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FISH DIVERSITY AND CONSERVATION PERSPECTIVES IN WETLAND OF KOSHI RIVER, IN ARARIA DISTRICT (NORTH BIHAR), INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

A study was carried out to investigate the diversity of fishes and the conservation status of Wetland, a natural wetland of Araria District, North Bihar, India. The study revealed the occurrence of 33 species of fishes belonging to 23 genera under nine (09) orders and 14 families. Cyprinidae was the dominant family with eleven (11) species followed by Channidae with four (04) species, then followed by Siluridae , Bagardae Anabantidae, Ambassidae, Mastacembelidae and Notopteridae with two (02) species each whereas Heteropneustidae, Clariidae, Gobiidae, Belonidae, Synbranchidae and Tetraodontidae were represented a single species each. The threatened status of species of this wetland included two (02) Endangered species, six (06) Vulnerable species, twenty (20) Near Threatened (NT) whereas five (05) are registered as Not Evaluated (NE) category. The maximum fish diversity was recorded in the monsoon season as compared to post-monsoon. Haphazard fishing consistently throughout the year along with broad weed pervasion could be liable for exhaustion of fish variety in Wetland of Koshi River in Araria district.

Keywords: Fish diversity; endangered species; conservation status; Wetland of Koshi River; Araria dist.

1. INTRODUCTION

The Koshi river system and its tributes is the important river basin of North Bihar. The river Koshi drains the southern slope of the Nepal Himalayas (25°20' to 29°0' N and 85°20' to 89°0' E long.) sprawled over a catchment area of 70.409 Km^2 covering the territory of two countries viz. Nepal (59,570 Km^2) and India (10,893 Km^2 North Bihar). River originates from the glaciers of the Mount Gasainthan (8013 m), the Mount Everest (8848 m) and the Kanchenjunga (8579 m) in the form of 3main

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different streams viz. Sunkoshi, Arun koshi and Tomar koshi respectively all joining together at Tribeni. About 12 km downstream Tribeni flows in adeep mountain George before its movement into the Terai plain at chatra. The river flows further downstream at chatra and builds up its plain by dividing into several channels spread over a width varying from 8 to 20 km. The bed slope of the Koshi near at Chatra is about 1:1000, whereas at the lowermost reach near the confluence with the Ganges is as low as 1:23000. The drainage area of the Koshi at Tribeni is about 61000 sq. km. The average annual flow of this Koshi river at Tribeni is 1614 cu m/sec. The flow of the Koshi is very high almost 3 times higher than that of the Sutlaz at Bhakra and more than 4 times than that of Colorado at Hoover dam. It is only 36% less than that of the Nile at Aswan. Because of its excessive flow and changing course, it is called as Sorrow of Bihar. The maximum flood discharge of the koshi records on 5th October 1968 was 913000 cu m/sec. (The Hindu-08). Every year koshi carries 6828 cr. Cuses of water and 950 lakhs cuses of sand (The Hindu 08). The sediment settles in the river bed, raising its level yearly. Koshi breached its eastern embankment at Kusaha in Sunari district of Nepal on August 18,2008 and flooded northern Bihar. This was the eighth incident of its kind and the first time a breach developed upstream of the Koshi barrage. The flood resulted in 13 km wide current flowing at enormous speed over a stretch of 100 km. Over a million people lost their crops, land and homes. The koshi river which gathers water from some of the highest mountains in the world including Everest and enters India in North Bihar suddenly changed its course and shifted over 120 km eastwards (times of India 08). Five districts of North Bihar viz, supaul, Madhepura, Araria, Saharsa andpurnea were affected,and about 97 villages were affected, about 3 cr. Of people were affected, very large number of livestock were dead and 125000 hectares of agricultural land damaged. Hundreds of people died. These are the only official estimates (Down to earth 08). According to census 2001, 9.88 lakhs people in 380 villages were living between koshi and its embankments. The average distance between embankments is 10 km and the koshi is free to spill 10 km. the river goes and spills outwards during a breach causing annual deluges in these villages without anyone noticing. Embankment technology is based on water levels; it does not take note of the role of sediment trapped within the walls. (The Hindu-08). Since time immemorial the Koshi River has been a constant source of trouble and misery of the people of north Bihar because of its divesting courses, flood rapidity of stream and ever shifting of its main flow. From ecological point of view the koshi river system is one of the prominent riverine systems of North Bihar and the major fisheries recourse. Fishes are primarily aquatic vertebrates. The system of adaptive interactions of fish with its environments in interrelationship with the biotic and abiotic environment. If any change occurs in biotic and abiotic environment it generally evokes a profound effect upon fishes and its habitat. Population ecology of fish is challenging job for fish biologists, due to its sampling problem. Fish landing data and population dynamics determine the sizes and fluctuations of exploited fish population and arrive at some ideas as to whether the population is declining, increasing or stabilizing. Population dynamics theory is a part of the development of life which states that the laws of reproduction and growth cause death of living organisms. Fisheries scientists have the view that the reduction of spawning grounds is primarily due to changes in river morphology Jhingran, [1] the flow caused by water extraction , siltation, and increase in flood plain area has reduced the fish yield.

