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ICHTHYOFAUNAL DIVERSITY OF DISTRICT FAIZABAD (UTTAR PRADESH), INDIA

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ABSTRACT - Uttar Pradesh has vast potential of aquatic bio-resources and offers considerable scope for inland fisheries development and aquaculture. To investigate the ichthyofaunal diversity of Faizabad (Uttar Pradesh), data were collected with the help of local skilled fishermen and fish farmers from different locations of the district for 6 months during 2010-2011. Collections were made from rivers (Ghaghra, Tamsa), lakes, irrigation canals and ponds. During the study period, 62 fish species belonging to 41 Genera, 20 Families and 9 Orders were identified. Cypriniformes was the dominated Order with 22 species (35.48%) followed by Siluriformes 20 species (32.25%) and Perciformes 9 species (14.51%). The present study showed that Faizabad possesses rich fish diversity but proper conservation measures are required to maintain sustainability and richness of the species diversity of the district.

***Key word*:** Fish diversity, species composition, Faizabad, Uttar Pradesh.

INTRODUCTION

Life on the Earth is diverse at many levels, beginning with genes and extending to the wealth and complexity of species, life forms, and functional roles, organized in spatial patterns from biological communities to ecosystems, regions and beyond (Colwell, 2009). In other words, it means variety and variability among living organisms, their genetic differences and the ecosystems in which they live. The diverse weather and physico-geographic features contribute to rich biodiversity. Biodiversity has been viewed in many ways depending upon the perspectives of people from different spheres. In many instances, it has also been referred to "life" or "wilderness". The challenge of quantifying patterns of diversity at the species level, even when the organisms are known to science, is complicated by the problem of detecting rare species and the underlying complexity of the environmental template. Biodiversity is the variation in the genetics and life forms of populations, species, communities and ecosystems (Winter and Hughes, 1997). Biodiversity affects the capacity of living systems to respond to changes in the environment and is essential for providing goods and services from ecosystems-nutrient cycling and clean water (Rahbek and Colwell, 2011).

Uttar Pradesh has vast potential of aquatic bio-resources and offers considerable scope of inland fisheries development and aquaculture.The State contributes approximately 14.68% of the total national fish diversity (Lakra, 2010). Aquatic resources are available in the form of 28,500 km of rivers and canals, 1.38 lakh ha of reservoirs and 1.61 lakh ha of ponds and tanks as well as 1.33 lakh ha of floodplain lakes and derelict water. The total fish production from all resources in the state is 3.93 million tonnes (2009-2010) (http://fisheries.up.nic.in). During the last few decades, the fish biodiversity of the state are declining rapidly due to introduction of exotic fish species (Dwivedi and Nautiyal, 2010; Pathak *et al*, 2011) and anthropogenic environmental degradation like urbanization, damming, abstraction of water for irrigation and power generation and pollution, which have subjected natural water bodies in general and rivers, in particular to severe stress with devastating effects on freshwater fish diversity (Lakra, 2010). The aim of this study was to investigate the current ichthyofaunal diversity and provide the first systemic account of fishes of district Faizabad (Uttar Pradesh).

MATERIALS AND METHODS

Data Collection: The data were collected with the help of local skilled fishermen from different locatins, fish farmers and fish markets from different locations of Faizabad (Fig. 1) for 6 months during 2010-11. The climate of this region ($26^0$47'N & 82^0 08'E; msl 113 m) is marked by mild cold during winter and intensive heat during

Table 1 : Fish diversity of Faizabad District (Uttar Pradesh).

