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| REVIEW ARTICLE

A Survey on Fish Diversity of Ishob River in the Khahan District of Badakhshan Province, Afghanistan

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| ABSTRACT
The present survey was conducted in the Ishob River of Khahan District, situated in the Badakhshan Province of Afghanistan. The study was carried out spring and summer seasons of 2025 by using a variety of fishing nets, like dragnets, hooks, and gill nets. During the survey, a total of 140 fish specimens were collected from all three sampling regions. As a result, the Nori Darah region had the highest number of collected fish (44.28%), followed by the Qaria-e-Tang region (31.42%), and the least number of fish (24.28%) was collected from the Pool-e-Ishob region. We found that Schizothorax curvifrons is the most abundant species with 37.85% in all three sites, followed by Glyptothorax cavia with 34.5%, Salmo trutta with 22.14%, and Paracobitis longicauda was less abundant species in the three sampling regions with 17.14%. In conclusion, four fish species, S curvifrons, G cavia, S trutta, and P longicauda were documented in this survey.

| KEYWORDS
Khahan District, Ishob River, S trutta, S curvifrons, and G cavia

| ARTICLE INFORMATION
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1. Introduction

Biological diversity refers to the variety of living things regarded at three levels: genetic diversity, species diversity, and ecosystem diversity(Coad, 2009; Wang et al; 2021). Biodiversity is not merely the total number of species in a territory; species richness is one of its key components (Majidi et al., 2024). Fish are one of the most important groups of vertebrates that have a direct impact not only on human civilization but also on the structure of the food chain, nutrient cycling, energy flow, and overall ecological performance in the aquatic ecosystem from ancient times to today(Kumar 2014). According to existing records, fish inhabit nearly all aquatic environments and make up half of all vertebrates on the planet (Akhtar et al., 2015).

These vertebrates are an important group of aquatic animals that play an essential role in human life by providing valuable protein and vitamins. Moreover, fish are also used in the preparation of by-products such as fish oil, fish glue, and fish powder(Yang et al;2021). Studying fish diversity holds scientific, ecological, and economic importance because it provides basic insights into the composition and health of aquatic ecosystems (Mirza et al., 2011; Taiwo, 2023). At present, the conservation of fish biodiversity and the management of their habitats present significant global challenges(Kumar et al; 2020). Over the past centuries, river ecosystems have suffered from extensive human interventions, leading to habitat degradation and the endangerment or extinction of many fish species, particularly in freshwater rivers(Majidi et al; 2024)

Afghanistan is an arid, mountainous country(Majidi. 2023). The average height is 1,300 meters. The climate varies significantly between the highlands and the lowlands. Afghanistan's water wildlife has not been extensively explored. The country has 85 native fish species. The Amu River, one of Afghanistan's largest water bodies, is located in Badakhshan Province (Coad, 2015). Ishob liver is a tributary of the Amu-Darya (Amu River). Maximum water flow is in the spring and summer seasons, and minimum flow is in

the fall to winter. The Ishob River originates from the flow of natural springs and the melting of snow from the high mountains of Safid Khers and Qutan Asap. This river flows from the southeast of Khahan District towards the southwest and eventually joins the Amu River. It supports many aquatic living organisms. The fish is one of the important components of this aquatic ecosystem (Majidi and Mansoor, 2022). This study aimed to identify and document the fish diversity of the Ishob River in Badakhshan province of Afghanistan.

2. Materials and methods

2.1 Study area

The site of research is related to the Ishob River within the Khahan District of Badakhshan Province, Afghanistan. The Isab River is geographically represented under the following coordinates: Pool-e-Isob sampling site 37°49'26"N 70°16'10"E, Qaria-e-Tang sampling site 37°50'16"N 70°17'13"E, and Nori Darah sampling site 37°52'04"N 70°18'47" E (figure 1). The area is situated in the northeastern part of Afghanistan, bordering Tajikistan to the north and extending down into the mountain divisions of Qarya-i-Tang, Bustanak, Do Dargah, and Kham-e-Tugh. It has rugged rock and mountain-hilly region having steep slopes and narrow, shaped valleys (Majidi et al., 2022, Sabooryar et al., 2024). Ishob River has its source in the springs and snow melted from the high mountains of Sefid Khers and Qotan Esp regions. The Ishob River has a height of approximately 300 to 400 meters, along with the Ishob Mahipar Waterfall. The river flows southeastward from the Khahan District southwestward and finally merges with the Amu River. Several waters, including Qangharab water, feed the river system. The total length of the Ishob River is roughly 45-50 km. This microclimatic condition normally presents a continental mountainous type of climate, having very cold winters with substantial snow as part of the precipitation regime. Snowmelt helps to maintain the aquatic ecosystems and their seasonal aquatic water availability. An area popularly accepted as being of major ecological importance concerning comparative studies of hydrological and mountain ecosystems is the Ishob valley(Qasimi et al; 2023).

