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Analysis of Marketing of Fish Fingerlings and Environmental Awareness Level of Fishermen in Dakshin Dinajpur District of West Bengal

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Abstract

The existing marketing status of fish fingerlings has been analysed with a special reference to environmental concerns and awareness of the fishermen. The constraints have been identified and suggestions have been made for the development of marketing of fishery on the basis of primary data collected from Dakshin Dinajpur district of West Bengal in 2006. Small and marginal farmers dominate the fishery and about 10 per cent of fish farmers earn their major livelihood from fishing. Three to four middlemen have been noted in the existing four marketing channels. Insignificant price variation among the channels has been confirmed by low value (7.25 per cent) of co-efficient of variation (CV). The fisherman's share to consumer price has been found to be 62.80 per cent which is higher than any other agricultural crop. The average elasticity of demand has been found to be one (approx.). Infrastructural facilities are lacking. However, judging from the modest profits of middlemen and their reasonable marketing margins, fish market appears to be competitive and relatively efficient in the study area. The pollutants in aquatic environment are diverse and complex in nature. The main sources of pollution are pesticides and leaching of dissolved chemical fertilizers, sewage and waste disposal, retting of fibre-crops, processing wastes, etc. It has been found that degree of consciousness about the environmental-related consequences on fish production and marketing is highly limited. Market survey has shown that production of small local catch fishes has a declining trend. The study has found that over-fishing and lack of production culture are the main reasons for this decline. The study has suggested that a collective effort should be initiated for eco-friendly and sustainable fish conservation, production and marketing with the existing resources, socio-economic and environmental constraints, which, in turn, will upgrade the economic status and quality of lives of the fishers in the district.

Introduction

Fish production and marketing make significant contributions to economic growth, livelihood support and poverty alleviation in the country. So, farmer-friendly fish culture is an economic activity of the rural people for augmenting their income, generating employment and ensuring food and nutritional security (Randhir, 1984). It also adds to the foreign-exchange earnings of the country (Anjani, 2004).

Unlike many agricultural and industrial products, fresh fish is not treated as a well-defined commodity. Fish is highly perishable with unpredictable supply and individual fishes are heterogeneous products. Product differentiation may lead to imperfect competition and a segmented market. To make the fish available to consumers at reasonable prices, right time and place require an effective marketing system.

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Therefore, fish marketing is a vital aspect for sellers, consumers and other facilitating agencies, including the government.

Fishery, like many other farming practices, relies heavily on natural resources, such as water, land, seed and feed. Therefore, environmental interactions play a vital role in determining the aquaculture production (Jhingran,1991). The need to address environmental interactions and various issues for the benefit of sustainable fishery development, has been reiterated in several global inter-governmental conferences. Of late, technology-rich farming operations responsible for hazardous and seepage of toxic materials into aquatic environment, pressure of population leading to urbanization and threat to eco-system, awareness for quality of food in the event of WTO agreement, lack of environmental consciousness among the fishers, variations in choices of products and prices, competition in world and domestic trade, etc. have made fish marketing more vulnerable. Thus, quantity and quality of fish products, in general, face a threat and, accordingly, demand and supply may show variations (Dastagiri, 2003). Domestic and international fish markets are liable to be influenced in respect of production, import, export and prices, which, in turn, may affect the micro and macro level economic perspectives, including the livelihood of millions of fishermen. So, environmental awareness and, thereby, appropriate actions on the part of fishers assume significant importance. A study was conducted in the Dakshin Dinajpur district of West Bengal in 2006 to analyze the existing marketing status of fish fingerlings, with special reference to environmental concerns and awareness level of the fishermen, who are linked to production (producer) as well as disposal (consumer).

Dakshin Dinajpur, an economically backward and "no industry" district, is situated in the northern part of West Bengal. Agriculture is the main occupation in this district. Majority of the farmers (95%) are marginal and small with average size of holdings 0.95 hectare (Census Report, 2001). So, diversification of farm investment with high-value crops and full utilization of available vast expanse of freshwater bodies offer a great opportunity for fish culture for a better livelihood in this area.

