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FISH DIVERSITY IN HOOGHLY DISTRICT IN RESPECT TO THEIR ECONOMIC IMPORTANCE

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ABSTRACT

Fish biodiversity is important for future sustainability of aquatic resources in India. However stress due to overfishing, climate change, habitat loss, eutrophication and pollution pose threat to fish biodiversity. This study was designed to investigate the availability of fish species, marketing channel and constraints associated with fish market of Hooghly, West Bengal in order to provide suggestions for efficient management and fish marketing system. The primary data were collected by using questionnaire interviews and cross interviews with sellers and buyers with information from Rabindranagar (Chinsurah), Jyoti (Chandannagore), Sheoraphuli, Guptipara and Mogra fish markets during September 2018 to January 2019. A total number of about 60 fish species belonging mostly to freshwater families were available in these fish markets. Highest number of fish was found in Rabindranagar (Chinsurah) fish market. Buyers seemed quite satisfied with the availability of the fishes. Rohu, Catla, Mrigala, Silver carp, Bata were the fishes mostly available in these markets. Some fishes had high demand like *Hilsa* and *Catla*, where some fishes were on low demand like Foli, Telapia. Most of the fishes could be found throughout the year. Number of some fishes seemed to be decreasing in five years according to the information collected from the buyers and sellers of these markets. Enforcement of regulatory methods to protect the habitat and reduce over fishing must be done in order to increase the fish production and restrain the rare fishes in these areas.

Keywords: Fish diversity, Hooghly, Fish market, Fishing, Fish demand

I. INTRODUCTION

Fishes are the most diverse group of vertebrates with 32,447 species [1]. Knowledge of fish fauna of tropical Asia is still in its exploratory phase particularly in India where survey work is incomplete [2].

Fishes have been recognized as a high quality food source for human beings and are preferred as a perfect diet not only due to its good taste and high digestibility but also for having higher proportions of unsaturated fatty acids, essential amino acids and some minerals for the formation of functional and structural proteins. In India there are about 2500 species of fishes of which 930 live in fresh water and 1570 live in marine water [3].

West Bengal is one of the best sources of fish in India as there are many rivers, lakes, ponds etc. Fishes are mainly cultivated in fresh water lakes, ponds and rivers. Bengal is basically famous for its various kinds of fishes. For more than 40 types of fishes are used as Bengali food such as Rohu, Catla, Ilish, Chingri, Vetki, Magur etc. As fish is a dominant kind of food in West Bengal above said are the majorly eaten fishes. In West Bengal various species of fish are found. They have been divided in two type's freshwater fish species and marine water fish species.

The fish market is a vital aspect for sellers, consumers and facilitating for companies. It is not only limited to selling of fish but also include all the activities such as export and import of fishes, distribution to another small markets, prevention of fish in addition to actual sale of fish by reducing middlemen [4]. Local market is large, varied, and complex in terms of volume and as compared to export market domestic market is great. About 97% of the production of fish is marketed internally for internal consumption while remaining 3% is processed for export [5].

A large number of people, many of whom living below the poverty line, fine the employment in the fisheries sector in the form of farmers ,processor ,traders, intermediaries, day labours and transporters [6,7,8]. Fisheries sector is important for socio-economic development, nutrition supplementation, employment generation, poverty alleviation and foreign exchange earnings [9].

In recent years the lifestyle, food habits of generation, agriculture and fishery development, urbanization, rapid environmental and ecological changes are observed which significantly affected our eating habits. The availability and supply of edible food fishes are also influenced by circumstances. So, we tried to find out the changes in availability of these edible fishes in some recent years in our local markets in this project.

In this project we discussed about 5 fish market and a wholesale market located in Hooghly district of West Bengal. Market names are Rabindranagar Fish market, Jyoti (Mankundu) Fish Market, Mogra Fish Market, Guptipara Fish Market and Sheoraphuli wholesale fish market from here fishes are transferred to small local markets. Mainly we came to know about 60 species of fish. 40 species were recognized as freshwater fish and 20 species were assumed as marine water fish. Through this survey we came to know about how many fishes are mainly found in this area as per requirements and demand of the consumers. Last few years some species of fish price have risen high compared to the other species. The main reason behind the increase in price may be because of its high demand or may be not proper cultivation. Some points are also very important part of this project such as- Cultivating areas, what type of fish (Seasonal or All time fish), any common name of the fish etc.

