

Problems & prospects of prawn production process in Purbamidnapur: an empirical inquest



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Abstract: Fisheries sectors play very vital role in socio-economic development of our country. Purba Midnapur is a pioneer district for growth and development of prawn culture in West Bengal which is a powerful source of earning foreign exchange and it has also recognised as a employment generator sector. Development of rural economy is one of the most important factors for growth and development of Indian economy. But due to lack of proper and systematic planning and some socio-economic constraints prawn culture profession are not developed in optimum level. This study examines the problems and prospects of prawn culture for development of rural area as well as country as a whole by means of earning foreign currency through export of prawn.

INTRODUCTION

Fish and fishery products are considered superior to red- meat in many countries in the world. Consumption of prawn is now remarkably increasing day to day among the health conscious people in the world specifically among the people of developed countries and also in the developing countries too. Prawn has a weighted and balanced food value and has no side effect like red-meat. In developed countries, it has an unbelievable demand among the aristocrat family as a main and precious food. The rich people of U.S.A., Japan, U.K., Canada, Mexico, Australia, China, Switzerland, Italy, Norway, Spain, Portugal, Brazil, Colombia, Iran, Italy, New Zealand, Singapore, Taiwan etc have used to consume maximum portion of imported prawn. In developing countries like South Korea, Lebanon, Israel, United Arab Emirates, Malaysia, Nigeria, Romania, Thailand etc have also consumed a remarkable portion of self produced and imported prawns. So, a huge amount of prawns are consumed by the people of the world as it is used as an alternative food of red-meat. Besides as a source of food, these fishery products also have some significant industrial use. Fishery products are either exploited from the natural water bodies through various methods of fishing or raised artificially in suitable environment through different kinds of aqua cultural process and demand of such product have grown day to day.

World position:

The first recognised output of farmed giant river prawn (*M. Rosenbergii*) production recorded in F.A.O. statistics appeared in 1970 (F.A.O., 2008), showing a production of 10 tons by Mexico and less than 0.5 ton by Mauritius. By 1979 annual global production had risen above 1100 tons; farming statistics were being reported to F.A.O. by Brazil, Ecuador, French Polynesia, Honduras, Malaysia, Mauritius, Mexico, Myanmar, Thailand and the U.S.A. By 1990, annual global production had risen above 20,000 tons and many new countries were recording production. However production then appeared to plateau, averaging 21,700 tons/year in the years from 1991 to 1995 inclusive, with a low of 17,200 tons in 1993 and a high of 26,600 tons in 1991.

The high global figure in 1991 corresponded with the pick output from Taiwan (16200 tons, nearly 61% of the global total production). A major expansion in the global output of farmed freshwater prawns first became obvious in the mid 1990s when China began to submit separate statistical returns for farmed giant river prawns(F.A.O.,2008), showing that Chinese production had already exceeded 37,000 tons by 1996. In the following decade, Chinese production of giant river prawn continued to increase, rapidly rising from about 55,500 tons in 1997 to 1, 11,282 tons by 2001. Then production fell to 75,376 tons in 2003 but has since risen substantially. By 2007, China reported production to be over 1, 24,500 tons (F.A.O., 2009). A trend of world farmed giant river prawn production from 1998 to 2007 is given in Table- 1

TABLE- 1

Farmed Giant River prawns production (in tons)

Name of countries	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Bangladesh	5751	5394	5504	9471	9559	10200	17123	19609	20810	23240
Brazil	279	227	450	450	450	450	363	370	373	230
China	55502	69565	84891	111282	98383	75376	84965	85541	93695	124520
India	3900	7000	16600	24230	30500	35870	38720	42820	30115	27262
Indonesia	-	-	-	-	400	246	290	1009	1199	989
Malaysia	281	653	1338	752	535	627	317	514	194	246
Taiwan	8165	7223	8149	6859	7026	10045	10039	10515	9878	8316