Order	Family	Scientific name	Local/common name
Osteoglossiformes	Notopteridae	*Chitala chitala*	Moi/ knifefish
		Notopterus notopterus	Patra/ featherback
Cypriniformes	Cyprinidae	*Amblypharyngodon mola*	Dhawai
		Aristichthys nobilis	Bighead carp
		Aspidoparia morar	Moraki
		Catla catla	Bhakur/ Catla
		Cirrhinus mrigala	Nain/ Mrigal
		Cirrihina reba	Raia
		Ctenopharyngodon idella	Grass carp
		Cyprinus carpio communis	Common carp
		Cyprinus carpio specularis	Common carp
		Cyprinus carpio nudus	Common carp
		Hypophthalmichthys molitrix	Silver carp
		Labeo angra	Rain
		Labeo bata	Bata
		Labeo calbasu	Karonchh
		Labeo dero	Kalabans
		Labeo gonius	Kurai
		Labeo rohita	Rohu
		Osteobrama cotio	Gurda
		Puntius chola	Sidhari
		Puntius sarana	Barb/ Olive barb
		Puntius sophore	Pool barb
		Puntius ticto	Ticto barb
Siluriformes	Bagridae	*Sperata aor*	Whiskered catfish
		Sperata seenghala	Giant river-catfish
		Mystus bleekeri	Day's mystus
		Mystus cavasius	Gangetic mystus
		Mystus menoda	Menoda catfish
		Mystus tengra	Tengara
		Mystus vittatus	Striped dwarf catfish
		Rita rita	Belgagra/ Rita
	Siluridae	*Ompak bimaculatus*	Pabda/butter catfish
		Wallago attu	Pahin/ Wallago
	Schilbeidae	*Ailia coilia*	Patasi/ Gangetic ailia
		Clupisoma garua	Garua
		Eutropiichthys vacha	Vacha
		Silonia silondia	Siland
	Sisoridae	*Bagarius bagarius*	Goonch
		Gagata cenia	Gagata

Table 1 continued...

Table 1 continued...

	Clariidae	*Clarias batrachus*	Mangur
		Clarias gariepinus	Bidesi magur
	Heteropneustidae	*Heteropneustes fossilis*	Singhi
	Pangasiidae	*Pangasius pangasius*	Pangas catfish
Perciformes	Channidae	*Channa marulius*	Sauri
		Channa punctatus	Sauri
		Channa striatus	Sauri
	Anabantidae	*Anabas testudineus*	Kawai
	Ambassidae	*Chanda baculis*	Chanri
		Chanda nama	Chanri
		Parambassis ranga	Chanri
	Cichlidae	*Oreochromis mossambicus*	Tilapia
	Nandide	*Nandus nandus*	Dhebari
Clupeiformes	Clupeidae	*Gudusia chapra*	Suhia
		Tenualosa ilisha	Hilsa/ Hilsa shad
Beloniformes	Belonidae	*Xenentodon cancila*	Kauwa
Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	Bam/ Zig-zag eel
		Mastacembelus pancalus	Malga/barred spiny eel
	Synbranchidae	*Amphipnous cuchia*	Andhasanp/Cuchia
Mugiliformes	Mugilidae	*Rhinomugil corsula*	Corsula
		Sicamugil cascasia	Yellowtail mullet
Tetraodontiformes	Tetraodontidae	*Tetraodon cutcutia*	Ocellated Pufferfish

Fig. 1 : Location of district Faizabad (Uttar Pradesh).

summer. The samples were collected from tanks, lakes, rivers (Ghagra, Tamsa),irrigation canals and fish markets. Ghaghra is the main river which flows from west to east and cover entire length of the district. It is one of the most important river for capture fishery. The collected fishes were initially treated with 8% formalin for 48 hours and finally preserved in 5% formalin after transport to the laboratory for further study.

Identification of Fishes: Identification of fishes was based on fresh or preserved specimens. They were identified by using standard taxonomic keys *viz.* Day (1878), Talwar and Jhingran (1991), FAO Identification Sheets, Srivastava (2002), ITIS (Integrated Taxonomic Information System) Standard Report (http://www.itis.gov), FishBase (http://fishbase.org). The collected fish were identified up to species level.