II. MATERIALS AND METHODS

The present study was conducted at five different fish markets in our local area. Several types of fish species are available in different fish markets. The aim of the present study was to create a list of fish species available in these different markets and to study the differences between these markets in respect to fish species availability.

2.1 Study area

The study was carried out in 5 fish markets of Chinsura Rabindranagar fish market, Sheoraphuli fish market, Mankundu fish market, Guptipara fish market, Mogra fish market. Those are the local fish markets with varieties of fish species available in this market. These five fish markets are located in Hooghly district of West Bengal.

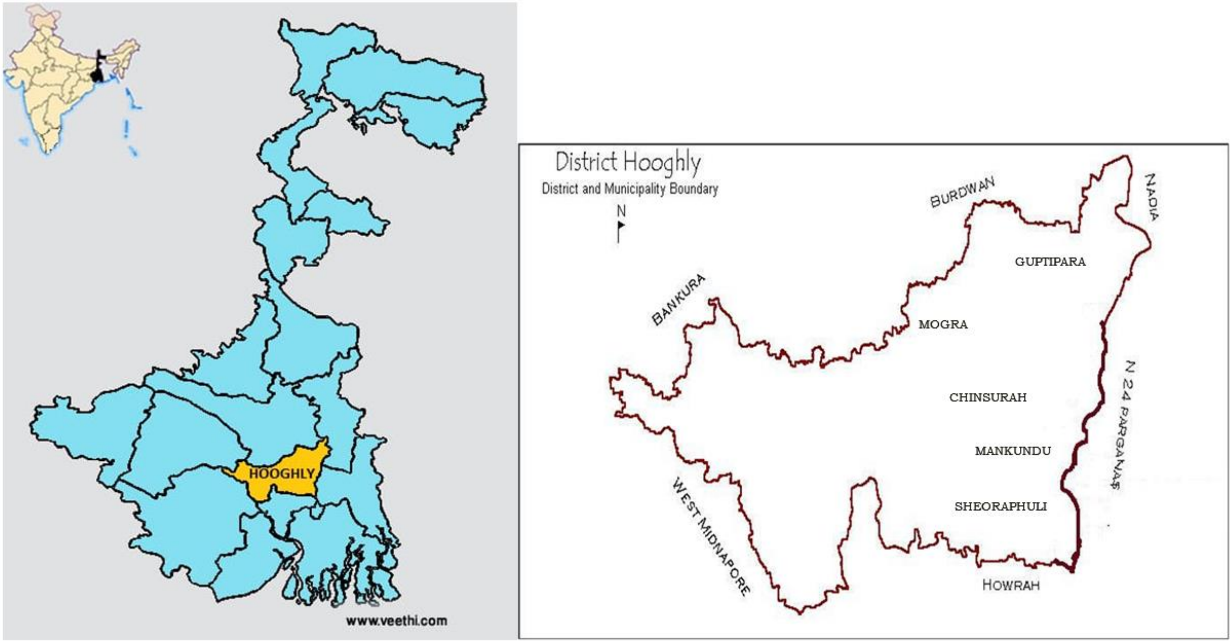


Fig 1. Study areas within District Hooghly of State West Bengal, India

2.2 Data collection method

The study was carried out for the period of few months. Primary data were collected by using questionnaire interviews. For questionnaire interviews, 100 fish traders (retailers) were selected in 3 markets (20 in each market) through simple random sampling method. Mainly asked questions to fish retailers to get an overview on fish distribution, marketing systems and constrains of marketing. Results from the data analyze, in combination with qualitative information collected through questionnaire interviews were compared with original data sheets to ensure the accuracy of data entered. All the collected data were carefully scrutinized, recorded and graphically represented using Microsoft excel.

III. RESULTS

3.1 Fish fauna of Hooghly district from various markets

We discussed about fish diversity and profit and also demand availability, seasonal status, cultivation status, habitat etc with fish sellers. Here we prepared a Questionnaire sheet for data collection and the criteria for these questions are - Fish name, Availability, Demand, Profit, Seasonal status, Habitat etc.