Thailand	4764	8494	9917	13310	15393	28151	32583	28740	25353	27650
U.S.A	-	-	-	44	54	49	38	218	218	200
Vietnam	2918	2544	3513	4933	5552	5961	6247	5200	5482	7900
Others	498	409	327	286	284	384	370	626	584	621
Total	8205	10150	13068	17161	16813	16735	19105	19516	18790	22117
	8	9	9	7	6	9	5	2	1	4

Source: F.A.O. - 2009

In the last three decades (1980 to 2010), world food fish production of aquaculture has expanded by almost 12 times, at an average annual rate of 8.8%. Global aquaculture production has continued to grow although more slowly than in the 1980s and 1990s. World aquaculture production attained another all-time high in 2010, at 60 million tonnes (excluding aquatic plants and non food products), with an estimated total value of US \$ 119 billion. When farmed aquatic plants and non food products are included, world aquaculture production in 2010 was 79 million tonnes, worth US \$125 billion. (F.A.O.- 2012).

INDIA'S POSITION:

India is considered as one of the world leaders in prawn production and export next to china. Considering the requirement of precious foreign exchange for the country for national prosperity, Ministry of commerce has identified marine products prawn which has been treated as dominant item though there has been appreciable increase in value realisation, the total prawn export in term of quantity has not significantly increased till to-day. This indicates that despite of our efforts to increase prawn production through increased fishing efforts, introduction of new fishing methods, vessels, fish identifying devices etc production has not remarkably increased. It has basically remained more or less stagnant. So aquaculture of prawn is the best alternative to increase huge volume of prawn production. The Marine Product Development Authority has implemented many schemes with a view to promote scientific prawn farming in the country. Ministry of Commerce has brought prawn processing under high light for large scale production and faster development of aquaculture of prawns throughout the country. Many incentive are extended to develop prawn processing in new field of aquaculture in the country specifically in coastal areas and island where huge possibilities are there for culturing both fresh water prawns and brackish water shrimps or marine shrimps.

Prawn and fish production in India has touched 5.6 million tonnes in 1999-2000 which was a mere 0.75 million tonne in 1950-1951. The world production during this 50 years has gone up from 23.5 million tonnes to around 120 million tonnes in 1999-2000. India's share in global fish production has grown gradually from about 2.6% in 1960s and 1970s to 4.7% in 1999-2000.

Indian growth in fish production compared with the global fish production has been at a faster rate, mainly due to increasing contribution from inland fish production. This is shown in Table-2.

Table- 2

Prawn and fish production in India and world during 50 years (1950-51 to 1999-2000) in million tonnes.

Year	World production	India's production	India's share (in %)
1950-1951	23.50	0.75	3.19
1960-1961	43.60	1.16	2.66
1970-1971	66.20	1.76	2.66
1980-1981	72.30	2.44	3.37
1985-1986	85.60	2.88	3.36
1990-1991	97.97	3.84	3.92
1999-2000	120.00	5.66	4.72

Source: Hand Book on Fisheries Statistics (2000), Ministry of Agriculture, Government of India.

India, by virtue of its extensive geographical stretch and varied terrain and climate, supports a wide diversity of inland and coastal wetland habitats. The coastal areas are productive and rich in natural resources. Its eastern coast is low-lying with lagoons, marshes, beaches, and deltas while western coast is dominated by rocky shores. India has 14 major river systems, which have led to formation of a wide network of creeks and estuaries in the coastal areas, thus facilitating coastal aquaculture. The ministry of environment and forests , Government of India, estimated that India has total estuarine area of 3.9 million hectare and backwater of 3.5 million hectare; out of this, 1.2 million hectare of coastal self affected lands have been identified to be potentially suitable for shrimp farming. West Bengal and Gujrat are the two states that have major potential areas because of their high tidal location.

