
Research Article**Biodiversity and conservation status of Ichthyofauna of the river Island Majuli, India****Hazarika A.K¹, Bordoloi R.^{2*}**¹Department of Zoology, Majuli College, Kamalabari, Majuli, 785110, Assam, INDIA.²Department of Zoology, D. R. College, Golaghat, Assam, 785621, INDIA.***Corresponding author**

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Abstract: The River Island, Majuli lies in the geographical ordinates between 26°45' N- 27°12' N latitude and 93°39'E- 94°35'E longitude with mean height of 84.5 m above MSL. The present investigation was conducted on Ichthyofauna of the River Island Majuli, from January 2011 to December, 2012. During our study period we have encountered 79 species belonging to 10 orders and 23 families. Maximum diversity was observed in the order Cypriniformes which represents 31 species Order Cypriniformes (39.24%) followed by Siluriformes with 19 , Perciformes 18, Synbranchiformes3 (3.79%) ,Clupeiformes and Osteoglossiformes with 2 species(2.53%), Anguilliformes, Beloniformes, Cyprinodontiformes and Tetradontiformes each with 1 species(1.26%). Out of 79 species 29.11% are Lower Risk near threatened (LRnt) , 22.78% are not evaluated (NE), 20.25 % are Vulnerable (VU), 13.92% are Endangered , 6.32% are Lower Risk least concern (LRlc), 5.06 % are Exotic species, 2.53% are Data Deficient as per the report of the Conservation, Assessment and Management (CAMP,1998) plan on freshwater fishes of India. According to IUCN Red List category, 45.56%species are Least Concern (LC), 40.60% species are Not Evaluated (NE), 10.12% species are Near Threatened (NT) and 1.26 % Data Deficient (DD).**Keywords:** CAMP, Conservation, Endangered , Vulnerable , IUCN, Majuli.

INTRODUCTION

Most significant contributions on fish diversity and beel ecology are those of Agarwala [1] in Tamrangew et al and, Abujam *etal*[2, 3] in Maijanbeel, Biswas & Boruah[4] in lentic and lotic water bodies of upper Brahmaputra basin, Bordoloi [5] in “closed” and “open” beels in upper Assam, Bordoloi[6] in Potiasola wetland, Jorhat, Bera *et al*[7] in Deeporbeel, Dakua *et al*[8], Hussain & Biswas [9] in wetland of Dhemaji, Paswan *et al*[10] in Borsalabeel of Jorhat and Singh *et al* [11].

The North East Region shares its fish fauna predominantly with that of the Indo- Gnetic fauna and to a small extent with the Burmese and South China fish fauna [12]. The North Eastern region of India is considered as one of the hot spots of freshwater fish biodiversity in the world [13].

Literature shows that 132 fish species with reference to their economic importance were recorded by Ghosh and Lipton [14], Sen[15] and Mahanta *etal*[16] recorded all together 183 fish species from Assam and the neighbouring North Eastern state. Sinha [17]his comprehensive review prepared a list of 230 fishes available in the North Eastern region. Nath and Dey [18] recorded a total of 131 species from the

drainages of Arunacha Pradesh. Sen[19] documented 267 species from North East India. Thevarious reports show a wide variation in the total number of species reported. As per NBFGR [20] report among the states, Assam has the largest number of ichthyo species (200), followed by Arunachal Pradesh (169), Meghalaya (165), Tripura (134), Manipur (121), Nagaland (68) and Mizoram (48).

MATERIALS AND METHODS**Study area:**

The geographical extent of the study area is 26°45' N- 27°12' N latitude and 93°39'E- 94°35'E longitude with mean height of 84.5 m above MSL (Fig.4). Majuli, bounded by the river Subanisri on the northwest, the Kherkatia Suti (a spill channel of the river Brahmaputra) in the northeast and the main Brahmaputra River on the south and the south west is regarded as the largest fresh water inhabited island of the world. Water yield of the Subansiri is 0.076 cumec/km²[21]. The Brahmaputra is a classic example of a braided river consisting of a network of interlacing channels with unstable bars and islands (locally known as chars). As the flow begins to rise with the onset of the monsoon, most of the islands are submerged and the river then flows in more or less single channel. The most striking feature is the continuous shift of the

thalweg (deep channel) from one location to another within the bankline, its movement being high in the rising stage (May to August), most erratic during the falling stage (September to October) and minimal in the low flow stages[21]. Land area of the Majuli and has been decreasing day by day. The land area as evidenced till 1966-1975, 1998 and 2008 were 706.14, 578.38 and 484.34km² respectively[22]. The total average annual rate of erosion and deposition covering the entire period were 8.76 km²/yr and 1.87 km²/y r [22].