We studied the diversity and profit of fish fauna at various localities of Hooghly district. Our data collection is chiefly obtained from the markets of Seorapholi, Jyoti, Rabindranagar, Mogra and Guptipara. In total about 56 species of fish are studied by us. Systematic position of these fishes is discussed below.

3.2 Rabindranagar Market

From this market we found 13 species. Among them Rohu , Catla, Bata, Mrigal, Magur, Shol, Pomfret, Koi, Chital, Pabda are very common but Rohu, Catla, Magur, Shol, Pomfret, Bhetki, Koi, Pabda and Chital are high in demand. Bata and Mrigal are low in demand. Tengra is very few and low in demand. Baghair is very rare and also low in demand.

Table 1. Fish diversity at Rabindranagar market

Name of fishes	Zoological name	Availability	Demand	Profit	Seasonal status	Habitat
Rohu	*Labeo rohita*	Common	High	High	Always available	Freshwater
catla	*Catla catla*	Common	High	High	Always available	Freshwater
Bata	*Labeo bata*	Common	Low	Low	Always available	Freshwater
Mrigal	*Cirrhinus mrigala*	Common	Low	Low	Always available	Freshwater
Magur	*Clarias batrachus*	Common	High	High	Always available	Freshwater
Shol	*Channa striata*	Common	High	High	Always available	Freshwater
Pomfret	*Pampus argenteus*	Common	High	High	**Winter**	Marine water
Bhetki	*Lates calcarifer*	Common	High	High	Always available	Marine water
Koi	*Cyprinus carpio*	Common	High	High	Always available	Freshwater
Baghair	*Bagarius bagarius*	Rare	Low	Low	Winter	Freshwater
Chital	*Chitala chitala*	Common	High	High	Always available	Marine water
Tengra	*Mystus tengra*	Few	High	High	Always available	Freshwater
Pabda	*Ompok pabda*	Common	High	High	Always available	Marine water

3.3 Jyoti Market

From this market we have found 12 species. Rohu, Mrigel, Hilsa, Silver carp, Lata, Koi and Pangas are very common and having high demand except Mrigel. Tengra, Foli, Khoira are very few but except Tengra remains low in demand.

Name of fishes	Zoological name	Availability	Demand	Profit	Seasonal status	Habitat
khoira	Goniolosa manmina	Few	Low	low	Rainy season	Freshwater
Bhola bhetki	Nibea soldado	Common	High	High	Always available	Freshwater
Bele	Awaous grammepomus	Rare	Low	Low	Winter	Marine water
Kalbose	Labeo calbasu	Common	High	High	Always available	Freshwater
Punti	Puntius chola	Common	High	High	Always available	Freshwater
Nilotica	Oreochormis nilotica nilotica	Common	Low	Low	Always available	Freshwater
Pangas	Pangasius pangasius	Few	High	High	Always available	Freshwater
Magur	Clarias batrachus	Common	High	High	Always available	Marine water
Rup Chanda	Pampus chinensis	Rare	Low	Low	Always available	Freshwater
Sar punti	Puntius sarana	Few	Low	Low	Rainy season	Freshwater
Sardine	Sardinella longiceps	Few	Low	Low	Always available	Marine water
Koi	Cyprinus rubrofuscus	Common	High	High	Winter	Marine water

Table 2. Fish diversity at Jyoti market

3.4 Seorapholi market

From this market we have found 11 species of fish. Para bhetki, Hilsa, Chital ,Silver carp, Shol, Prawn, Shingi and Bombey bhetki are very common and high in demand. Aor and Bhangonbata are few but remain high in demand. Foli is very rare and its demand is also low.

