

REVIEW ON THE PRESENT FRESH WATER INTRODUCED FISH FAUNAL DIVERSITY OF WEST BENGAL OF INDIA

Saumya Biswas

Assistant Teacher, Dogachhi High school, Dogachhi, Nadia, West Bengal, India Pin- 741102

Received: May 30, 2018

Accepted: July 16, 2018

ABSTRACT

Fish, the most diverse group among vertebrates plays an important role in stability of ecosystem and also a very good source of animal protein. But the only indigenous fish sometimes cannot fulfill all the human need of the local people. So fishes from other places such as other area or other country are introduced to compensate the human needs. These exotic fishes of authorized introduction are cultured for food and also for beauty in India. Thus these fishes are playing an important role in the development of socio- economic condition in India including West Bengal. But there are some fish of unauthorized introduction and they are really harmful for indigenous fish and their ecosystem. This review is to study the present exotic fish fauna present in the West Bengal and their origin, status and abundance according to family.

Keywords: introduced fish, invasive fish, uses, conservation status, West Bengal

I. INTRODUCTION

From the past centuries human have been moving flora and fauna around the world for benefit. The exotic fish species are those that are not native or endemic to a particular place and they are brought and introduced to a new place and named as exotic to that place. But these imported species from their native habitat may be very destructive than their home. Some time they cannot live the foreign ecosystem due to failure in competition with the native species. So it is very unpredictable that the introduced species will be able to live or not in foreign places.

West Bengal is called Nadimatrik state i.e. this land is nourished by rivers with a fresh water area about 332379 ha area (WB fisheries handbook 2015). There are several indigenous fish species in the fresh water of West Bengal. Fish is the one of the most demanding food items of this state. But the population of this state increasing day by day and the area of fresh water bodies are decreasing day by day. Due to unscientific over exploitation of native fish fauna, the resource is under serious threat. Not only as food, fish is also used as fancy pet to maintain indoor as well as outdoor beauty. Due to increased demand and need some fishes of different region of different country are introduced in India including West Bengal. Now in India 24 exotic fish fauna are found (Fishbase 2018). Thus fish diversity of this state play a major role in social economy. So, various exotic fish fauna are now available in different river stretches, lakes, wetlands and reservoir due to human interest. But an important point is that due to different motives, such as ornamental, aquaculture, improvement of wild stocks, biological control and recreational purpose, exotic fishes have been introduced in this country illegally or intentionally (Singh and Lakra, 2011). Generally those fish species are successfully, they have a rapid growth with rapid sexual maturity, high fecundity, good acclimatization ability and genetic variability. These introduced fish species have wide range of diet and a special ability to live in disturbed habitats competing with native fishes.

INVASIVE FISH SPECIES:

Invasive fish species can be define as a non- indigenous fish species whose introduction can harm the ecological environment or human economy or human health (Raman et.al 2013). IUCN has defined invasive species as an alien species which may be a threat to native biological diversity. Exotic species can be introduced in many ways; accidentally or intentionally. These exotic fish may be useful or harmful in natural ecosystem. For successful establishment in a new habitat of an introduced fish, there should be three major criteria; arrive, survive and thrive (Raman et.al 2013). As example, the red billed pacu of South America was introduced in the Indonesia. The fish is naturally herbivorous and nut eater. But in Indonesia due to lack of natural food this fish is preying and destroying most of the native aquatic flora and fauna. It is also reported that this pacu fish has attacked on two swimmers (Discovery channel India, 2017).

EFFECT OF INVASIVE FISHES:

Introduction of invasive fishes can cause much serious harm in different ways. This fishes can dominate the other fish species and sometime prey and destroy the indigenous fishes and introduce new

parasites with new diseases (Bhakta and Bandyopadhyay 2008). Thus it has a bad impact on ecology and biodiversity. Due to production loss of other fish species, alien fishes directly affect the economy. In United States invasive species cause billion of dollar loss in every year (Pimentel et al. 2005).

