

Impact of Inland Fisheries on the Socio – Economic Development: A Focus on Perspectives on Development, Nadia District, West Bengal, India.

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Abstract

Inland fishing has an important role on the socio-economic development of the developing countries. This economic activity will be a companion of agriculture in the populated countries like India.

Fishing is not only a source of income but also provider of necessary nutrients to our body. Moreover, fishing influences local and national economy, create scopes of engagement for the rural women and marginal farmers, alleviate poverty through employment generation, helps the development of ancillary industries and infrastructure, conserves the aquatic ecosystem and biodiversity etc. Overall it helps in the total development of a region. In the present chapter, the above mentioned facts have been highlighted by analyzing the scope and prospect of inland fishing in Nadia district of West Bengal in India. Here the main focus is given to how much the socio-economic development of this district have been done through inland fishing and what will be its possibilities in this regard to achieve the aforesaid goal with proper planning.

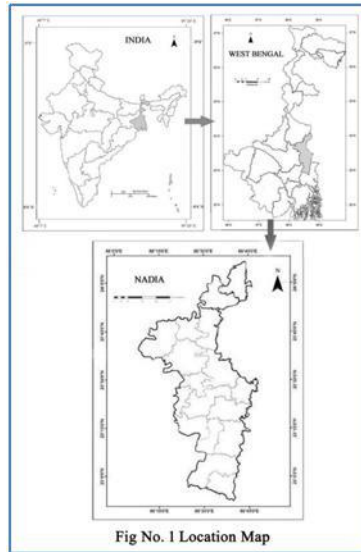
1.0 Introduction:

Fisheries play a very important role in the socio economic development of a country. These inland fisheries contribute about 25 percent to the world production of fish (Sugunan, Welcomme, Bene, Brummett& Beveridge, 2007). It has been recognized as a powerful source of income and employment generator. It is also the source of the cheapest and most easily digestible animal protein besides being a foreign exchange earner. Most importantly, it is the source of livelihood for a large section of

economically backward population of the country. As a developing country, India is known for its inland fishery resources with rich indigenous fishery diversity. The rural community depended for their livelihood and food security on these species. Now in India fisheries sector contributes 60 percent of the fish production of the country, provide employment to around 23 lakh household in the country. It makes more productive and sustainable to provide food security and generate employment to landless, small and marginal farmers. The fish producing states of India are- West Bengal, Andhra Pradesh, Gujarat, Kerala, Tamilnadu, Maharastra, Bihar, Karnataka, Orissa, Uttar Pradesh, Chattisgarh etc. (Ompraksash, Singh, Neelkanth, Azit, Ramachandrudu). In West Bengal, inland aquaculture emerged as a first growing enterprise and a stable alternative to the declining capture fisheries. West Bengal has been able to secure the leading position in fish production for seven successive years and rewarded accordingly by the Central Govt. as best productivity award. West Bengal is the only state in India, where fishes have been cultivated in every kind of water bodies' i.e. brackish water, sweet water, sewage water and marine water as well. The total production of inland fish was 15.30 lakh ton. Apart from the fact that they are mainly consumed in the state, a large amount of inland fish is exported to Delhi, Uttar Pradesh, Madhya Pradesh, Bihar and other adjoining states. About 78 percent of the caught fish in the state is marketed as fresh or chilled and forms staple food for the population and inland landing centers. About 6 percent of the catch is used for drying and curing, frozen fish production accounts for 12 percent and about 4 percent is used for reduction to fish meal. In the wake of changing lifestyles, value added fishery products of different descriptions as convenience food is also gaining popularity in the markets. So it can be said that the fishery sector has an important role for the development of the state's economy. The major productive districts of West Bengal are South 24 parganas, This district is the highest productive area of inland as well as marine fish aggregating to a total value of 3.3 lakh tons in the year 2009- 10 followed by Paschim Medinipur, North 24 parganas, Burdwan and Nadia (Paul & Basak, 2015) . Though the fish production of Nadia is comparatively low than the other mentioned district, inland fisheries having emerged as a fast growing economic activity in this district. At present fish production of Nadia is 92443.80tons, from April 2013 to March 2014 (Assistant Director of fisheries, Nadia); where fishes have been cultivated in every kind of water bodies i.e. ponds, tanks, beel, baor, rivers, canal etc. The present chapter is an attempt to illuminate the importance of Inland fisheries on socio-economic development as well as problems and prospect.

2.0 Location of the study area:

The Study area has been selected the district of Nadia in West Bengal bounded between latitudes, 22°53' N and 24°11' N and longitude from 88°09' E to 88°48' E, covering an area of 3,927 square km, surrounded by Murshidabad on the north, on the east by Bangladesh, on the south, North 24 Parganas and on the west by Burdwan and Hooghly. The district is divided by the tributaries of the river Bhagirathi-Hooghly, consisting of 17 Blocks and 4 Sub-divisions which located at the lower deltaic plain



3.0 Fishery resource:

Alluvial soil with wet monsoon climate and topographically mature deltaic plain is the characteristics of the district which is an ideal situation for inland aquaculture. As a consequence it has extensive potential aquacultural area in the form of rivers i.e. Jalangi, Churni, Ichamati, Bhairab, Bhagirathi, Mathabhanga, (680 Km. or 20339.45 acre); Ponds and Tanks (36977.52 acre); Beel&Baor (9402.45 acre). These bodies cover an area of 26027.35 hectare. According to satellite imagery analysis, district total impounded water area are 7490.288 hec; 6 rivers which are 680 Km; 491 canals, length 1099.991 Km. and one reservoir which is 10.02 hec. (Nadia District Council & Fisheries Department, 2014).

