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Research Article

DIVERSITY OF THE EDIBLE FRESH WATER FISHES SPECIES OF THE NIWARI DISTRICT, MADHYA PRADESH, INDIA

***S.K. Dhusiya**
Department of Zoology
P M College of Excellence ASCA,
Govt. P. G. College, Niwari (M.P.)
**Author for Correspondence: dhusiyask@gmail.com*

ABSTRACT
Fish diversity, a most important part of the aquatic ecosystem, has been studied widely in India. However, the diversity distribution and distribution of fish species have not been well-researched at the state and regional levels. The variety of fish found in Madhya Pradesh freshwater bodies, including lakes, rivers, irrigation canals, and dams, is abundant. The size of Madhya Pradesh fish and fisheries is of great interest from an economic standpoint. Fishes are one of the most important vertebrate groups provide rich protein source in human diet and other animals. The domestic fish markets play a significant role in the livelihood of the rural population and people consumed variety of fishes for their taste and protein requirements. To investigate the fresh water fish diversity of edible fish major fish markets of Niwari, Madhya Pradesh. The information on the fish diversity of the market were collected and identified from the different fish vendor's along with some question regarding local name of fish, source of fish. The different freshwater fish specimens were observed, collected and identified from the available literature. 68 fish reported from the period of January 2024 to December 2024. In the present extensive survey and investigation, observed 27 species of fish from the 09 orders belonging to 12 families.

Keywords-*Fish diversity, fish market, freshwater, Niwari, Madhya Pradesh*

INTRODUCTION
Fish constitute basic and largest vertebrate groups for humans. Fish may be a good food resource for millions of humans that suffers from hunger and malnutrition, and that is influencing their lives in various ways. Fish are the only large group of vertebrates that greatly influence human civilization from ancient times to the present day. The economic importance and reach of fish and fisheries, especially in Uttar Pradesh, are essential for studying the distribution and availability of fish from freshwater basins, reservoirs and tanks (Shinde, *et al.,* 2009).

The study of fish, technically known as ichthyology, that is less popular branches of animal science. Fish is economically a very important group of animals in addition to its use as food. Fish's liver is main source of oil containing A and D. The production of quality protein is linked to the development of fisheries on a commercial basis. Freshwater fish are a rich origin of animal protein and their consumption is the most excellent protein source for humans.

Fishes are cold-blooded (poikilotherms) animals meaning their body adapt to an aquatic lifestyle and able to adjust their body temperature according to the external conditions and maintains homeostasis. And therefore, fishes are well adapted and found in natural aquatic bodies.

Cultivation of India's major carp and exotic species has been very popular in recent times. The study of fish, technically known as ichthyology, that is less popular branches of animal science. Fish is economically a very important group of animals in addition to its use as food. Fish's liver is main source of oil containing A and D.

Fish is a very important source of quality protein and haves in essential amino acids. It is also a valuable source of vitamin A, vitamin B_{12}, calcium, and omega-3 fatty acids, that is the major source of fish's protein

for human being around the world, where fishing and aquaculture support over 10% of the world's population. India currently ranks second in aquaculture and third in fish production in the world, contributing 6.3% to total world fish production (Anonymous, 2020a, b).

Fishes are a major payment crop in different country and a rapidly growing agricultural sector. The fishing sector is an extensive source of food supplements, income and livelihoods, but offers good job and income opportunities for many surrounding fishing communities and economically backward rural areas. In general, the physico-chemical and biological properties of water bodies are directly proportional to the fish growth and their optimal production. The physico-chemical properties of water in a fish farm depend mainly on the regional climatic condition and the geographical condition of the area affected by biotic factors (Shinde *et. al*., 2011).

India possesses around 4% of the world's renewable freshwater reserves, which support over 18% of the world's population and a diverse array of aquatic and semi-aquatic biota. India holds globally sixth rank in freshwater ichthyofaunal diversity. The Indian fish population describes 11.72% of species, 23.96% of genera, 57% of families, and 80% of global fishes (Vander and Albert).

The significance of this study on the edible fish diversity of the Niwari, Madhya Pradesh extends beyond a local context, contributing valuable insights to both national and global perspectives on freshwater fish diversity. Freshwater ecosystems, which support a disproportionately high diversity of species compared to terrestrial and marine environments, are critical for global fish diversity, human health, and the economy.

