Impact of Fish Farming on Household Income: A Case Study from Mymensingh District

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Abstract: Problem statement: Fisheries sector is a rising sector in Bangladesh. Many farmers are shifting their rice fields to ponds for fish farming in the study areas. This transformation of farming raises a question to the researchers whether fish farming has any impact on household income or not. Thus, the researchers took the present study to identify the contribution of fish farming on household income of the fish farmers in the study areas. **Approach:** The population of the study consisted of all fish farmers of the selected eight villages from four sub-districts of Mymensingh district. Required data for the study were collected with questionnaire through personal interviewing of the respondent farmers. **Results:** Result shows that fish farming is contributing in a range of 15.35-86.63% on household income of the respondent farmers and the average contribution of fish farming is 50.99% indicating major contribution of this entrepreneurship on household income of the practitioner farmers. The result of the stepwise multiple regression analysis shows that all of the income sources jointly can elucidate 98.3% variation on household income where fish farming alone can contribute the highest (44%) on household income of the respondent farmers. However, the results of multiple regressions indicate that 74% of the variance in the income from fish farming could be explained by the explanatory variables of the study. The study successfully explored following factors: age of the household head, family land holdings, pond size, training on fish farming and access to information on fish farming which can influence income from fish farming. **Conclusions/Recommendations:** The study reported that fish farming has significant contribution on household income of the practitioner farmers. Thus, it is essential for the policy makers in the field of fisheries to take into account the identified factors for rapid expansion of fish farming in rural Bangladesh.

Key words: Fish farming, practitioner farmers, household income, Department Of Fisheries (DOF)

INTRODUCTION

It is hard to ignore the importance of fish in Bangladesh. It is located on a major river delta adjoining to the Bay of Bengal, much of its land mass is low lying and it has high levels of rainfall. All of these factors contribute to its suitability for aquaculture and the importance of fisheries. The fisheries resources of Bangladesh are significantly important to the national economy. Some 1.3 million people directly and 15 million people indirectly are involved in the fisheries sector and fish is the main source of animal protein for the people of the country (BBS, 2008). Fish consumption remains a major source of essential dietary nutrients in most households in the country. Per capita annual fish intake is estimated to be about 12 kg contributing to about 60% of animal protein intake. Bangladesh has immense natural potential for developing the fisheries sub-sector. The sub-sector contributes 4% of the GDP and 20% of the agriculture sector (BBS, 2009) and Fig. 1 shows that the growth rate of this sub-sector is rising recurrently.

The country is rich in extensive fisheries resources and fish export ranked the third position in the overall export earnings of the country. There are an estimated 1.3 million pounds in Bangladesh comprising of 0.24 million ha with perennial water and 0.08 ha with seasonal water (Bangladesh Economic Review, 2009).
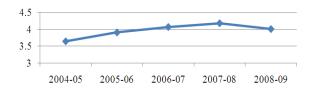

Fig. 1: GDP growth rate of fisheries sub-sector in Bangladesh (2004-05 to 2008-09) **Source:** http://www.bbs.gov.bd/na_wing/GDP_2008_09.pdf
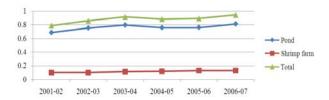
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Fig. 2: Trends of fish production in Bangladesh (2001-02 to 2006-07) **Source:** Bangladesh Economic Review, 2008

Table 1: Summary of the sample size

Sub-district	Number of Study villages	sample farmers
Mymensingh Sadar	Maijbari	12
Kishmot	12	
Muktagacha	Padurbari	12
Malotipur	12	
Trishal	Birrampur	12
Horirampur	12	
Gauripur	Pasar	12
Sunakandi	12	
Total	96	

There are huge untapped fisheries resources, which need to be developed for contributing to the economic growth of Bangladesh. In fact the culture fisheries (fish farming) are making a significant contribution to the domestic availability of fish as well as export earning of the country (Fig. 2). Due to increasing demand of fish for the growing population of Bangladesh, fish farming is attaining popularity to the farmers of rural Bangladesh (Sarker *et al*., 2006). Production of pond fish culture has also been doubled in last decade (Bangladesh Economic Review, 2006).