POSITION OF WEST BENGAL:

West Bengal has a long and wide range of coast line of about 158 Km and a continental shelf of 17000 sq. Km with coastal area about 22862 sq. Km. In view of the existence of productive agro-climatic and soil morphological conditions and with a dynamic estuarine river system, a unique network of productive fishery resources including brackish-water fisheries has emerged in West Bengal. The brackish-water fisheries development has occupied major portion in West

Bengal particularly because of the extensive saline soil water resources. The socio-economic condition of human resource is mainly based on agriculture and fisheries. The favourable agro-climatic conditions, the productive estuarine eco-system including the favourable location of World's largest river island Sundarvan influence to develop brackish-water fisheries to the large extent. The abundance of natural prawn seeds and other small and medium brackish-water fin fishes also help to make development in fishery of West Bengal.

During last few years the state West Bengal has made considerable progress in the field of fish seed production and fish culture. With the sustained efforts of the state government and active participation of fish farmers at the grass root level it has been possible to increase fish production in the state from 3.55 lakh (1983-84) to 11 lakh (2001-02), with an average annual growth rate of 7.3%. The advancement of state in fisheries sector can be measured by its receiving the national Productivity award for the last nineteenth century as well as for the different welfare measures for the uplift of fishing community, who are the prime contributors to production. Realising the importance of fisheries in the economy of the state, the government of West Bengal has formed an independent department designated as Department of Fisheries, Aquaculture, Aquatic Resource and Fishing Harbours. The minister of fisheries is in charge of this department. This department implements the plans, policies and schemes of the government through the directorate of fisheries, Government of West Bengal. The Directorate is controlled by the Director of Fisheries who is assisted by one additional Director, 2 Joint Director, 12 Deputy Directors, 41 Assistant Directors, 112 District Fishery Officers and 562 Assistant Fishery Officers.

POSITION OF PURBA-MIDNAPUR:

Purba-midnapur district has occupied a long and wide range of coastline of about 80 km long, started from Haldia to Digha. These areas are influenced by Haldi River, Rasulpur River, and Hooghly River. Besides, these areas are also connected by Orissa coast canal, Pichaboni canal, Kalinagar canal, Bamunia canal and many other small canals of perennial salty water. These rivers and canals are connected directly or indirectly with Bay of Bengal from where required amount of favourable salty water are available for prawn processing, growth and development through scientific aquaculture. Coastal and semi-coastal region of Purba-midnapur are topographically sound and favourable for prawn culture, processing and development. These areas are excessively suitable for commercial aquaculture of prawn which is more and more precious and valuable for utmost economic development of this region. But due to lack of proper and systematic planning and influence of government of West Bengal regarding scientific aquaculture and processing of prawn has not properly developed and expanded. Aquaculture has developed only in 3000 hectare areas out of 3000 hectare potential areas in the district Purba-midnapur. (Aquaculture Authority News, Government of India.

September - 2002.) It indicates that only 10 % of potential area of district Purba-midnapur has been utilised for aquaculture practices only. So an extensive research is immediately being required to increase the culture and development of prawn through aquaculture in the district Purba-midnapur.

It is reality that this area may be identifiably prospered through aquaculture of prawn compared with production normal paddy, grain and other vegetables. The economic condition of this region is very poor and some middle class people are there having no surplus or minimum surplus which is not sufficient for private individual investment in scientific aquaculture of prawn extensively or intensively. Besides, aquaculture requires high range of investment of capital for development of prawn culture instruments, development of pond management, water quality management, health and seed management of prawn etc. Only lack of capital investment, proper motivation, inspiration and consciousness among the farmers this inevitable prosperity has been neglected till to-day. So an unique discussion and research is immediately being essential to utilise such prospective areas for aquaculture of prawns to ensure economic growth and development of poor coastal people of the district Purba-midnapur.