RESULTS AND DISCUSSION

The freshwater fisheries resources of Faizabad consisted exclusively of culture fishery from seasonal, perennial and culture ponds and capture fishery from rivers, nullas and irrigation canals. Present fish biodiversity in the river originate mainly from natural reproduction and/or escape from the numerous water bodies of the district. During the present study, 62 fish species belonging to 41 Genera, 20 Families and 9 Orders were identified (Table 1). Analysis of data showed that Order Cypriniformes (22 species) contributed maximum as compared to Siluriformes (20 species) and Perciformes (9 species). Synbranchiformes shared 3 species while Clupeiformes, Mugiliformes and Osteoglossiformes contributed 2 species whereas Beloniformes and Tetraodontiformes shared only 1 species (Fig. 2). Order Cypriniformes was the most abundant with 35.48% (Fig. 3) and the Family Cyprinidae comprised *Amblypharyngodon mola, Aristichthys nobilis, Aspidoparia morar, Catla catla, Cirrhinus mrigala, C. reba, Ctenopharyngodon idella, Labeo angra, L. bata, L. calbasu, L. dero, L. gonius, L. rohita, Osteobrama cotio, Puntius chola, Puntius sarana, Puntius sophore* and *Puntius ticto*. Genus *Labeo* represented by 6 species was dominant followed by Genus *Puntius* with 4 species. Order Siluriformes contributed 20 species (32.25%). Among Siluriformes, Family Bagridae contributed 12.9% of total fish species followed by Schilbeidae 6.45%, Sisoridae 3.22%, Clariidae 3.22%, Siluridae 3.22%, Heteropneustidae 1.61% and Pangasiidae 1.61% while Perciformes contributed 9 species (14.51%). Among Perciformes, Channidae (4.83%) and Ambassidae (4.83%) were dominant followed by Anabantidae (1.61%), Cichlidae (1.61%) and Nandidae (1.61%) (Fig. 4, 5).

In the culture ponds, *Catla catla, Labeo rohita, Cirrhinus mrigala, Ctenopharyngodon idella, Hypophthalmichthys molitrix* and *Cyprinus carpio* were very common species in the district. Tilapia (*Oreochromis mossambicus*) and *C. carpio* were recorded in both the ponds and rivers. In the seasonal ponds, *Puntius* spp., *Channa* spp., *Wallago attu, Clarias batrachus* and *Heteropneustes fossilis* were the common fish species. In the rivers and irrigation canals, Indian major carps and catfishes was also recorded frequently.

Fish diversity in terms of number (62 species) observed in district Faizabad. The fisheries of riverine system are based on relatively large number of species and a wide range of fishing gears. Habitat degradation, invasion of exotic fishes and fishing pressure are the main causes for loss of fish biodiversity in the district (Lakra *et al*, 2008; Lakra, 2010). Fish diversity recorded in the present study is less than the earlier reports of Faizabad (Pandey, 1999; Dwivedi *et al*, 2004) - 17 species less recorded by Pandey (1999) and 15 species less than the report of Dwivedi *et al* (2007) which might be attributed to large areas covered in earlier studies. Environmental stress and fishing pressure are reflected in the fish community composition and biodiversity of fishes (Dwivedi and Nautiyal, 2010; Mayank *et al*, 2011; Kumar, 2012; Tamboli and Jha, 2012). Present study indicate changing scenario (pattern) of fish diversity of Faizabad district (Uttar Pradesh).

There exist reports on occurrence of 87 fish species from eastern part of Uttar Pradesh and 111 taxa have been recorded from Uttar Pradesh and Bihar whereas 30 species are described in stretches of river Ganga at Allahabad (Srivastava, 2002; Lakra, 2010). 63 fish species belonging to 20 Families and 45 Genera were reported from river Betwa (a tributary of Ganga basin approved under First River - Linking Plan of India) in Uttar Pradesh (Lakra 2010). More recently, 92 fish species belonging to 58 Genera and 24 Families were recorded by NBFGR from river Ganga in Uttar Pradesh. Another report revealed the presence of 56 species belonging to 42 Genera, 20 Families and 7 Orders from river Gomti (Sarkar *et al*, 2010). Recent assessment by NBFGR, Lucknow revealed the occurrence of about 123 fish species in Uttar Pradesh (Lakra, 2010).

