Ichthyo-Diversity in different rivers of West Bengal, India: Status and conservation strategy

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Abstract

West Bengal is surrounded by many rivers. Rivers play a decisive role in freshwater habitat and connects with ocean. But fish diversity knowledge is inadequate in different rivers of West Bengal. West Bengal provides 7.5% of resources of water of the country. West Bengal is fulfilled with many resources of water like, beel, pond, rivers. Freshwater diversity in rivers may loss due to anthropogenic effect and also by pollution. Besides this exploitation and change of climate are another major cause of biodiversity loss. Decreasing trend of fish diversity is an aggregate approach to conservation of fish diversity. For this reason riverine fishes are the threatened taxa. But less effort have been dedicated for conservation of river fishes this review helps to understand fish species in south and north Bengal rivers in West Bengal.

Keywords: Diverse, management, cryopreservation, fish safe zone, keystone, flagship, sustainability

Introduction

Fishes are most common and have diverse group. Lévêque et al., (2008) showed fish related research in India are exploratory stage. Fish base have 34700 species of fish and provides information to the researcher (Fish base). In West Bengal river Ganga is divided into two parts North Bengal and South Bengal. Southern part of West Bengal is called South Bengal. Some districts of South Bengal are Nadia, Howrah, Hooghly, East Midnapore, West Midnapore, etc. Some districts of Northern Bengal are Alipurduar, South Dinajpur, Coochbehar, etc. South Bengal and Northern Bengal have hotspot of fishes. Swain (2008) identified freshwater ornamental habitats in India. Sarkar et al., (2015) studied diversity of ornamental fish in Torsa river and Gargharia river. Agriculture and rivers are directly interlinked in West Bengal. West Bengal act as rivers land. Due to irrigation from tributaries of the river Ganga, number of fish species have been decreased (Payne et al., 2004). Lakra et al., (2010) showed from river Ganga 29 fish species were recorded as threatened category. Freshwater fish species mainly loss due to Industries (Gibbs 2000) and they are the menace group (Darwall and Vie 2005). Management of fish habitats is a challenge now days (Dudgeon et al., 2006). Researcher showed ichthyofaunal diversity in many reservoirs and lakes (Patra 2006, Mahapatra 2003). Different estuarine system provides significant production of fisheries (Sugunan and Sinha 2001). In India conservation and management of rivers have insufficient information. Proper planning of conservation is essential to save freshwater biodiversity (Pusey et al., 2010, Lipsey and Child 2007).

Rivers in West Bengal

Many important river flows inside the West Bengal. Some of them are Bhagirathi Hooghly, Dwarakeshwar, Churni, Barakar, Jaldhaka, Mahananda, Kangsabati, etc. West Bengal consists of many rivers. Bhagirathi Hooghly and Ganga Padma rivers tributaries are the major rivers in West Bengal. Some Himalayan rivers that flows through West Bengal are Tista, Mahananda Jaldhaka, Torsa, etc. From the Chotonagpur plateau some river arises. They are Damodar, Rupnarayan, Ajay, Haldi, Subarnarekha, etc. Some tidal river like Matla flows through West Bengal. In West Bengal tidal rivers are present in Sundarban area like, Gosaba, Kultali, etc. Main problem of tidal river is they overflow bank during the high tide.
Fish diversity in Damodar River
Saha and Patra (2013) [25] showed fish diversity in Damodar river. In Daomodar 46 species of fishes were present during January 2011-2012 (Saha and Patra, 2013) [25]. Saha and Patra (2013) [25] reported 38 % fish belongs to order Cyprinodontiforms, 30% fish belongs to order Perciformes, 26 % fish belongs to order Siluriformes in Damodar river. Highest fish diversity Index was observed in Barsul (0.97) followed by Krisak setu (0.96) and Palla (0.95) (Saha and Patra, 2013) [25]. Ornamenta fish diversity in Damodar river have been identified by Sarkar L (2020) [29].

Fish diversity in Churni river
In river Churni 48 species have been reported which belongs to 18 families, 29 genera, 8 orders (Bhakta and Bandyopadhyay, 2007) [2]. Highest population of fish that were present in river Churni are Oreochromis mossambicus, Cyprinus carpio and lowest population fish is Clarias gariepinus (Bhakta and Banyopadhyay, 2007) [2].