Bearing in mind the economic profitability of pond fish farming in comparison to cultivating rice or any other crops, farmers of Mymensingh district is converting their rice fields into pond (Sarker *et al*., 2006). Thus, the researchers took an attempt to know the answers of the following specific research questions:

- Is there any significant contribution of fish farming on household income of the practitioner farmers
- If the answer is yes, then to what extent fish farming is contributing on their household income
- If fish farming raise household income then what factors can influence the income from fish farming

MATERIALS AND METHODS

Study area and sample: The study was conducted in Mymensingh district of Bangladesh. Empirical data for the study were collected from eight such villages under four sub-districts of Mymensingh district. Lists of the fish farmers within the villages were collected from the concerned extension workers of the Department Of Fisheries (DOF). From the three lists, a total of 96 farmers were randomly selected and interviewed. Table 1 summarizes the distribution of the sample across the three villages.

Prior to data collection, a pilot survey was undertaken to pre-test the questionnaire, targeting 16 fish farmers from the eight villages, who were not on the interview list.

Data collection: A structured survey questionnaire was used to collect data related to the research objectives. The survey was conducted between 01 and 30 June 2010. Data were collected from the targeted fish farmers by means of personal interviewing by the researchers and three trained data collectors.

Statistical analysis: Besides the common statistical measures such as mean, standard deviation and percentage, a number of statistical tests were performed. Stepwise multiple regressions and multiple regression analysis were done for drawing inferences about the research questions.

RESULTS

Socio-economic profile of the fish farmers: The average age of the respondent fish farmers was 35.63 years (Table 2). All fish farmers were male and family size had an average of 5.77 persons.

The average year of schooling of the fish farmers was 8.78 years while average fish farming experience for household heads was 7.18 years. The average family land holding was 1.25 ha and on average the farmers had dedicated 0.34 ha of land under fish farming. Table 2 showed that each respondent family had an average of 1.75 numbers of family labors. However, it was evident from the study that the average household income of the respondent fish farmers was very handsome and it was 177.12 thousand BDT (Bangladeshi currency; 1USD = 70 BDT). On the other hand, the fish farmers had relatively less access to information and training on fish farming.

Household income scenario of the fish farmers: The important focus of the study was to get a picture of the household's income of the respondent fish farmers. Thus, it was assessed that the amount of household's income earned personally by the household heads and other family members from various economic activities and the data are presented in Table 3.

Table 2: Descriptive statistics of the selected attributes of the fish farmers (N = 96)

Attributes	Scoring method	Observed score		Mean	SD
		Minimum	Maximum		
Age Number of years	15.00	62.00	35.63	11.72	
Education	Year of schooling	0.00	15.00	8.78	4.06
Family size	Number of persons	2.00	13.00	5.77	2.10
Family labors	Number of persons	1.00	5.00	1.75	0.97
Family land holdings	In hectares	0.04	4.45	1.25	1.04
Pond size	In hectares	0.04	2.02	0.34	0.32
Access to information on fish farming	Scale	0.00	6.00	1.47	1.05
Fish farming experience	In years	1.00	20.00	7.18	3.65
Annual family income	In thousand BDT	20.00	865.00	177.12	175.88
Training received on fish culture	Number of days	0.00	10.00	1.36	1.55

Source: Authors' analysis

Table 3: Fish farmers' household income from various sources (unit in '000' BDT)

Sub-district		Crop	Livestock	Fish farming	Business	Service	Wage labor	Remittance	Household income
Mymensingh	TI	547.00	177.50	932.00	78.50	44.00	15.00	0.00	1794.00
Sadar	AVI	22.79	7.39	38.83	3.27	1.83	0.63	0.00	74.75
	PHI	30.49	9.89	51.95	4.37	2.45	0.00	100.00	
Muktagacha	TI	1153.00	410.50	2808.20	350.00	357.20	0.00	720.00	5798.90
	AVI	48.04	17.10	117.00	14.58	14.88	0.00	30.00	241.62
	PHI	19.88	7.07	48.40	6.03	6.16	0.00	12.42	100.00
Trishal	TI	871.00	371.00	1950.50	833.00	510.00	2.00	500.00	5038.00
	AVI	36.20	15.46	81.27	21.25	2.38	0.08	32.83	209.92
	PHI	17.29	7.36	38.72	16.53	10.12	0.04	9.92	100.00
Gauripur	TI	780.00	65.00	2979.00	331.00	218.00	0.00	0.00	4373.00
	AVI	32.50	2.71	124.13	13.79	9.08	0.00	0.00	182.21
	PHI	17.84	1.49	68.12	7.57	4.99	0.00	0.00	100.00
All sub-districts	TI	3351.50	1024.00	8669.70	1592.50	1129.20	17.00	1220.00	17003.90
	AVI	34.91	10.67	90.31	16.59	11.76	0.18	12.71	177.12
	PHI	19.71	6.02	50.99	9.37	6.64	0.09	7.17	100.00