While evaluating the utilization pattern in Uttar Pradesh, out of 123 species about 33% are considered as ornamental, nearly 57% are potential food and 10% are listed under potential sport fishes (Lakra, 2010). The environmental threats could be man-made and natural or in combination with cascading and interlinked impacts. Conservation and sustainable utilization of natural

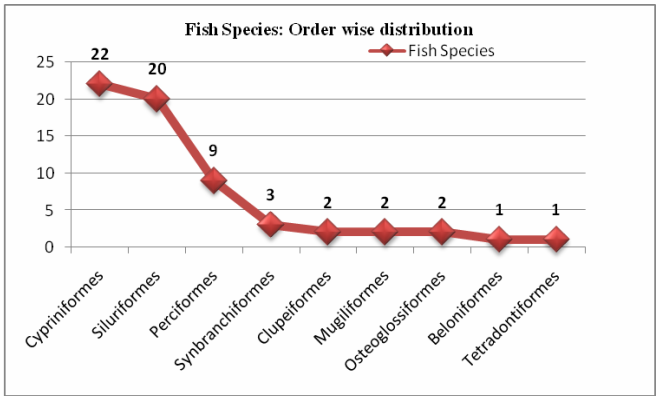

Fig. 2 : Order-wise distribution of fish species.

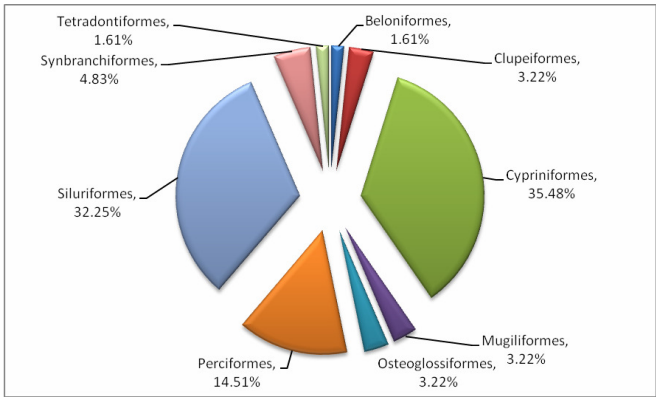

Fig. 3 : Diagrammatic representation of % contribution in each Order.

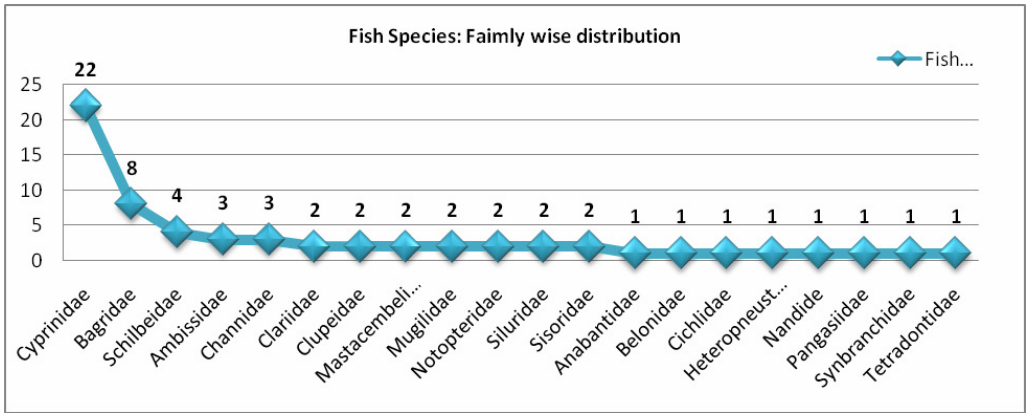

Fig. 4 : Diagrammatic representation of the number of species occurring in each Family.

