

Ichthyofauna of the River Punpun of Nabinagar, Bihar (India) and its Fisheries

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The paper deals with the fish and fisheries of the river Punpun of Nabinagar, Bihar (India). During course of investigation 75 species of inland fishes were recorded dominated by Cypriniformes (32 species) followed by Siluriformes (19), Perciformes (10), Channiformes (04), Mastacembeliformes (03), Osteoglossiformes (01), Symbranchiformes (01) and Tetraodontiformes (01). Among these fishes 21 were vulnerable, 04 exotic, 04 endangered, 01 threatened, 05 lower risk least concern and 21 lower risk near threatened. The existing fishing methods were of conventional type.

Keywords: Ichthyofauna; Punpun; Nabinagar; Bihar (India); Fishes**Abbreviations**

C: Carnivorous; H: Herbivorous; D: Detritivorous; O: Omnivorous; L: Larvivorous; P: Predatory; E-P: Euryphagous plaktivorous; Bp: Benthophagous; Mpp: Micro Phytoplankton Feeder; Mpf: Microplankton Feeder; Ppp: Periphytophagous; V: Vulnerable; T: Threatened; En: Endangered; Exo: Exotic; LRLc: Lower Risk Least Concern; LRLnt: Lower Risk Near Threatened

Introduction

Bihar is one of the most significant and interesting state in India ichthyologically owing to its diverse ichthyofauna. The Punpun flowing in North - East direction is fed by a number of hilly torrents, namely, the Adri, the Batre, the Batane, the Dhawa, the Kasman, the Ramrekha, the Madar etc., joins the river Ganga at Fatawh, 25 Km downstream of Patna, the capital of Bihar state. Inland water comprise approximately 0.01% of the total volume of water on earth [24]. Inland fish comprise about 40% of all fish species and 20% of all vertebrate species [9]. Inland fish serve as a major source of protein, essential fats and micronutrients for hundreds of millions of people, particularly in rural communities [20,27,29]. More than 60 million people in low income countries rely upon inland fisheries as a source of livelihood and women represent

half the individuals in inland fisheries society chains [5]. During financial year 2018, the fish production amounted to around 650 thousand metric tons in Indian state of Bihar. Thus fisheries sector has an important role in overall development of state of Bihar.

A perusal of literature reveals that since Day's time (1878-1889) ichthyofaunal work of Bihar has been extremely fragmented, however, Indian state of Bihar has many major rivers, rivulets and streams, offering diverse habitat. The most important contributors on Bihar inland Ichthyofauna are Hamilton [8], Srivastava [25]; Mishra, *et al.* [18]; Hasan [7]; Mishra [16]; Payne [19]; Datta Munshi, *et al.* [3]; Sinha [23]; Mishra [17] and Sinha, *et al.* [22] but no attempt has been done on the ichthyofauna of the river Punpun of Nabinagar, Bihar (India) hence the present study was undertaken.

Materials and Methods

The Punpun river of Nabinagar, Bihar (Figure 1) lying between 84°: 0' - 85°: 20' E Longitude and 24°: 1' - 25° 25' N Latitude is a right bank tributary of the river Ganga having a catchment area of about 8530 sq. km., which is about 1% of the total Ganga basin area in the country.



Figure 1: Location map of study area.

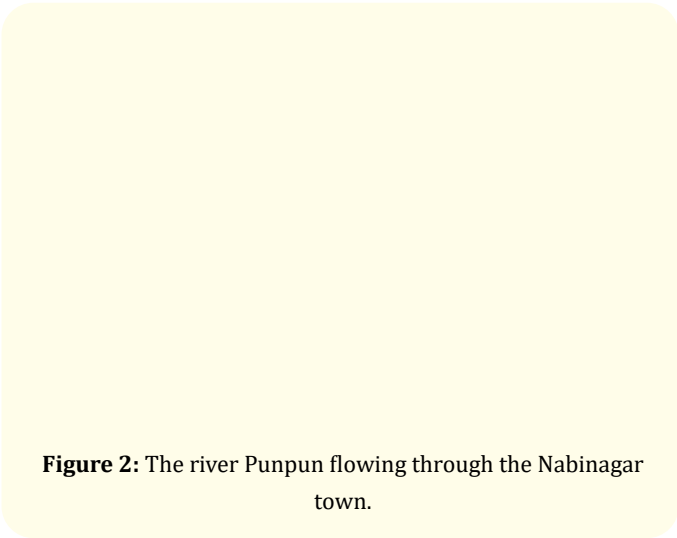


Figure 2: The river Punpun flowing through the Nabinagar town.