In the fish market variety of fishes are available for the different consumers (Chourey *et al*., 2014). Fish mostly remain in acceptable quality till the end of this chain but in conditions like high temperature and high relative humidity the spoilage of fish accelerates with greater economic losses to the seller (Alam, *et al*., 2010). The maintenance of fish from spoilage requires good handling practices that involve regulation of the temperature in such a way that accelerate fish preservation so that the quality and quantity of the fish remain undamaged (Kumar *et al* 2008).

Madhya Pradesh is one of most important state of the country and recognized as a tiger state and its forest areas. It is situated almost in the centre of India. Niwari has a network of rivers, streams, dams, ponds and lakes and found rich fish faunal diversity in the area.

MATERIALS AND METHODS

Study aera- Niwari is a town and a Nagar in Newari district in the Indian state of Madhya Pradesh. It is the administrative headquarters of Niwari district. His district was formed on 1 October 2018. It was formerly part of Tikamgarh. Niwari is the smallest district of Madhya Pradesh. Niwari is located on 25.34°N 78.80°E. Niwari is adjacent to the Jhansi and Mahoba districts of Uttar Pradesh. It is located in Bundelkhand Region of Madhya Pradesh. It belongs to Sagar Division. As of the 2001 Census of India, Niwari had a population of 20,711 with the 606,00 km^2 area. The Betwa River passes through this district, on the banks of this river Orchha town was established by ancient Kings of Bundelkhand. National Highway 39 and National Highway 44 and National Highway 539 passes through Niwari.

Sampling and data collection were done for one-year January 2024 to December 2024. Observation method has been applied to note down variety of fishes caught and brought by the fishermen for selling local hats and bazaar along this traverse. Fish species were collected with the help of local fishermen and the tribal people at various locations. Photographs were taken after and some questionnaire and interview taken to the fish vendors. Those were identified up to species level following Jayaram (2003), Jhingran (1991), Qureshi and Qureshi (1983), Srivastava (2016) and Heda (2009). Fish Base website was also referred for various aspects of fish fauna (www.fishbase.org). Morphometric measurements and meristic characters were taken and the identified samples were preserved in 10% formalin.

RESULTS AND DISCUSSION

The present study recorded 27 species of fishes belongs to 09 different orders,12 families and 21 genera from the fish market of Newari. Among these, 22 species of fishes are indigenous and 5 species are exotic

Table 1: Fresh water fishes identified from the different fish market of Niwari

Order	Family	Zoological Name	Local Name	**IUCN Status**
Cypriniformes	Cyprinidac	*Amblypharyngodon mala*	Dhawai	LC
		Catla catla	Catla	VU
		Cirrhinus mrigla	Nain	LRnt
		Ctenopharyngodon idellus	Grass carp	NE
		Cyprinus carpio	Common carp	VU
		Hypophthalmichthys molitrix	Silver carp	NT
		Labeo rohita	Rhou	VU
		Labeo calbasu	Kalbasu	VU
Siluriformes	Siluridae	*Wallago attu*	Boyari	LRnt
		Ompak bimaculatus	Jalkapoor	EN
	Bagridae	*Mystus tengara*	Tengra	LC
		Mystus vittatus	Tengra	VU
		Sperata seenghala	Giant River Catfish	LC
	Heteropneustidae	*Heteropneusteus fossilis*	Singhi	VU
	Claridae	*Clarias magur*	Air breathing catfish	LC
		Clarias gariepinus	African cat fish	LC
Cichliformes	Cichlidae	*Oreochromis mossambica*	Tilapia	LC
		Oreochromis niloticus	Nilotica	LC
Gobiiformes	Gobiidae	*Glossogobius giuris*	Bulla	LRnt
Channiformes	Channidae	*Channa punctatus*	Garai	LRnt
		Channa striatus	Sauri	LRlc
Mastacembeliformes	Mastacembelidae	*Macrognathus aculeatus*	Gainchi	NE
		Mastacembelus armatus	Bam	NT
Clupeiformes	Notopteridae	*Notopterus notopterus*	Patra	EN
		Notopterus chitala	Moya	EN
Beloniformes	Belonidae	*Xenentodon cancila*	Kauwa	LRnt
Symbranchiformes	Synbranchidae	*Monopterus cuchia*	Swamp eel	LC

LRnt = Lower Risk near threatened, LRlc= Lower Risk least concern, VU= Vulnerable, EN= Endangered, NE= Not Evaluated

fish species in different areas of Niwari. The IUCN status of the fishes was presented in table-1. During the study it has been observed and recorded that 22 species of indigenous freshwater fish belong to 08

orders and 11 families and 5 freshwater exotic fish species belongs to 2 orders and 2 families from different fish markets of Newari (Table1,2).