Fish diversity in Kangsabati River
In Kangsabati river, 46 fish species have been recorded including 17 families, 29 genera, 8 orders during August 2013 to January 2015 (Kar et al., 2016) [12]. According to Kar et al., (2016) [12] in Kangsabati river 41 % fish species were Cypriniformes, 18% fish species were Perciformes, 28% fish species were Siluriformes. Highest fish diversity Index was observed in Pathra River Bank (3.30) followed by Sal Dahari river bank (3.26), Balishira river bank (3.04), Payraguri river bank (2.92), Najargunj (2.66) (Kar et al., 2016) [12].

Table 1: Annual estimated discharge (mcm) of some rivers in West Bengal (Rudra, 2016) [24]

| River         | Estimated discharge (mcm) |
|---------------|---------------------------|
| Teesta        | 29947                     |
| Mahananda     | 23129                     |
| Jaldhaka      | 17212                     |
| Torsa         | 23097                     |
| Ganga at Farakka | 513100               |

Table 2: List of fish species found in Hooghly river (Nath and Patra, 2015) [18]

| Scientific name                          | Frequency occurrence           |
|------------------------------------------|--------------------------------|
| Rhinomugil corsula                      | 30-40% in the catch            |
| Sicamugil cascasia                      | Occur very occasionally        |
| Channa Punctatus                        | 5-10 % in the catch            |
| Channa orientalis                       | 5-10 % in the catch            |
| Pseudambassis ranga                     | 1-5 % in the catch             |
| Jhontius gureticus                      | 5-10 % in the catch            |
| Trichogaster fasciatus                  | 5-10 % in the catch            |
| Glossogobius giuris                     | 30-40% in the catch            |
| Periophthalmodon sp.                    | Occur very occasionally        |
| Pseudaprocryptes lanceolatus            | 30-40% in the catch            |
| Odontamblyopus rubicundus               | 30-40% in the catch            |
| Apocryptes bato                         | 5-10 % in the catch            |
| Platyccephalus indicus                  | 30-40% in the catch            |
| Datnioides quadrifasciata               | Occur very occasionally        |
| Macroganthis aral                       | Occur very occasionally        |
| Macrognathus pancalus                   | Occur very occasionally        |
| Mastacembelus armatus                   | Occur very occasionally        |
| Sillaginopsis panijus                   | 10-30% in the catch            |
| Badis badis                             | Occur very occasionally        |
| Eleotris fusca                          | 10-30% in the catch            |
| Acanthopagrus latus                     | Occur very occasionally        |
| Nandus nandus                           | Occur very occasionally        |
| Polynemus paradiseus                    | Occur very occasionally        |
| Scatophagus argus                       | Occur very occasionally        |
| Tilapia nylotica                        | Occur very occasionally        |
| Etroplus suratensis                     | Occur very occasionally        |
| Lates calcarifer                        | Occur very occasionally        |
| Ompok pabda                             | Occur very occasionally        |
| Walilago alta                           | Occur very occasionally        |
| Mystus cavasi                           | 10-30% in the catch            |
| Mystus vittatus                         | 1-5% in the catch              |
| Mystus bleekari                         | Occur very occasionally        |
| Mystus vittatus                         | Occur very occasionally        |
| M gulo                                  | 1-5% in the catch              |
| Sperata aor                             | 1-5% in the catch              |
| Sperata seeghala                        | 1-5% in the catch              |
| Rita rita                               | 5-10% in the catch             |
| Rita gogra                              | 30-40% in the catch            |
| Gagata gagata                           | Occur very occasionally        |
| Gagata sexualis                         | Occur very occasionally        |
| Gagata cenia                            | Occur very occasionally        |
| Bagarius bagarius                       | Occur very occasionally        |
| Glyptothorax telechitta                 | Occur very occasionally        |
| Entropichthys vacha                     | 30-40% in the catch            |
| Silonia silonida                        | 1-5% in the catch              |
| Eutropichthys murius                    | Occur very occasionally        |
| Fish Species                          | Percentage in the Catch |
|--------------------------------------|--------------------------|
| Ailia colia                          | 30-40% in the catch      |
| Clupisoma garua                      | 30-40% in the catch      |
| Neotropius atherinoides              | 1-5% in the catch        |
| Secutor ruconis                      | 5-10% in the catch       |
| Heteropeustes fossilis               | 5-10% in the catch       |
| Pangasius pangasius                  | Occur very occasionally  |
| Gerres oyena                         | 1-5% in the catch        |
| Eomus damicrus                        | Occur very occasionally  |
| Amblypbyngodon mola                  | 1-5% in the catch        |
| Puntius conchonius                   | 5-10% in the catch       |
| Puntis ticto                         | Occur very occasionally  |
| Ostebroma coto coto                  | Occur very occasionally  |
| Laubuca laubuca                      | Occur very occasionally  |
| Cirrhina reba                         | Occur very occasionally  |
| Cirrhina miriata                     | 10-30% in the catch      |
| Salmpohiasa phalo                    | 10-30% in the catch      |
| Salmpohiasa bacaila                  | 10-30% in the catch      |
| Labeo caiba                          | 5-10% in the catch       |
| Hypophthalmicryx molitrix             | Occur very occasionally  |
| Labeo rohiita                         | Occur very occasionally  |
| Labeo bats                            | 5-10% in the catch       |
| Catla catla                           | Occur very occasionally  |
| Rasbora sp.                           | Occur very occasionally  |
| Chaquinius chagunio                   | Occur very occasionally  |
| Lepidocephalichthyx guntea           | Occur very occasionally  |
| Tenualosa lisa (juvenile)             | 30-40% in the catch      |
| Tenualosa tisa (adult)                | 1-5% in the catch        |
| Gadusia chapra                        | 5-10% in the catch       |
| Corcia soborna                        | 30-40% in the catch      |
| Setipinna phasa                       | 30-40% in the catch      |
| Xenentodon concila                    | Occur very occasionally  |
| Hemiramphus far                       | Occur very occasionally  |
| Aplocheilus panchax                   | Occur very occasionally  |
| Pisodonophis boro                     | 10-30% in the catch      |
| Anguilla bengalensis bengalensis      | 5-10% in the catch       |
| Amphipnous cuchia                     | Occur very occasionally  |
| Cynoglossus cynoglossus              | 5-10% in the catch       |
| Euryglossa orientalis                 | 10-30% in the catch      |
| Microphus cuniculus                   | Occur very occasionally  |
| Tetradon cutucia                      | Occur very occasionally  |
| Notopterus noopterus                  | Occur very occasionally  |
| Notopterus chitala                    | Occur very occasionally  |
| Crocodile fish Pterygoplichthyx sp.   | Occur very occasionally  |