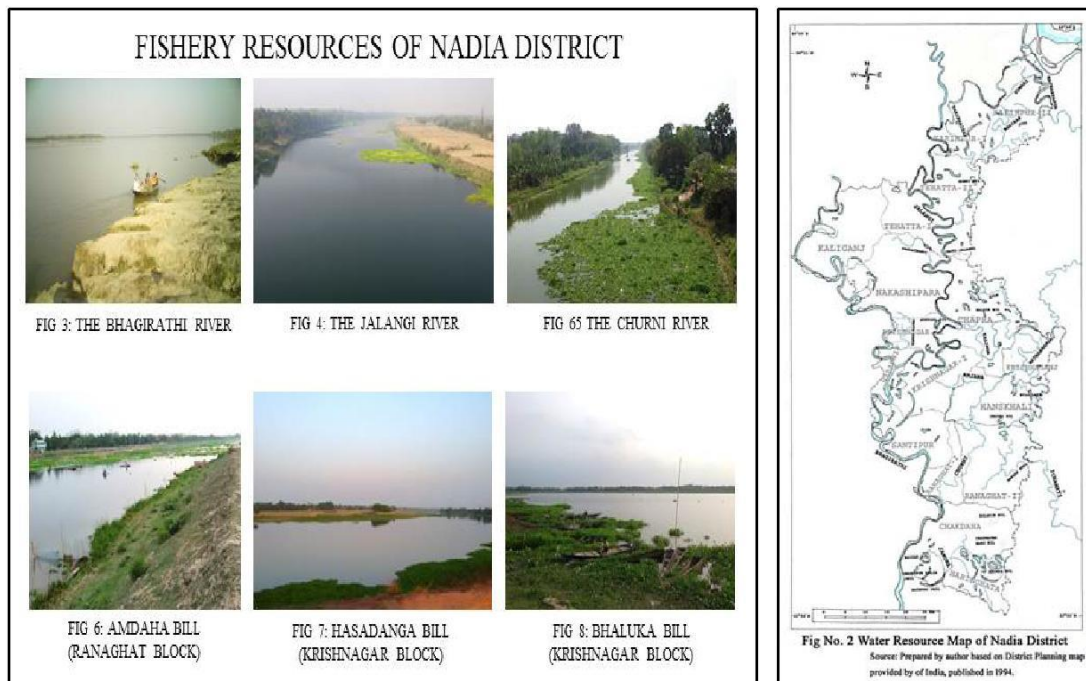


Table 1: The potential area of inland fishing in Nadia district.

Sl.No.	Name of Blocks	Pond and Tanks (F.W) FFDA	Pond and Tanks (F.W) Non FFDA	Beel and Baor (F.W)	Reservoir, Canal, Borropit etc.	Total Production in tons
1.	Karimpur-I	1170.48	643.32	1227.64	641.34	3682.78
2.	Karimpur-II	4217.92	1141.71	1221.51	971.42	7552.56
3.	Tehatta-I	1480.40	2047.72	1031.83	472.34	5032.29
4.	Tehatta-II	1242.40	1504.04	73.40	720.14	3539.98
5.	Krishnaganj	598.64	733.80	846.29	1070.29	3249.02
6.	Chapra	1805.44	2482.70	1843.50	0.00	6131.64
7.	Nakashipara	2921.52	3434.18	422.2	0.00	6777.90
8.	Kaliganj	1866.64	2156.6	1662.19	33.68	5719.11
9.	Hanskhali	1611.28	1467.68	2000.52	848.07	5927.55
10.	Ranaghat-I	1112.64	1019.42	567.3	2.37	2701.73
11.	Ranaghat-II	3658.40	1621.68	146.81	148.53	5575.42
12.	Santipur	1255.60	965.07	1072.92	40.51	3334.10
13.	Krishnagar-I	2806.88	1581.21	1125.66	2727.62	8241.37
14.	Krishnagar-II	565.44	659.38	513.87	0.00	1738.69
15.	Nabadwip	3497.44	289.81	218.18	787.55	4792.98
16.	Chakdaha	6523.60	4145.44	1953.61	780.52	13403.17
17.	Haringhata	642.80	1839.38	2561.33	0.00	5043.51
Total		36977.52	27733.14	18488.76	9244.38	92443.80

Source: Assistant Director of Fisheries, Nadia

4.0 Impact of Inland Fisheries on Socio Economic Development:

Inland fisheries enjoy one of the prime of place in Indian economy. It provides employment and livelihood for fishers who solely depend on it. The fisheries sector usually makes a valuable contribution to economic and social development of rural areas. The small scale fisheries adds to maintain economically exist rural communities. In history, fisheries have often been the basis for human settlements. For example; Iceland was established as a fishing settlement. In Africa, fish farmers invest the funds which they earn from fish farming, in agricultural sector. As far as economic development is concerned, it directly contributes as multipliers. This multiplier effect acts in two ways. Firstly, through intra-sectoral activities i.e. the relationship between captured fish and associate activities, example- net weaving, reparation, distribution of fish etc. Secondly through inter-sectoral activities such as through interaction between forest resource and fisheries, boat making through the distribution of woods, then, interaction between agriculture and fish i.e. distribution of fish feed. Besides this, through infrastructural development like building of roads, markets, reformation of water bodies, it is quite possible to witness socio-economic progress.