It has been observed that small fishes or fish fingerlings have high demand for their choiced tastes and nutritional values. The production level is also satisfactory and a substantial number of fishermen are involved in this activity. The study has also identified constraints and has provided suggestions for the expansion and development of marketing activities in fisheries in the zone.

Methodology

The primary data for the study were randomly and purposively collected from forty fish farmers during 2006-07. Four villages, namely, (i) Majhian, (ii) Manipur, (iii) Pagliganj and (iv) Lakshipur in the Balurghat Block of Dakshin Dinajpur district, West Bengal were selected purposively for the study. Appropriate representation of different categories of fish farmers was included for recording the data. Secondary sources of information were also consulted. Mainly tabular form of analysis was carried out for the interpretation of data.

Results and Discussion

Present Status of Fishery in Dakshin Dinajpur District

Dakshin Dinajpur has surplus fish production compared to its demand, although at the state level there is a gap of nearly 1.63 lakhs tonnes between demand and supply (total production being 11.2 lakhs tonnes). The reported area under aquaculture is 8360 ha (pond and tank) in the district, which is 26 per cent of total geographical area. Nearly 81 per cent of water bodies are owned by the private concern and rests are run by the government. The average size of pond/tank is very small, measuring 0.57 acre for private and 0.75 acre for government farms. This shows that fishermen are generally either small or marginal farmers. It is also reported that more than three lakh people are engaged directly or indirectly in the fishery sector in this district (ADF, 2006).

Socio-economic Status of Fishers

Small and marginal farmers were found to dominate the fish culture. Only 10 per cent of the fish farmers were earning their major livelihood from the fishing business. Fish culture was a side/

additional economic activity beside farming, dairying, poultry, etc. General economic condition of the fishers was poor. The average age ranged from 20 to 45 years and educational level was from illiterate to10th standard. Female involvement was low and was found only in net preparation and its maintenance, sorting of fish and the local marketing. If processing of fish could be developed, then women would be effectively utilized (FAO website).

Table 1. Types of retail fish sellers in the rural markets

Fish seller category	Number of sellers/markets	Percentage of all sellers
Dry fish seller	Not found	Nil
Live fish seller	12	30
Fresh fish seller		
Small fish (fingerlings)	17	40.25
Large fish	11	29.75

Marketing Status of Fish Fingerlings

Marketing Status: The district currently produces 17,562 tonnes of fish which surpasses its total demand of 11,720 tonnes. Fish marketing in the Dakshin Dinajpur district was found to be largely controlled by the private dealers. So, an efficient marketing mechanism was required to transfer the excess fish production to outside the district for the benefits of fishers (Roy, 2008).

The market had three main sets of players : buyers who purchased on behalf of retail stores and markets, wholesalers or dealers at the market, and the suppliers who caught the fish in the first place. Fishermen who caught fish from common-property water bodies did not normally sell them in retail market. Three to four intermediaries were found to operate between producers and final consumers. At the landing point, the number of intermediaries was low. No open biding existed in such a case. Therefore, the poor fishermen had to often face exploitation. Table 1 shows the types of retail fish sellers in the rural markets in the study area.

Marketing of fish was mainly being done at the primary local rural markets. In these markets, mainly small fishes were being sold because of their good consumer demand. More than 40 per cent of fishermen were found selling fresh small-sized fish and nearly 30 per cent sell fresh big fish. Live fishes have very good demand, and accounted for 30 per cent of total transactions.

Transport cost was negligible and role of middlemen was very low. Fishes were heterogeneous in nature. But, fish fingerlings could be treated as nearly homogeneous products. The general pattern of transaction being more or less similar, competition existed at the primary market. Price variation was recorded very low, which was confirmed by the estimated low value (7.25%) of co-efficient of variation (CV). Prices were found to be lower compared to the urban market prices. In the villages, a fish farmer has to face one to two middlemen who buy fishes from them at cheaper rates and take them to urban markets for better profit margins. The practice creates a situation for the small and poor farmers where there is every possibility of being exploited, especially if they are tied with the middlemen for any type of financial obligation.