Fig 1: Basin area (sq. km.) of Bhagirathi (Nabadwip), Mayurakshi, Ajoy, Damodar (Jamalpur), Dwarakeswar, Silai, Kansai (Rudra. 2016) [24]
Conservation Strategy

Conservation of fish species in Guadiana River was reported by Filipe et al., (2004) [8]. Cooke et al., (2012) [3] showed some factors that hampers the conservation of endangered fish species in rivers. According to Madhavi et al., (2012) [16] some conservation strategy are

a) For conservation of gene by cryopreservation method gene bank plays a pivotal role.

b) Mass awareness among the common people must be increased.

c) For conservation of fish species application of Geographic information system must be expanded.

Freshwater Fish Safe Zone is an idea for maintenance of biodiversity and conservation (Gupta et al., 2014) [10]. Some important strategy for Freshwater Fish Safe Zone is as follows
(Gupta et al., 2014) [10]
a) To protect the habitat of fish species Freshwater Fish Safe Zone must be carefully maintained.
b) Freshwater Fish Safe Zone should be outlined into two parts; core area and buffer area.
c) Deforestation and agricultural practice should be stopped in the terrestrial area near the river.
d) Research and field study should meticulously maintain.
e) To identify the connection between Keystone and Flagship species with Freshwater Fish Safe Zone for Conservation purpose.

Conclusions
In this study we found many fish species in different rivers of Wet Bengal. Wet Bengal’s river is regarded as hot spot of fish species. But due to pollution, flood fish diversity has been reduced. Besides this indiscriminate killing is another cause for threatening of freshwater biodiversity. Conservation helps to maintain freshwater biodiversity. So there is a need for conservation strategy to protect the freshwater diversity. In situ conservation is an key step for sustainability. Beside this proper planning and people’s awareness are the important step to conserve biodiversity.

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