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# Ichthyofaunal Diversity of Baur Reservoir, Gularbhoj, Udham Singh Nagar, Uttarakhand, India

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#### ABSTRACT

The idea of variation and variability among living things is known as biodiversity. In addition to the diversity of species, habitats, genetic diversity, and ecological communities are all included in biodiversity. Maintaining biodiversity is essential to preserving the environment and guaranteeing future generations access to it. This study is emphasized on the fish faunal diversity of Baur reservoir in Udham Singh District, Uttarakhand. The study was conducted during 2022-2023. Fish samples were collected basis from three sites namely Boat stand, Dhai number and Shiv Shakti Temple. Fish species were identified with the standard methods of Jhingran (1992), Jayaram (1981), Day (1878) and their fin formula. During the study 20 species were identified which was belong to six families. During our observation Cyprinidae (55%) was dominant among all the recorded families. Family cyprinidae followed by Siluridae (20%), Channadae (10%), Notopteridae (5%), Mastacembelidae (5%) and Belonidae (4%).

#### Key words: Fish Fauna, Baur reservoir, overexploition, Cyprinidae,

#### Introduction

According to Rathoure and Patel (2020), biodiversity is one of the planet's most valuable natural resources. We can gain a greater understanding of the complexity and adaptability of life on Earth by comprehending the relationships between genes, species, ecosystems, and ecological processes. Conservation and restoration initiatives are directed by a holistic perspective to guarantee that biodiversity continues to benefit present and future generations.

Alpha, beta, and gamma diversity are important words in biodiversity research because they each indicate different levels of diversity at different spatial scales. Habitat loss and fragmentation disrupt ecosystems and ecological processes at the local, regional, and global levels, which ultimately leads to a decrease in biodiversity. These effects are sometimes exacerbated by other problems such as pollution, invasive species, climate change, and misuse of natural resources. In order to maintain ecological integrity and conserve biodiversity, it is imperative that habitat damage and fragmentation be addressed.

Protecting and restoring ecosystems, establishing wildlife corridors to bring disparate areas back together, and prioritizing biodiversity preservation and human development in land-use planning strategies are all aspects of conservation. Freshwater fishes are one of the taxonomic groupings most threatened globally. Numerous causes contribute to the decline in freshwater fish populations and the degradation of their habitat (Darwall and Vie 2005). Coordination and collaboration are required to address the threats to freshwater fish. These include plans to adapt to climate change, pollution control methods, fisheries management, habitat conservation and restoration, and sustainable water management.

The preservation of freshwater ecosystems and their biodiversity is essential for managing ecological services, preserving livelihoods, and ensuring the long-term health and resilience of these ecosystems. Cardinale et al. (2012) emphasized that ecosystems' capacity to deliver vital products and services that promote human well-being can be significantly impacted by biodiversity loss. The study of fish biodiversity and identification is one of the most interesting fields of biological research since it offers insights into the morphological differences and population diversity of fauna in both contaminated and non-polluted regions of any given ecosystem (Napit, 2013). For any ecosystem to remain stable and support the healthy operation of its food chains, its rich biodiversity is vital (Siddiqui et al. 2014).

India boasts a remarkable biodiversity that is important globally. The information they provided demonstrates the diversity and abundance of India's flora and fauna. These numbers highlight the need for robust conservation efforts to preserve India's distinctive biological heritage and explain why the country is a biodiversity hotspot. The preservation of India's distinctive ecosystems and species is essential for maintaining genetic diversity, maintaining ecosystem services, and ensuring the well-being of both wildlife and human societies. Fish are predominantly aquatic vertebrates that are cold-blooded also known as ectotherms or poikilotherms. Fish play an important part in human life. In the diets of many people around the world, they were a common and high-quality source of protein.