Table 3. Fish diversity at Seoraphuli market

Name of fish	Zoological name	Availability	Demand	Profit	Seasonal status	Habitat
Para bhetki	*Lates calcarifer*	common	High	High	Always available	Marinewater
Hilsa	*Tenualosa ilisha*	common	High	High	Always available	Freshwater
Chitol	*Chitala chitala*	common	High	High	Always available	Freshwater
Silver carp	*Hypophthalmichthys molitrix*	common	High	High	Always available	Freshwater
Shol	*Channa striata*	common	High	High	Always available	Freshwater
Aar	*Sperata aor*	few	High	High	Always available	Freshwater
Bhangor bata	*Labeo boga*	few	High	High	Winter	Freshwater
Prawn	*Fenneropenaeus indicus*	common	High	High	Always available	Freshwater
Shingi	*Heteropneustes fossilis*	common	High	High	Always available	Freshwater
Pholi	*Notopterus notopterus*	rare	Low	Low	Winter	Freshwater
Bombey bhetki	*Lates calcarifer*	common	High	High	Always available	Marinewater

3.4 Mogra Market

Prawn, Shingi, Magur, Koi, Pabda, Kalbose and Tilapia are very common and high in demand. Tengra and Pangas are very few and also high in demand. Sarpunti is rare and low in demand.

Table 4. Fish diversity at Mogra market

Name of Fish	Scientific Name	Availability	Demand	Profit	Seasonal Status	Habitat
Sar Puti	Puntius Sarana	Rare	Low	Low	Summer	River
Prawn	Fenneropenaeus Indicus	Common	High	High	Always available	River
Singhi	Heteropneustes fossilis	Common	High	High	Always available	Fresh Water
Magur	Clarias batrachus	Common	High	High	Always available	Fresh Water
Koi	Cyprinus rubrofuscus	Common	High	High	Always available	Fresh Water
Pangas	Pangasius pangasius	Few	High	High	Always available	Fresh Water
Pabda	Callichrus pabda	Common	High	High	Always available	Fresh Water
Kalbose	Labeo calbasu	Common	High	High	Always available	Fresh Water
Tangra	Mystus tengara	Few	High	High	Always available	Fresh Water
Tilapia	Oreochromis mossambicus	Common	High	High	Always available	Fresh Water

3.5 Guptipara Market

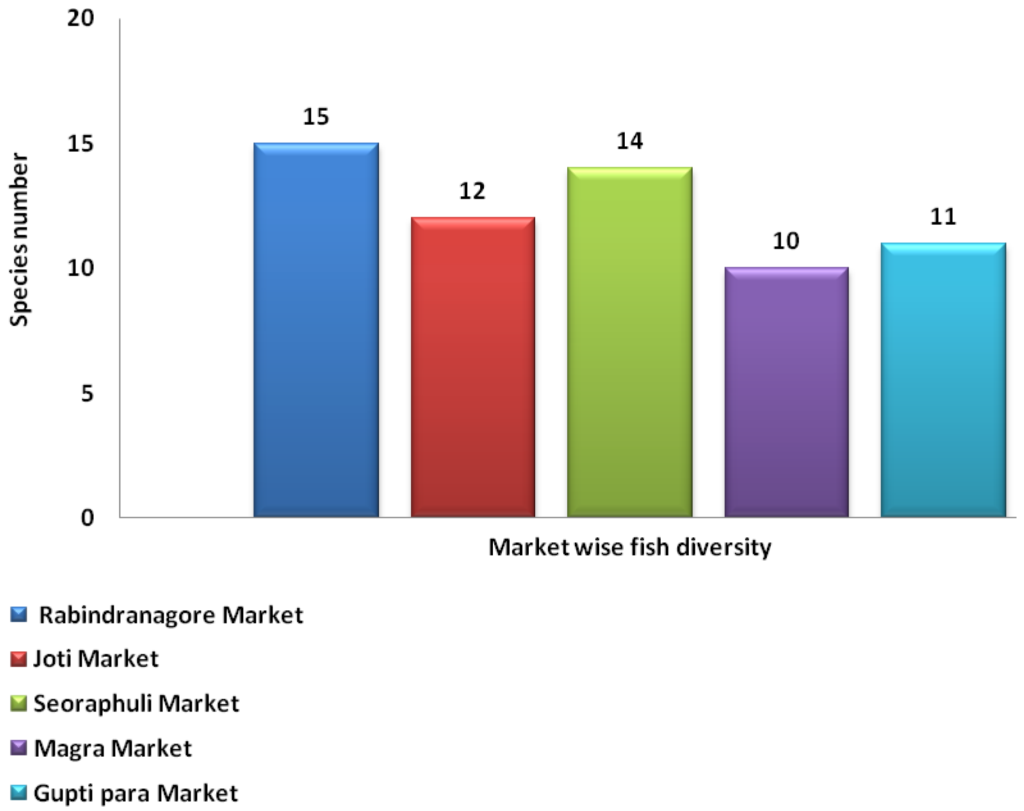
From this market we have found 12 species of fishes. Rohu, Mrigel, Hilsa, Silvercarp, Lata, Koi and Pangas are very common and remain high in demand except Mrigel. Tengra, Foli, Khoira are low in demand except Tengra.