India is endowed with rich natural seed resources of prawn in the sea and a vast stretch of coastal topography with suitable landscape for growing and development of aqua-farming of prawns. Universal taste, high unit value, short harvest duration, early return on investment, persistent indigenous and international demand and fast expanding worldwide market are the major attractions to adopt scientific aquaculture of prawns in all coastal areas where suitable environment prevails to ensure economic growth and development of our country. Many South-East Asian and Latin American countries have already been adopted such golden opportunity of developing aquaculture from 90th decade of 20th century and India had made beginning to participate in the field of scientific aquaculture race for commercial prawn culture, processing and development actually from 21st century and West Bengal is at present in a very infant stage in the aquaculture race for growing and developing commercial aquaculture farming of prawns throughout its coastal, brackish water, and delta regions. The State Fisheries Development Corporation Ltd.(W.B.) during 1999-2004 sustained a loss of Rs. 371.35 crore in their field of activity as per Audit report (commercial), March- 2004. This indicates the breakdown of State management structure of fisheries and it should be re-organised by efficient management staff and to be mobilised as per present need of all round economic growth and development of our state to explore inland fisheries farming, scientific culture and development of prawn farms, Prawn breed and seed farms etc. A thorough study is immediately required regarding failure of West Bengal State fisheries management for their inabilities of expanding fisheries activities including scientific aquaculture of prawn culture,

growth and development and processing in West Bengal which is a sunrise sector in India even if in the world.

LITERATURE REVIEW

Prawn culture is a highly profit earning farming in India. In a case study it is found that profitability of freshwater prawn farming under the conditions prevailing in Kerala for 5 hector prawn farming, Net profit estimated Rs. 7,09,000 by investing fixed capital Rs. 16,40,000 and working capital Rs. 10,07,000. Percentage of profit is 31% on turn over and 26% on investment. (Sebastian, C D. and George, K C, 1994). Scientific aquaculture promotes infrastructural facilities like electricity, transportation, communication, cold storage, ice factory etc. may grown up and will provide multidimensional development in rural areas (Shigueno, K. 1984). Prawn farming development holds immense employment potential for the rural people (Swift, D. 1985). It provides direct employment to at least 2 persons for management and 2 persons in operating in one hector culture area.

It also provides indirect employment to the extent of 1100 mandays per hector during construction, input supplies handling of harvest materials etc. If prawn farming is taken place in remote areas, it will provide ample employment to the rural people (The Marine Product Export Development Authority. Kochi, Hand Book on Shrimp Farming). A preliminary estimate carried out by MPEDA, Govt. of India shows that for developing an area of 100 hector farm requires 25 and 75 personnel respectively at managerial and operating level. It can employ 200 skilled labour during construction and 50 labours during operation phases of the farm. In the case hatchery it has been estimated that 3 managerial and 5 technicians are required for a medium size hatchery. It can employ 20 labourers during construction and 13 personnel during operation. As regard to feed mills, it can employ 2 managerial and 2 technical personnel for a small feed unit. The labour force utilized will be 30 nos. during construction and 15 nos. during operation.(MPEDA, Hand Book on Shrimp Farming.)

Thus, it is hoped that the favourable conditions district Purba midnapur will encourage farmers /entrepreneurs to take up Prawn farming in a big way to earn huge profits for themselves and a billion Dollars to the nation through exports. This will generate large scale employment opportunities for the rural poor and unemployed youth.

Prawn farming is a highly profitable farming based on export demand. "Due to high profitability and export demand at attractive prices, the industry has grown quickly. The farm owners have concentrated on methods which will give higher yields." –S.N.Dwivedi, Scientist Emeritus, National Institute of Oceanography, Goa (Sustainable Brackishwater Industrial Aquaculture and management of Environment-Use of Ozone). It is a profitable farming without

degradation of environment. "The semi-intensive method of prawn cultivation is the most desirable in view of the high level of sustainable yield without disturbing environment" – K.P.Cheriyian and T.N.Sivadasan Asari. It can enhance foreign exchange fund of a country. "Prawns constitute one of the most important foreign exchange earners of India. The export earnings from prawn and prawn products have increased from about Rs. 17 million in 1960 to over Rs. 686 million in 1974 and this has further increased to Rs 950 million in 1975." – C.V.Kurian and V.O.Sebastian, 1st edition 1982 (Prawns and Prawn Fisheries of India). "The export of prawns and Prawn products during 1979 was 53676 tonns, fetching a foreign exchange of Rs. 2238 million. This is approximately 85.41%of the value of the total export of marine products from India during the year." - C.V.Kurian and V.O.Sebastian, 2nd edition 1982. (Prawns and Prawn Fisheries of India)

