cyprinidae family are regarded as extremely valuable because of their commercial significance to Pakistan economy [6,7].

The overexploitation, degradation, and destruction of natural breeding habitats brought about by the construction of dams, the introduction of exotic species, the repeated droughts, the frequent hybridization, the careless use of pesticides, and the discharge of raw sewage and industrial effluents into natural river systems all pose a constant threat to these wild fish populations [8]. Due to their simple method of collection, handling, and identification as well as their susceptibility to habitat loss and other environmental stresses, fish have been used as indicators of changes in aquatic ecosystems [6,7]. For transitional waters, which include heavily damaged and physiologically significant habitats like estuaries and coastal lagoons, the use of fish is viable [6]. Therefore, the present work aimed to find out the fish fauna of Gomal Zam Dam, Shin Kach Dam, and various water bodies of the district tank, Khyber Pakhtunkhwa, Pakistan.

Figure 1. Location Map of Study Sites (S-1= Gomal Zam Dam, S-2= Jandola, S-3= Alikhel, S-4= Mullazai, S-5= Gomal Beraj, and S-6= Kaur) in the District Tank region of Khyber Pakhtunkhwa, Pakistan.



2. Materials and Methods

2.1 Experimental Area

This research was carried out in the rural area of district Tank Khyber Pakhtunkhwa and mountains areas. Tank is located in the southern district of the Khyber Pakhtunkhwa province of Pakistan. The districts of South Waziristan to the southwest, west, and northwest, Dera Ismail Khan to the east and southeast, and Lakki Marwat to the northeast form the boundaries of district Tank. Temperatures in Tank District can be as high as 110–120°F. In total an area of 1,679 km², the district includes several key water bodies. The fish were collected from Gomal Zam Dam, Sheen Kach Dam, and different water bodies, including Jandola, Ali Kheil, Kaurr, Mullazai, Gomal, and District Tank. The ichthyofauna was observed and collected by a thorough survey of the study area (Figure 1).

2.2 Sample Collections

Sampling was done at five distinct sites in the district Tank, including Gomal Zam Dam. The sampling stations are located in Khajuri Katch in the district of South Waziristan, Khyber Pakhtunkhwa, Pakistan, and are located at coordinates of 32°05′55 N and 69°52′53 E. The water bodies in Jandola are located at coordinates of 32°19′54 N 70°7′22 E / 32.33167°N 70.12278°E / 32.33167; 70.12278, Ali Kheil water bodies, water bodies near Kakarr Fort are located at 25°24'40.0" N 62°18'13.0" E, and the water bodies in Mulazai are located at 32°24'48.56" N 70°27'56.97" E, respectively. Monthly fish samples were taken with drift nets and hooks. This fishing equipment is attached to wooden and bamboo poles. Five captures took place each month, with specimens being collected from both stagnant and flowing waterways.

2.3 Sample Preservation and Identification

Fish were preserved in either 70% alcohol or 10% formalin. The same amount of formalin was injected into the abdomens of specimens before they were stored in 10% formalin. The preserved fish samples were brought and identified at the Fisheries Lab Department of Zoology, Kohat University of Science and Technology, KUST using standard keys outlined by Talwar and Jhingran [9], Khan et al [7] and Gul et al. [6].

3. Results

The fish biodiversity of different water bodies in the district Tank was conducted during the periods February 2024 to July 2024. In the present study we found 25 species of 19 different genera, 8 families, and 4 orders were recorded from different water bodies of district Tank. The Cyprinidae was found to be the most dominant family which includes 16 species namely *Labeo cylendricus, Crossocheilus diplocheilus, Cyprinus carpio, Barralius vagra, Garra gotyla, Garra rhengensis, Garra dengba, Labeo rohita, Chrossochielus latius, Labeo caeraleus, Notropis photogensis,* and Tor *putitor*. The family Nemachleilidae includes Paraschistura kesseleri. Family Sisoridae includes *Glyptothorax pantherinus* and *Bagarius bagarius* while family Channidae includes Channa punctiuta. The family Mastacembelidae, Botiidae, and Bagridae include single species *Mastacembelus armatus*, *Botia almorhae*, and *Mystus nigricep* respectively (Table 1).