In general, the retail marketing was not satisfactory in the area. The government does not have any regulatory mechanism over the market. Besides, based on demand and supply, eye estimation was still the common practice for price fixation. The consumer does not have any option to judge the quality of the product to find if it was contaminated with inert materials or disease-affected or caught from a polluted water resource. No grading, sorting, standardization, certification, etc. were found in either rural or urban fish markets in the district.

Marketing Channel: Marketing channel of fish starts with the fish farmer, passes through a number of intermediaries and ends at the ultimate consumer. Major intermediaries in the fish marketing channels were : Beopari / Paikars, Aratdars and Retailers. Fish farmers do not sell fish directly to the consumer in the urban markets, except in few cases in the rural areas. The following marketing channels were identified during investigation :

Channel – I : Fishermen → Consumers

Channel – II : Fishermen → Beopari → Aratdar → Paikar/Retailer → Consumers

Channel – III : Fishermen → Aratdar → Retailer → Consumers

Table 2. Quantity transacted and price variations (farmers' selling price) through different channels of fish marketing in Dinjapur district

Channel	Weekly sale (kg)	Share (%)	Price variation (CV) (%)
Channel - I	52	10.10	6.24
Channel - II	185	35.17	8.99
Channel - III	135	25.66	7.40
Channel - IV	109	20.72	7.26
Home consumption	45	8.55	-
Total	526	100	7.25

Channel – IV: Fishermen → Beopari → Paikar/ Retailer → Consumers.

Beoparies (a trading intermediary who collects products directly from producers or primary markets for further transfer of products/commodities) handle a large volume of fish. They sell their purchases to Aratdars (big wholesaler) and some portion to Paikars (a small-scale wholesaler who may be involved in retailing also). They can be local or non-local traders having no licenses, but remain tagged with Aratdars who hold licenses. It was revealed that the length of marketing channel for freshwater fish was relatively small due to non-existence of value addition/processing, which leads to farmer's share more in the area under study.

Channel–II was found to be the most preferred marketing channel. Details of the quantity transacted, share of transaction and price variations in each channel are shown in Table 2.

Marketing Margin : Marketing margins include costs of marketing and profit or loss incurred by all intermediates in the marketing channel. The marketing margin is the price intermediaries charge for all the functions they perform. Different components of fish marketing costs identified during the study were as follows : (i) commission of fish catcher, (ii) van fare (transportation cost), (iii) paikar-1 (wholeseler–I) receiving commission, (iv) paikar-II (wholeseler–II) receiving commission, (v) weighing charges, (vi) cost of wastages, (vii) cost of storage and icing, and (viii) miscellaneous expenditures.

The total marketing cost for fish was found to be Rs 547/q, comprising Rs 280/q for Paikar–I (Beopari) and Rs 267/q for Paikar-II (retailer). Among the components, labour wages and aratdar's commission occupied the major share, 22 per cent each. On an average, marketing cost represented only 17 per cent of total consumer's cost, indicating low level of processing or value-addition activities. Table 3 shows the marketing margin earned by different intermediaries and farmer's share.

On an average, Paiker-I (Beopari) and Paiker-II (Retailer) received 8 per cent and 14.5 per cent net margin on purchase price. The fisherman's share to consumer price was 62.8 per cent, which was much higher than that of any agricultural crop. However, these were likely to vary according to seasons, demand, supply and prices in the market. Nearly 38 per cent of total consumer's prices were absorbed by the intermediaries. Judging from the modest profits of middlemen and their reasonable marketing margins, fish market appears to be competitive and relatively efficient (Singh, 2004).

Demand for and supply of fish in the market was analyzed through the technique of price elasticity of demand. The average elasticity was found to be one (approx.), i.e. percentage change in quantity would always be equal to the percentage change in price. In fact, people with low purchasing power had budgetary constraints and had to contend with low quality of fishes.

Different indicators of fish marketing in the study area have been presented in Table 4.