It can be noted that in developing countries the lifestyle of 39 million fish farmers partially or entirely is dependent on this sector. So we have tried our best to show

the significant contributions of this sector and we hope that surely it will help variously in socio-economic development in developing countries.

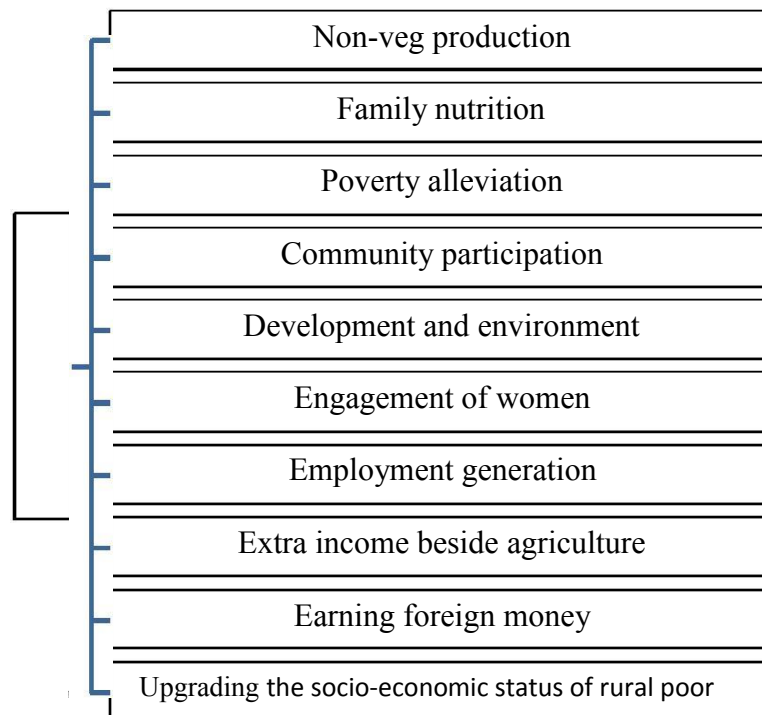


Fig No. 9: Importance of Inland Fishing

4.1 Protein supplement:

More than 80 percent of Indians suffer from protein deficiency. According to the survey, 91 percent of vegetarians and 85 percent of non-vegetarians in India are deficient in protein which is considered as bodybuilding element (“More than 80 percent”, 2015). Protein helps to build and repair tissues including hair and skin. It also provides essential amino acids which are not produced by the body. Protein is an essential ingredient of human food. It is also particularly essential for growing children both for their physical and mental growth. Protein deficiency leads to several diseases in human beings, particularly children. Among sources of protein, animal meat is a vital source and fish is one of the most enriched and the cheapest and most easily digestible animal protein.

Fish not only provides protein but also other nutrients like fat, iron, calcium, phosphorus, carbohydrate, calorie etc. The common fishes which are available in the inland water bodies of Nadia district are Rohu, Catla, Mrigale, Pungas, Grass Carp, Bighead Carp, Silver Carp, Common Carp, Tilapia, Nilotica, Bata, Koi, Shinghi, Magur etc. and in the given table the nutrient values are shown which we get from



Fig No. 10: Different types of common inland fishes of Nadia District

Table 2: Nutrient elements (per 100 grams) of some common inland fishes.

Species	Water (gm)	Protein (gm)	Fat (gm)	Iron (gm)	Calcium (gm)	Phosphorus (gm)	Carbohydrate (gm)	Calorie
Rohu (Labeorohita)	76.7	16.6	1.4	0.085	0.68	0.15	4.4	124
Catla (CatlaCatla)	73.7	19.5	2.8	0.76	0.51	0.21	3.0	111
Mrigel (Cirrhinusmrigala)	75.0	19.5	0.8	0.09	0.35	0.28	3.3	NA
Calbasu (Labeocalbasu)	81.0	14.7	1.0	0.33	0.32	0.38	NA	NA
Pungas (Pangasisuspangasisus)	72.3	14.2	10.8	0.00052	0.18	0.13	NA	NA
Boal (Wallagoattu)	73.0	15.4	2.7	0.62	0.16	0.43	NA	NA
Chital (Chiatalachitala)	75.0	18.6	2.32	2.98	0.18	0.24	NA	108
Falui (Notopterusnotopterus)	73.0	19.8	1.0	0.16	0.59	0.45	1.0	NA
Singhi (Heteropneustesfossilis)	68.0	22.8	0.6	0.26	0.67	0.65	6.9	124
Magur (Clariasbatrachus)	78.2	15.0	1.0	0.71	0.21	0.69	4.2	85
Shoal (Channastriatius)	78.0	16.2	2.3	0.54	0.14	0.135	NA	NA

Source: Cultivation of Fish, BikashkantiSaha (2010)

So it can be demanded that the protein deficiency can be reduced by increasing the consumption of fish in daily food habit.

