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RESEARCH ARTICLE

Ichthyofaunal Diversity of Kurram River at District Bannu, Khyber Pakhtunkhwa

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ABSTRACT

From July to September of 2022, a study on the fish of the Kurram River was carried out at Slema Sikander Khel Essaki Bannu Village, District Bannu, Khyber Pakhtunkhwa. Five fish species in all, from three families (*Cyprinidae*, *Channidae*, and *Mastacembelidae*) and three orders (*Cypriniformes*, *Perciformes*, and *Mastacembeliformes*), were recognized. The richest family in the current survey was the Cyprinidae family. *Puntius sophore*, *Crossocheilus diplochilus*, *Barilius*, *Pakistannicus*, *Mastacembelus armatus*, and *Channa gachua* are among the species that have been identified. Based on current study, it can be said that the ichthyofauna, particularly Cyprinid species, is abundant in the Kurram River Downstream. From the perspective of conservation and taxonomy studies, the work will be extremely helpful in the future.

1. Introduction

The Kurram River, flowing through the picturesque landscapes of Bannu, Pakistan, holds a profound significance both ecologically and socio-economically [1]. Nestled within the heart of the Khyber Pakhtunkhwa province, Bannu serves as a cradle of life for myriad aquatic species thriving in the embrace of the Kurram River's gentle currents [1, 2]. As the lifeline of this region, the river not only sustains the livelihoods of local communities but also nurtures a rich tapestry of ichthyofaunal diversity, making it a captivating subject for scientific inquiry and conservation efforts [3].

The ichthyofaunal diversity of the Kurram River at Bannu encapsulates a complex interplay of ecological, hydrological, and anthropogenic factors, each contributing to the intricate mosaic of aquatic lifeforms that call this river home [3]. From its humble origins in the rugged terrain of Afghanistan to its meandering journey through the verdant valleys of Bannu, the Kurram River serves as a vital conduit for biodiversity, shaping the ecological dynamics of its surrounding landscapes [4].

Understanding the ichthyofaunal diversity of the Kurram River at Bannu requires a holistic approach that transcends traditional disciplinary boundaries [5]. It necessitates an exploration of the river's hydrological regime, morphological characteristics, water quality parameters, and the myriad ecological interactions that influence the distribution and abundance of fish species within its waters [6]. Moreover, it demands a nuanced understanding of the socio-economic dynamics that underpin human interactions with the river and its aquatic resources [5, 6].

At the heart of this exploration lies the remarkable diversity of fish species that inhabit the Kurram River at Bannu [1]. From iconic freshwater giants to diminutive denizens of the riverbed, these fish species embody the resilience and adaptability required to thrive in dynamic aquatic environments [6, 7]. They serve as indicators of ecosystem

health, reflecting the intricate web of ecological processes that govern the river's biotic community [5, 6, 7].

The ichthyofaunal diversity of the Kurram River at Bannu is shaped by a myriad of factors, including hydrological variability, habitat heterogeneity, water quality fluctuations, and anthropogenic disturbances [8]. The river's hydrological regime, characterized by seasonal fluctuations in flow and water levels, exerts a profound influence on fish populations, influencing their reproductive cycles, migratory patterns, and overall distribution within the riverine ecosystem [9].

Furthermore, the morphological diversity of the Kurram River, encompassing riffles, pools, runs, and backwaters, provides a mosaic of habitats that cater to the diverse needs of fish species, offering refuge, spawning grounds, and foraging opportunities [10]. These diverse habitats serve as critical nurseries for juvenile fish, facilitating their growth and development before they venture into the main channel of the river [11].

Water quality emerges as a defining factor shaping the ichthyofaunal diversity of the Kurram River at Bannu [12]. From pristine headwaters to anthropogenically influenced reaches downstream, the river's water quality undergoes a myriad of transformations, influenced by inputs from agricultural runoff, urban pollution, and industrial activities [12]. These changes in water quality can have profound implications for fish populations, affecting their health, reproductive success, and overall survival [13].

Human activities exert a significant impact on the ichthyofaunal diversity of the Kurram River at Bannu, presenting both challenges and opportunities for conservation efforts [14]. Overfishing, habitat degradation, pollution, and the construction of dams and weirs pose immediate threats to fish populations, jeopardizing their long-term viability and ecological resilience [15]. Conversely, community-based conservation initiatives, sustainable fisheries management practices, and habitat restoration efforts offer hope for the preservation of the river's biodiversity and the sustainable utilization of its aquatic resources [16].

In conclusion, the ichthyofaunal diversity of the Kurram River at Bannu represents a captivating tapestry of aquatic life, woven intricately into the fabric of its surrounding landscapes [2,4]. Understanding and conserving this biodiversity hotspot requires a multi-faceted approach that integrates scientific research, community engagement, and policy interventions [6]. By unraveling the mysteries of the Kurram River's ichthyofaunal diversity, we can unlock valuable insights into the ecological dynamics of riverine ecosystems and chart a course towards their sustainable management and conservation for generations to come [5, 7, 9]. Therefore, the aim of the study to investigate the ichthyofaunal diversity of Kurram river at Bannu.