USES OF EXOTIC FISHES:

Exotic fish species are introduced to improve the fish production and economic benefit from fisheries and also for increase of aquatic diversity (Raman et.al 2013). Exotic fishes are introduced as food fish, ornamental fish, and mosquito larvaevorous fish and also for bad intention. These exotic fish are also cultured other than natural growth and this aquaculture force the movement of fishes from one place to another place even from country to country; continent to continent. The transfer of fishes from one geographical area to another geographical area for introduction is an important cause of improvement of worldwide aqua culture. Composite fish culture is a well known example of this type of aquaculture. In India including West Bengal, Three exotic Carp viz. *Hypophthalmichthys molitrix* (Silver carp), *Ctenopharyngodon idella* (Grass carp), and *Cyprinus carpio* (Common carp) along with three Indian major carps viz. *Labeo rohita* (Rohu), *Catla catla* (Catla), and *Cirrhinus mrigala* (Mrigel).



Common carp (*Cyprinus carpio*)



Silver carp (*Hypophthalmichthys molitrix*)



Nilotica (*Oreochromis niloticus*)



Grass carp (*Ctenopharyngodon idella*),(Hill,2018)

Figure: 2 Photograph of some introduced fish of West Bengal

STUDY AREA:

In India, West Bengal is the only state which extends from Himalaya Mountain to Bay of Bengal and situated between 21°38' N to 27°10' N and Longitude 85°38' E to 89°50' E (Bandyopadhyay et.al 2014, Bengal fishery investment profile 2016). There are so many rivers from different origin with diverse indigenous fish fauna. But there are some rivers of southern part of West Bengal suffer from lack of water in the summer and some rivers became degraded canal. Now these rivers contain both types of fish fauna; indigenous and introduced (figure: 1).