4.2 Source of income beside Agriculture:

In developing countries the main source of economy based in primary activities, like agriculture, fishing, mining, food gathering etc. The fishery is one of the main parts of primary activities. The developing countries' economy is mainly dependent on agriculture. In India a major percentage of people are directly or indirectly engaged in agriculture and Nadia district of West Bengal is not an exception. There is a huge scope of fishing activities as there are many inland water bodies like pond, beel, baor, rivers, and flood plain lakes etc. which are formed naturally.

Fish cultivation is more beneficial than other agriculture resources. It is comparatively encouraging as it takes minimum time and labour. For this reason, in the developing countries, fish cultivation

is now have become an industry. In our district, fishermen can earn by three different methods. These are i) Nursery ii) Rearing iii) Grow out. Approximately Rs. 2,600 per acre can be obtained as a profit by cultivating “Dhanipona” in a nursery pond whereas for composite farming, the amount may be Rs. 14,000 per hectare (Chakraborty, 2013).



4.3 The production & profit in cultivating fish among the marginal fish farmers:

Some developed techniques may be adopted in producing fishes in large number in shallow water bodies in a very short time and thereby satisfaction may be obtained. Last thirty to forty years, particularly in the last fifteen to twenty years the spreading of pisciculture is increased extensively by adopting scientific way of inland fish farming and in recent past, the necessity of growing eco-friendly fishes is also felt. For this an outline idea is given for the core, marginalized fish farmers so that they may cultivate fishes in low cost and in a large number within a very short time.

The measures for developing fish farming suitable for the marginal fish farmers.

Multiple Stocking & Multiple Harvesting: If the farmers adopt this method, the production of fishes will be doubled.

Suppose, at first approximately one thousand fries are put in a tank for fishing and after two to three months the enlarged 150 – 200 fishes are caught and sold in the market. Again some new fries are put into the same tank for cultivating, and after 2 – 3 months the big fishes are sold on catching. This process continuous 3 – 4 times in a year and



as a result the ratio of productivity of fishes increases and in the district of Nadia the farmers particularly the marginalized fish farmers, are greatly benefitted by adopting this method of fish cultivation.

Batch Culture: It would be better if the long drawn process fishing such as putting fries, dhani-pona, fingerlings and big fingerlings is not applied in a single tank. Instead, if these methods such as putting fingerlings, big fingerlings in different tanks are adopted, the production and growth of fish will increase remarkably as different sizes of fingerlings will get enough space for free movement and ensuring of easy availability of foods helps them to grow at their own will. Thus the marginal fisherman benefitted extensively.

Diversification of species and crop rotation: It is found that that different types of fishes grown well in different seasons. So if the fishermen try to cultivate different types of fishes in different seasons, they will be much benefitted if they do not stick to cultivation of a particular fish throughout the year. For example, silver carp, common carp grow well in winter season whereas cat fish (Magur, Shingi, Pungas, Tilapia etc.) grow well in summer seasons. If it is done rotationally, the production of fishes will be remarkably high.

Poly culture: It is a known fact that small water contains food for all types of fishes. If we only cultivate a particular type of fish, than suppose the food for prawns will be wasted. On the other carps are cultivated with the prawns simultaneously then each species will get enough food for them and there will be no question of wastage of food already stored in a tank.

Integrated fish farming: It is notable characteristics of pisciculture. In a big tank or pond besides the cultivation of fish, a marginal fisherman can keep hens or pigs or ducks at ease. Because, excrete (stool or other things) of such animals is a good food for fishes. Here a fisherman can enjoy double benefit such as (i) the household animals can grow easily by living in a congenial atmosphere as the land is situated by the water and (ii) the fisherman can supply good food for the fishes easily available from his or her hens or pigs or such animals.

Monosex culture: It is noticed some male species of fishes i.e. lobsters and tilapia grow rapidly than the female types of these fishes. So a fisherman can easily cultivate only the male species of these types of fishes and he/she earn more money easily.

Cultivation of infertile fishes: The fishes capable of procreation need enough food for survival and they cannot be healthy or fleshy though fed sufficiently. On the other hand the fishes which are infertile or unable to procreate can grow in a healthy way without taking sufficient food. So the cultivation of these types of infertile fishes like Common carp, Tilapia is very profitable and lucrative for the fisherman, particularly for the poor marginalized fisherman (Nadia District Council & Fisheries Department, 2014).

Hence it may be concluded that, if a fisherman can cultivate those types of fishes which grow remarkably within a very short time, take little homogenous food or do not need extra food, monosex type of fishes and infertile fishes, he/she may earn sufficiently enough and truly speaking in Nadia there is ample opportunity of fishing of these types of fishes mentioned above.

