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Potential Ornamental Ichthyofauna of Bordoibam Bilmukh Bird Sanctuary (IBA-site) and implication for conservation, North Eastern India

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ABSTRACT

A total of 58 potential aquarium fishes have been reported under 42 different genera and 21 families in the study area. Ornamental fishes in the sanctuary have potentialities to develop low cost enterprise with these bio-resources that can provide a sustainable development through self-employment to a considerable numbers of families as capture based export is an unsustainable technique and the key reason of ornamental fish depletion. Captive breeding of ornamental fish is the best measures for conservation of threatened species besides being creating substantial job opportunities for the local communities through development of low cost enterprise. Implication for conservation of habitat and fishes are also conferred.

Key words: Ornamental ichthyofauna, IBA site, conservation.

INTRODUCTION

The knowledge of keeping live fishes inside a glass aquaria perhaps originated after 300 B.C. when blowing of glass was originated [1]. These aquaria have been providing entertainment to a great extent when they are kept in a public place or inside the houses of the persons concerned. India is represented by 2200 fin fishes while more than 24618 species reported worldwide [2]. Due to unique topographical and hydro-biological conditions of North-East India the region becomes paradise for quite varieties of valuable fish species. The area is considered as live gene banks or storehouse of fish germplasm resources. About 285 fish species belonging to 114 genera under 38 families have been reported from this North Eastern region of India, which is approximately 33.13% of total Indian fresh water fishes [3]. Here, Assam has the largest number of species 217 followed by Arunachal Pradesh 167, Meghalaya 165, Tripura 134, Manipur 121, Nagaland 68 and Mizoram 48. The North-East shares its fish fauna predominantly with that of Indo-Gangetic fauna and with the Burmese and South-China fish fauna [4]. In Assam, alone 115 species of fishes are belonging to ornamental category of which 9.56% are endangered (EN), 21.73% are vulnerable (VU), 26.08% are lower risk near threatened (LRnt), 6.95% are lower risk least concern (LRlc), 1.73% is data deficient (DD) and 33.9% are not evaluated (NE) respectively. In India about 85% of fresh water ornamental fish trade from North Eastern states rest from Southern states and exotic varieties [5].

Till now no proper scientific investigation has been made on ichthyofaunal status, more specifically ornamental fishes of Bordoibam Bilmukh bird sanctuary, an Important Bird Area (IBA) site of NE India. The present paper aims to figure out the status of potential ornamental ichthyofauna of the IBA-site for long-term conservation and sustainable use of native species.

MATERIALS AND METHODS

Description of the study area:

a) Location and area:

Assam government declared Bordoibam Bilmukh riparian wetland as a Bird Sanctuary in the year 1996 vide Govt. notification no. Pre. FRW-15/96/3-A on 3rd of July. This is also an IBA-site of North Eastern India, code-AS07. The area is located about 50 km away from North Lakhimpur, the district headquarter of Lakhimpur district of Assam and nearly 455 km from the state capital Dispur, Guwahati. Geographical location is in between 27^o.20N'' (Latitude) and 94^o.20'E (Longitude). This riverine origin wetland situated in the northern boundary of the mighty river Brahmaputra. The wetland linked with river courses, particularly the river Champara during peak monsoon months. This river is a tributary of the river Brahmaputra and is flowing in the north-eastern boundary of the IBA-site. The IBA-site covers an area of 1124.78 hectares i.e. 11.25km².

b) Ornamental fish diversity:

The survey was conducted during Aug'09 to July'10 to figure out the status of ornamental ichthyofauna of the IBA-site. Field works have done in a monthly basis round the year. The fish specimens were collected from the fishermen's catches and the fish markets of the nearby area and preserved in 4% formalin solution. Identification of fishes was done with the standard literature of [6 and7]. Status of potential aquatics was measured with the help of [8].

RESULTS AND DISCUSSION

List of ornamental fishes recorded in Bordoibam Bilmukh Bird Sanctuary along with their respective families, scientific names, local names, frequency of occurrence, feeding habit, prominent ornamental features and status were summarized in the Table:1. A total of 58 potential aquarium fish species belongs to 21, 33 families and genera respectively were recorded while family wise distribution pattern is depicted in the Figure: 1. Out of 58 ornamental fish species 11(18.96%) species were very common, 19 (32.75%) species were occasional, 24 (41.37%) species were common and 4 (6.89%) species were rare in the wetland. Seven various types of feeding habit namely (1) Surface column feeder (12 species i.e. 20.68%), (2) Surface feeder (4 species i.e. 6.89%) (3) Bottom feeder (13 species i.e.22.41%), (4) Bottom column feeder (20 species i.e. 34.48%), (5) Surface column bottom feeder (2 species i.e. 3.44%) (6) Bottom feeder surface visitor (2 species i.e. 3.44%) and (7) Column feeder (5 species i.e.8.62%).