[2]. Materials and Methods

Material and Methods

Research area

The purpose of the study was to determine the Ichthyofaunal diversity of the Kabul River.

A complete history of river Kurram

The Kurram River also known as the Kurrama River, rises in the watershed of Spin Ghar in the Kurram District of Pakistan and the Paktia Province of Afghanistan. It then flows through the cities of Bannu and North Waziristan, before joining the Indus River close to Isa Khel. It is a right bank tributary of the Indus River that drains the southern sides of the Spin Ghar mountain range. Kurrama River flow, Khyber Province, Pakistan. Originally spoken (Pashto) Where about Nation: Pakistan State: Khyber Pakhtunkhwa Area: Kurram Agency Physical attributes. The site is 20 km (12 mi) southeast of Gardez, Paktia, near the mouth of the Indus River. The coordinates are 32°37′36 N 71°21′53 E. The length is 320 km (200 km). Features of basins Right Tributaries The Gambila The Kurrama River irrigates about 32,000 hectares (80,000 acres) of land and flows through Pakistan's tribal areas. The Kirman River and the Khurmana River are two of its tributaries. The adjacent Kurran-Garhi Project, completed in 1962, is utilized for irrigation, electricity generation, and flood control. The Kurrama River's surrounding soil is excellent for farming because it has living qualities and occasionally floods (Figure 1).

Examine Period

Fish is collected cyclically over the three months of July, August, and September in 2022. Most of the collecting was done in the morning.

Selected samples

These fish were gathered using cloths for little fish and a basic netting mechanism. The local fisherman, Slema Skander Khel, who was familiar of both the tiny and major streams, carried out this collection. Fish of various sizes and types were collected at different times; between 15 and 20 different species were found. Twenty-five specimens of the right size were chosen for additional research after four intervals of collection; the remaining specimens were discarded. There are roughly five distinct species represented in all specimens.

Aquatic parameter

The temperature, pH, and water velocity are some of the water characteristics that influence the distribution and diversity of fish in that particular area.

Temperature of Water

The summertime when this sample collection was conducted saw temperatures between 20 and 24 degrees Celsius for the duration of the investigation. A typical mercury thermometer is used to measure this temperature.

It is immersed immediately into water for a few minutes, and the scale reading is noted.

Water's pH

Using pH paper, the water's PH was measured and found to be 6, 7, and 7.5, respectively.

Water's Speed

To find the average speed of water, throw a piece of wood into the water at point A. The wood will travel across the water's surface and arrive at point B. The velocity is determined by measuring the wooden piece's distance traveled in a unit of time.

V=S/T

Where,

V= Velocity of water

S = Distance covered

T= time taken

Water's Length and Depth

By projecting the stream's length from its outlet point to its end point on a map, its length was determined. A graded cylinder is submerged in water until it touches the bottom, at which point the length from surface to bottom is recorded to determine the depth of the water.It was done again at various intervals in order to determine the average depth. General observation was used to study the water's color and the bank's conditions.

Pretraction

Samples were taken at every cycle collection. For all fish, big and tiny, specimens were preserved in 10% formaldehyde solution in around ten plastic and glass vials based on their similarities. To maintain their quality, each bottle's solution was periodically examined and they were stored in a different container.

Recognition and Marking

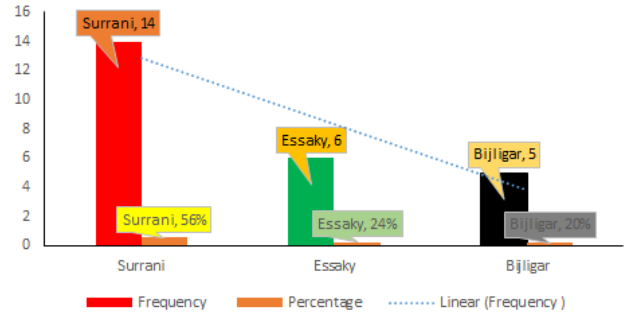
The identification of the specimens that were gathered came second after sampling. Identification was done using the Mirza and Sandhu [17] standard identification key for Punjab, Pakistan. The total number of fish that have been identified belongs to five distinct species: Puntius sophore, *Barilius pakistanicus*, *Channa gachua*, *Crossocheilus diplochilus*, and *Mastacembelus armatus*. Following the identification of every species, the name of each bottle was permanently marked along with the collection month and date.