Originally, the island was a narrow and long piece of land called Majoli (land in the middle of two parallel rivers that had Brahmaputra flowing in the north and the Burhidihing flowing in the south, till they met at Lakhu). Frequent earthquakes in the period 1661–1696 set the stage for a catastrophic flood in 1750 that continued for 15 days, which is mentioned in historical texts and reflected in folklore. As a result of this flood, the Brahmaputra split into two branches—one flowing along the original channel and the other flowing along the Burhidihing channel and the Majuli Island was formed. The Burhidihing's point of confluence moved 190 km east and the southern channel which was the Burhidihing became the Burhi Xuti. The northern channel, which was previously the Brahmaputra, became the LuitXuti. In due course, the flow in the Luit Xuti decreased, and it came to be known as the KherkutiaXuti and the BurhiXuti expanded via erosion to become the main Brahmaputra River [23].

During survey we recorded 155 small and large (0.001 - 1.7 sq.km.) wetlands in the Majuli. Fish samples were collected from various station of fish landing site of the River Island, Majuli. The fish species were identified with the help of standard procedure of Jayaram [24] and Talwar and Jhingran [25]. Fish samples were preserved in 5% formalin for further investigation. The individual species were weighted and recorded after collection. Information was collected from individual fishermen [26], local fishermen and Mohalder having more than 25 years fishing experiences.

RESULTS AND DISCUSSION

During survey period we encountered 79 species belonging to 10 orders, 23 families. List of fish fauna and their conservational status are shown in the table 1, 2, 3& 4 and figure 1, 2,&3. Order Cypriniformes was the dominant group with 31 species(39.24%) followed by Siluriformes with 19 ,

Perciformes 18,Synbranchiformes(3.79%), Clupeiformes and Osteoglossiformes with 2 species(2.53%), Anguilliformes, Beloniformes, Cyprinodontiformes and Tetrodontiformes each with 1 species(1.26%). Out of 79 species 29.11% are lower risk near threatened (LRnt) ,22.78% are not evaluated (NE), 20.25 % are vulnerable (VU), 13.92% are endangered , 6.32% are lower risk least concern (LRlc), 5.06% are exotic species, 2.53% are data deficient as per the report of the Conservation, Assessment and Management [27]plan on freshwater fishes of India. According to IUCN red list[28], 40.50% species are least concern (LC), 35.44% species are not evaluated (NE),10.12 % species are Near threatened (NT) and 1.26 % data deficient (DD).Number and percent contribution of different families and species under various orders are different. Order Siluriformes contributed 7 families followed by Perciformes 7 families, Synbranchiformes 2, Clupeiformes and Osteoglossiformes each Cypriniformes 2 families, Anguilliformes, Beloniformes, Beloniformes, Cyprinodontiformes and Tetrodontiformes each 1 family.

Maximum diversity is observed in the order Cypriniformes which represents 31 species followed by Siluriformes 19, Perciformes 18, Synbranchiformes 3, Clupeiformes and Osteoglossiformes each 2 species while Anguilliformes, Beloniformes, Beloniformes, Cyprinodontiformes and Tetrodontiformes were lowest species observed. Similar observation were reported by , Abujum[3] Singh [11] , Bordoloi[5, 6], Balkhande and Kulkarn[29], Goswami *et al* [30], Wani & Gupta [31]. According to CAMP [27] endangered (EN) species are *Mystus microphthalamus*, *Ompokbimaculatus*, *Ompokpabda*, *Ompokpabo*, *Chacachaca*, *Eutropiichthysvocha*, *Channa – barca* , *Tor puitora*, *Tor tor* , *Chitalachitala* and *Anguilla bengalensis* but IUCN [28] such species have not been included as endangered. 13.92% species are endangered and 20.25 % vulnerable according to CAMP [27]. Higher percent species (35.44%) has not been assessed by IUCN [28] as compare to CAMP [27] report (22.78%) table 5 &6 .