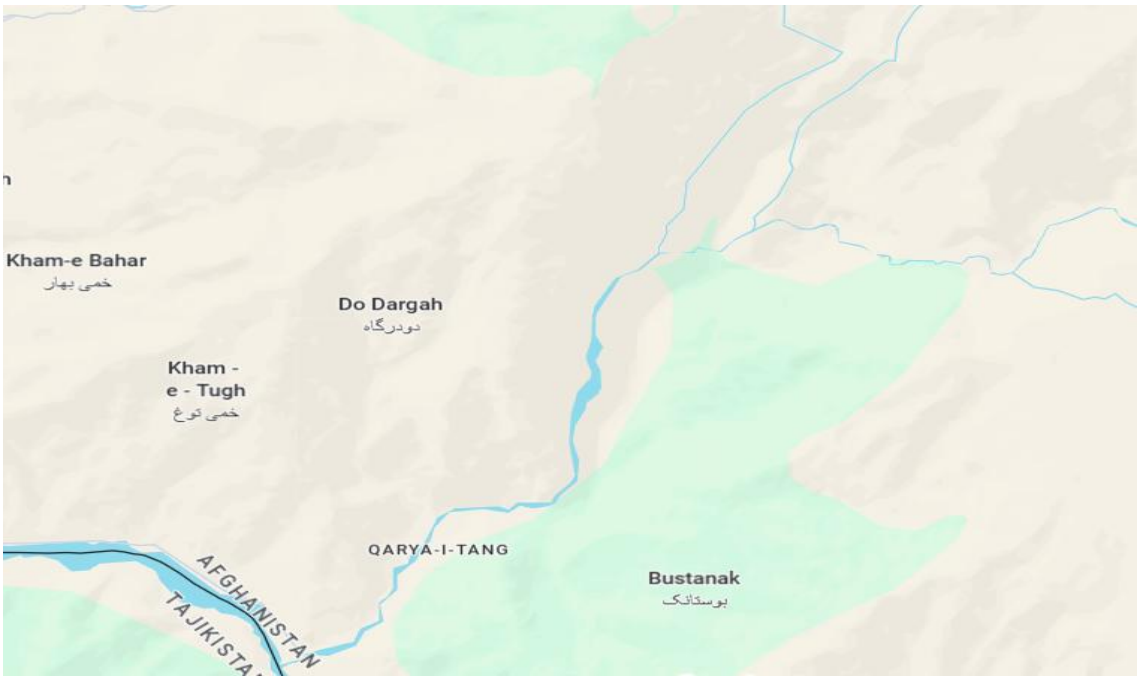


Figure 1 shows the Ishob River in the Khahan District of Badakhshan Province

2.2 Methods

Ichetofouna of the Ishob River was collected from each selected region during the year 2025. The survey was conducted during the spring and summer seasons by using a variety of fishing nets, like dragnets, hooks, and gill nets existing in the biology lab (Majid and Mansoor; 2023), and with the same length (5 m) and height (2 m), although with meshes varying from 3 to 3 cm, knot to knot. Two samples were taken from each site (Majidi et al., 2024). The specimens were preserved in 10% formalin for further study in the laboratory of the Department of Biology, Badakhshan University. Collected specimens were identified to order, Family, genus, and species level using taxonomic keys (Fish Base, 2025; Coad, 2015, Majidi et al., 2024). Computation of data for the Simpson (S), Shannon diversity (H), Dominance (D), Evenness (E), and Margalef (R) of fish was documented by using a computer-based program, PAST 4.03(Majidi et al; 2024).

3. Results

Ishob River is the second largest wetland in the Khahan District. It is one of the tributaries of the Amu River, which has a varied diversity of fauna. During the current survey, 4 fish species belonging to 4 orders and 4 families were documented. These species were Salmo trout, Glyptothorax cavia, Schizothrox curvifrons, and Paracobitis longicauda (Table 1)((Majidi et al., 2024).

Table 1. Fish diversity in the Ishob River of Khahan District, Badakhshan Province

S. No	**Order**	**Family**	**Genus and Species**	**Local name**
1	Salmoniformes	Salmonidae	*Salmo trout*	Khal-mahi
2	Siluriformes	Sisoridae	*Glyptothorax cavia*	Sag-mahi
3	Actinopterygii	Cyprinidae	*Schizothrox curvifrons*	Shir-mahi
4	Cypriniformes	Nemacheilidae	*Paracobitis longicauda*	Mor-mahi

In this survey, a total of 140 fish specimens were collected from all three sampling sites. The list of species of fish documented is given in Table 2. The sampling region, Nori Dara, was one of the regions where the maximum number of fishes (44.28%) were collected, followed by Qaria-e-Tang (31.42%), and the minimum number of fish (24.28%) was collected from the Pool-e-Ishob region (Mirza et al., 2011; (Majidi et al., 2024).