The water physiochemical parameters were taken from the water bodies of the Gomal Zam Dam. The findings of the water analysis showed that the temperature was recorded at 23 °C and the pH level was 7.1. Chlorides were detected at 48 ppm and the total dissolved solids (TDS) content was 240 mg/L. Electrical conductivity was measured at 1000 µS/cm, while turbidity was recorded at 0.49 Nephelometric Turbidity Unit (NTU). Although there were bacteria found in the sample, there were no *E. coli* or *coliform* bacteria. The results showed that the hardness was 502 ppm, the nitrates were 6 ppm, and the alkalinity was 297 ppm. Moreover, it was discovered that the total chlorine level was 0.5 mg/L and that the residual chlorine was 0.3 mg/L (Table 2 and Figure 2).

Table 1. Systematic representation of fish species found in Gomal Zam Dam, Shin Kach Dam, and different water bodies of District Tank.

S.NO.	Order	Family	Genus	Species
1.	Cyprinoforms	Cyprinidea	*crossocheilus*	*Diplocheilus*
2.	Cyprinoforms		*Garra*	*Gotyla*
3.	Cyprinoforms		*Cyprinus*	*Carpio*
4.	Cyprinoforms		*Labeo*	*Cylendricus*
5.	Cyprinoforms		*Baralius*	*Vagra*
6.	Cyprinoforms		*Tor*	*Putitor*
7.	Cyprinoforms		*Garra*	*Rhengensis*
8.	Cyprinoforms		*Garra*	*Dengba*
9.	Cyprinoforms		*Labeo*	*Rohita*
10.	Cyprinoforms		*chrossochielus*	*Latius*
11.	Cyprinoforms		*Labeo*	*Caeruleus*
12.	Cyprinoforms		*Notropis*	*Photogensis*
13.	Cypriniformes		*Barbodes*	*Binotatus*
14.	Cypriniformes		*Labeo*	*Barbus*
15.	Cypriniformes		*Hypophthalmicthys*	*Molitrix*
16.	Cypirinoformes		*Cirrhinus*	*Molitorella*
17.	Cyprinoforms	Botiidae	*Botia*	*Almorhea*
18.	Cyprinoform	Nemacheilidae	*Paraschitura*	*Kessleri*
19.	Siluriform	Bagridae	*Mystus*	*Nigricep*
20.	Siluriform	Siluridae	*Wallago*	*Attu*
21.	Siluriform	Sisoridae	*Bagarius*	*Bagarius*
22.	Siluriform	Sisoridae	*Glyptothorix*	*Pantherinus*
23.	Synbranchiformes	Mastacembelide	*Mastacembelus*	*Armatus*
24.	Anabentiformes	Channidae	*Channa*	*Striata*
25.	Siluriform	Siluridae	*Ompok*	*Pabda*

Figur 2. Average value of different Quality Water Parameters of Gomal Zam Dam, Shin Kach Dam, and different water bodies of District Tank.

