

Participatory Pond Fish Production as an Income Generating Activity: A farm level study

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Abstract

The study attempted to determine the extent of participatory pond fish production by the fish farmers at two villages namely kheruajani and luxmipur of Kheruajani union of Muktagacha upazila under Mymensingh district of Bangladesh. Data were collected by using a structured interview schedule during 01 to 31 October, 2018 from a sample of 100 fish farmers (50 percent of total population) who were selected randomly from a population of 200. Majority of the fish farmers (75 percent) had medium participation in participatory pond fish production, 20 percent had high level and only 5 percent of them had low participation in participatory pond fish production. Among 22 participatory fish production activities, 'Regular health check-up of fish' got the highest score (230) and 'Consulting with Upazila Fisheries Officer' got the lowest score (140). Among twelve selected characteristics, level of education, farm size, area under fish farming, training exposure and credit received were significantly related to the extent of participatory pond fish production. The study revealed that there is an ample scope to increase the participation of the fish farmers in participatory pond fish production. It is therefore recommended that the Department of Fisheries (DoF) and other related organizations can offer more funds and attention to organize more motivational programs to make the fish farmers more enthusiastic for participatory pond fish production to meet the increasing demand of fish in Bangladesh.

Keywords: Pond fish production, participatory, fish farmers, income generating activity.

Introduction

Bangladesh has a large water body including *haor*, *baor*, *beel*, lake, river, coastal area and culture pond. Rivers spread as like as net all over the country, such as Padma, Meghna, Jamuna, Surma, Karnaphuli, Brahmaputra, Tista, Issamoti, Halda, Atrai etc. Due to favorable climate and availability of natural fish feed, the water resources of Bangladesh strongly support fish life. Bangladesh is considered one of the most suitable regions for fisheries in the world, with the world's largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India (Shamsuzzaman *et al.*, 2016). There are about 260 freshwater fish species, 12 exotic fish species, 24 freshwater prawn species, 36 marine shrimp species and 475

marine fish species in Bangladesh. Fish supplements about 60% of Bangladeshi people's daily animal protein intake (DoF, 2016). Fish is a popular complement to rice in the national diet, giving rise to the adage *Maache-Bhate Bangali* ("a Bengali is made of fish and rice") (Ghose, 2014). It is our tradition to serve our guest in any occasion with our national fish Hilsa (*Tenualosailisha*). The fisheries sector plays a very important role in the national economy, contributing 3.69% to the Gross Domestic Product (GDP) of the country and 22.60% to the agricultural GDP (FRSS, 2016). More than 11 percent of the population directly or indirectly dependent on the fisheries sector for continuing their livelihood (DoF, 2016). Over last two

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decades, to meet the increasing foreign demands of fish and fishery product, aquaculture has expanded tremendously (Rana, 2016). About 52.92% of total fish production comes from inland culture. The areas of inland open water body, inland closed water body and pond respectively are 3.92, 0.77 and 0.37 million hectares (DoF, 2012). But the production of inland open water is decreasing day by day for various reasons. In this case, to meet the demand of fish, enhancement of participatory pond fish culture is essential. Ponds cover only 3.5% of the total inland waters of Bangladesh whereas they contribute about 31% of the total inland fish production thus playing a vital role in fresh water fish production. The production from participatory pond is increasing very sharply due to

dissemination of adaptive technologies such as Tilapia, Koi, Magur, Shing, Pungas, Sarputi, Rui, Catla, Mrigel etc. through effective extension services by the Department of Fisheries (DoF), government and non-government organizations. This helps to increase the fish production as well as income of fish farmers also increased. On the basis of above findings, the researchers carried out this research keeping in mind the following objectives: (i) To determine the extent of participatory pond fish production by the fish farmers; (ii) To describe the selected characteristics of the fish farmers; and (iii) To explore the relationships between the selected characteristics and the extent of participatory pond fish production by the fish farmers.