Table 5. Fish diversity at Guptipara market

Name of Fish	Scientific Name	Availability	Demand	Profit	Seasonal Status	Habitat
Tangra	Mystus tengara	Few	High	High	2-3 months	River
Foli	Notopterus notopterus	Few	Low	Low	2-3 months	River
Koi	Cyprinus rubrofuscus	Common	High	High	Always available	Fresh Water
Lotey	Harpodon nehereus	Common	High	High	Always available	Fresh Water
Silver Carp	Hypophthalmichthys molitrix	Common	High	High	Always available	Fresh Water
Pungus	Pangasius pangasius	Rare	Low	Low	Always available	Fresh Water
Rohu	Labeo rohita	Common	High	High	Always available	Fresh Water
Mrigel	Cirrhinus mrigala	Common	Low	Low	Always available	Fresh Water
Hilsa	Tenualosa ilish	Common	High	High	Rainy Season	River
Khoira	Gudusia chapra	Few	Low	Low	Always available	Fresh Water

IV. DISCUSSION

Fish market is the place where people gather for buying and selling fish. The availability of fish in the market depends on the demand and supply of fish in the market, transport and communication facilities and season of capture and culture of fish. A total number of 60 fish species are recorded during the study period in the 5 fish markets of Hooghly district. The fish diversity in Rabindranagar market seems to be most diverse followed by Sheoraphuli market. More or less same and moderate varieties of fish are observed in Jyoti and Guptipara markets and only few species were found in Mogra market



Comparative fish diversity

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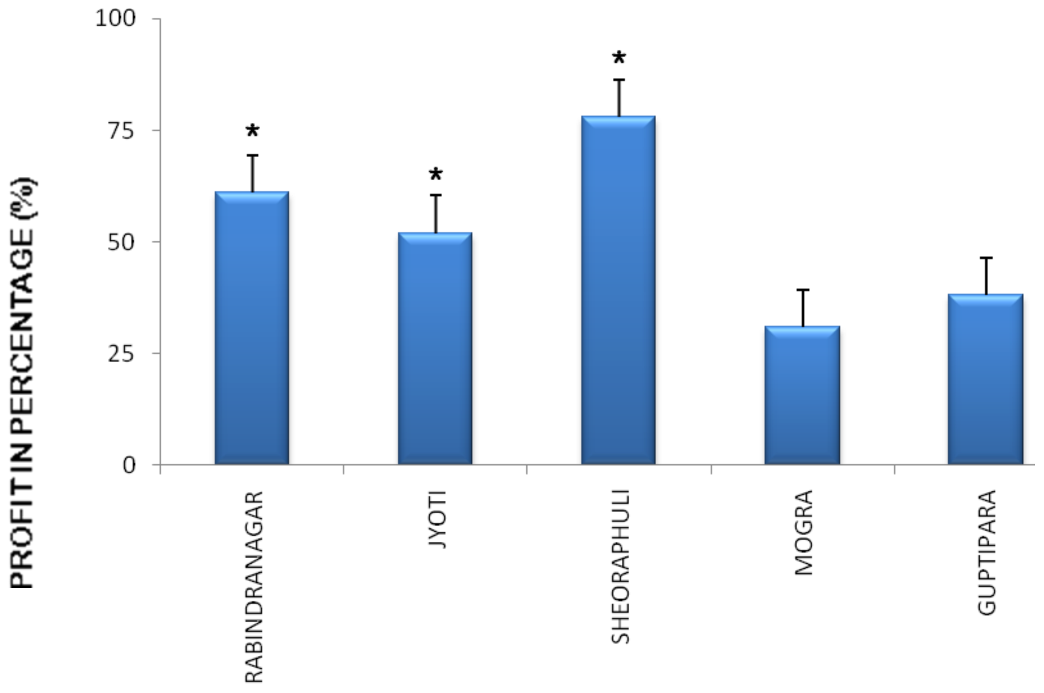
According to our data, market wise profit is highest at Sheoraphuli. It may be because it is a wholesale market. It is followed by Rabindranagar market where profit is moderately high. The Jyoti market showed a moderate profit followed by Guptipara market and Mogra market showed lowest profit among them. Pofit amounts of Sheoraphuli, Rabindranagar and Jyoti markets were significantly higher than Mogra and Guptipara markets.