Prawn culture has its own rank in the fisheries sector of India. "The prawn fishery ranks among the most valuable and important fisheries of India with a good potential for expansion."- Subramanian et. Al, 1980. Estuarine of coastal areas of Purba-midnapur may be the nursery ground of prawn culture and development. "It is a well known fact that the estuarine areas are the most potential nursery grounds for the young prawns. Consequently these water bodies form the most important prawn seed collection centres. The availability of prawn seeds as and when required by the farmers is, naturally the most essential prerequisite for the successful operation of prawn culture in extensive areas."(Rao, 1980) Such natural seed resources are especially important for the small prawn farmers who can utilise their own labour to collect seeds.(Cook, 1976). Prawn directly enhances the fund of foreign exchange. "Shrimp is the premier fishery product and is expected to play a great role in foreign currency earnings."- Untung Wahyono. The prawn culture involves various problems. "The major problems inherent in extensive culture efforts are feeds, management and diseases."-Cheng I Liu. Profitability of aquaculture can be increased by use of modern technology."Aquaculture is a profitable occupation regardless of level of technology used. However, the profitability would be much higher if modern technology were used."-Srivastava & Dholakia. Use of modern technology can increase net profit about 4 times than traditional use of technology. "Modern technology was highly capital intensive and involved an annual cost of Rs.1.10 lakh\ha, and it generated a net profit of Rs. 80,000/ha. But the traditional technology, which involved use of lower levels of inputs, required an annual cost of Rs. 38,000/ha and generated a net profit of Rs. 22,000/ha."- Srivastava, Rao &Vathsala. The physical size of prawns can increase its commercial importance. "The fresh water prawn *M. Rossenbergii* is commercially important because of its size as well as its eating qualities. The males can attain a size of about 25 cm and the females about 15 cm."- T.V.R. Pillay.

OBJECTIVES OF THE STUDY:

Prawn production is an important part of fishery and a sunrise sector of our country. Its role in increasing food supply, generating job opportunities in rural and semi-urban areas, providing nutritional cum balanced and healthy food to richer section of people and earning huge amount of foreign exchange have become important in the all round economic development of rural India specifically in coastal areas of our country. Moreover rural economic development can ensure total economic growth of our country. The study area Purba-midnapur is an important prospective area for culture, development and production of prawn on account of its favourable geographical location and topography. The long coastal area of the proposed study are excessive suitable for commercial aquaculture of prawns and development of prawn fields. However, in spite of all these probabilities of development, there need to be done much fundamental works to ensure production and to apply the perfect techniques of culture, growth and development of prawns and to increase the volume of production. Besides no information was found regarding the prospective planning and development of that region either from central or state government side or from the side of any private or joint or corporate sectors. Compared to the development and progress in production with other land uses the technique of prawn culture and production is very slow and almost stagnant. Although a definite and perfect planning is a pre-requisite for successful commercial aquaculture of prawn in the district Purba-midnapur.

The economic condition of prawn farmers of the district Purba-midnapur is very marginal and miserable also. At least 50 % of rural people of the said district are staying below the poverty line and maximum coastal people are schedule and backward classes. These coastal people maintain their livelihood through monsoon based agricultural farming which is very uncertain and capricious of nature. As a result starvation and insomnia is their constant companion to their personal and social life of such coastal people. But there is an ample scope to divert their means of subsistence by introducing intensive or semi intensive method of prawn cultivation through scientific aquaculture. This shifted cultivation can be yielded more than four to five times than general monsoon based agriculture. There is no effect of whimsical attitude of nature upon scientific aquaculture of prawns. So prawn culture and production is a burning subject to be discussed for the economic development of the coastal people of Purba-midnapur as an alternative but high yielded means of livelihood. It can enrich not only the economic aspect of this area but also enrich the national income of our country.