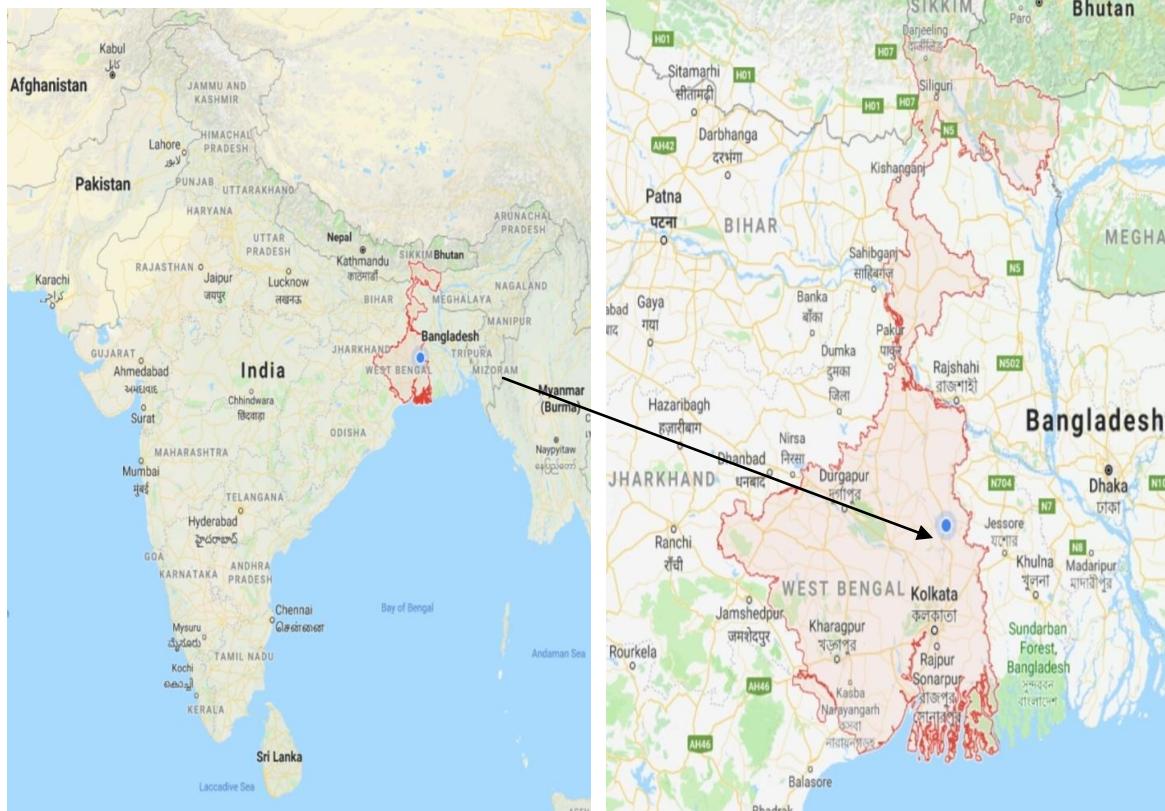


Figure: 1 Position of West Bengal in India and Its outline map (Source: Google Map)

RECENT STATUS:

Unscientific, inhuman, and unauthorized activity of man is a major cause of biodiversity loss. Overexploitation is another major cause of loss of fish faunal. Due to natural and artificial calamities indigenous and non-indigenous both type of fishes are under threat. Introduced fish species are generally under less threat than the indigenous species. For the awareness the most comprehensive, effective and evaluating procedure for the conservation status of animal and plant species in the world is IUCN. The exotic fishes of West Bengal are also in the IUCN conservation status list.

INTRODUCED FISH FAUNA OF WEST BENGAL

There are several introduced fish species are found in the water bodies of West Bengal. These fish species are introduced in India from their different home country of different geographical location. According to different author and by field survey the different exotic fishes are compiled in the sequence of order, family, scientific name, common name, home country, year of introduction in India and IUCN status (Table-1).

Table: 1 Freshwater introduced fishes of West Bengal with note on order, family, Scientific name, local name, home country, year of introduction in India and conservation status IUCN = International Union for Conservation of Nature and Natural, EN= Endangered; VU= Vulnerable; NT= Near Threatened; LC= Least Concern; DD= Data Deficient; NE= not evaluated.

Order and family	Scientific name	Common name	Home country	Year of Introduction	IUCN Status	Source:
Order: Characiformes						
Family: Serrasalmidae	<i>Piaractus brachiopomus</i> (G.Cuvier 1818)	Red-bellied Pacu	South America	Unauthorized introduction	NE	Dhara et.al 2016
Order: Cypriniformes						
Family: Cyprinidae	<i>Carassius auratus</i> (Linnaeus, 1758)	Gold fish	United Kingdom	1870	LC	Mogalekar et.al 2017