During investigation we reported 4 exotic species such as *Cyprinus carpio*, *Ctenopharyngodonidella*, *Hypophthalmichthys molitris* and *Puntius javanicus*. Introduction of such exotic species are seem to be serious threat to other native species. Studies suggest that native fish fauna is at the verge of extinction due to introduction of exotic species with regard to competition for food and spaces.

Table 1: Diversity of fish fauna

Systematic Position : Order :	Systematic Position : Family	Scientific Name	Local Name (Assamese)	CAMP [27]	IUCN [28]
Anguilliformes	1.Anguillidae	1. <i>Anguilla bengalensis</i>	Bakas mas/nadalbami	EN	NT

Beloniformes	2. Belonidae	2. <i>Xenentodon cancila</i>	Kokila mass	LRnt	LC
Clupeiformes	3. Clupeidae	3. <i>Gudusia chapra</i>	Karatimass	LRlc	LC
		4. <i>Hilsailisha</i>	Ilish mass	VU	NE
Cypriniformes	4. Cyprinidae	5. <i>Amblypharyngodon mola</i>	Moa mass	LRlc	NE
		6. <i>Aspidoparia jaya</i>	Bariala mass	LRnt	LC
		7. <i>Salmophasia bacaila</i>	Selkonah mass	LRlc	LC
		8. <i>Salmophasia phulo</i>	Selkonah mass	NE	LC
		9. <i>Esomus danricus</i>	Danikona mass	LRlc	LC
		10. <i>Raiamas bola</i>	Korang	VU	NE
		11. <i>Rosbora daniconius</i>	Danikon amass	NE	NE
		12. <i>Puntius chola</i> (Hamilton, 1822)	Puthi mass	VU	LC
		13. <i>Puntius ticto</i>	Chakariputh	LRnt	LC
Cypriniformes	4. Cyprinidae	14. <i>Puntius sophore</i>	Puthi mass	LRnt	LC
		15. <i>Puntius gelius</i>	Puthi mass	NE	LC
		16. <i>Puntius sarana</i>	Senneeputhi	VU	LC
		17. <i>Puntius conchoniuis</i>	Puthi mass	VU	LC
		18. <i>Puntius terio</i>	Puthi mass	LRnt	LC
		19. <i>Cirrhinus mrigala</i>	Mirika mass	LRnt	LC
		20. <i>Labeobata</i>	Bata mass	LRnt	LRnt
		21. <i>Labeo gonius</i>	Kuhi mass	LRnt	LC
		22. <i>Cyprinus carpio</i>	Common carp	Exotic	NE
		23. <i>Ctenopharyngodon idella</i>	Grass carp	Exotic	NE
		24. <i>Hypophthalmichthys molitris</i>	Silver carp	Exotic	NE
		25. <i>Catla catla</i>	Bahu mass	VU	NE
		26. <i>L. calbasu</i>	Kaliajoha	LRnt	LC
		27. <i>L. rohita</i>	Rohu mass	LRnt	LC
		28. <i>Puntius javanicus</i>	Japani Puthi	Exotic	NE
		29. <i>Puntius arnatus</i>	Puthi mass	NE	NE
		30. <i>Labeo pugnusia</i>	Heel gorya	VU	NE
	31. <i>Tor putitora</i>	Pithia mass	EN	NE	
	32. <i>Tor tor</i>	Pithia mass	EN	NT	
	33. <i>Cirrhinus reba</i>	Lachunbhangun	VU	LC	
5. Cobitidae	34. <i>Botia doria</i>	Doria	VU	NE	
	35. <i>Lepidocephalus guntea</i>	Botia mass	NE	LC	
Cyprini Dontiformes	6. Aplocheilidae	36. <i>Aplocheilus panchax</i>	Goroipipora	DD	LC
Osteoglossiformes	7. Notopteridae	37. <i>Notopterus notopterus</i>	Kanduli mass	LR-nt	LC
		38. <i>Chitala chitala</i>	Humped featherback / chital	EN	NT
Perciformes	8. Chandidae	39. <i>Chanda nama</i>	Chanda Mass	NE	LC
		40. <i>Parambassis ranga</i>	Chanda mass	NE	LC
		41. <i>Parambassis lala</i>	Chandamass	NE	NT
	9. Nandidae	42. <i>Nandus nandus</i>	Gadgadi mass	LRnt	LRnt
		43. <i>Badis badis</i>	Randhani mass	VU	LC
	10. Gobiidae	44. <i>Glossogobius giuris</i>	Patimutura mass	LRnt	DD
	11. Anabantidae	45. <i>Anabas testudineus</i>	Kaoi mass	DD	NE
	12. Belontiidae	46. <i>Trichogaster fasciata</i>	Kholihona	LRnt	NE
		47. <i>Trichogaster sota</i>	Vacheli mass	NE	NE
		48. <i>Trichogaster lalius</i>	Vacheli mass	NE	NE
		49. <i>Trichogaster labiosa</i>	Kholihona	NE	NE
	13. Channidae	50. <i>Channa punctatus</i>	Goroi mass	LR-nt	NE
		51. <i>Channa marulius</i>	Shoal mass	LR-nt	NE