4.4 Contribution to the local economy:

Small scale inland fisheries have been supported fish related activities play a critical role in generating wealth and sustaining economic growth (Bene,2006). In developing countries, inland fishing plays an important role for the development of local economy besides cattle rearing and agriculture. In Srilanka, recent economic valuations have put the value of fisheries at about 18 percent of total economic returns to water in irrigated paddy production (Renwick, 2001).

In Nadia districts a notable population engaged in fishing related activities. They earn more cash for households by selling fish. Fisheries provide a “Bank in the water” for remote rural population.

Table 3: Contribution to employment and income of fisheries in Nadia district.

Sl.No.	Name of the Block	Employment (Fishers) 2013	Actual production	
			Fish production (Metric ton)	Value (CroreRs. per year) Approx.
1.	Hanskhali	17968	5927.55	59.27
2.	Chakdaha	16450	13403.17	134.03
3.	Kaliganj	27078	5719.11	57.19
4.	Chapra	17209	6131.64	61.32
5.	Tehatta-I	10123	5032.29	50.32
6.	Tehatta-II	5821	3539.98	35.40
7.	Nakashipara	24295	6777.90	67.78
8.	Krishnagar-I	17715	8241.37	82.41
9.	Krishnagar-II	12907	1738.69	17.39
10.	Santipur	10250	3334.10	33.34
11.	Karimpur-I	6833	3682.78	36.83
12.	Karimpur-II	9111	7552.56	75.53
13.	Krishnaganj	13666	3249.02	32.49
14.	Nabadwip	7845	4792.98	47.93
15.	Haringhata	22169	5043.51	50.44
16.	Ranaghat-I	8807	2701.73	27.02
17.	Ranaghat-II	24649	5575.42	55.75
Total		252896	92443.80	924.43

Source: Assistant Director of Fisheries, Nadia

4.5 Gender Empowerment:

The fishery sector is an important sector for poverty alleviation and gender empowerment. As the other sector of economy, fishing also a sector where females are engaged in different activities. Though men are dominated in fish capture but post-harvest activities like fish processing, retailing and trading are often done by women. Uneducated and poor women of the fishing villages are involved in post



harvest activities as high skill and large amount of capital is not required in this purpose. A large number of small scale fishers are women. They often supported their family by earning from fishing though men control a large of the households main cash generating activities. Vulnerable women are involved these activities which play a important role in our district, a large number of female are engaged in fish related activities in the fishing villages which represent a vital element of the day to day struggle for economic and social development. "She who cooks also tees her hair." This cherished proverb indicates that fish farming is not the dominion of man any more. Women are playing a prior part in this sector. In West Bengal the association of women in fish farming is concerned in commendable like Maharastra, Karnataka, Kerala, Tamilnadu, Odisha, and Andhrapradesh. The women of 'Kalyani Shahid Palli' a self-dependent community are the trend seaters in this respect. The women of Medermath apart from this approx. 200 women of Medermath village annex to the Hingnara Gram Panchyot, Chakdah Block have firmed 18 self-dependent communities through the S.G.S.Y. project and their prime activities is to work up the socio economic progress through fish firming.

From above mentioned 18 communities every single self-dependent community whose 70% of women are in BPL category. For them many measures have taken. In 2012-13 a project of Rs.2,52,000/-has been spent for duck rearing parallel with integrated fish firming. And for this reasons ponds have been build, banks are made, trees have been



planted on the banks rooms are made for the ducks and duckling have been distributed which have proved to be beneficial for their prosperity.

The cultivation of ornamental fish has brought in success. With the aid of this success and potentialities, women are cultivating ornamental fish through organization like men. Namely 'Sarada Ornamental Fish Farming', a women co-operative organization of Haringhata block in the middest of 2007 with the wistful attempt of 12 diligent women, this organization was in the formation process. On 17th November, 2008 this heartiest venture was transformed into reality tsthrough Fisheries Department of west Bengal (Nadia District Council & Fisheries Department, 2014).

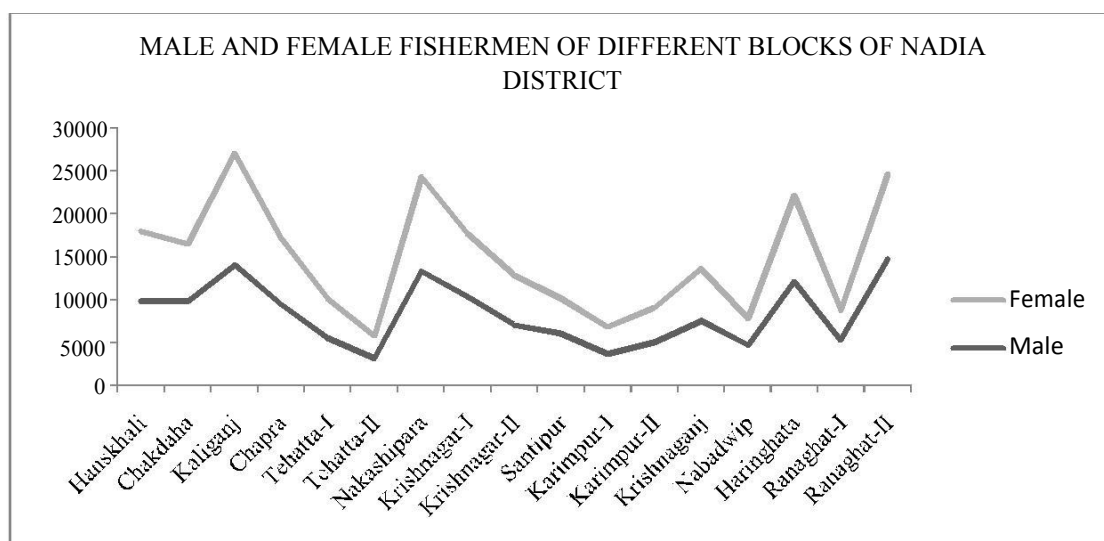
In near future, in Nadia cum West Bengal, women will portray or citable part regarding fish farming and also in the success in the cultivation of ornamental fish and