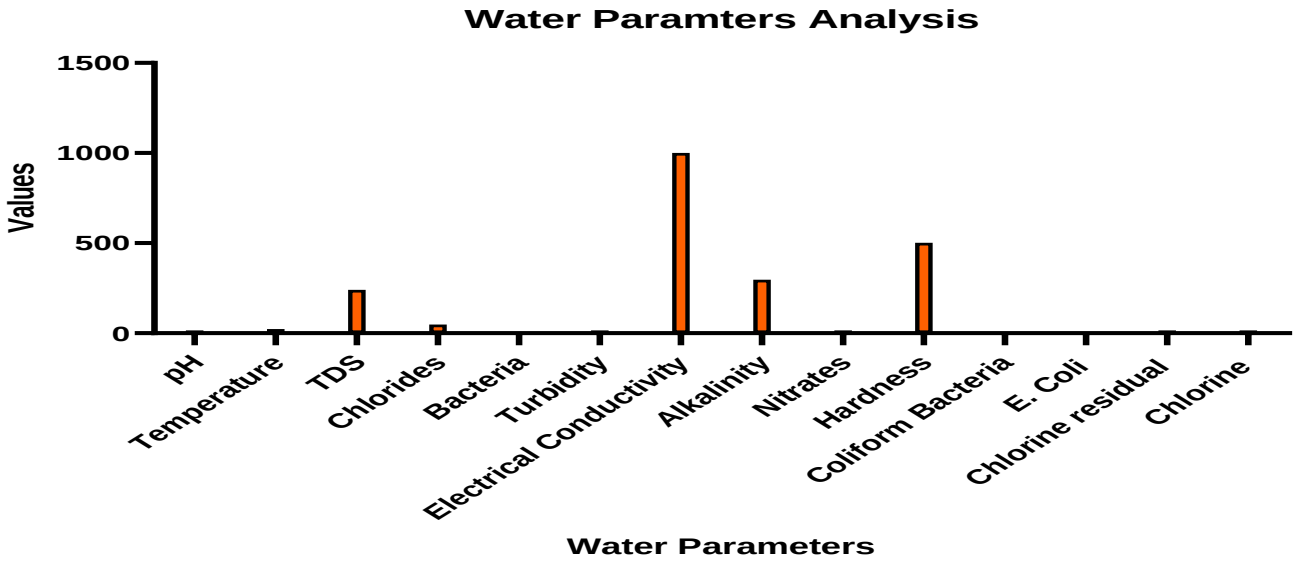


Table 2. Water analysis parameters and their corresponding values.

S. No.	Parameters	Value
1	pH	7.1
2	Temperature	23°C
3	TDS	240 mg/L
4	Chlorides	48 ppm
5	Bacteria	Present
6	Turbidity	0.49 NTU
7	Electrical Conductivity	1000 µS/cm
8	Alkalinity	297 ppm
9	Nitrates	6 ppm
10	Hardness	502 ppm
11	Coliform Bacteria	Absent
12	*E. Coli*	Absent
13	Chlorine residual	0.3 mg/L
14	Chlorine	0.5 mg/L

4. Discussions

The current study contributed the identification of fish fauna in six different water bodies including Gomal Zam Dam, Jandola, Alikhel, Mullazai, Gomal Beraj, and Kaur located in the district Tank, Khyber Pakhtunkhwa, Pakistan during the periods from February to July 2024. Various fish species lives in rivers serves as a warning to fishermen and other stakeholders about the threat to the variety and quantity of fish in the environment. In the present study, the data collected from six different water bodies in district Tank include 25 species with 19 different genera, 8 families, and 4 orders. In valley of the River Swat, Akhtar et al. [10] reported and identified 18 fishes belonging to 3 orders and 3 families which are in line with our study. In addition, 30 species from six orders and 10 families were identified in the water bodies of Hazara Divisions [11], Variations were found in different locations fish fauna's diversity might be climates variations [12]. The results of our study strongly are in agreement with the reported data. Most of the species recorded 45 species belong to 31 genera, 15 families, and 6 orders. in the previous study, the fish fauna along the Budhabalanga River were found to be widely spread throughout the Odishan streams and rivers. Fish such as Labeo *rohita, Cirrhinus mrigala, Amblypharyngodon mola, Labeo ticto, Puntius conchonius, Crossocheilus latius, Garra mullya, Labeo calbasu, Labeo bata, Salmophasia bacaila,* and *Puntius amphibious.* The more prevalent groups are *Barrilius vagra, Puntius pulchellus,* and *Puntius stigma* [13]. In our study 25 species with 19 different genera, 8 families, and 4 orders. Several factors, such as anthropogenic impacts, seasonal variations, environmental changes, or methodological differences

between the two studies, could be responsible for reducing species diversity see in table 1.