Methodology

The study was conducted at two villages namely Kheruajani and luxmipur of Kheruajani union of Muktagacha upazila under Mymensingh district of Bangladesh. These villages were purposively selected as the study area for obtaining a representative sample because most of the fish farmers in these areas are engaged in participatory pond fish production. A total of 100 fish farmers (50 percent of total population) were selected randomly from a population of 200 fish farmers which constituted the sample of this research. Data were collected by using a structured interview schedule through face to face interview with the selected fish farmers during 01 to 31 October, 2018. Extent of participatory pond fish production by the fish farmers was the focus variable and twelve selected characteristics of the fish farmers were selected as explanatory variables namely age, level of education, household size, farm size, area under fish farming, fish

farming experience, annual family income, training exposure, credit received, extension media contact, organizational participation and knowledge on fish farming.

Extent of participatory pond fish production was measured through securing opinion of the fish farmers based on 22 fish production related activities. In measuring extent participatory pond fish production in this study, a 4- point rating scale was used such as high participation, medium, low and not at all participation and weights were assigned to these responses as 3, 2, 1 and 0, respectively. Thus, extent of participation score for a respondent could range from 0 to 66, where 0 indicating no participation and 66 indicating high participation in participatory pond fish production. Mean value of the participation in participatory pond fish production was calculated and on the basis of individual mean value a rank order of the participation in participatory pond fish production was prepared. For

making rank order Participation Score (PS) was also computed. The PS was computed by using the following formula:

$$PS = (N_{hp} \times 3) + (N_{mp} \times 2) + (N_{lp} \times 1) + (N_{np} \times 0)$$

Where,

PS = Participation Score

N_{hp} = Number of fish farmers with high participation

N_{mp} = Number of fish farmers with medium participation

N_{lp} = Number of fish farmers with low participation

N_{np} = Number of fish farmers with no participation

Thus, the Participation Score (PS) of individual fish production related activity could range from 0 to 300, where 0

indicating no participation and 300 indicating high participation in participatory pond fish production. The collected data were coded, compiled, tabulated and analyzed for interpretation. The SPSS (version 22) computer program was used for analyzing the data. Different descriptive statistical measures such as frequency, number, percentage, mean, standard deviation and rank order was used for categorization and describing the variables. Karl Pearson's Product Moment Correlation coefficient (r) (Pearson, 1895) was used for testing the relationship between the concerned variables.

Findings and Discussion

In this section, summary of the selected characteristics of the fish farmers have been presented in Table 1. The findings revealed that the majority of the fish farmers (90 percent) were young to middle aged and maximum of them (65 percent) had primary to secondary education. Most of the fish farmers (80 percent) were belong to medium to large sized family and the highest proportions (90 percent) of them had small to medium sized farm. The majority of the fish farmers (62 percent) mainly used their small sized farm area for fish culture and most of them (86 percent) had medium to high income. Maximum of the fish farmers (75 percent) had medium to high farming experience. Majority of the farmers (59 percent) received not raining on aquaculture and the highest proportions (86 percent) of them had low to medium extension contact. Maximum of the fish farmers (85 percent) had received low to medium amount of credit for fish production. The highest proportions of the

farmers (85 percent) had low to medium organizational participation and most of them (98 percent) had high knowledge on fish farming for increasing their fish production level.

Extent of participation in participatory pond fish production

The extent of participation in participatory pond fish production by the fish farmers ranged from 14 to 57 with an average of 42.77 and standard deviation of 9.47. Based on the observed scores, the distributions of the respondents have been presented in Table 2. The data presented in table 2 reveal that 75 percent of the fish farmers had medium participation in participatory pond fish production, 20 percent had high level and only 5 percent of them had low participation in participatory pond fish production. The findings lead to illustrate that the majority of the fish farmers (95 percent) had medium to high participation in participatory pond fish production.

Table 1 Socio-economic characteristics of the fish farmers (n=100)