Prawns constitute one of the most important foreign exchange earners of India (Kurian & Sebastian). The long coastal area of Purba-midnapur can provide a remarkable production of prawn which leads to increase the value of foreign trade. A research is required to compare the income from agriculture or animal husbandry with the income from prawn culture and

production from a specific piece of land. The high yielded prawn culture and production is an important aspect of earning foreign exchange for the economic development of a country. A review of aquaculture research is needed immediately to sort out the problem of scientific prawn culture compared with the advancement of ancillary means of present level agriculture and animal husbandry development. National Research programmes are needed to solve this regional problem regarding adoption of scientific prawn culture and development system in the coastal region of district Purba-midnapur. It is also essential to set up regional or sub-regional Research centre to discuss this important topic.

Research Vacuum/Gap

In the case of coastal aqua cultural development in the district Purba-midnapur, some social, political and commercial cum technological conflicts has developed recently in the year 2012. These conflicts were caused largely by disease outbreaks in prawn farms, environmental pollution due to overcrowding of prawn farms, conversion of paddy fields into prawn farms, causing displacement of labour and increase of 'Ethxiquine', a poison in the flesh of prawn. This intolerable poison of human body was identified at Japan at the time of clinical check up of imported prawn flesh from India as per provision of the said country. As a result all the containers of prawn flesh with shipments were returned to India. This incident caused ample loss of foreign exchange of our country as well as the prawn farmers have become insolvent on account of huge loss of capital invested in prawn farms. Actually there was no demand of harvested prawns on account of such incident in 2012. This was the adverse effect of modern technology to increase volume of production and to keep the prawns free from specific epidemic disease. So some specific study and discussion for implementation of poisonous Anti Oxidant with the food of prawns are needed immediately to overcome this adverse episode technology.

A review of natural prawn seed resources of India (Natarajan, 1988) indicate that the deltaic region of West Bengal with extensive creeks and criss-cross of tidal canals against the backdrop of vast mangrove vegetation and high tidal amplitudes provide ideal nursery habitat for prawns and fishes. The tidal canals and inter tidal pits provide excellent sites for collection of prawn post larvae and juveniles respectively. In Purba-midnapur district of West Bengal there are several tidal canals directly attached with the Bay of Bengal. These may be treated as ideal nursery for prawn seed. So, specific discussion and study are essential for the use of such tidal canals regarding prawn culture and development in the district Purba-midnapur.

METHODOLOGY OF THE STUDY:

The present study comprises of two parts, - theoretical and empirical. For the theoretical part, the entire research have basically based on the available literature on particular subject issued in various countries of the world and also in India by various researchers, professors, farm experts, farm managers, management experts and some other port-folio holders of reputed farms and organisations. The literature on the specific subject matter have been collected from various published books, articles, farm reports, lectures, and some other published documents mentioned in the bibliography at the end of the thesis.

For empirical part of the present study it is examined the current practice of scientific culture and development of prawn through aqua cultural practice in various parts of India and world by various farms and farmers from their published annual reports, conference reports, director's speech and other published documents made by various port-folio holders of reputed farms and organisations engaged in the aqua culture of fish and prawns in India and the world. These secondary have been mentioned in the thesis with their source of collection and logical comments and recommendation have been made considering justification of such secondary data.

Sample Size for the present study

Purba-midnapur district has a long and vast coastal area for which selected eight (08) potential prawn culture and development areas situated in various assembly constitutions have been chosen on account of the maximum prawn cultured fishermen community live in those areas. These selected areas are Ramnagar, Contai, Bhagwanpur, Khejuri, Nandigram, Narghat, Tamlook and Sutahata. Primary data have been collected through administering questionnaires among 460 selected fishermen household units living in the proposed assembly constituency areas of the said district. However analysis have been made considering 400 questionnaires as rest 60 questionnaires have been rejected on account of incomplete response and some illiterate non-co-operative behaviour regarding proper response of facts and circumstances of the proposed study. The collected primary data have been processed, tabulated and analysed after justified classification. The classified data have been analysed based on standard hypothesis through various statistical tools of experiment to find out facts and circumstances of the problem and to reach in a justified conclusion.