	<i>Carassius carassius</i> (Linnaeus, 1758)	Crucian carp		Europe and America	LC	Raman et.al 2013
	<i>Cirrhinus molitorella</i> (Valenciennes, 1844)	Mud carp	North East Asia	Unauthorized introduction	NT	Dhara et.al 2016
	<i>Ctenopharyngodon idellus</i> (Valenciennes, 1844)	Grass carp	Japan	1957	NE	Mogalekar et.al 2017
	<i>Cyprinus carpio</i> (Linnaeus, 1758)	Common carp	Sri Lanka	1939	VU	Mogalekar et.al 2017
	<i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844)	Silver carp	china	1957	NT	Mogalekar et.al 2017
	<i>Hypophthalmichthys nobilis</i> (Richardson, 1845)	Bighead carp		Unauthorized introduction	DD	Mogalekar et.al 2017
	<i>Mylopharyngodon piceus</i> (Richardson, 1846)	Black carp/Snail carp	China/Russia		DD	Dhara et.al 2016
	<i>Puntius javanicus</i> (Sauvage, 1881)	Japanese Punti/barb	Indonesia	1972	LC	Dhara et.al 2016
Order: Cyprinodontiformes						
Family: Poeciliidae	<i>Gambusia affinis</i> (Baird and Girard, 1853)	Top Minnow	Italy	1928	LC	Mogalekar et.al 2017
	<i>Poecilia reticulata</i> (Peters, 1859)	Guppy	Central America	1908	NE	Mogalekar et.al 2017
	<i>Poecilia sphenops</i> (Valenciennes 1846)	Molly	Central America		LC	
	<i>Poecilia latipinna</i> (Lesueur, 1821)	Molly	Mexico		LC	
Order: Perciformes						
Family: Chichlidae	<i>Oreochromis mossambicus</i> (Peters, 1852)	Tilapia	Africa	Unauthorized introduction	NT	Mogalekar et.al 2017
	<i>Oreochromis niloticus</i> (Linnaeus, 1758)	Lilontica	Africa	Unauthorized introduction	NE	Mogalekar et.al 2017
Family: Osphronemidae	<i>Osphronemus goramy</i> (Lacepede, 1801)	Giant gouramy	Thailand and Indo china		LC	Mogalekar et.al 2017
Order: Siluriformes						
Family: Clariidae	<i>Clarias gariepinus</i> (Burchell, 1822)	Thai Magur		Unauthorized introduction	LC	Mogalekar et.al 2017
Family: Loricariidae	<i>Pterygoplichthys</i>				NE	Mogalekar

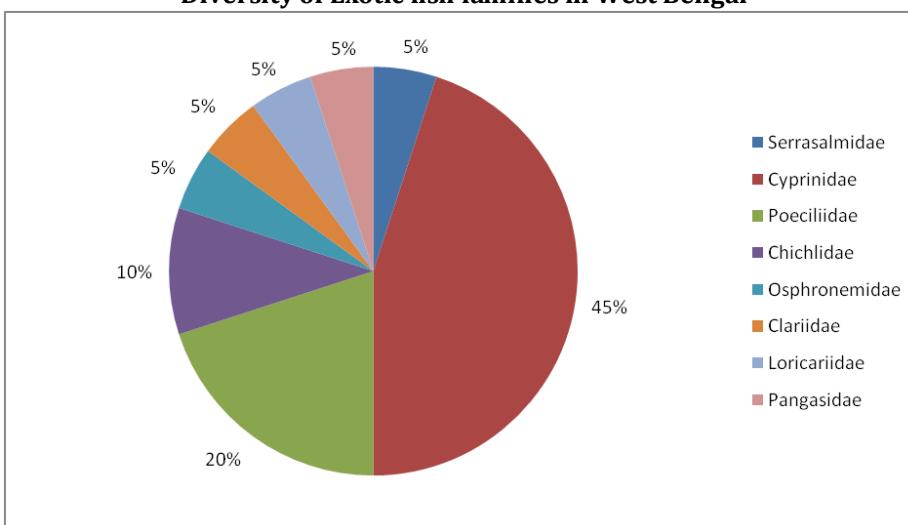
	<i>multiradiatus</i> (Hancock, 1828)					et.al 2017
Family: Pangasidae	<i>Pangasianodon hypophthalmus</i> (Sauvage, 1878)	Sutchi pangas	South east Asia	1997	EN	Mogalekar et.al 2017

Table: 2 Exotic fish diversity in number in order, family, genera and species wise

	Order	Family(no.)	Genera (no.)	Speceis (no.)
	Characiformes	01	01	01
	Cypriniformes	01	07	09
	Cyprinodontiformes	01	02	04
	Perciformes	02	02	03
	Siluriformes	03	03	03
Total		08	15	20

CONCLUSION:

This review shows that in West Bengal there are 20 introduced fresh water fish species belonging to 5 orders, 8 families and 15 genera (Table: 2). The family cyprinidae of the order cypriniformes consists 9 species and shows the highest diversity of exotic fish species. The exotic fish fauna are introduced for the fulfillment of the need of fish protein and economical benefit in West Bengal but there are some unauthorized introduced fish species causing ecological and economical destruction. The struggle for existence of indigenous fish species is increased due to introduction of exotic species in limited area. According to IUCN status there are 1 species under endangered category, 1 species under vulnerable category, 3 species under near threatened category, 8 species under least concern category, and 2 species are under data deficient category and 5 species under not evaluated category among the introduced fishes of West Bengal. Now in West Bengal composite fish culture is a very effective for social economy. So, the aquaculture for both indigenous and non-indigenous fish fauna should be scientific and with full awareness for establishment of successful and economical fishery in West Bengal.