The legacy of humans is greatly influenced by fish fauna, both directly and indirectly. Furthermore, the swift expansion of the human population has resulted in additional stream habitat destruction, which has reduced aquatic organism abundance, especially fisheries resources, and increased demand for water and its bioresources. To keep these fragile ecosystems from deteriorating further, the environment needed to be repaired and maintained quickly and efficiently (Kar, 2013). Fish make up roughly half, or 21,723 species, of the 39,900 vertebrate species that are currently known to exist. Of them, 8411 are freshwater fish species and 11,650 are marine fish species. The Indian subcontinent is home to 2,500 different kinds of fish, of which 1,570 are marine and 930 are freshwater. (Jayaram, 2010; Kar 2013). Based on floristic composition, flora naturalness, and climate, the 262379 square kilometer North Eastern region of India was divided into the Eastern Himalaya and North East India bio-geographic zones (Rodgers and Panwar, 1988).

Built on the Baur and Kakrala rivers in the Udham Singh Nagar District of the State of Uttarakhand, the Baur reservoir is an earthen embankment dam. The reservoir's highest height and length are 17.98 meters and 9.50 kilometers, respectively. This irrigation dam supplies water to the Rampur District of Uttar Pradesh and the Tarai region of Uttarakhand. Rudrapur, Kashipur, Haldwani, and Nainital are the cities closest to this dam. This study is focused on Plankton variety in Baur Reservoir.

#### **Materials and Methods**

#### Baur Reservoir

The Baur reservoir is an earthen embankment dam, built on Baur and Kakrala rivers in Udham Singh Nagar District of uttarakhand. River Ganga is the basin area of this dam. The dam has a maximum height of 17.98 metres and length of 9.50 Kilometres. This is an irrigation dam and water of this dam irrigates Tarai area of Uttarakhand & areas of Rampur Districtof U.P. The nearest cities from this dam are Nainital, Haldwani, Rudrapur and Kashipur.



#### A View of Baur Reservoir, Udham Singh Nagar, Uttarakhand

Table:1- Morphometry of Baur Reservoir (Source: Irrigation Department, US Nagar, Uttarakhand)

S.N.	Name	Baur Dam
1.	District	Udham Singh Nagar
2.	Tehsil	Gadarpur/Bajpur
3.	Latitude	290,8' N
4.	Longitude	790,18' E
5.	Year of start of construction	1961-62

6.	Year of Completion	1966-67
7.	Year of First Filling & RL	1967 / 785 Ft.
8.	Normal Monsoon Rainfall	1500 MM
9.	Minimal Monsoon Rainfall	547 MM
10.	Length Of Dam	9.50 Km
11.	Maximum Height	9 59 Feet
12.	No. Of Gates	04
13.	Dead Storage Level	756.00 Feet/230.43 M.
14.	Full Reservoir Level	795.00 Feet/ 242.32 M.
15.	Total Area of Reservoir	1271.00 Hect.

Fish samples were taken from three carefully chosen sampling locations within Baur Reservoir, and with the assistance of local fishermen and villagers, useful data was gathered through the use of cast nets, gill nets, fatellajals, basic fabric, and angling with different kinds of bait, namely species. Fish were collected, inspected, tallied, and then returned to the system. A few specimens of uncertain species were stored in buffered formalin (5%) and brought to the laboratory for species confirmation. The literature provided by Day (1878), Jayaram (1981), Jhingran (1992), Talwar and Jhingran (1991), and Srivastava (1998) was used to identify and confirm the species.