Species category in relation to CAMP, 1998 are depicted in the Figure:2 .The species can be considered into five categories as (1) Lower risk near threatened (LRnt) with 31.03%, Lower risk least concern (LRlc) with 13.79%, Vulnerable (VU) with 17.24%, Not evaluated (NE) with 32.75% and Endangered (EN) with 5.17%. Categorization of species signifying the healthy status of the habitat.

Study reveals that the area has high opportunity for used as natural stock of native potential aquarium fish for production of ornamental fishes through artificial breeding. Artificial breeding has manifold advantages like trim down the environmental pressure by lowering down wild collection, conservation can be achieved, helps in employment generation through development of low cost enterprise like aquarium fish breeding and selling centre. Ninety five per cent of our ornamental fish export is based on wild collection [9]. In recent time ornamental fish marketing has been growing in faster way in different parts of the globe and many fish farmers as well as entrepreneurs involved in the trade. Improvement of air transport facility along with some other scientific inventions transformed this ornamental fish industry into a lucrative bio-trade industry in many countries including the India. The recent value of world trade for ornamental fish has been estimated to be about 4.5 billion US dollar and has an annual growth rate approximately 8%. The demand of ornamental fish is gradually increasing day by day.

Implication for conservation

Habitat conservation of the sanctuary, an ore of native fish species (Plate: 1-4) is to be imperative because, at present the wetland is in such a state that native fishes alone cannot withstand the fishing pressure due to collapse in native fish stock [9]. Integrity of aquatic communities and ecosystems should be conserved by appropriate management techniques. In particular, efforts should be made to minimize the harmful effects of over-fishing in these water bodies. In this regard, the carrying capacity of aquatic environments should be well studied in order to eliminate the adverse effect on native fish fauna. The problem needs to be addressed with a view to find a long term solution in terms of sustainable income generation and conservation of the ecosystem symbiotically. Mass culture of aquarium fish has manifold advantages as it reduces pressure on the natural habitats, maintained ecological balance of our local environment by restoration of species; restoration of the diversity and make possible of the conservation of rare, endangered and endemic species [10]. Ornamental fish culture in captive condition and their trade still have not been well planned in the North-eastern region of India, a mega-biodiversity centre and a hotspot [11]. Therefore, the government organizations and some NGOs should play imperative role to the same. Large scale ornamental fish production programmed with the help of mass culture is hoped to be the best measures for conservation of habitat and threatened species besides being creating substantial job opportunities for the locals.