Wetlands are classified into five categories such as (a) oxbow lake, (b) fresh water lakes, (c) fresh water ponds, (d) marshes, swamps and bogs, and (e) reservoirs Kar et al. [2].

A decrease in mean water level during monsoon months in the gang at Allahabad from 1971 to 1995 by about one meter supports this observation Dehad Rai, [3]. On the basis of the above background the current research project selected for scientific investigation and exploration under the project named as “Conserving Koshi Fish Biodiversity in Araria District in North Bihar.

1.1 Objective of the Work

I. To check the diversity of fish species in Wetland of Koshi River in Araria district.
II. To check the conservation status of fishes in Wetland of Koshi River in Araria district.

2. MATERIALS AND METHODS

The Study was carried out in Wetland of Koshi River in Araria District, of North Bihar, Bihar, India. It is endowed with rich aquatic biodiversity of flora and fauna. Araria district is one of the thirty-eight districts of Bihar state, India. Araria district is a part of Purnia division. The district occupies an area of 2830 km². Araria town is the administrative headquarters of this district. The above mentioned district lies on Latitude:-26°7′ 48″ N Longitude:- 87°28′ 12″ E.

To investigate the seasonal variation of fish communities, this study period was categorized into three phases, viz., pre-monsoon (Feb-May) with little or no rainfall but with very high temperature, the

monsoon (June–September) with heavy rainfall and relatively lower temperature, and post-monsoon (October–January) season with a drastic reduction of temperature and occasional rainfall.

The threat status of fishes were determined by following IUCN Red List of Threatened Species categories and criteria (2017). The frequency of occurrence of each. species was calculated based on the number of occasions the species was collected during the samplings. The status was determined with the help of a standard catch frequency chart presented by Tamang et al. [4]; Catch frequency: 91–100 % = Common, 81–90 % = Abundant, 61–80 % = Frequent, 31–59 % = Occasional, 15–30 % = Sporadic, 05–14 % = Rare, Less than 5% = extremely rare).

2.1 Data Collection

Fish samples were collected from many sites of wetland in whole Araria district. Fish collection was made with the help of local fisherman and the catches of fishers. Narayanan, S. [5]. The fishing was done by using different mesh size gill net, cast net, trap and angling. After the collection of fish, the sampled specimens were immediately preserved in 10% formalin for identification. Before preservation photograph was taken with the help of Nikon digital camera. The identification was made with the help of taxonomic references Jhingran, [6]; Linderberg, [7]; Srivastava, [8]; Talwar and Jhingran, [9]; Jayaram, [10]; Das et al. [11]. The conservation status of fishes based on conservation assessment and management plan for freshwater fishes of India Molur &Walker. [12].

3. RESULTS AND DISCUSSION

Comprehensive records on the fisheries of river Koshi are scanty. River is the major source of fisheries and contributes significantly to the inland capture fish production. But during last few decades the riverine system witnessed clear alterations due to enormous human interventions in the form of water abstraction, dam construction, sedimentation and illogical fishing. These have discerningly adverse effect on natural fish production, which showed constant declining trends. The evaluation of conservation status of the fishes and the results of the present study revealed that , out of 33 species , 61% belong to Near threatened (NT), 15% not evaluated (NE), 18% vulnerable (VU), and 6% endangered (EN) category. The study revealed the occurrence of 33 species of fishes belonging to 23 genera under nine (09) orders and 14 families. Cyprinidae was the dominant family with eleven (11) species followed by Channidae with four (04) species, then followed by Siluridae, Bagardae Anabantidae, Ambassidae, Mastacembelidae and Notopteridae with two (02) species each whereas Heteropneustidae, Clariidae, Gobiidae, Belonidae, Synbranchidae and Tetraodontidae were represented a single species each (Table 1).