there is no doubt about it. More women will certainly join fish Farming being inspired and motivated by the activities of the above mentioned women.

Table 4: Engagement of woman in inland fishing of the Nadia District

Sl.No.	Name of the Block	Total no. of Fishing villages in Block	Total no. of fishermen family in Block	Fisherman population in Block	
				Male	Female
1.	Hanskhali	28	3229	9882	8086
2.	Chakdaha	48	5166	9870	6580
3.	Kaliganj	38	4908	14108	12970
4.	Chapra	26	3100	9465	7744
5.	Tehatta-I	18	1808	5568	4555
6.	Tehatta-II	12	1033	3202	2619
7.	Nakashipara	35	4391	13362	10933
8.	Krishnagar-I	29	4133	10329	7386
9.	Krishnagar-II	14	2325	7099	5808
10.	Santipur	24	2841	6150	4100
11.	Karimpur-I	23	1292	3758	3075
12.	Karimpur-II	24	1678	5061	4050
13.	Krishnaganj	17	2454	7516	6150
14.	Nabadwip	10	2066	4707	3138
15.	Haringhata	28	4004	12193	9976
16.	Ranaghat-I	23	2583	5284	3523
17.	Ranaghat-II	16	4649	14789	9860
Total		413	51660	142343	110553

Source: Assistant Director of Fisheries, Nadia



4.6 Environment and Development:

As Fishing is a primary economic activity, it directly related to the environment. The inland fishing is related with two elements of the environment directly or indirectly, these are-wetlands and biodiversity.

‘Wetland’ is a very common word in today’s context. The term ‘Wetland’ is well known after the ‘Ramsar Convention’ of Iran in 1971. Though the literal meaning of Wetland is water bodies, in broad senses it indicates the logged water due to flood in a low land or artificial reservoir including canal. These wetlands save biodiversity through which the aquatic plants and animals are survived. On the basis of this enriched biodiversity, inland fishing has been developed in the tropical countries. In India the development of inland fishing is directly related to the proper planning and management of wetlands. But the area of



wetlands is reduced continuously due to lack of dragging, unplanned urbanization, conversion of agricultural fields etc. So it is necessary to protect the wetlands for the sake of environment and it can be done through organized inland fishing. In this regard, in our study area i.e. Nadia district, the wetlands have been protected through conservation, reformation, extension and proper usage by the Fishery Department. This Department already reforms some small and medium water bodies through FFDA (Fish Farmer Development Agency), new water bodies are formed through MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme) and big water bodies, beel, baor also are reformed through the NCDC (National Co-operative Development Corporation) etc. With the help of Fishery Department of Nadia district, the fishermen conserve these wetlands through proper usage. As a result, the wetlands are conserved and at the same time the inland fishing is developed(Nadia District Council & Fisheries Department, 2014).

The term ‘Biodiversity’ means the variety of species, both flora and fauna, contained within an ecosystem. The biodiversity gives us different types of resources of our daily needs and livelihood on which the families, communities, nations and future generations are dependent. Fish is one of the main parts of biodiversity which is also an important resource. In the world, there are about 20,000 species of fishes and in this; about 2,200 (11 percent) types of species of fishes are available in India. On the basis of this fish diversity, aquaculture has been grown up which is a source of food all over the world and the management of fishing, processing, marketing etc. act as a medium of employment generation, income and recreations of the millions of people in the world. In addition, this is also an important resource to the next generation. But at present unscientific and illegal fishing, industrialization, pollution, scarcity of reproduction area, decrease of river’s navigability, formation of bars at river bed, use of delicate fishing net are the burning problems to fishery is concerned. Even Bengalee’s favourite Hilsha is at stake. Awareness and alertness is very much desirable from every level. If any measure is not taken at this high time, innumerable

fishermen's life will be distressed and there is doubt about this. It can be mentioned, Hilsha's reproduction area in Ganga was stretched from Murshidabad to Bhagalpur, Bihar. This course is contracted during the construction of Farakka. This is not only a single problem. Mother Hilshas have been caught indiscriminately by unscientific way before reaching the reproduction area. Uncountable fishermen are catching little Hilshas by using delicate nets from different ghats of Nadia and as a consequence, Bengalees favourite fish is now in grave peril.