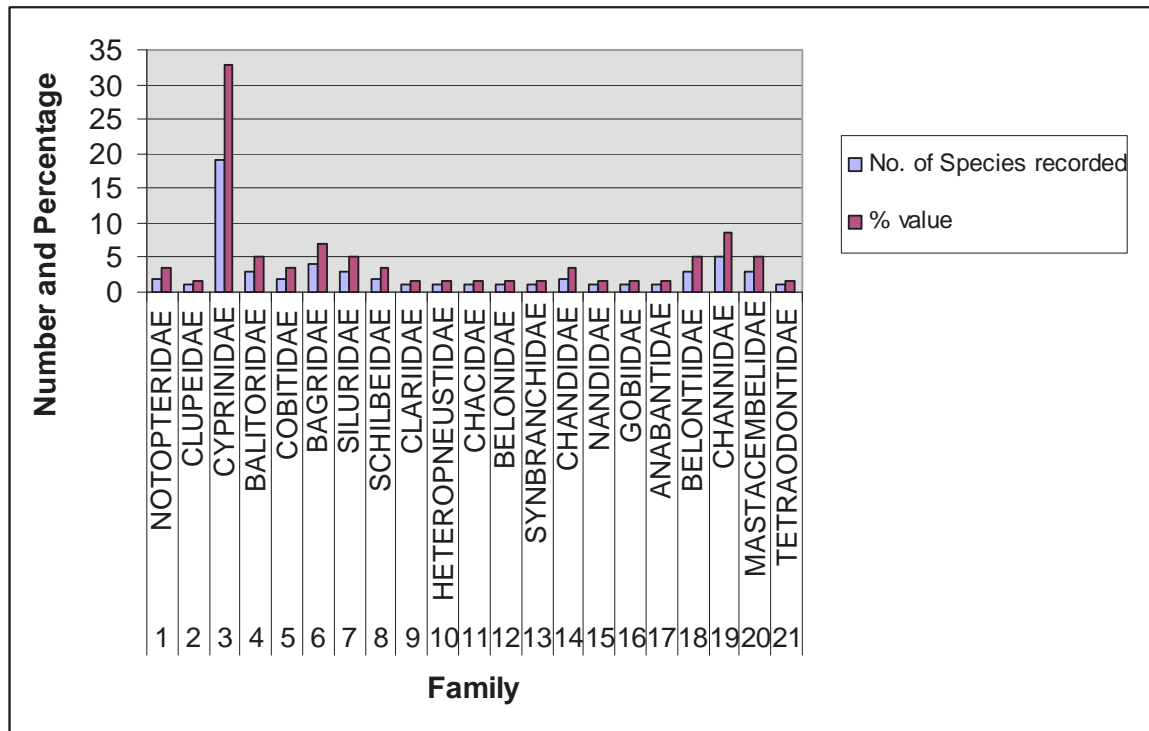


Fig. 1: Family wise distribution of ornamental fishes in the IBA-SITE

Table 1: List of ornamental fishes recorded in Bordoibam Bilmukh bird sanctuary.

Name of Family	Name of Species	Local name	Frequency	Feeding habit	Prominent ornamental quality	CAMP-status
Notopteridae	<i>Notopterus notopterus</i> (Pallas)	Kandhuli	Very common	SCF	Body colour silvery-white with numerous fine spots.	LR-nt
	<i>Chitala chitala</i> (Ham-Buch)	Chital	Occasional	SCF	Body colour coppery brown, about 15 transverse silvery bars on the body.	EN
Cyprinidae	<i>Danio acqipinnatus</i> (Mc Clelland)	Saldanikana	Occasional	SCF	Brilliant basic blue; a well marked lateral dark blue band. Fins bright orange.	NE
	<i>Danio dangila</i> (Ham-Buch)	Laupeta	Occasional	SCF	Black olive, sides silvery with many narrow blue lines.	NE
	<i>Labeo calbasu</i> (Ham-Buch)	Mali	Common	BF	Blackish green, lighter below; flanks buff pink with spots. Fins black.	LR-nt
	<i>Puntius guganio</i> (Ham-Buch)	Puthi	Common	BCF	Light greenish with a silvery band along the side; black blotch at side of the caudal fin.	LR-nt
	<i>Puntius sarana sarana</i> (Ham Buch)	Senee	Common	BCF	Back olive, flanks silvery with golden reflections.	VU
	<i>Puntius phutunio</i> (Ham-Buch)	Puthi	Common	BCF	Back brownish-green with a brilliant emerald-green shine on the scales, head and operculum.	LRlc
	<i>Puntius sophore</i> (Ham-Buch)	Puthi	Common	BCF	Beautiful silvery, back grey-green to brownish, underside white.	LR-nt
	<i>Puntius ticto</i> (Ham-Buch)	Kaniputhi	Common	BCF	Back grey to grassy-green; flanks brilliant shining silver.	LR-nt
	<i>Puntius chola</i> (Ham-Buch)	Puthi	Rare	BCF	Body uniform silky silvery with olive green on back; flanks yellowish.	VU
	<i>Chela cachius</i> (Ham-Buch)	Laupeti	Occasional	SCF	Body colour translucent, shining brilliant silver. Back light olive.	LRlc
	<i>Chela labuca</i> (Ham-Buch)	Laupeti	Occasional	SCF	Body colour translucent, shining greenish grey with a violet luster on caudal peduncle.	LRlc
	<i>Salmostona bacaila</i> (Ham- Buch)	Chelkona	Common	SF	Upper side of the body grey-green. A broad gleaming white-green band along flank.	LRlc
	<i>Amblypharyngodon mola</i> (Ham-Buch)	Moah	Very common	SCBF	Body colour golden yellow with a broad silvery lateral band.	LRlc
	<i>Aspidoparia moror</i> (Ham-Buch)	Moah	Occasional	BCF	Back of the body light brown, belly yellowish-silvery; blue lateral streak on sides.	LR-nt
	<i>Aspidoparia jaya</i> (Ham-Buch)	Moah	Occasional	BCF	Body colour is silvery	VU
	<i>Barilus barila</i> (Ham-Buch)	Bariala	Rare	SF	Back of the body dark olivaceous; vertical blue bands from back to lateral line	VU
	<i>Bengala elanga</i> (Ham-Buch)	Elang	Occasional	SCF	Body colour is silvery; some coloured band along upper portion of side.	NE
	<i>Esomus danricus</i> (Ham-Buch)	Donikona	Very common	SCBF	Body colour olive-green with a pearly iridescence and sprinkled with fine dots.	LRlc
<i>Rasbora rasbora</i> (Ham-Buch)	Donikona	Common	SCF	Colour olive-brown above, silvery below; a blue-black lateral stripe from head to the base of the caudal fin.	NE	
Clupeidae	<i>Gudusia chapra</i> (Ham-Buch)	Korati	Rare	SF	Back of the body is brown, flanks silvery; dark blotch behind gill openings.	LRlc
Balitoridae	<i>Nemacheilus botia</i> (Ham-Buch)	Balibotia	Occasional	BF	Body colour olivaceous to yellowish-orange, blackish cross bands of turns and twists.	NE
	<i>Nemacheilus labeosus</i> (Kottelat)	Balibotia	Occasional	BF	Body colour light brown, some indistinct narrow vertical black bands on the sides of the body.	NE
	<i>Nemacheilus pavonaceus</i> (Mc Clelland)	Balibotia	Occasional	BF	Body marked with about twenty half bars of a darkish grey.	NE
Cobitidae	<i>Botia Dario</i> (Ham-Buch)	Gethu	Occasional	BF	Body colour grayish with eight brownish oblique bands from back to abdomen.	NE
	<i>Botia dayi</i> (Hora)	Botia	Occasional	BF	Head and body reticulated with dark brown bands.	NE
Bagridae	<i>Mystus bleekeri</i> (Day)	Singorah	Common	BF	Body colour brownish above, lighter below, two longitudinal bands on the body.	VU
	<i>Mystus cavasius</i> (Ham-Buch)	Singorah	Occasional	BCF	Body colour grayish with mid lateral longitudinal stripe.	LR-nt
	<i>Mystus tengara</i> (Ham-Buch)	Singorah	Common	BCF	Delicate greenish to bright yellow, back slightly darkened.	NE
	<i>Mystus vittatus</i> (Bloch)	Singorah	Common	BCF	Body colour delicate grey silvery with several dark longitudinal bands.	VU
Siluridae	<i>Ompok bimaculatus</i> (Bloch)	Pabho	Occasional	BCF	Body colour silvery, dorsally grey green to brownish; a large spot on shoulder	EN