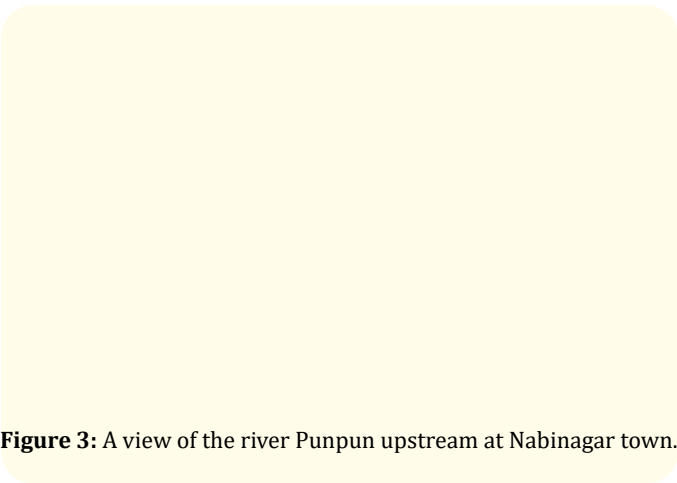


Figure 3: A view of the river Punpun upstream at Nabinagar town.

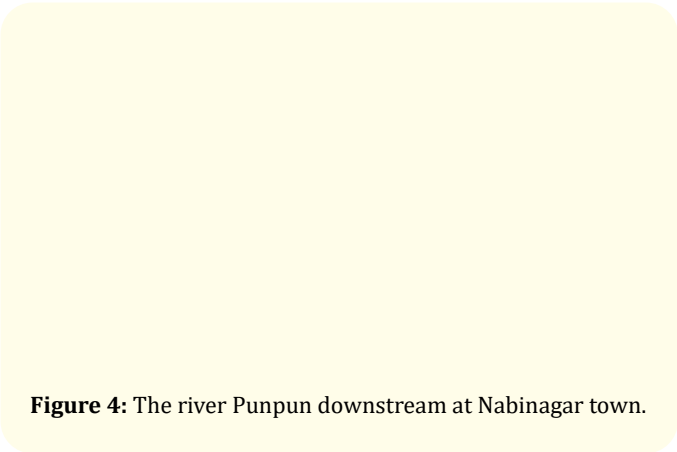


Figure 4: The river Punpun downstream at Nabinagar town.

Fish specimens were collected using different kinds of fish catching appliances and device with the help of fishermen while some were procured from the local market. Ecological notes, wherever possible were taken down. The specimens were fixed in 8% formaline solution. Fixed specimens were kept in containers with proper labeling and the tail pointing upwards for further studies. The identification of fishes are based on Day [4]; Jayaram [12]; Talwar, *et al.* [26] and Yadav [28]. Classification of fishes followed here are that of Greenwood, *et al.* [6] from Menon [15] check list. The nomenclature of various species are based on recent revisions and ICUN status of fishes were prepared based on CAMP, categorisation and IUCN category [1,10,11].

Results, Discussion and Conclusion

The river Punpun (Figure 2) has been surveyed within a stretch of 6 Km (3 Km upstream and 3 Km downstream of Nabinagar town) (Figure 3,4). The ichthyofauna of the river Punpun flowing through Nabinagar (Bihar) is based on a collection of 75 species of inland fishes belonging to 51 genera, 22 families and 10 orders as presented in table 1.