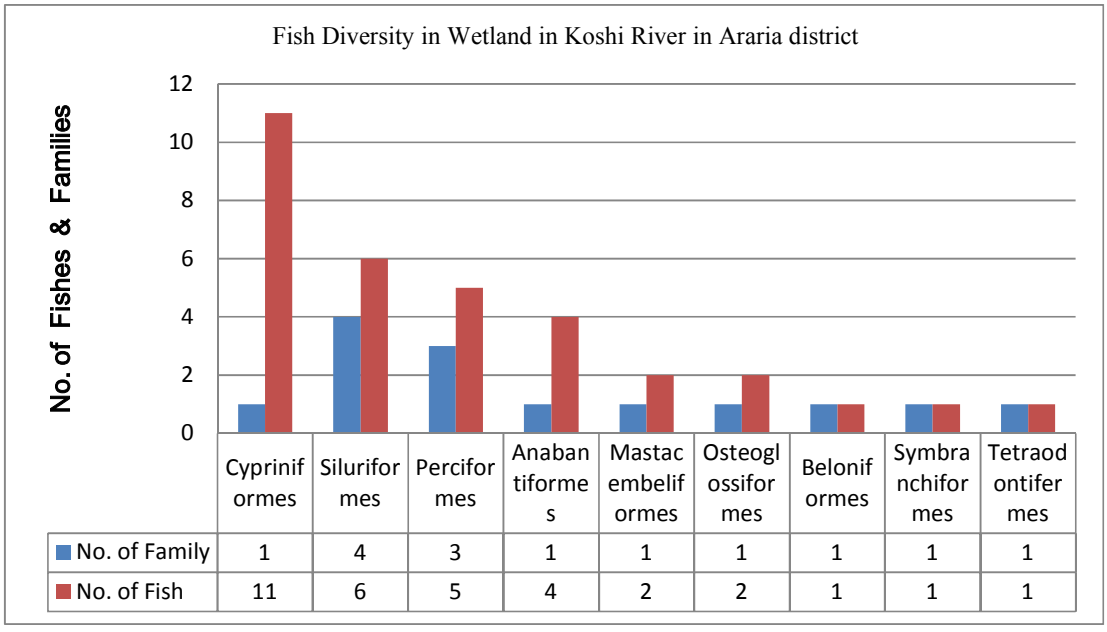

Fig. 1. Fish diversity in Wetland, Koshi River across Araria Dist

Table 1. List of 33 species found in Wetland of Koshi River in Araria Dist

Order	Family	Scientific Name	IUCN status	Local name
Cypriniformes	Cyprinidae	*Labeo rohita (*Hamilton ,1822)	NT	Rohu
		Labeo kalbasu (Hamilton,1822)	NT	Basrahi
		Labeo gonitus (Hamilton,1822)	NT	Kursa
		Puntius ticto (Hamilton,1822)	NT	Sidhari/ Pothia
		Puntius sophore (Hamilton,1822)	NT	Pothia
		Puntius sarana (Hamilton,1822)	NT	Darahi
		Cirrhinus mrigala (Bloch,1795)	NT	Naini
		Cirrhinus reba (Hamilton,1822)	NT	Reba
		Catla catla (Hamilton,1822)	VU	Bhakura/ catla
		Amblypharyngodon mola (Hamilton,1822)	NEf	Dhawahi
		Aspidoparia morar (Hamilton,1822)	NE	Chilwa
Siluriformes	Siluridae	*Wallago attu* (Bloch & Schneider1801)	NT	Boyari
		Ompak bimaculatus (Bloch,1794)	EN	Jalkapor
Siluriformes	Bagardae	*Mystus aor* (Hamilton,1822)	VU	Tengra
		Mystus vittatus (Bloch,1794)	VU	Tengra
Siluriformes	Heteropneustidae	*Heteropneusteus fossiis* (Bloch,1794)h	VU	Singhi
Siluriformes	Clariidae	*Clarias batrachas* (Linnaeus)	VU	Mangur
Perciformes	Anabantidae	*Anabus testudineus* (Bloch,1792)	VU	Kawai
		Colisa fasciatus (Bloch & Schneider,1801)	NT	Kotra
Perciformes	Ambassidae	*Ambassis nama* (Hamilton,1822)	NE	Chamwa
		Ambassis ranga (Hamilton,1822)	NE	Chanari
Perciformes	Gobiidae	*Glossogobius giuris* (Hamilton,1822)	NT	Bulla
Anabantiformes	Channidae	*Channa gachua* (Hamilton,1822)	NE	Chanaga
		Channa marulius (Hamilton,1822)	NT	Saur
		Channa punctate (Bloch,1793)	NT	Garai
		Channa striatus (Bloch,1793)	NT	Sauri
Mastacembeliformes	Mastacembelidae	*Macrognathas aral* (Bloch & Schneider,1801)	NT	Pateya
		Macrognathus aculeatus (Smith,1945)	NE	Gainchi
Osteoglossiformes	Notopteridae	*Notopterus notopterus* (Pallas,1769)	NT	Bhuna/ Ptra
		Notopterus chitala (Hamilton,1822)	EN	Moya
Beloniformes	Belonidae	*Xenentodon cancila* (Hamilton,1822)	NT	Kauwa
Symbranchiformes	Synbranchidae	*Monopterus cuchia* (Hamilton,1822)	NE	Bami
Tetraodontifermes	Tetraodontidae	*Tetradon cutcutia* (Hamilton,1822)	NT	Galphulani