Fish has a high nutritional value and is a great source of protein. Ichthyo-diversity, or the variety of fish species found in all aquatic habitats, is essential for maintaining the lotic and lentic ecosystems, protecting the water's quality, and comprehending the richness and abundance of other aquatic animals. The following describes the diversity and occurrence of fish species throughout the current investigation:

During the study period total 20 species were identified (Notopterus notopterus, Puntius chola, Puntius sarana, Puntius sophore, Puntius ticto, Catla catla, Cirrhinus mrigala, Labeo rohita, Nandus nandus, Rasbora daniconius, Oxygaster bacaila Osteobrama cotio, Channa punctata, Channa gachua, Wallago attu, Mystus tengara, Mystus vittatus, Heteropneustes fossilis, Xenetodon cancila and Notopterus notopterus) belonging to six families (Cyprinidae, Siluridae, Belonidae, Channidae, Notopteridae and Mastacembelidae) were identified from January, 2022 to December, 2023 in the Baur reservoir (Table-2 Photo plate 1). The dominant family among the six families, representing the 10 species, is Cyprinidae. The family Siluridae made up the second major family in terms of species composition which represents four species, Siluridae represents two species and Notopteridae, Belonidae and Mastacembelidae represents one species.

During the two year (2022-23) fishes were belong to 6 families, collected at all sampling sites, maximum 11 fish species (50%) belong to cyprinidae, 4 fish species (20%) Siluridae, 2 fish species (10%) belonging to channadae, 1 fish species (5%) belonging to Belonidae, 1 fish species (10%) belonging to Notopteridae, and 1 fish species (5%) belonging to Mastacembelidae.

S.N.	Family	Scientific Name	Local Name
1.	Cyprinidae	Puntius chola (Hamilton, 1822)	Putiya
2.		Puntius sarana(Hamilton, 1822)	Putiya
3.		Puntius sophore (Hamilton, 1822)	Putiya
4.		Puntius ticto(Hamilton, 1822)	Putiya
5.		Catla catla (Hamilton, 1822)	Katla
6.		Cirrhinus mrigala (Hamilton, 1822)	Naini
7.		Labeo rohita (Hamilton, 1822)	Rohu
8.		Nandus nandus(Hamilton, 1822)	bhedal
9.		Rasbora daniconius (Hamilton, 1822)	Devla
10.		Oxygaster baceilla (Hamilton, 1822)	Chal
11.		Osteobrama cotio(Hamilton, 1822)	Kataya

Table-2-: List of Fish species collected from Baur Reservoir During study period (Jan 2022 to Dec 2022 and Jan 2023 to Dec 2023 )

12.	Channidae	Channa punctata (Bloch, 1793)	Saal
13.		Channa gachua (Hamilton, 1822)	Bjriya
14.	Siluridae	Wallago attu(Bloch & Schneider, 1801)	Lachi
15.		Mystus tengara(Hamilton, 1822)	Tengra
16.		Mystus vittatus (Bloch, 1794)	Singhora
17.		Heteropneustes fossilis(Bloch, 1794)	Singhi
18.	Belonidae	Xenentodon cancila (Hamilton, 1822)	Kakila
19.	Mastacembelidae	Mastacembelus armatus (Lacepede, 1800)	Baam
20.	Notopteridae	Notopterus notopterus (Pallas, 1769)	Patra



(A)

**(B)** 

Graph-A: Showing family wise composition of Fishes in Baur Reservoir during 2022-2023

Graph-B: Showing genera wise composition of Fishes in Baur Reservoir during 2022-2023

#### Discussion

The diversity of fishes is known as Ichthyofaunal diversity or the range of fish species found in all aquatic habitats, which is essential for maintaining lotic and lentic ecosystems, conserving water quality, and understanding the diversity and abundance of other aquatic organisms. The following describes the diversity and occurrence of fish species throughout the current study.

During the study period total 20 species were identified (Notopterus notopterus, Puntius chola, Puntius sarana, Puntius sophore, Puntius ticto, Catla catla, Cirrhinus mrigala, Labeo rohita, Nandus nandus, Rasbora daniconius, Oxygaster bacaila Osteobrama cotio, Channa punctata, Channa gachua, Wallago attu, Mystus tengara, Mystus vittatus, Heteropneustes fossilis, Xenetodon cancila and Notopterus notopterus) belonging to six families (Cyprinidae, Siluridae, Belonidae, Channidae, Notopteridae and Mastacembelidae) were identified from January, 2022 to December, 2023 in the Baur reservoir (Table-2 Photo plate 1). The dominant family among the six families, representing the 10 species, is Cyprinidae. The family Siluridae made up the second major family in terms of species composition which represents four species, Siluridae represents two species and Notopteridae, Belonidae and Mastacembelidae represents one species.