		52. <i>Channa gachua</i>	Shengali mass	NE	LC
		53. <i>Channa stewartii</i>	Shoal mass	NE	NE
		54. <i>C. striatus</i>	Shoal mass	LR-Ic	NE
		55. <i>Channa orientalis</i>	Shoal mass	VU	NE
		56. <i>Channa barca</i>	Senga mass	EN	DD
Siluriformes	14. Bagridae	57. <i>Mystus bleekeri</i>	Singara mass	VU	LC
		58. <i>Mystus cavasius</i>	LaluwaSingara	LRnt	LC
		59. <i>Mystus tengara</i>	Singara mass	NE	LC
		60. <i>Mystus vittatus</i>	Singara mass	Vu	LC
		61. <i>Rita rita</i>	Litha mass	LRnt	LC
		62. <i>Aorichthys aor</i>	Ari mass	NE	NE
		63. <i>Mystus pulcher</i>	Singara	NE	LC
		64. <i>Mystus microphththalmus</i>	Gagal/Veow mass	EN	NE
	15. Siluridae	65. <i>Ompokbimaculatus</i>	Pabha mass	EN	NT
		66. <i>Ompok pabda</i>	Pabha mass	EN	NT
		67. <i>Ompokpabo</i>	Pabha mass	EN	NT
	16. Schilbeidae	68. <i>Wallagoattu</i>	Borali mass	LRnt	NE
		69. <i>Ailia coila</i>	Bahpotia mass	VU	NT
		70. <i>Eutropiichthys vocha</i>	Bacha mass	EN	NE
	17. Sisoridae	71. <i>Gagata cenia</i>		NE	LC
72. <i>Bagarius bagarius</i>		Garuah mass	LRnt	NE	
18. Clariidae	73. <i>Clariusbetrachus</i>	Magur mass	VU	NE	
19. Chacidae	74. <i>Chacachaca</i>	Kurkuri	EN	LC	
20.Heteropneustidae	75. <i>Heteropneustes fossilis</i>	Singhi mass	VU	LC	
Synbranchifor mes	21.Synbranchidae	76. <i>Monopterus cuchia</i>	Cuchia mass	LRnt	LC
	22. Mastercembelidae	77. <i>M. astacembelusarmatus</i>	Bami mass	NE	LC
		78. <i>Macragnathus pancalus</i>	Tora mass	LRnt	NE
Tetraodontifor mes	23.Tetradontidae	79. <i>Tetradon cutcutia</i>	Gongatop	LRnt	NE

Note :EN- Endangered, VU-Vulnerable, LRnt-Lower risk near threatened, LRlc- Lower risk least concern, DD-Data deficient, LC-Least Concern, NE- Not evaluated & NT - Near threatened.

Table 2:No. of species and percentage of fish fauna as per CAMP[27]

Status	No. of species	Percentage
Lower risk threatened near(LRnt)	23	29.11
Not evaluated (NE)	18	22.78
Vulnerable (VU),	16	20.25
Endangered (EN)	11	13.92
Lower risk least concern (LRlc),	5	6.32
Exotic species	4	5.06
Data deficient(DD)	2	2.53
Total	79	

Table 3: No of species and percentage of fish fauna as per IUCN [28] red list category

Status	No.of species	%
Least concern (LC)	36	45.56
Not evaluated (NE)	32	40.50
Near threatened (NT)	8	10.12
Lower risk near threatened(LRnt)	2	2.53
Data deficient (DD)	1	1.26
Vulnerable(VU)	0	0
Endangered (EN)	0	0

Table 4: Percentage of Ichthyofauna under different Categories as per CAMP [27] / IUCN [28]