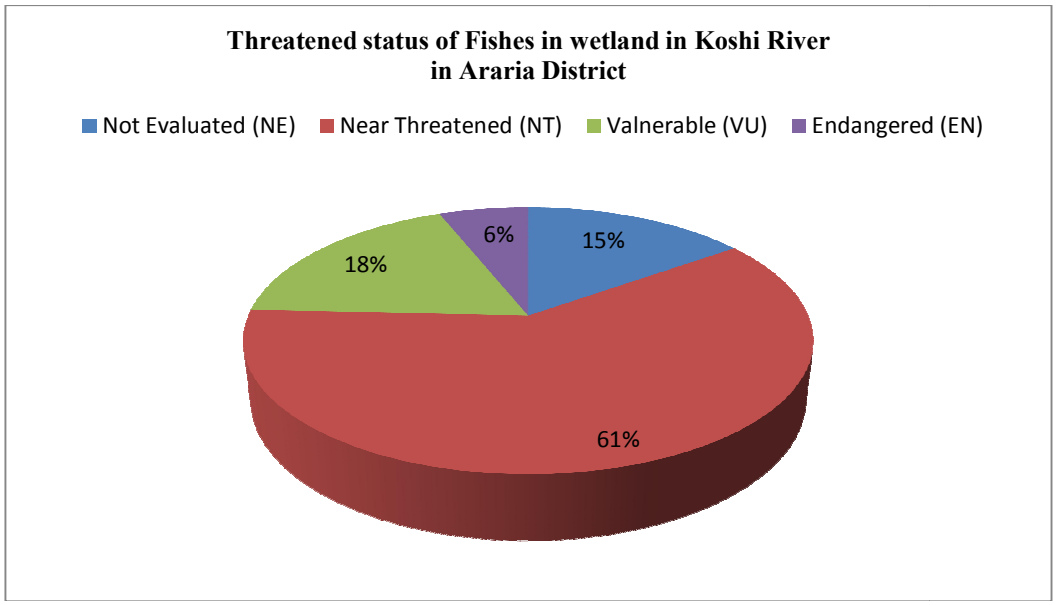

Fig. 2. Threatened status of fishes in Wetland, Koshi River across Araria Dist

4. CONCLUSION

The study revealed the occurrence of 33 species of fishes belonging to 23 genera under nine (09) orders and 14 families. Cyprinidae was the dominant family with eleven (11) species followed by Channidae with four (04) species, then followed by Siluridae, Bagardae Anabantidae, Ambassidae, Mastacembelidae and Notopteridae with two (02) species each whereas Heteropneustidae, Clariidae, Gobiidae, Belonidae, Synbranchidae and Tetraodontidae were represented a single species each (Fig. 1). The threatened status of species of this wetland included two (02) Endangered species , six (06) Vulnerable species , twenty (20) Near Threatened (NT) whereas five (05) are registered as Not Evaluated (NE) category (Fig. 2). The maximum fish diversity was recorded in the monsoon season as compared to post-monsoon. Haphazard fishing consistently throughout the year along with broad weed pervasion could be liable for exhaustion of fish variety in Wetland of Koshi River in Araria district.

5. RECOMMENDATIONS

Aimless fishing has been seen during the whole year, which has brought about enormous lessening of significant carps. A new Fish sanctuary needs to be established in Araria District of North Bihar area to study more and more on diversity of fishes. Government should focus on conservation of fish fauna of Koshi River and Wetland of same. Fishery regulation should be strictly followed to protect fish species and improve the fish production especially Indian major carps. Indian major carps are costly fishes, but their stocks are declining. Awareness campaigns should be done regularly among the fishers with regard to the value of fresh water fish commercial species and obtain higher price. As reported by various fishermen the decline in fish catch was due to arbitrary fishing, siltation, usage of fine nets, flood and changing land use pattern. This has resulted and forced many of them either give up or their change their profession. Thus, awareness programmes among fishers, strict ban on illegal monsoon fishing and usage of small mesh nets besides the protection of breeding grounds of commercially important fish species are some of the management measures, which would protect and conserve the precious fish diversity of the system.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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