Table 2. Fish species documented in the Ishob River

Fish name	**Pool-e-Ishob**	**Qaria-e-Tang**	**Nori Darah**	**Total collected fish**
Salmo trutta	10	8	13	**31**
Glyptothorax cavia	8	10	14	**32**
Schizothrax curvifrons	10	18	25	**53**
Paracobitis longicauda	6	8	10	**24**
Total No. of fish observed	**34**	**44**	**62**	**140**

In the sampling areas, the Nori Darah region had the highest number of collected fish (44.28%), followed by the Qaria-e-Tang region (31.42%), and the least number of fish (24.28%) was collected from the Pool-e-Ishob region (Figure 2). All fish collected from the study site are of Asian origin (Bari et al., 2014), and it is known that natural flow systems are the main factors controlling riverine fish groups in aquatic ecosystems (Mirza et al., 2011).

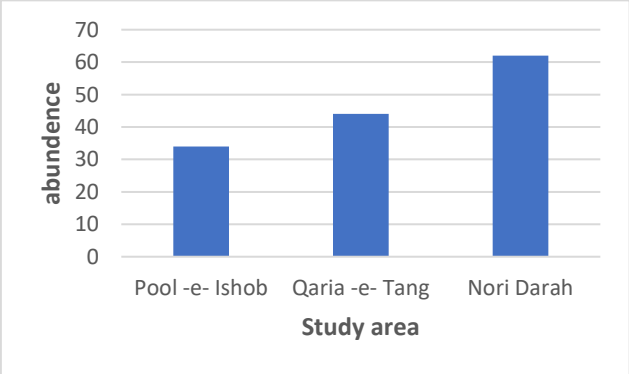
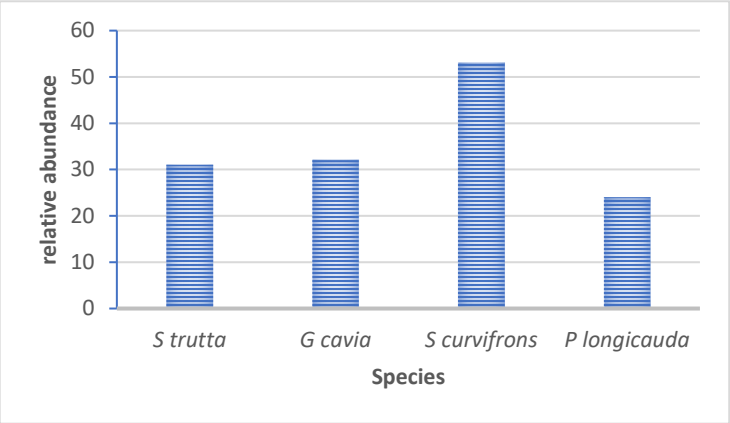


Figure 2 shows the abundance of fish species in the study area.

In the current survey, we found that *Schizothorax curvifrons* is the most abundant species with 37.85% (N = 53) in all three sites, followed by *Glyptothorax cavia* with 34.5% (N = 32), *Salmo trutta* with 22.14%(N=31), and *Paracobitis longicauda* was less abundant species in the three sampling regions with 17.14% (N = 24) study area (Figure 3). In the following graph, *Salmo trutta* (ST) is 31 ± 2.5, *Glyptothorax cavia* (GC) is 32 ± 2.7, *Schizothorax curvifrons*(SC) IS 53 ± 3.5, and *Paracobitis longicauda* (GC) is 24 ±1.5 (figure 3) (Kelzang et al, 2021; Dube & Kamusoko, 2013).

Figure 3 shows the abundance of fish species in the study area.

The fish species diversity indices (Table 3) of these sites showed the dominance of fish at the Pool-e-Ishob as 0.23, at Qaria-e-Tang as 0.26, and at Nori Darah as 0.27. Simpson index at Pool-e-Ishob was 0.76, at Qaria-e-Tang 0.73, and at Nori Darah 0.72.



Shannon index at Pool-e-Ishob was 1.32, at Qaria-e-Tang 1.28, and at Nori Darah 1.3. Evenness at Pool-e-Ishob was 0.93, at Qaria-e-Tang 0.90, and at Nori Darah 0.91. (Altaf et al., 2015).