Order	Family	Genus	Species	Feeding habit	Status
Clupeiformes	Engraulidae	Setipinna Swainson	(01) <i>Setipinna phasa</i> (Ham.)	C	
Osteoglossiformes	Notopteridae	Notopterus Lacepede	(02) <i>Notopterus chitala</i> (Ham.)	C	V
			(03) <i>Notopterus notopterus</i> (Pallas)	C	T
Cypriniformes	Cyprinidae	Catla Valenciennes	(04) <i>Catla catla</i> (Ham.)	H	V
		Ctenopharyg-odon Steinbachner	(05) <i>Ctenopharyngodon idellus</i> (Valenciennes)	H	Exo
		Crossocheilus Van Hasselt	(06) <i>Crossocheilus latius</i> (Ham.)	H	V
		Chela Hamilton	(07) <i>Chela laubuca</i> (Bleeker)	E-P	LRlc
		Hypophthalmichthys Bleeker	(08) <i>Hypophthalmichthys molitrix</i> (Valenciennes)	Mpp	Exo
		Salmostoma Swainson	(09) <i>Salmostoma bacaila</i> (Ham.)	O	LRlc
		Esomus swainson	(10) <i>Esomus danricus</i> (Ham.)	O	LRlc
		Danio Hamilton	(11) <i>Danio rerio</i> (Ham.)	O	
		Rasbora Bleeker	(12) <i>Rasbora daniconius</i> (Ham.)	O	
		Aspidoparia Heckel	(13) <i>Aspidoario morar</i> (Ham.)	O	LRnt
		Barilius Hamilton	(14) <i>Barilius bendelisis</i> (Ham.)	Ppp	LRnt
		Cyprinus Linnaeus	(15) <i>Cyprinus carpio</i> (Linnaeus)	O	Exo
		Puntius Hamilton	(16) <i>Puntius chola</i> (Ham.)	H	V
			(17) <i>Puntius conchonus</i> (Ham.)	O	V
			(18) <i>Puntius sophore</i> (Ham.)	H	LRnt
			(19) <i>Puntius sarana sarana</i> (Ham.)	O	V
			(20) <i>Puntius ticto</i> (Ham.)	H	LRnt
			(21) <i>Puntius terio</i> (Ham.)	O	LRnt
		Osteobrama Heckel	(22) <i>Osteobrama cotio cotio</i> (Ham.)	O	LRnt
		Labeo Cuvier	(23) <i>Labeo angra</i> (Ham.)	H	LRnt
			(24) <i>Labeo boga</i> (Ham.)	D	LRnt
			(25) <i>Labeo calbasu</i> (Ham.)	H	LRnt
			(26) <i>Labeo dero</i> (Ham.)	H	V
			(27) <i>Labeo rohita</i> (Ham.)	H	LRnt
			(28) <i>Labeo dyocheilus</i> (McClelland)	H-O	V
			(29) <i>Labeo gonius</i> (Ham.)	H	LRnt