					on lateral line.	
	<i>Ompok pabda</i> (Ham-Buch)	Pabho	Occasional	BCF	Body colour silvery grey with a tinge of yellow, dark on back.	NE
	<i>Ompok pabo</i> (Ham-Buch)	Pabho	Occasional	BCF	Body colour silvery grey above, lighter below.	NE
Schilbeidae	<i>Ailia coila</i> (Ham-Buch)	Bordoa	Common	SCF	Body colour silvery. The edges of the fins are grayish.	VU
	<i>Pseudeutropius atherinoides</i> (Bloch)	Bordoa	Occasional	SCF	Body colour silvery-greenish on back, longitudinal bands on flank, a pale golden stripe along the lateral line.	EN
Clariidae	<i>Clarius batrachus</i> (Linnaeus)	Magur	Common	BFSV	Body colour brownish to green-blue, back dark with greenish appearance.	VU
Heteropneustidae	<i>Heteropneustes fossilis</i> (Bloch)	Singi	Common	BFSV	Body colour purplish-brown above, two lateral yellowish bands present.	NE
Chacidae	<i>Chaca chaca</i> (Ham-Buch)	Kurkuri mach	Common	BF	Body colour brownish marbled with darker. fins dark brown, with black blotches.	NE
Belonidae	<i>Xenotodon cancilla</i> (Ham-Buch)	Kokila	Common	SF	Body colour greenish above, a series of blotches on sides of body.	LR-nt
Synbranchidae	<i>Monopterusuchia</i> (Ham-Buch)	Cuchia	Common	BF	Body colour greenish-brown, abdomen lighter,	LR-nt
	<i>Chanda nama</i> (Ham-Buch)	Chanda	Common	SCF	Body transparent, silvery-yellowish with a longitudinal band along the flank.	NE
Chandidae	<i>Chanda nama</i> (Hamilton)	Chanda	Common	SCF	Body transparent with a greenish-yellow tinge, a silvery broad lateral stripe on side of the body.	NE
Nandidae	<i>Nandus nandus</i> (Ham-Buch)	Bhedbhedi	Common	CF	Body colour greenish-brown with brassy reflection, vertically marbled with three broad patchy blotches.	LR-nt
Gobiidae	<i>Glossogobius giuris</i> (Ham-Buch)	Patitmutura	Common	BF	Body colour yellowish-brown with five dark blotches on flank, sides of head having irregular violet spots.	LR-nt
	<i>Colisa fasciatus</i> (Schneider)	Khalihana	Very common	CF	Body colour greenish with orange bars descending obliquely from back to anal fin.	LR-nt
Belontiidae	<i>Colisa sota</i> (Ham-Buch)	Bheseli	Very common	CF	Body colour dull greenish, lighter along belly, fins immaculate, caudal fin often with black spot at base.	LR-nt
	<i>Colisa lalia</i> (Ham-Buch)	Lal Khalihana	Very common	CF	Body colour scarlet, crossed by oblique bands of pale blue, fins with scarlet spots.	NE
Anabantidae	<i>Anabas testudineus</i> (Bloch)	Kawai	Very common	CF	Body colour greenish and dark grey on dorsal sides and flank,	VU
	<i>Channa marulius</i> (Ham-Buch)	Saal	Very common	BCF	Body colour grayish-green above lateral line, six dark oval blotches on flank.	LR-nt
	<i>Channa stewarti</i> (Playfair)	Pakhara Chenga	Rare	BCF	Body colour dark brown, a series of darker bands sloping forward usually present above lateral line.	NE
Channidae	<i>Channa striatus</i> (Bloch)	Shol	Very common	BCF	Body colour grey-green on upper side, dark blotches on flanks which may form angular bands.	LR-lc
	<i>Channa punctatus</i> (Bloch)	Goroi	Very common	BCF	Body colour black to light-green on dorsal side and flanks.	LR-nt
	<i>Channa orientalis</i> (Bloch-Schneider)	Chengeli	Very common	BCF	Dorsal and flanks of the body green, ventral side pale with a radish tinge.	VU
	<i>Mastacembelus armatus</i> (Lacepede)	Bami	Occasional	BF	Body colour brown and usually zigzag lines.	NE
Mastacembelidae	<i>Macrogathus aral</i> (Bloch-Schneider)	Tora	Common	BF	Body colour greenish, marbled superiorly, becoming yellowish along abdomen.	LR-nt
	<i>Macrogathus pancalus</i> (Ham-Buch)	Tora	Common	BF	Body colour greenish-olive along back, yellowish on belly.	LR-nt
Tetraodontidae	<i>Tetradon cutcutia</i> (Ham-Buch)	Gongatoop	Common	BCF	Back of the body dark to olive green, flanks yellowish, belly white.	LR-nt