Status	No. species. IUCN[27]	CAMP[27]	CAMP [27] %	IUCN[28] %
Least concern(LC)	36	0	0	45.56
Not evaluated(NE)	32	18	22.78	40.50
Near threatened(NT)	8	0	0	10.12
Lower risk near threatened (LRnt)	2	23	29.11	2.53
Data deficient(DD)	1	3	2.53	1.26
Vulnerable(VU)	0	16	20.25	0
Endangered(EN)	0	11	13.92	0
Exotic species	0	4	5.06	0

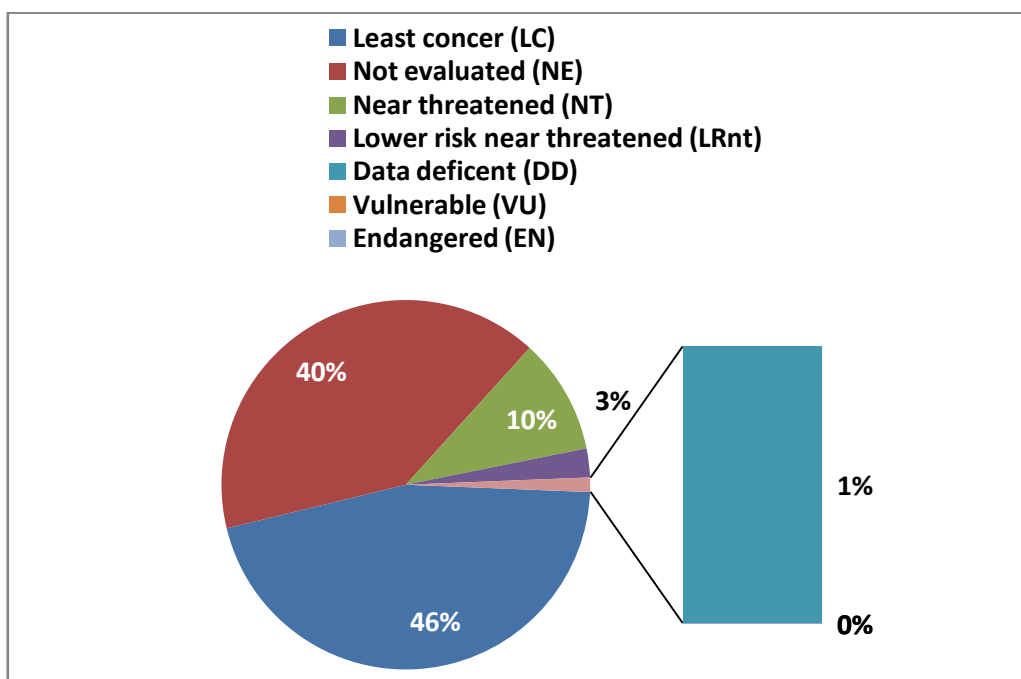


Fig-1: Percentage of fish species under different categories of threat as per IUCN [28]

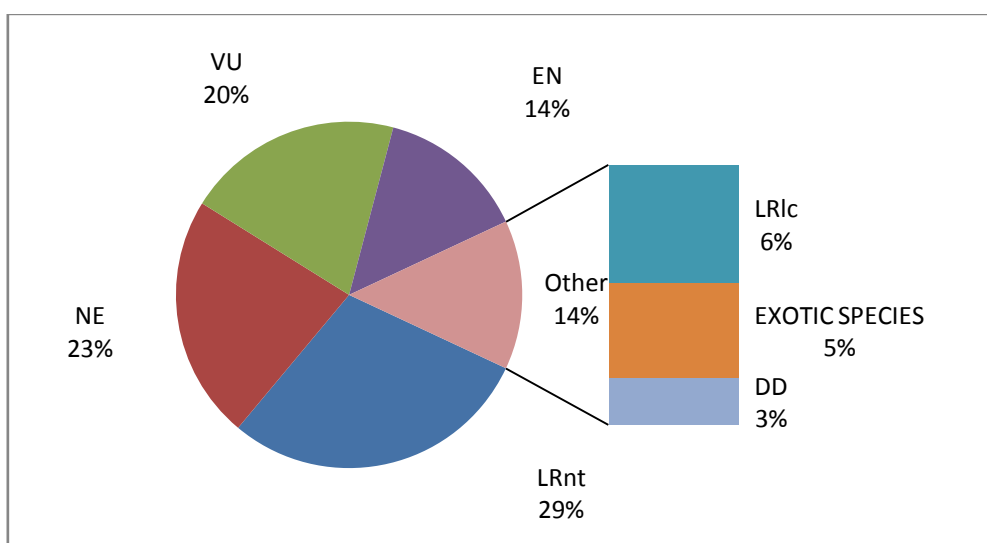


Fig-2: Percentage of fish species under different categories of threat as per CAMP [27]