Period of the study

It should be mentioned in this connection that the primary data were collected for last five years from 2007-08 to 2011-13(upto Dec' 2012). As fishermen do not maintain systematic records of prawn production activities carried on by them and they are also reluctant to supply relevant information, the study period has been limited up to five years. Besides, the data and information provided by maximum farmers from their own memory as there was no black and

white records are kept by them for future references. So, simple average of tabular data, have been considered to take proper and justified conclusion. Besides, Assistant Director of Fisheries (ADF), Contai, has provided all relevant official documents of prawn culture of the district for the sake of exploring research activities. These data and information has helped to draw justified conclusions also.

Methods for Data Collection

Mainly Interview method through structured questionnaire and observation method was followed for the study. Besides, we had also to rely on the Govt. level and Block level data provided by the local, district level and state level departments of the concerned study area.

Tools for Analysis

Mainly percentage, proportion, charts and diagrams were used for the interpretation of the data collected and arranged in tabular form. Some financial tools like ratio, BEP analysis and Profitability Analysis, were also used in the study, wherever found necessary. Some statistical tools like Descriptive Statistics, Correlation and Regression Analysis and Factor Analysis, were used in the study, according to necessity and pertinence.

Chapter Arrangements of the Study

For the convenience of discussion, the whole study has been divided into the following chapters:

Chapter 1:	<i>Introduction including Brief Review of the Available Literature</i>
Chapter 2:	<i>Nature And Status of Prawn Culture In India</i>
Chapter 3:	<i>Management of Prawn Culture in India</i>
Chapter 4:	<i>Economics and Profitability of Prawn farming in India</i>
Chapter 5:	<i>Nature and Status of Prawn Production in West Bengal</i>
Chapter 6:	<i>Brackish Water Fish Farmers Development Agency (BFDA) – An Overview</i>
Chapter 7:	<i>Marine Product Export Development Authority (MPEDA) – An Overview</i>
Chapter 8:	<i>Empirical Analysis relating to the Problems and Prospects of Prawn Processing in Purba Midnapur.</i>
Chapter 9:	<i>Findings, Conclusions and Recommendations.</i>

Conclusion:

Fisheries play a very important role in socio economic development of a country. This sector of the district, Purbamidnapur has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries. This sector earns valuable foreign exchange through the export of prawns and fish products. Most importantly,

fisheries sectors of the district are a source of livelihood for a large section of economically backward population belonging to SC/ ST/ OBC categories. Besides, the district is an agro based and more than 90% people maintain their livelihood through agriculture which is very uncertain for monsoon climate. High yielding paddy depends on supply of fresh water which is not abundantly available throughout the district. Above all, prawn culture gives more than three times return than high yielding paddy cultivation. Again, paddy cultivation requires maximum manpower which leads to increase cost of production and decreases return on investment. But, in case of prawn culture requirement of manpower is minimum and return is maximum. So, expansion of prawn culture is the only solution to ensure all round economic development of the district which will lead to develop socio economic status of the district.

Purba midnapore district has occupied about 80 K.m. long coastal areas started from Haldia to Digha. These areas are influenced by Haldi river, Rasulpur river, and Hooghly river. Besides, these areas are also connected by Orissa coast canal, Pichabani canal, Kalinagar canal, Bamunia canal and many other small channels of salty water. These rivers and canals are connected directly or indirectly with Bay-of-Bengal from where required amount of favourable salty water are available for prawn processing development through scientific aquaculture. Coastal semi-coastal region of Purba midnapur are topographically sound and favourable for prawn culture and processing. These areas are excessive suitable for commercial aquaculture of prawn which is more and more precious and valuable for utmost economic development of this region within a very shorter period. It is reality that this area may be identifiably prospered through aquaculture of prawn compared with production of normal paddy, grain and other vegetable. But due to lack of proper and systematic planning influence of government regarding scientific culture and processing of prawn through aquaculture has not developed and expanded properly and has also neglected the highly possible prosperity of economic growth and development of this region and state. Scientific aquaculture of prawn processing in the district Purba midnapur has developed minimum more or less 10% of total possibilities through private efforts only. The economic condition of this region is very poor and some middle class people are there having no surplus or minimum surplus which is not sufficient for investment in scientific aquaculture of prawn extensively or intensively. Besides, aquaculture requires high range of investment of capital development of pond management, water quality management, health and seed management of prawn etc. Only lack of capital investment, motivation, inspiration and consciousness among the farmers this inevitable prosperity has been neglected till to-day.