Diversity of Exotic fish families in West Bengal**Figure: 2** Representation of exotic fish species abundance in percentage (outside the pie) of different family (indicated by different color).**ACKNOWLEDGEMENTS:**

I am grateful to the fisherman and owner of fish shop for their kind cooperation for data collection.

References:

1. Bhakta, J.N. and Bandyopadhyay, P.K. (2008). Fish diversity in freshwater perennial water bodies in East Midnapore district of West Bengal, India. *Int. J. Environ. Res.* 2(3): 255-260.
2. Bandyopadhyay S, Kar NS, Das S, Sen J. River Systems and Water Resources of West Bengal: A Review. Geological Society of India Special Publication. 2014; 3(2014):63-84.

3. Bhakta J.N., Bandyopadhyay P.K. (2007), Exotic Fish Biodiversity in Churni River of West Bengal, India, *eJBio*, Vol. 3(1): 13-17
4. Chakraborty S, (2018), Review on freshwater fish diversity of Northern West Bengal, India: status, threats and conservation measures *Int. Res. J. Biological Sci.* Vol. 7(7), 39-51
5. Dhara K., Mukherjee S, Madhu N.R., Karmakar S.R., (2016), Exotic food fishes in North 24 Parganas district, West Bengal and their ecological assessment, *Int. J. Exp. Res. Rev.*, Vol. 5: 67-73
6. Government of West Bengal. Fisheries Department, Fishery resources Profiles: Inland Resources. 2016. <http://www.bengalfisheriesinvestment.org/overview.html>
7. Hill J.E., 2018, <http://fosterfollynews.net/2018/03/24/grass-carp-a-biological-control-tool-to-manage-invasive-aquatic-plants>
8. <https://www.google.co.in/maps>
9. <https://www.fishbase.org>
10. IUCN. The IUCN Red List of Threatened Species. IUCN, Gland, Switzerland and Cambridge, UK, <http://www.iucnredlist.org>. 2018-1
11. Mogalekar H.S., Canciyal J., Ansar C.P., Bhakta D., Biswas I., Kumar D., (2017), Freshwater fish diversity of West Bengal, *J. Entomol. Zool. Stud.*; 5(2): 37-45
12. Pimentel, D., R. Zuniga and D., Morrison (2005) Update on the environmental and economic costs associated with alien invasive species in the United States. *Ecological Economics* 52: 273288
13. Raman R.P., Mishra A., Kumar S., Sahay S., Bhagat M.N., Kumar S.,(2013), introductions of exotic fish species into Indian water: an overview of benefits, impacts, issues and management, *Advances in Fish Research*, Vol.VI, Pages 1-14
14. Resources (2015). Handbook of fisheries statistics 2014-15. <https://www.wbfisheries.in/files/Statistical%20handbook15-16.pdf> (Accessed on 31/03/ 2018)
15. River monster episode, discovery channel India, 2017
16. Singh A.K., Srivastava Sharad C., Kumar D, Ansari A., Verma R., Verma P.,(2013), Exotic Fish Diversity, Invasion and its Impacts on aquatic biodiversity and ecosystems in Uttar Pradesh, Uttar Pradesh State Biodiversity Board
17. Sing A.K., Lakra W.S. (2011), risk and benefit assessment of alien fish species of the aquaculture and aquarium trade into India reviews in Aquaculture 3, 3-18.