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During our study, the common threats for fish population in Baur reservoir were also identified. Overfishing is mostly caused by the employment of improper methods such as dynamite, hammering, bleaching powder, and ichthyotoxic plants. The aquatic biota, human health, water quality, and populations of juvenile and brooder fish are all harmed by these methods. Fish spawning is being impacted by these practices, which is lowering fecundity rates. Similarly, Begum et al. (2009) identified the dangers to fish populations. The water quality of the reservoir has suffered as a result of Uttarakhand's industrial expansion, especially at Udham Singh Nagar. Frequently, either directly or indirectly, industrial effluents are released into the aquatic environment. Second, pesticides, insecticides, solid waste, sewage disposal, and household trash all wind up in aquatic environments. The state's fish population is seriously threatened by nonbiodegradable trash because it lowers oxygen levels and raises fish mortality.

The diversity of fish fauna and also that of the many other aquatic-community components has been affected by factors like temperature, flow regime, water volume, river bottom, foraging and breeding grounds of the organisms. Among 25 fish species, three species of Schizothorax (*Schizothorax richardsonii, S. plagiostomus, S. progastus*,) exhibits 12.0%; two species of Tor (Tor tor, Tor putitora) exhibit 8%; five species of Labeo (*Labeo calbasu, L. dero, L. boga, L. bata, L. dyocheilus*) constitutes 20%; four species of Puntius (*Puntius ticto, Puntius sarana, Puntius chola, Puntius conchonius*) constituted 16.00%; three species of Noemacheilus lotia, *Noemacheilus rupicola, Noemacheilus savona*) exhibited 12.00%; two species of Channa (*Channa gachua, Channa punctatus*) exhibited 8.00%; one species of Clarias (*Clarias batrachus*) exhibited 4.%; two species of Mystus (*Mystus tengara, Mystus aor*) constituted 8.00%; one species of Mestacembalus (*Mestacembelus armatus*) constituted 4.16% in the present study. All the life forms have been influenced due to the water quality (**Bhutiani and Khanna, 2014**).

Joshi (2022) conducted research on the water quality of Uttarakhand's Nanak Sagar Dam and found that it has a significant role in the density and diversity of aquatic life. Biological diversity's survival strategies have been documented in a few studies and recently studied in considerable detail by (Shyam et.al., 2020). Joshi and Tripathi (2010) examined on biotic variables of Nanak Matha reservoir and concluded the water quality is responsible for distribution of aquatic milieu.

The study's findings and analysis make it abundantly evident that the environment of Baur Reservoir is beneficial to fisheries in certain research locations. However, at certain locations and sample stations, environmental variables exhibit diversity. Anthropogenic activities such home sewage, industrial effluents, solid waste disposal, illicit fishing, indigenous fishing practices, and lake of awareness pose serious risks to the decline of biological diversity in Baur Reservoir. Following two years of research, we have some suggestions for conserving and safeguarding the fish population. It should be illegal to use unscientific fishing techniques (such as the use of chemicals, death of fry and fingerlings, etc.), dump solid waste, or release sewage into rivers, especially during the spawning and breeding season.



Channa punctatus

Wallago attu



Cirrhinus mrigala

Mystus tengara



Channa gachua

Notopterus notopterus

Mastacembelus armatus



Nandus nandus



Osteobrama cotio

Heteropneustes fossilis



Puntius sophore



Puntius chola



Chanda nama

Xenentodon cancila



Oxygaster bacaila

Rasbora daniconius



Labeo rohita

Catla catla

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