Table 3. Statistical analysis of the fish diversity of the Ishob River

Serial number	**Pool-e-Ishob**	**Qaria-e-Tang**	**Nori Darah**
Number of Species	4	4	4
Dominance (D)	0.23	0.26	0.27
Simpson (S)	0.76	0.73	0.72
Shannon (H')	1.32	1.28	1.3
Evenness (E)	0.93	0.90	0.91

Figure 2. *Salmo trutta* (Order Salmoniformes, Family Salmonidae)

Figure 3. *Schizothorax curvifrons* (Order Actinopterygii, Family Cyprinidae).

Figure 4. *Paracobitis longicauda* (Order Cypriniformes, Family Nemacheilidae).

Figure 5. *Glyptothorax cavia* (Order Siluriformes, Family Sisoridae).

During the study, we identified only one significant threat to fish diversity in the river area of the Ishob Waterway: flooding, which stands to majorly disturb the aquatic habitat and influence the survival and distribution of many fish species.

4. Discussion

During the current survey, a total of 140 fish specimens were collected from the three sampling places along the Ishob River. The current survey recorded four fish species belonging to four families and four orders. These species were *Salmo trutta*, *Glyptothorax cavia, Schizothorax curvifrons*, and *Paracobitis longicauda*. The study found that *Salmo trutta* were a highly abundant species, and *Paracobitis longicauda* were the least abundant species in the study region. There is very little information about the ichthyofauna of Afghanistan. A previous study reported 1190 fish specimens from the Kabul River of Afghanistan, representing the orders Cypriniformes, Salmoniformes, and Cichliformes. However, many of the widely distributed Asian catfish species (Siluriformes) are poorly represented in Afghanistan due to the geographical isolation of the country and the limited suitability of its aquatic environments, resulting in relatively low diversity of catfish. Members of the Cyprinidae family adapt very well to cold-water conditions and can travel under low dissolved oxygen. Thus, in combination with historical biogeographic processes, cyprinids generally dominate freshwater ecosystems for much of Asia (Kelzang et al., 2021).

The report of Coad (1981) tells us that upper Kabul River basin cold-water fish communities are mostly made up of snow trout (*Schizothoracini*) and loaches from the family Cobitidae. Afghan rivers and streams bear a mixture of Oriental and Palaearctic taxa, including northern and southern elements, as well as species adapted to high-altitude and low-altitude environments. The

ichthyofauna is largely dominated by Cyprinidae (56.9%), followed by Cobitidae (24.5%); Siluriformes contribute less (11.8%). Other studies further indicate the presence of cyprinid species in northwestern Afghanistan and northeastern Iran (Coad & Bogutskaya, 2012) and some similar findings from its neighboring areas (Khattak et al., 2015; Mirza et al., 2011; Muhammad et al., 2017; Hossain et al., 2013).

Afghanistan is endowed with considerable natural resources and striking scenery comprising mountains, deserts, forests, rangelands, and diverse water bodies, all supporting rich biological diversity under varying environmental conditions (Majidi, 2023; UNEP, 2008). This biological diversity is further manifested through the myriad of species, community compositions, and ecological behaviors seen and found in the different habitats and ecosystems across the country (Adil, 2000; Majidi et al., 2022). Nevertheless, long-standing periods of conflict and instability, poor educational systems, weak enforcement of laws, illegal logging, high unemployment, pervasive poverty, periodic droughts and natural disasters, population growth, and the influx of displaced or returning communities have all grievously exerted pressure on Afghanistan's environment and wildlife (Saidajan, 2012).

This study is the first documented survey of fish species from the Ishob River in Badakhshan Province. The Khahan district has adequate water resources as well as environmental conditions for fish aquaculture. In spite of this potential, aquatic organisms, seen as good food, find their way into only a fraction of the local diet because fish production in the district has not been meeting the demand of consumers. Fishing is banned throughout Badakhshan Province at the moment, and it is believed that this has benefited the local wildlife (Majidi et al; 2023). Without prior records of fish diversity along the Ishob River, the findings from this study set an important baseline that can help reference future studies concerning fish species diversity in Afghanistan.

5. Conclusion

The current survey was performed on the Ishob River in Khahan District of Badakhshan Province, Afghanistan. This habitat was surveyed for fish species diversity in 2025. In the present survey, four fish species belonging to four orders and four families were recorded. These species were *Schizothorax curvifrons* is the most abundant species with 37.85% (N = 53) in all three sites, followed by *Glyptothorax cavia* with 34.5% (N = 32), *Salmo trutta* with 22.14%(N=31), and *Paracobitis longicauda* was less abundant species in the three sampling regions with 17.14% (N = 24). The current research recorded the flooding threat to ichthyofauna in this aquatic habitat.

5.1 Highlights

1. The Ishob River, located in Khahan District, provides a significant habitat for fish species.
2. Four fish species have been documented in this research.
3. Flooding is documented main threat to fish diversity.

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Conflicts of Interest: The authors declare no conflict of interest

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