Table 3. Marketing margins of intermediaries and farmer's share in fish marketing

(Rs/q)

Intermediary	Purchase price	Sale price	Gross margin	Marketing cost	Net margin
Paiker-I or Beopari	3256	3892	536	280	256(8.0%)
Paiker-II or Retailer	4295	5185	890	267	623(14.5%)
Farmer's share *					62.8%

*Farmer's share = Farm gate price / Retail price × 100

Table 4. Observations on fish marketing status in the study area

Sl No.	Subjects	Observations
1	Market competitiveness	Low, with poor access to information
2	Producers' activities in market	Compelled to do selling operation
3	Marketing channel	Short-medium
4	Market intermediaries	Three to four
5	Market infrastructure	Poor
6	Market ownership	Mainly with private sector
7	Market margin and middlemen share	38 per cent, vary across seasons/channels
8	Farmers' share	62 per cent
9	Value addition / processing	Almost absent
10	Quality of product	Judged by eye inspection only
11	Grading and standardization	Not found
12	Producer's bargaining power	Low
13	Prospects of product	High demand and high prices
14	Scope of development	Viable

Constraints and Suggestions for Development of Fishery Sector

Following issues have been identified which seemed to be the point of intervention for fish marketing development in the area under study:

(i) Small size of pond and multiple ownership inhibiting plan setting for investment;

(ii) Provision of credit to be organized for poor and small fishers;

(iii) Practice of poaching or mixing of poison in water by local enemy to be checked;

(iv) Availability of good seed (here fry) for fish fingerlings culture to be ensured;

(v) Minimum size of pond to be maintained (cooperative/group approach is effective);

(vi) Maintenance of water quality and up-gradation of environmental aspects;

(vii) Higher investment for development of market infrastructure (e.g. road, transport, grading, weighing, icing, shelter, electricity, etc.) should be given priority;

(viii) Awareness generation for use of natural resources like fish in a sustainable manner; and

(ix) Initiatives for processing/value-addition activities to be taken as per the choice and demand of the consumer.

To sum-up, the government, NGOs, private entrepreneurs, extension functionaries, research institutions, local governance, financial organizations, marketing agencies, etc. should come forward to facilitate access to scientific fish production techniques and efficient marketing system for the poor fish farmers in the district (Rahim, 1994).

Environmental Awareness of Fishermen

An effort was made to study the environmental awareness of fishermen and to find the relation between fish marketing and different environmental indicators, as perceived by the fishers. Fishery has other broad perspectives in relation to land-use, water resource utilization and its environmental consequences. Recently, the adoption of sanitary and phyto-sanitary (SPS) measures of WTO has led to maintain certain level of quality of food products and has put the member countries, including India to change production strategies according to their environment and resources. Environmental concerns of the consumers have resulted in mobilization of public opinion which links the decision to buy a fishery product and, thus, may affect its marketing. Followings are some of the aspects which relate environment with fish productivity, quality and marketing.

Environmental Pollution: It has been reported that exponential growth of human population and progressive urbanization are posing serious threat to aquatic environment and its resource potential. Water quality is judged by the factors like pH, alkalinity, acidity, salinity, other chemical contents, organic content, micro-organisms (flora and fauna), etc. The pollutants in aquatic environment were diverse and complex in nature and the main sources of pollution were pesticides and dissolved chemical fertilizers' leaching from agricultural fields, sewage and waste disposal and retting of fibre-crops, processing wastes, unscientific use of water for domestic purposes, etc. They were accelerating detrimental effects either directly or indirectly on the normal physiological functions of organisms in question, which could adversely affect productivity and quality (like diseases) of the fishes (Natarajan, website).