MARKETWISE COMPARISON OF TOTAL PROFIT FROM FISH

V. CONCLUSION

The aim of this study was to reveal the fish species diversity in the fish markets of particular region and increase or decrease of these species in last 10 year in their availability. The objective of this study was to know the trend of availability of these fish species and the probable causes of these changes were studied through questionnaires and interviews of local people including consumers and sellers. The causes of these changes of availability of these species could reveal the environmental changes that affect directly our daily life. Not only environmental but also some other reasons like economic and social reasons are there that affects the fish farming and their availability in our markets. Based on the present study it may be concluded that the rivers and the ponds are the definitive region as habitat of these fishes. Fish farming involves raising fish commercially in tanks or enclosures, usually for food. The most important fish species used in fish farming are carps, salmon, tilapia. Result shows that these species of fishes are produced rapidly in every season especially in rainy season like-

Rohu/Rui (*Labeo* sp), Mrigal (*Cirrhinus* sp), Tilapia (*Oreochromis* sp), Catla (*Catla* sp), Hilsa or ilish in Bengali (*Tenualosa ilisha*), Bhetki (*Lates calcarifer*) – yield of these species increasing rapidly day by day.

But the production of some species of fish decreases in last 10 years like Gandhara, Khorsula, Loitta (*Harpadon nehereus*), Bagair, Punti etc.

Ecological and environmental parameters play an important role in formation of fish biomass. The cause of their less production in last 10 years-

Causes-

1. Decrease in availability of some fish species than others due to high production, cost, less tasty in nature, lower demand, loss of habitat, introduction of more robust exotic species etc.
2. Availability of some species increases due to low production cost, high rate of growth and reproduction, and good taste, high demand, high market value and great business benefit, low risk of diseases, high survival rate, adjustability with changing environment etc.
3. Periodic changes in some natural phenomena such as ocean current, water temperature and oxygen layer affect the ecological and environmental balance.
4. Marine ecological pollution is caused by direct or indirect dumping of excessive sewage industrial effluents and toxic materials into the rivers and coastal sea which affects aquatic resources.
5. Over fishing, Sand mining, recreational activities and organic as well as inorganic pollution affect river ecosystems.

Due to such modifications to the environment, overexploitation, habitat loss, exotic species, and others, aquatic biodiversity is greatly threatened. In order to preserve this threatened areas and species for future generations, immediate action in form of aquatic biodiversity conservation strategies are necessary. The conservation policy should promote the management practices that maintain integrity of an aquatic ecosystem, prevent species loss and enhance recovery of the threatened species [10,11,12,13,14,15,16,17,18,19].

The following measures seem relevant for consideration:-

1. Control destructive fishing such as the use of small scale fisheries.

2. To overcome disease problems in larval rearing tanks and culture ponds.

3. Encourage national awareness of the need of preserving the environment.

4. To provide technical support to private hatchery owners to help them to maximum production of quality seeds. Authorities can also legislate to limit the size of nets, or to increase the size of the mesh-to enable the smaller fish to escape being caught.

5. Better information for fishermen on the current size of fish stocks, and estimates for the future.

However, fisheries development has not been uniform in all the region of district. The development of science and technology resulting in higher production of some specific fishes. The concerned conservationists, government and non-governmental agencies have a major role to play in creating public awareness and support for the conservation mechanism for the fish species.

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