Additionally, the study was done on the fish fauna in the River Barandu District Buner, Khyber Pakhtunkhwa, Pakistan. 11 species from the River Barandu were identified during from April to September 2012 survey. These species include *M. armatus, P. sophore, S. plagiotomus, C. gachua, G. gotyla, G. punjabensis, B. pakistanicus, T. naziri, T. putitora*, and *C. latius*. According to Saeed *et al.* (2013), several species may exist in the area but were not able to be recorded during the study. The comparable fish species reported in this study include *G. gotyla*, *P. sophore*, *M. armatus*, *H. molitrix*, *C. punctata*, and *C. diplocheilus*. However, in the current study, certain species were not reported due to some factors such as human activity and global warming.

In North Waziristan, Khyber Pakhtunkhwa, Pakistan, a study on the Barganat Dam was carried out between June 2015 and March 2016. 10 species were found during the survey, of which 8 belonged to the Perciformes family. The species *B. vagra, C. carpio, P. sarana, C. mrigala, C. idella, L. rohita, H. molitrix*, and two from the *Cichlidae* family, order *Cypriniformes*, as well as *Oreochromis niloticus*, *O. aureus*, and *T. tor*, belong to the *Cyprinidae* family [12].

Other studies were conducted on the Suleman Mountain Range in the Dera Ghazi Khan. There are twenty fish species in the subclass Actinopterygii, which are classified into three orders: cypriniformes, siluriformes, and synbrancheiformes; 5 families: cyprinidae, siluridae, coptidae, bagridae, and mastacembalidae; and 16 genera. In contrast, 15 species were found in this area in a prior survey [14]. Compared to a prior survey, 8 new fish species were discovered in this area. As a result, up to 23 different fish species have been detected in the Suleman Mountain Range in the Dera Ghazi Khan Region. Our results are also parallel with previous shared research studies conducted previously in the same region on River Zhob, [15] and water bodies of Dera Ghazi Khan region [14,16]. Our studies were similar to previous data but 3 species, *Schistura sp*, *Mystus cavacius*, and *Glyptothorax cavia* were not reported in our data. This may suggest that the water bodies in this sub-mountainous region are physically isolated from one another as well as from other regions within the region.

In a study conducted on River Tochi from July to December 2018, [12], explored the ichthyofaunistic composition of the River Tochi district in North Waziristan. The reported species were *B. modestus, B. naseeri, B. vagra, B. pakistanicus, G. gotyla, A. morar, C. diplocheilus, C. watsoni, P. conchonius, P. sophore, C. mrigala, L. rohita, S. curtistigma, S. prashari, S. afaciata. C. gachua, O. pabda, G. naziri, O. niloticus* and *M. armatus*. According to the current study, comparable fish species including *C. armatus, G. gotyla, P. sophore, B. vagra, Cyprinus carpio, C. mrigala, L. rohita*, and *C. diplocheilus* have been recorded. [12], did not include the following species: *Puntius conchonius*, *Aspidoparia morar*, *B. naseeri*, *Barilius modestus*, *Schistura curtistigma*, *Schistura prashari*, and *Schistura afaciata*, and *C. gachua*. due to habitat degradation and global warming.

5. Conclusion

The current study found that the ichthyofauna population in Gomal Zam Dam, Shin Kach Dam, and associated water bodies in District Tank, Khyber Pakhtunkhwa is significant. Future ichthyologists will benefit from this study of ichthyofauna records. Maintaining the diversity of ichthyofaunal life is an essential and challenging environmental issue. The aquatic ecosystem of the Gomal Zam Dam, Shin Kach Dam, and associated water bodies in District Tank is severely affected by human activity and illegal fishing. Some individuals use electric current for fishing which destroys all aquatic ecosystems.

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