Socio-economic Condition: Waterbodies are usually medium to small in size and have plurality in ownership; therefore, poor rural people try to have open access to them. They cannot maintain demarcation between water for domestic use and water for fisheries production. As a consequence, indiscriminate use of waterbodies was posing a threat to fisheries. Human role in this connection was very deleterious in actions like : (i) throwing of waste or garbage materials into water, (ii) washing of utensils and clothes with soap, (iii) bathing of human beings and animals, (iv) throwing of sewage effluents, (v) throwing of animal wastes like blood, flesh, hair, bone, etc. These activities were, to some extent, common in the rural areas and were attributed to their poverty, lack of education, limited alternative sources of livelihood and, above all, lack of scientific and environmental knowledge and awareness.

Quality Evaluation Facilities: Due to pollution and indiscriminate use of waterbodies, variations in productivity and quality of fishes (through diseases) are likely to occur. It was observed that no facilities were available to ascertain the quality of fishes which were brought for marketing. Consumers and dealers had to judge the fishes with their eyes only. Fishes which were disease-infected and were made attractive with chemicals or were overfed by fertilizers or otherwise could not be detected. Live and fresh small fishes were preferred by the consumers. But, market survey showed that small local catch fishes had a declining trend in production. It was found that indiscriminate and over-fishing and lack of culture were the main reasons for it.

Fishes are natural and biological resources of eco-system (Paria, 2003). It has been found that details about impact of environment on fish or of fish culture on environment are not fully known. As an immediate action, conservation of such resources has been suggested. In fact, awareness could occupy an important place in the conservation, production and marketing of fishes and related problems. Accordingly, opinion of the fishers of the area under study was sought on environmentally sensitive aspects relevant to local fish production and marketing with a view to ascertain their perception and awareness level. Table 5 demonstrates some of the observations perceived by the fishers.

Conclusions

The study has revealed that the degree of consciousness among respondents about the environment and its impact on fish production and

Table 5. Environment and its relation with fish marketing as perceived by fishermen

Sl No.	Subject	Compiled statements as perceived by the fishermen
1	Environmental degradation	Climate was changing adversely, but exact reasons behind it and how to manage the situation were not yet fully understood. Hence, insignificant attention should be paid to it.
2	Environmental impact on fishery	Heard for the first time.
3	Impact of fishery on environment	Could not say about the whole environment, but admitted that local environment was being affected.
4	Fish biodiversity and its conservation	Indigenous and small local fishes were declining due to over-fishing (as a means of livelihood) and lack of culture. There was lack of awareness among fishers and few farmers continue to culture endangered fishes.
6	Water pollution and its effect	Felt that residuals of farm chemicals were leaching into water.
8	Water pollution and control measures	Few consulted the experts occasionally. Used lime during fish culture. Efforts of common people were constrained by low capital.
9	Use of waterbodies	These were being used for domestic purpose also. Being a common property, irrational use was being made as the way of life, but it was threat to fishes.
10	Waste or garbage materials	These were stored/thrown near waterbodies. Had little conscious about water pollution and quality of fishes.
11	Local environment	Pressure on land had created overcrowding. Had experiences of polluted environment, including water and residential areas. Looked towards Panchayat to help and action.
12	Farming system	Agriculture-Aquaculture-Animal husbandry was followed side-by-side. Impact of one upon another was seldom felt.
13	Quality of fish and environment	Knew few diseases. Had no special technique to diagnose it. Undergone few training programmes. Majority neglected the issue.
14	Marketing of fish and environment	It was based on harvesting (supply) performance. Had little scope to respect consumers' needs, preferences and quality. Environmental role yet to be ascertained and convinced.
15	Awareness generation meets	Lacking from organization and local body.
16	Prawn culture and environment	Knew that it could affect water badly. High price sometimes stands in the way to discontinue or special care before culture.
17	Knowledge of SPS under WTO	Heard through mass media. But, government help and action were deserved by the people having subsistence level of livelihood.
18	WTO and fish products	Production was mainly for domestic market. Felt that this knowledge was of little use for near future.

marketing is limited. Infrastructural facilities and information dissemination about marketing are two very important issues which need immediate attention. Hence, a collective effort by all concerned should be initiated for eco-friendly and sustainable fish production and marketing under the existing resources, and socio-economic and environmental constraints which, in turn, will upgrade the economic status and quality of lives of fishers in the area.

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