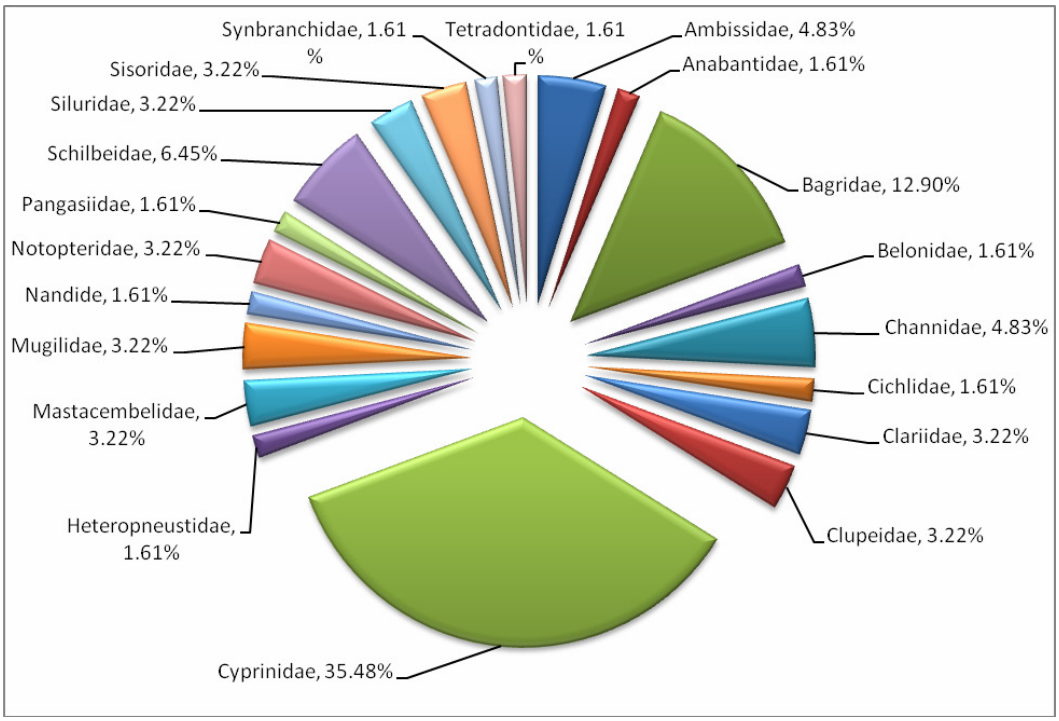

Fig. 5 : Diagrammatic representation of the % contribution in each Family.

resources are issues receiving global attention after signing the Convention on Biological Diversity (CBD, 1992). The freshwater resources of Uttar Pradesh are currently experiencing an alarming decline in fish taxa due to various anthropogenic activities. Destructive fishing methods (Dwivedi and Nautiyal, 2010), entry of exotic species (Singh and Mishra, 2001; Lakra *et al*, 2008; Pathak *et al*, 2011), habitat alteration and water diversion (Jagera *et al*, 2001), poor vegetation cover in the catchment areas, siltation, water abstraction and low water velocity (Mayank *et al*, 2011) have been implicated in affecting the overall piscine diversity (Pandey and Das, 2006; Lakra and Pandey, 2009; Kumaran *et al*, 2012).

Though not much published literature is available on the threat status of fish species of Uttar Pradesh, yet it is fact that population of some species is constantly going down and there is an urgent need to protect the same for posterity. According to recent conservation assessment of NBFGR, a total of 20 freshwater fishes are categorized as threatened of which 9 under Endangered and 11 Vulnerable (Lakra, 2010). The Government of Uttar Pradesh has declared endangered *Chitala chitala* as a State Fish and planning for its conservation is in process (NBFGR, www.nbfgr.res.in). Due to lack of previous sufficient information on occurrence and abundance of fish species of Faizabad, is not possible to quantify the rate of decline in its diversity but this report would be useful as baseline data for any future assessment and conservation plan for fisheries. However, more awareness and motivation is required on the value of indigenous fish diversity and conservation of aquatic resources to ensure the sharing of benefits of its utilization in an equitable manner so that the aquatic ecosystem gets adequate time to recover its natural community structure (Lakra and Pandey, 2009; Lakra, 2010).

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