LRnt-Lower risk near threatened; LRlc-Lower risk least concern; EN-Endangered; VU-Vulnerable; NE-Not evaluated; SCF-Surface column feeder; BF-Bottom feeder; BCF- Bottom column feeder; SF-Surface feeder; SCBF-Surface column bottom feeder; BFSV- Bottom feeder surface visitor; CF-Column feeder.

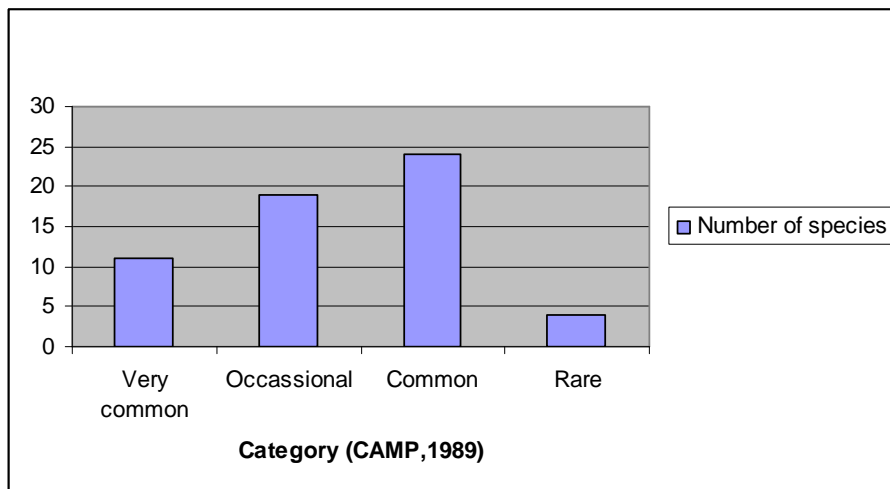


Fig. 2: Ornamental fishes of different categories in the IBA-SITE



Plate 1: Fish Productivity of Bordoibam Bilmukh Bird Sanctuary



Plate: 2

Plate:3

Plate: 4

Plate 2-4: Fishes of the Bordoibam Bilmukh Bird Sanctuary

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