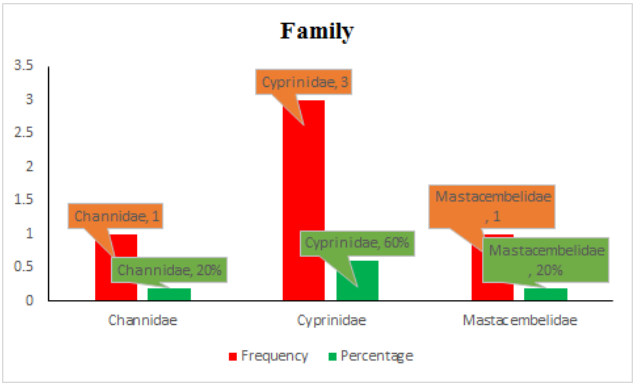
Measurement by morphometric

Using meter tape, rules, magnifying glass, and light microscope, the morphometric parameters of fish, such as body length, number of scales on lateral lines, and meristic count of all fin rays, were measured. Fish length increased proportionately, according to these criteria.

[3]. Results

A deceased four-month-old kid was presented to the clinical medicine department with no prior history of illness. The sudden death prompted an investigation into the cause, which revealed petechial hemorrhages on the myocardium, watery intestinal contents, and hemorrhages in the small intestine and colon, along with the characteristic softness of both kidneys indicative of enterotoxaemia.





[4]. Discussion

As a staple food for a large number of people, fish are one of the most significant components of the aquatic environment and are vital to the economies of many countries [18]. One billion individuals globally eat animal proteins [19, 20]. Five species, representing three orders and three families, were gathered from three separate locations during the fish diversity survey on the Kurram River. *Barilius pakistanicus*, *Crossocheilus diplochilus*, *Puntius sophore*, *Mastacembelus armatus*, and *Channa gachua* were the species in question. Following collection, the following species were kept in glass and plastic vials

with a 10% formalin solution that was changed roughly three times.

Each time a collection was made, they were recognized. As a consequence of the collection, three species *Crossocheilus diplochilus*, Puntius sophore, and *Barilius* Pakistani represent the dominating family *Cyprinidae*, which accounts for almost 60% of the whole collection. 20% each of the families *Channidae* and *Mastecemmelidae* make up the remaining 40% of the collection. All of them are members of the Actinopterygii class. From August to November 2011, a study on the kurram fishes in District Bannu, Khyber Pakhtunkhwa, was carried out. A total of twenty-four fish species were identified, categorized into eight families (*Cyprinidae, Nemacheilidae, Sisoridae, Siluridae, Bagridae, Channidae, Mastacembelidae* and *Schilbeidae*) and four orders (*Cypriniformes, Siluriformes, Channiformes and Mastacembeliformes*). With 14 species: *Carassius auratus, Cyprinus carpio, Hypophthalmichthys molitrix, Puntius sophore, Puntius ticto, Crossocheilus diplochilus, Tor macrolepis, Orienus plagiostomus, Barilius pakistanicus, Barilius vagra, Barilius modestus, Garra gotyla, Labeo rohita, and Cirrhinus mrigala*: represented the richest family in the current survey [21].

Rauf et al. conducted a survey of the fish species of the Kurram River in Michini Nowshehra, close to Mohmand Agency, between June and November of 2011-2015). Twenty-three freshwater fish species, representing six orders, nine families, and seventeen genera, were identified in that study. *Barilius vagra, Rasbora daniconius, Cirrhinus mrigala, Labeo diplostomus, Puntius ticto, Puntius sophore, Tor macrolepis, Crossocheilus diplochilus, Garra gotyla, Carassius auratus,* and *Cyprinus carpio* were the members of the dominant family, the *Cyprinidae*. Four species: Bagarius *bagarius, Glyptothorax naziri, Glyptothorax punjabensis,* and *Glyptothorax stocki*: represented the family *Sisoridae* [21].

Channa punctata and *Channa gachua* were the two species that represented the family Channidae. Each of the other six families; the *Cobitidae* family, represented by *Botia birdi*; the *Siluridae* family, represented by *Wallago attu*; the *Schilbeidae* family, represented by *Clupisoma naziri;* the Heteroneustidae family, represented by *Heteroneusteus fossilis*; the *Mastacembelidae* family, represented by Mastacembelus armatus; and the Cichlidae family, represented by *Oreochromis niloticus*. Every species discovered in this study was also included in the earlier investigation, demonstrating the species' healthy growth and survival in the Kurram River [15, 16]

5. Conclusion,

The River Kabul supports a variety of species and is a healthy aquatic system in terms of fish diversity. The recent study has determined that the fish fauna in Pakistan's Kurram River, KP, is abundant. Even though the Kurram River has yielded the identification of five species, there is yet hope for many more. Aqua-culturists can benefit from knowledge about the various edible species found in the most dominating family, *Cyprinidae*. Thus, greater research on the taxonomy and ichthyo diversity of fish in the Kurram River in the Bannu district is necessary.

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