Characteristics (Measuring unit)	Score Range		Respondents			Mean	SD*
	Possible	Observed	Category	No.	%		
Age (year)	Unknown	24-60	Young (18-35)	35	35	37.95	9.84
			Middle age (36-50)	55	55		
			Old (>50)	10	10		
			Illiterate (0)	08	08		
Level of education (year)	Unknown	0-16	Can sign only (0.5)	15	15	8.05	3.65
			Primary (1-5)	30	30		
			Secondary (6-10)	35	35		
			Higher secondary (>10)	12	12		
Household size (number of member)	Unknown	3-10	Small (up to 4)	20	20	6.37	1.76
			Medium (5-6)	56	56		
			Large (>6)	24	24		
			Landless(0.02 ha)	0	0		
Farm size (ha)	Unknown	(0.76-4.21)	Marginal(.02-0.2 ha)	0	0	1.52	1.02
			Small (0.21-1 ha)	55	55		
			Medium (1.01-3 ha)	35	35		
			Large (>3 ha)	10	10		
Area under fish farming (ha)	Unknown	(0.40-3.32)	Small (up to 1 ha)	62	62	1.13	0.88
			Medium (1.01-3 ha)	33	33		
			Large (> 3.01 ha)	5	5		
			Low (up to 50)	14	14		
Annual family income ("000" Tk.)	Unknown	40-200	Medium (51-80)	56	56	249.72	310.09
			High (> 80)	30	30		
			Low (up to 15)	25	25		
			Medium (16-30)	45	45		
Fish farming experience (year)	Unknown	8-30	High (> 30)	30	30	13.31	8.44
			No training (0)	59	59		
			Short duration (up to 5)	37	37		
			Long duration(> 5)	04	04		
Credit received "000" Tk.	Unknown	1-15	Low (up to 2)	52	52	111.65	256.47
			Medium (3-9)	33	33		
			High (>9)	15	15		
			Low (0-9)	31	31		
Extension media contact	0-33	4-21	Medium (10-18)	55	55	7.42	3.66
			High (>18)	14	14		
			Low (up to 5)	59	59		
			Medium (5-8)	31	31		
Organizational participation	0-15	1-10	High (>10)	10	10	2.16	1.95
			Low (up to 10)	00	00		
			Medium (11-20)	02	02		
			High (>20)	98	98		
Knowledge on fish farming	0-30	20-30	Low (up to 10)	00	00	25.22	2.44
			Medium (11-20)	02	02		
			High (>20)	98	98		
			Low (up to 10)	00	00		

SD* stands for Standard Deviation

It would be clear if the individual participatory pond fish production related activities were analyzed according to their cumulative effectiveness rating along with

average rating. Rank order of different participatory pond fish production related activities with their total score and mean score was shown in Table 3.

Table 2 Distribution of fish farmers according to their extent of participation in participatory pond fish production (n=100)

Categories of fish farmers (Scores)	No. of respondents	Percentage of respondents	Mean	Standard Deviation
Low participation (up to 35)	5	5	42.77	9.47
Medium participation (36- 50)	75	75		
High participation (above 50)	20	20		
Total	100	100		

Table 3 Rank order of the extent of participation of different activities in participatory pond fish production

Activities	Extent of participation				PS	Mean	Rank order
	High (3)*	Medium (2)*	Low (1)*	Not at all (0)*			
Site selection	45	38	12	05	223	2.23	3
Pond excavation	34	30	08	28	170	1.7	19.5
Removal of weed	35	26	15	24	172	1.72	18
Lime and fertilizer application	40	22	18	20	182	1.82	13
Dyke preparation	25	45	15	15	180	1.8	15
Fry collection	55	17	18	10	217	2.17	4
Sort healthy fingerlings	38	22	15	25	173	1.73	17
Fry release	38	42	10	10	208	2.08	6
Feed procurement	40	35	13	12	203	2.03	8
Supplying food timely	48	35	12	05	226	2.26	2
Feed preparation in farm	30	30	31	09	181	1.81	14
Maintaining water quality (pH, salinity, temperature etc.)	42	38	08	12	210	2.1	5
Regular health check-up of fish	50	30	20	00	230	2.3	1
Removal of disease infected fish	25	35	25	15	170	1.7	19.5
Removal of undesirable fish	45	24	21	10	204	2.04	7
Consulting with Upazila Fisheries Officer	15	20	55	10	140	1.4	21
Treatment of diseased fish	40	35	12	12	202	2.02	9
Harvest fish in proper time	35	25	20	20	175	1.75	15
Sort out marketable size	20	45	10	25	160	1.6	20
Transport the fishes	25	50	15	10	190	1.9	12
Selling consider the market price	35	42	12	11	201	2.01	10
Timely supply of fish to the buyers	25	58	09	08	200	2.0	11

*Figures in the parentheses indicate weight age of the scale items; PS = Participation Score

For determining the extent of participation of the individual participatory pond fish production related activity, rank order was made by computing Participation Score (PS). According to the rank order (Table 3), the top five participatory pond fish production related activities with highest score have been described here. Data

presented in the Table 3 show that 'Regular health check-up of fish' got the highest score (230) and hence was considered as the 1st ranked fish production related activity. Majority of the fish farmers (50 percent) had high participation in health check-up of fish regularly to keep the fish species health and disease free for obtaining more profit.