The results of the present study show order Cypriniformes and Siluriformes dominant group in the assemblage composition contributing (08 species, 29.62%), Cichliformes, Channiformes, Mastacembeliformes and Clupeiformes contribute (2 species,7.40 %) and Gobiiformes, Beloniformes and Symbranchiformes (1 species,3.70 %, each) respectively. The total indigenous fish species are contributing 81.48 %, whereas exotic fishes are contributing 18.51% to total fishes in the fish market of Niwari. Similarly, order Cypriniformes among the identified exotic fishes are only 3 species (11.11%) followed by Order Cichliformes contributing 2 species (7.40. %) (Table 1, 2). The Order Cypriniformes and are Siluriformes maximum group of fish identified a total 16 species and contributing 59.25 % in different fish markets at Niwari (Table1,2).

It was noted that the Newari fish market offers two varieties of fish: live fish and fish preserved in ice. The Indian Major Carps (IMC), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*) and Catla *catla* (Catla) and other carps like Common carps (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idella)* etc. *Tilapia* (*Oreochromis mossambica*), Shol (*Channa striatus*), *Notopterus notopterus,* Indian freshwater Sharks (*Wallago attu*), Shingi (*Heteropneustes fossilis*), Magur (*Clarias batrachs*) and Bam (*Mastacembelus armatus*) etc. are transported here as live from the Betwa River and nearby districts. The other fish are brought to the Niwari market from various states. Preserved freshwater

Table 2: Families, genera and species in order (percentage and composition)

	Order	Families	% of fam. in order	Genera	% of genera in order	Species	% of species in order
01	Cypriniformes	01	8.33	07	33.33	08	29.62
02	Siluriformes	04	33.33	06	28.57	08	29.62
03	Cichliformes	01	8.33	01	4.76	02	7.40
04	Gobiiformes	01	8.33	01	4.76	01	3.70
05	Channiformes	01	8.33	01	4.76	02	7.40
06	Mastacembeliformes	01	8.33	02	9.52	02	7.40
07	Clupeiformes	01	8.33	01	4.76	02	7.40
08	Beloniformes	01	8.33	01	4.76	01	3.70
09	Symbranchiformes	01	8.33	01	4.76	01	3.70
	Total	12		21		27	

fish are delivered to the market in ice boxes or cages of various sizes, while live fish are transported in different types of drums or trays.

The pricing dynamics of fish are contingent upon various factors including production levels, availability, and the interplay of supply and demand among consumers. Based on a comprehensive market assessment, the daily influx of fish within the Niwari fish markets is significantly influenced by transportation logistics, cold storage facilities, intermediaries, and traders. It has been established that approximately 60% of the fish provided in the market is sourced from local suppliers, while the remaining 40% is procured from external regions beyond Niwari and its adjacent localities.

The maximum fish is supplied from different places like from Betwa River, Veer Sagar Dam and Tehraka Dam and adjoining areas of Niwari city as well as from states like Andhra Pradesh, Gujarat, Maharashtra and Madhya Pradesh. The trains, trucks vans and others are used for transport of fish to wholesalers in Niwari city. A total of 03 big fish market and 7 small vendors fish markets are present in Niwari city and few markets are also present nearby areas. Fishes are the valuable source of protein for humans. It was found that in the Niwari fish market variety of freshwater fishes are available. The different peoples of the

society purchased and consumed the various fishes as per availability and price of the fishes are different from the fish market within areas.

CONCLUSION

The fish market serves as a reflection of the dietary inclinations of the local populace regarding aquatic food sources. The fish markets in Niwari signify the presence of a considerable diversity of freshwater fish species, which suggests that a significant portion of the population favors various fish species to satisfy their nutritional protein needs. The dynamics of marketing have a profound impact on the socio-economic conditions and livelihoods of individuals engaged in marketing-related activities within these regions. The fish markets in Niwari play a pivotal role in shaping the economic sustenance of a substantial segment of the population involved in the fish marketing sector. It is imperative that governmental and public-private partnerships are established to facilitate commercial advancement and enhancement within the industry.

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