Table 5: List of endangered fishes of Nadia

Sl. No.	Local Name	Scientific Name
1.	Chanda	Chanda nama
2.	Kuchia	Monopterus kuchia
3.	Aor	Sperata aor
4.	Batasi	Neotropius atherinoides
5.	Shoul	Channa striata
6.	Chital	Chitala chitala
7.	Magur	Amblyceps mangois
8.	Khalsia	Colisa fasciata
9.	Darkina	Rasbora daniconius
10.	Bacha	Clupisoma garua
11.	Bele	Awaous grammepomus
12.	Shinghi	Heteropneustes fossilis
13.	Kalbous	Labeo calbasu
14.	Nadose	Nandus nandus
15.	Foli	Notopterus notopterus
16.	Pabda	Ompok pabo
17.	Kharsula	Rhinomugil corsula
18.	Chela	Salmostoma acinaces
19.	Phasa	Setipinna Phasa
20.	Shilong	Silonia silondia
21.	Kakila	Xenentodon cancila
22.	Rita	Rita rita

Source: Fisheries Department, Nadia

Some Endangered Fishes of Nadia District



Fig 11. Foli



Fig 12. Chanda



Fig 13. Nadose

Nadia District Administration has taken initiative to save this fishery resource and they have arranged many awareness programme at Kaliganj, Nakashipara, Krishnagar-I, Santipur, Ranaghat-I etc., relating this issue. The agendas were the usage of delicate fishing nets below 90 mm is strictly prohibited, the capture of Hilsha below 23 cm has been banned, and last but not least during reproduction period (June- August and October – December) any kind of fishing is strictly prohibited (Fisheries Department of Nadia District, 2012). Only public awareness can keep the diversity of fish intact and the development of fishing as well.



4.7 Infrastructural development:

The overall development of a particular area denotes the infrastructural development i.e. construction of roads, houses, installation of deep tube wells, building of fish markets, developments of co-operatives and communities, building of community hall, establishment of training center and over all the socio-economic development of fish farming villages. Different projects of National Fisheries Development



Board, Rastryia Krishi Vikash Yojona, Nadia District Fish Farmers Development Agency are implemented by the Fisheries Department Nadia of West Bengal owing to increase the fish production. With the help of this projects the increase of fish production and infrastructural development are going on simultaneously.

Various projects of fisheries Department:

- i) **Water based agricultural scheme:** Under this project communal fish farming (to provide spawn and fish food in the ponds of various industry), integrated fish farming (the inclusion fish farming with poultry and hog

farming), to emphasize on the cultivation of indigenous fish, distribution of spawn etc. are executed.

- ii) **The project to supply the equipment for fishing:** fish nets, pipkins', boats are distributed amongst the selected fisherman cooperatives or beneficiaries.
- iii) **Serviceable project:** The aged and destitute fishermen are given anility allowance (Rs.1000/mth) and identity cards are handed over to the fisherman. Fishermen saving cum relief scheme, Fishermen group personal accident insurance scheme are also insured.
- iv) **Training:** A training of five to ten days is imparted to the fishermen to develop fish farming in their respective areas.
- v) **Reformation of water bodies:** Fishermen cooperatives direct the reformation of various water bodies and the construction of sluice gate.
- vi) **Building project:** Under this project construction of roads, installation of deep tube wells, building of houses, community halls, fish markets for the fisherman are ensured.
- vii) **Testing of water and soil:** In district laboratories water and soil of the ponds are tested. The fisherman has to pay a meager fee for tests but in the case of poor farmers, the fee is excluded.
- viii) **Awareness camp:** Awareness camps are arranged on different issues relating to fish farming at various blocks and gram panchayat level. Fishermen day is the notable one.
- ix) **Reservation of fish species:** To form repositories of fish, spawns are released into the river(river ranching) and endangered fish hatchery are constructed for the conservation of the endangered species.

Apart from this, loans and donations have been arranged for the fish farmers through bank to accelerate the development of fish cultivation. Short term credit, Kishan credit card are conducted for loans. The meritorious students belonging to the fisherman families are awarded with a grant of Rs. 1000 at Madhyamik level(60%) and Rs. 1500 at Higher Secondary level at a time. Stipend of Rs. 10000 is awarded to the students who have succeeded in the JEE, either in medical or in engineering (Fisheries Department of Nadia District, 2012)

4.8 National Economy:

Inland fisheries can play a significant role in the economy of a region and countries as well. The sector contributes 0.75 percent to GDP in India (Ompraksash, Singh, Neelkanth, Azit, Ramachandrudu). Fishing related items i.e. frozen shrimp, frozen fish, cuttle fish, dried fish, live item, chilled items etc. can contribute to national income through export in intra states of our country. The above mentioned item are mainly prepared by brackish water fishes like prawn (Bagda, Galdah, Kuncho Chingri), Pomphret, Pabda, Bhetki, Persia etc. But Nadia produces fresh water fishes like Mrigel, Rohu, Catla, Silver carp, Grass carp, Common carp, Bata etc. So it is not possible to process these fishes in different exportable items. In this circumstance, Nadia helps to national economy by increasing these productions and export, these as non-processed items to other states of India.