The activity 'Supplying food timely' got the 2nd highest scores (226) and hence was considered as the 2nd ranked fish production related activity. This might be due to ensure proper growth and development of the fish species. The activity 'Site selection' got the 3rd highest scores (223) and hence was considered as the 3rd ranked fish production related activity. Before starting fish production, site selection is very important step and so 83 percent of the fish farmers had high to medium participation in this activity. The activity 'Fry collection' got the 4th highest scores (217) and hence was considered as the 4th ranked fish production related activity. Because high yielding variety of fish fries would increase the overall fish production which will provide more income to the fish farmers. The activity 'Maintaining water quality-pH, salinity, temperature etc.' got the 5th highest scores (210) and hence was considered as the 5th ranked fish production related activity. During fish production, maintaining water quality is very necessary

to ensure favorable environment to the fish species for their proper growth and development, as a result, 80 percent of the fish farmers had high to medium participation in this activity.

Relationships between extent of participation in participatory pond fish production by fish farmers and their selected characteristics

In order to determine the relationships between extent of participation in participatory pond fish production by fish farmers and their selected characteristics, Karl Pearson's Product Moment Correlation coefficient (r) analysis was conducted. The result of correlation analysis showed that among twelve selected characteristics, level of education, farm size, area under fish farming, training exposure and credit received were significantly related to the extent of participation in participatory pond fish production which have been shown in Table 4.

Table 4 Result of correlation analysis between explanatory variables and focus variable

Focus variable	Explanatory variables	Correlation coefficient (r) with 98df
Extent of participatory pond fish production	Age	-0.052
	Level of education	- 0.335**
	Household size	0.044
	Farm size	-0.358**
	Area under fish farming	-0.449**
	Fish farming experience	0.029
	Annual family income	-0.063
	Training exposure	-0.255*
	Credit received	0.204*
	Extension media contact	-0.141
	Organizational participation	0.155
	Knowledge on fish farming	-0.188

Notes: ** Significant at 1% level of probability; *: Significant at 5% level of probability

From the Table 4, it is revealed that level of education had a negative significant relationship with the extent of participation

in participatory pond fish production. Here, it clearly proved that with the decrease of the level of education, participation in

participatory pond fish production increases because knowledge level of the low educated fish farmers is also low that's why they are enthusiastic to participatory fish farming to manage adverse situations. There was a negative significant relationship between the farm size of the fish farmers and their extent of participation in participatory pond fish production which obviously indicated that with the decrease of the farm size of the fish farmers, the extent of participation increases. As a result, the small fish farmers involved them in participatory fish farming. The negative significant correlation of area under fish farming with the extent of participatory pond fish production revealed that the fish farmers who had his own large fish farming area were not willing enough to

participatory pond fish production. Training exposure of the fish farmers had significant negative relationship with extent of participatory pond fish production pointed out that majority of the fish farmers of the study area had not obtained any training related to fish farming. As a result, they were not ready to participatory pond fish production. There was a positive significant relationship between the credit received by the fish farmers and their extent of participatory pond fish production which indicated that it was comparatively easy for fish farmers to get credit from different credit providing organizations due to participatory pond fish production which increases confidentiality of the organizations to provide loan.

Conclusions

The findings revealed that majority of the fish farmers (75 percent) had medium participation in participatory pond fish production, 20 percent had high level and only 5 percent of them had low participation in participatory pond fish production. Among 22 participatory fish production activities, 'Regular health check-up of fish' got the highest score (230) and 'Consulting with Upazila Fisheries Officer' got the lowest score (140). The study revealed that there is an ample scope to increase the participation of the fish farmers in participatory pond fish production. It is

therefore recommended that the Department of Fisheries (DoF) and other related organizations can offer more funds and attention to organize more motivational programs to make the fish farmers more enthusiastic for participatory pond fish production to meet the increasing demand of fish in Bangladesh. In such case, it could be necessary to concentrate on the selected characteristics of the fish farmers such as level of education, farm size, area under fish farming, training exposure and credit received.

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