		Cirrhinus Oken	(30) <i>Cirrhinus mrigala</i> (Ham.)	O	V
			(31) <i>Cirrhinus reba</i> (Ham.)	H	V
	Cobitidae	Botia Gray	(32) <i>Botia dario</i> (Ham.)	O	V
			(33) <i>Botia lohachata</i> (Chaudhuri)	C	En
		Somileptes Swainson	(34) <i>Somileptes gongota</i> (Ham.)	C	LRnt
		Lepidocephalus Bleeker	(35) <i>Lepidocephalus guntea</i> (Ham.)	D	Lc
Siluriformes	Bagridae	Rita Bleeker	(36) <i>Rita rita</i> (Ham.)	Bp	LRnt
		Mystus Scopoli	(37) <i>Mystus bleekeri</i> (Day)	C	V
			(38) <i>Mystus cavasius</i> (Ham.)	C	LRnt
			(39) <i>Mystus tengra</i> (Ham.)	C	
	Siluridae		(40) <i>Mystus vitattus</i> (Bloch)	C	V
		Ompok Lacepede	(41) <i>Ompok bimaculatus</i> (Bloch)	P	nt
		Wallago Bleeker	(42) <i>Wallago attu</i> (Schneider)	C	nt
	Schilbeidae	Clupisoma Swainson	(43) <i>Clupisoma garua</i> (Ham.)	C	V
		Pseudotropius Bleeker	(44) <i>Pseudotropius atherinoides</i> (Bloch)	O	En
		Eutropiichthys Bleeker	(45) <i>Eutropiichthys vacha</i> (Ham.)	C	En
	Sisoridae	Bagarius Bleeker	(46) <i>Bagarius bagarius</i> (Ham.)	C	V
		Gagata Bleeker	(47) <i>Gagta cenia</i> (Ham.)	O	
		Nangra Day	(48) <i>Nangra viridescens</i> (Ham.)	C	LRnt
		Erithistes Muller and Troschel	(49) <i>Erithistes pussilus</i> (Muller & Troschel)	C	
		Laguvia Hora	(50) <i>Laguvia shawi</i> (Hora)	O	
		Glyptothorax Blyth	(51) <i>Glyptothorax telchitta telchitta</i> (Ham.)	O	V
		Sisor Hamilton	(52) <i>Sisor rhabdophorus</i> (Ham.)	C	En
	Claridae	Clarias Scopoli	(53) <i>Clarias batrachus</i> (Linnaeus)	C	V
	Heteropneustidae	Heteropneustes Miller	(54) <i>Heteropneustes fossilis</i> (Bloch)	C	V
Atheriniformes	Belonidae	Xenentodon Regan	(55) <i>Xenentodon cancila</i> (Ham.)	C	LRnt
	Cyprinodontidae	Aplocheilus McClelland	(56) <i>Aplocheilus panchax</i> (Ham.)	L	

Channiformes	Channidae	Channa Scopoli	(57) <i>Channa marulius</i> (Ham.)	C	
			(58) <i>Channa orientalis</i> (Schneider)	C	V
			(59) <i>Channa punctatus</i> (Bloch)	C	LRnt
			(60) <i>Channa striatus</i> (Bloch)	C	LRlc
Symbranchiformes	Synbranchidae	Monopterus Lacepede	(61) <i>Monopterus cuchia</i> (Ham.)	C	
Perciformes	Chandidae	Chanda Hamillton	(62) <i>Chanda baculis</i> (Ham.)	C	
			(63) <i>Chanda nama</i> (Ham.)	C	
			(64) <i>Chanda ranga</i> (Ham.)	C	
	Nandidae	Nandus Valenciennes	(65) <i>Nandus nandus</i> (Ham.)	C	
		Badis Bleeker	(66) <i>Badis badis</i> (Ham.)	C	V
			(67) <i>Badis dario</i> (Ham.)	C-O	
	Gobiidae	Glossogobius Gill	(68) <i>Glossogobius giuris</i> (Ham.)	C	LRnt
	Anabantidae	Anabas Cuvier	(69) <i>Anabas testudineus</i> (Bloch)	P	V
	Belontiidae	Colisa Cuvier	(70) <i>Colisa fasciatus</i> (Schneider)	O	LRnt
	Cichlidae	Tilapia A. Smith	(71) <i>Tilapia mosambica</i> (Peters)	H	Exo
Macrognathus Lacepade		(72) <i>Macrognathus aculeatus</i> (Bloch)	C		
Mastacembiliformes	Mastacembelidae	Mastacembelus Scopoli	(73) <i>Mastacembelus armatus armatus</i> (Lacepede)	C	
			(74) <i>Mastacembelus pancalus</i> (Ham.)	C	
Tetraodontiformes	Tetraodontidae	Tetraodon Linnaeus	(75) <i>Tetraodon cutcutia</i> (Ham.)	C	

Table 1: List of fishes of the river Punpun of Nabinagar (Bihar).

In the river Punpun out of 75 species Cypriniformes dominated with 32 species followed by Siluriformes (19), Perciformes (10), Channiformes (04), Mastacembeliformes (03), Osteoglossiformes (02), Atheriniformes (02), Clupeiformes (01), Symbranchiformes (01) and Tetraodontiformes (01). The trend of dominance of Cyprinids in the river is in agreement with the observations in tropical Indian rivers [2,21].