4.9 Development of Ancillary Industry:

Fish farming indirectly helps others ancillary industry such as;

Ice factory: It is well known that fish is a object which highly perishable in nature. It can be kept for 8-11 hrs. after catching. If it is left for more than 8-11 hrs it rots. So it is necessary to refrigerate fish as early as possible. The advantages to refrigerate fish are as follows:

- a) It keeps fish fresh and shiny.
- b) It helps to transport fish from one place to another.
- c) There is no harmful effect of it.
- d) And more importantly, it keeps the fish fresh and it can be consumed after 10-11 days.

Generally, the ratio of fish and ice has to be 1:1 to 2:1 for proper preservation. That is why adequate ice is required. Five types of ice are needed:

Block ice: In our country this type of ice is used maximally. Maximum ice factories produce this type of ice.

Flake ice: This kind of ice is used for the fish which are exported.

Tube ice: This ice is comparatively bigger in volume than flake ice. **Plate ice:** This type of ice is used through grinding.

Dry ice: Controls the temperature of the container.

Above mentioned ice factories are constructed near the production center or market. As a result it has become a remarkable ancillary industry. Though in Nadia the picture is not up to the mark but still there are potentialities for improvement.

Packaging Industry: In our country 50% of producing fish are sold within 40 km. Approx. 45% fish are sold within 200 km and 5% are sold in more than 200 km of distance. For the transportation of fish the refrigeration and packaging should be proper. Formerly cane baskets were used for packaging. As it has many problems, plastic container and thermocol boxes are used nowadays. It keeps the temperature of the refrigerate fish intact and there is no scope for any harm. Ancillary industry can be developed through the making of packaging ingredients. In developing countries the development of these associate industries is not satisfactory near the fish production center and fish market. That is why they are imported. If the ingredients are made locally the socio-economic progress can be observed simultaneously with the associate industry (Fisheries Department of Nadia District, 2012).

Fish processing industry: Fishes can be marketed in form of fresh fish, dried fish, processed and canned fish, fish paste, fish pickle, fish seed etc. For these, fish processing industry is needed. But in Nadia district, there is no such type of industries. Therefore it can be said that in our district, these types of industries may be constructed beside the fish farm or the market which can enriched the district.

4.10 Employment generation and poverty alleviation

Major parts of rural population of the developing countries belong to below poverty line. Their economy mainly based on primary economic activities. As there is a vast

scope of inland fishing in Indian River basins, there are many occupations which are generated in this regard i.e. formation of water bodies, reformation of ponds, cleaning weeds in water bodies, fishing, marketing etc. and the socio -economic environment also enhanced which play an important role in poverty alleviation. In Nadia district, there are three types of fishermen.



Table 6: Employment generation in fishery sector of Nadia District

Types of fishermen	Male	Female	Total employment
Full time Fishermen	55379	18457	73836
Part time Fishermen	24647	12264	36911
Occasional Fishermen	8593	3710	12303

Source: Fisheries Department, Nadia

5.0 Recommendation

For the development of this sector, some suggestive measures are:

- i. Developed National Inland Fisheries Policy for strengthen inland fisheries sector and promotion of fishery related livelihood.
- ii. Convergence with MGNREGS project for fisheries focused on tank development (creating dead storage, reparation etc.)
- iii. Established Fisheries Resource Centers (FRCs) in rainfed areas to provide technical support in the inland fisheries sector.
- iv. Make necessary budget allocation to improve basic infrastructure i.e. ice plants, market place, vehicles, for transportation etc.
- v. Setting up of cold storage under private initiatives for sweet water fish preservation in Nadia with capacity of 500 mt.
- vi. Special permission for the free movement of fish truck within the city.
- vii. A package with Govt. assistance should be framed to support the ice manufacturing units and water treatment plants.
- viii. Providing training and credit for non-fish related source of income in order to maintain the diversity of livelihood of the people.
- ix. Emphasis to bring more water resources under fish production with equal importance to indigenous species, ecosystem protection, biodiversity and above all, socio-economic benefit.
- x. Measures to be taken to ensure symmetrically collect and manage inland fish production data, including capture and culture of all species. This will help, take better policy decisions.

6.0 Conclusion

Therefore, from the aforesaid facts it can be clearly concluded that inland fish farming can also play an important role in the socio-economic improvement of a developing country along with agriculture. Especially, in a country as populous as India, inland fishing has immense potential as a source of livelihood which can, at the same time, provide nutritional elements to the society. Various impediments such as illiteracy, lack of knowledge regarding scientific fish farming, involvement of marginal farmers into this field only at the rainy season, act as hindrance in the way of all-round flourish of inland fish farming. Thus, in order to implement 'Blue Revolution' successfully not only the awareness of the concerned farmers should be enhanced but also the entrepreneurship of the local administration, state and central Government must be increased. So that NGOs and self-help groups may come forward with the help of proper Govt. aids and encouragement. Only then the economic activities like inland fishing, along with agriculture, can contribute something worthy to the socio-economic development of the developing countries like ours.

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