Future Prospects:

Some recommendations for future growth and prospect of prawn culture and production in the district Purbamidnapur:

The district Purbamidnapur is a highly potential and pioneer in prawn culture and production in the state West Bengal. Both physically and geographically the location of the coastal area of the district is highly favorable for growth and development of prawn culture and production. But on account of some socio-economic and structural hindrance point of view, the district has not yet been able to reach in its optimum level of growth and development in prawn culture and production having been highly potential for unexpected spread of such cash crop. So, for the future growth and development of prawn culture, some utmost essential recommendations are hereby prescribed to get rid of the depressed situation of the district.

Easy availability of seedling: Availability of healthy and virus free seedling is the main root of success to expand prawn culture in the district. Seedling should be supplied as and when it is required by the farmers. To fulfill the mission new seedling plant should be installed in the district and brood stock collected from the natural source for which specific process to be arranged so as to make them fully free from virus. Government of West Bengal should become pioneer to establish new scientific breeding plant in coastal areas as there is no such prawn breeding plant in the state till today. Again, the arrangement should be made to motivate private entrepreneur to establish new breeding plant in various areas of the state so as to ensure easy availability of seedling to make spontaneous growth and development of prawn culture. Besides, techniques of seedling production and thermostatic problem of seedling to be solved with the help of utilization of advance technology.

Improvement of Technical Knowhow: The total prawn culture process should be based on the structure of modern technical knowhow. The success of presently applied modified semi intensive culture of prawn is fully depend upon continuous use of ultra modern technical knowhow in all spare of culture activities. So, it should be the duty of the Government of West Bengal to arrange all kind of technical knowhow in the fore step of farmers of the district so as to farmers can avail the benefit of modern technology. For that modern laboratories of testing are to be installed in the district and farmers are to make well trained so as to comply and use of such technology. This is one of the important lacunas of prawn culture of the district.

Supervision upon profiteering motive of input suppliers: Government of West Bengal should keep strict supervision upon the input suppliers of prawn culture and to defy against the ultra motive of profiteering by means of adulteration of overdosed antioxidant in prawn food. The drug control department of the state should remain alert in all inter-state check-posts and border areas while entering prawn feed to our state regarding detection of quantity of ethaxiquine or any other anti oxidant used in the feed of prawn beyond the tolerable limit of

human being after taking prawn flesh so as to stop the unpredictable devastate situation that was happened in the year 2012-13. To make this mission successful the Government of West Bengal should establish ultra-modern and delicate laboratories to detect such micro poison. Besides, the department should be equipped with talented and expert technicians to enhance the sample experiment process.

Scope for further Research:

The researcher would like to focus on some areas mentioned below where further research on prawn culture of the district may be carried out. Some of these burning areas where research is essential are mentioned in nut shell.

The coastal area of the district is economically backward and suffers a lot from economic and marketing point of view while producing and culturing of prawn. So, it may be explored an economic analysis of prawn production and marketing of the district with a view to capturing the total profitability and problems of marketing of prawn culture from socio economic point of view and to take measure of economic development planning for the district. So, further research may be done to identify the economic and social constraints to measure productivity and profitability of prawn culture of the district.

To measure of socio economic status of the people of the district is an important aspect rural development. Research may be undertaken to finding out socio economic status of prawn farmers of the district so as to measure and recognize prawn culture as the best means of profession of the people of the district.

To measure standard of living of the people of the district is an important aspect determining socio economic status of rural people. So, research may be conducted to assess economic growth and development of prawn farmers of the district so as to measure their standard of living.