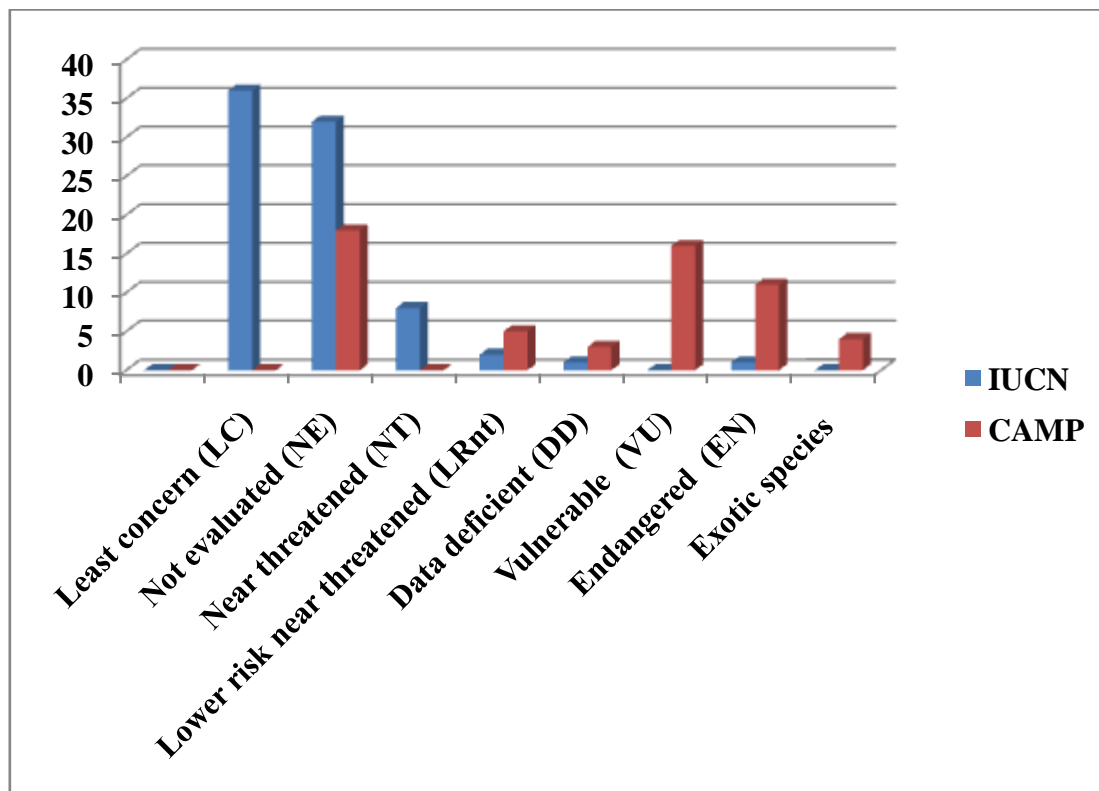


Fig-3: Number of fish species under different categories of threat as per CAMP [27]/ IUCN [28]



Fig 4.A map of Majuli, Assam.

CONCLUSION

Ecological degradation due to anthropogenic pressure and soil erosion are the most important factor for fish decreasing fish population in this region. The ecological degradation of the beels started with the arrival of the water hyacinth a century ago [32]. Rampant growth of this fast – growing weed contributing to eutrophication by slowing down water currents and depositing debris at the bottom. A number of fish species, such as are *Mystus microphthalamus*, *Ompokbimaculatus*, *Ompokpabda*, *Ompokpabo*, *Chacachaca*, *Eutropiichthysvocha*, *Channabarca*, *Tor*

putitora, *Tor tor*, *Chitalachitala* and *Anguilla bengalensis* are at the verge of extinction[33]. The use of unauthorized fishing gears is also important factor for declining fish population in this area.

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