Evaluation of the conservation status of the fish species showed that maximum species comes under vulnerable (28%) and lower risk near threatened (28%) category, followed by lower risk least concern (6.6%), endangered (5.3%), exotic (5.3%) and threatened (0.75%) (Table 01). The trophic composition revealed abundance of carnivorous species (46.6%) followed by omnivorous (22.6%), herbivorous (18.6%), detritivorous (2.6%), predatory (2.6%), euryphagous planktivorous (1.3%), microphytoplankton feeder

(1.3%), benthophagous (1.3%), periphytophagous (1.3%) and larvivorous (1%).

Engraulidae, one of the economically valuable families of fishes, comprising the anchovies are quite frequent during the monsoons and appears to be a migrant. Members of the family Notopteridae are predominantly tropical freshwater fishes of extraordinary diverse body form and size. Cyprinids are the most dominant and economically significant group of primary freshwater fishes within its distribution, were the chief contributor to the annual catch composition. *Ctenopharyngodon idellus* (Valenciennes), *Hypophthalmichthys molitrix* (Valenciennes) and *Cyprinus carpio* (Linnaeus) are common exotic fishes now cultured all over India. Cobitids are bottom dwellers, mostly of small size (upto 30 cm), having no interest to fisheries. Fishes of the family Bagridae are not much liked locally as food, taken, mostly by poorer sections. Among

Siluriids *Ompok bimaculatus* (Bloch) is considered a very tasty fish and is highly priced. *Wallago attu* (Schneider) a good sport and is very destructive to other more valuable food fishes. Schilbiidae is a family of cat fishes. These fish tend to swim in open water. Sisorids are eaten by poorer classes and of no interest to fisheries. Clarids, commonly named air breathing or walking catfishes, are a group of catfishes naturally occurring in the Indian sub continent. *Clarias batrachus* (Linnaeus) is of great economic importance as food fish and have been introduced, generally without through considerable threat to the biodiversity of local species. The threatened stinging catfish *Heteropneustes fossilis* (Bloch) is a nutritionally valuable food in Asian countries. The fish is mostly preferred for its tender flesh, delicious taste and low fat content, where as it is also appreciated in traditional medicine. Its natural populations have declined due to over exploitation, habitat loss and pollution, thus deserving high conservation importance for the remaining isolated, wild population of *Heteropneustes fossilis* (Bloch) in Asian countries. Belonids are elegant surface – living fish and of no interest to fisheries. *Aplocheilichthys panchax* (Ham.) is an important larvivorous fish. Snake head fishes of the family Channidae are predatory freshwater important food fish and have been introduced widely. Symbranchidae or Gangetic mud eels or swamp eels occur in both freshwater and occasionally in brackish water. Fishes of the family Channidae are not important due to its spines and scanty flesh. *Badis badis* (Ham.) is not commercially important due to its spinous small body with less flesh. *Glossogobius giurii* (Ham.) is commercially not important due to its 'bloodless' flesh and tastelessness, locally consumed when freshly caught and sold in the local fish markets. Anabantids are traditionally known for its excellent taste. *Colisa fasciatus* (Schneider) is very much popular for its good taste. *Tilapia mosambica* (Peters) is reported to be unsuitable for fish culture along with major Indian carps, because of its depredation on carp fry. *Macrognathus aculeatus* (Bloch) commercially not important due to its small size and less flesh. *Mastacembelus armatus* (Lacepede) and *M. pancalus* (Ham.) are most popular for good girth and oily taste. *Tetraodon lineatus* (Ham.) are not eaten locally due to its poisonous effects.

During field study the fishing method were studied. Fishing is carried out by local fishermen. A large variety of fishing gear and tackles are operated in different stretches of the river for commercial exploitation of the fishery resources. The fishery resources are exploited mostly by traditional methods and gears. depending upon the target species, fishing ground, climate, current

and other hydrobiological conditions. The methods of fishing vary from place to place. The existing fishing methods in the river Punpun are conventional type. The main fishing gear is the castnet, made of both nylon and cotton of various dimensions. The other method employed are Bag nets, Scoop nets, Stake nets. Gill nets, Hooks, Angling, Barriers etc. Fishing crafts includes different types of boats. Mostly traditional non – mechanized crafts and gears are in vogue since long.

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