*TI: Total Income; AVI- Average Income and PHI- Percent of Household Income. **Source:** Authors' analysis

Table 4: Summary of the stepwise multiple regression analysis showing contribution of the various income sources on household income of the regarding organic farming

Model	R^2	Adjusted R^2	Change in adjusted R^2	t- Value	F- value
Fish farming	0.447	0.441	44.1	8.67	75.28**
Fish farming + remittance	0.786	0.781	34.0	12.05	168.64**
Fish farming + remittance + crop	0.873	0.869	8.8	7.94	209.13**
Fish farming + remittance + crop + business	0.948	0.946	7.7	11.39	411.11**
Fish farming + remittance + crop + business + service	0.984	0.983	3.7	13.88	1068.62**

Note: ** - significant at 1% level; **Source:** Authors' analysis

Table 3 also shows that fish farmers in Bangladesh earn income not only from fish farming activities but also from many other sources (i.e., crop, livestock farming, wage earning, services, business and remittance earning) to increase their household income. It is evident from the Table that major income (51%) of fish farmers, comes from fish farming. The next highest share (20%) comes from crop farming. Consequently, business, remittance and service contribute to the household income of the respondent fish farmers. On the other hand, respondent fish farmers earn the least amount (0.09%) from wage earning activities.

However, the above mentioned Table 3 shows that among the fish farmers of four sub-districts, Gauripur received the highest amount (68%) of fish framing income and it was least among the fish farmers of Trishal sub-district.

Impact of fish farming on household income of the fish farmers: One of the important objectives of the study was to judge the contribution of fish farming on household income of the respondent fish farmers. The results of the study showed that the average fish farming income of the respondent farmers was 90.03

Table 5: Linear regression model for income from fish farming

Variables	Unstandardized coefficients B	Std. error	Standardized coefficients	t	Sig.
Constant	-72.642	34.030	-	-2.135	0.036
Age 1.150	.058	.129	2.262*	0.026	
Education	-1.602	1.490	-.062	-1.075	0.285
Family members	1.801	2.880	.036	.625	0.533
Family land holdings	-16.918	6.989	-.167	-2.421*	0.018
Pond size	143.154	23.493	.442	6.093*	0.000
Experience of fish farming	2.261	1.684	.093	1.342	0.183
Training on fish farming	24.524	4.365	.367	5.630**	0.000
Access to information on fish farming	24.503	5.395	.319	4.542**	0.000

Adjusted R^2 = 0.74, F - statistics: 17.93**. Parameter estimate significance: ** at 1% and ** at 5% levels. **Source:** Authors' analysis

thousand BDT. The result of the study shows that fish farming is contributing in a range of 15.35-86.63% on household income of the respondent farmers and the average contribution of fish farming is 50.99%. The result of the stepwise multiple regression analysis shows that all of the income sources jointly can explain 98.3% variation on household income where fish farming alone can contribute the highest (44%) on household income of the respondent farmers (Table 4).

Next to fish farming, remittance earning, income from crop and business income contribute to household income of the respondent fish farmers. Thus, it is evident from the study that among various income sources fish farming was found as the most effective income source which is contributing prominently compared to other income sources.

Factors associated with household food security: Another important objective of the study was to identify the factors associated with income from fish farming of the respondent farmers. With this purpose, multiple linear regression analysis was done where the dependent variable was fish farming income and functionalized with amount of money earned by the farmers from fish farming activities. The results of the multiple regression analysis between fish farming income and all explanatory variables are shown in Table 5.

The results of the study (Table 5) showed that among the eight (08) explanatory variables, five (05) variables had significant relationships with fish farming income. These significant variables were age of the household head, family land holdings, pond size, training on fish farming and access to information on fish farming, when combined they can explain 74% of variation on income from fish farming. Among these significant variables, except family land holdings, all were positively related to income from fish farming. This is due to the reason that a household having huge

land holdings is not usually involved in farm activities, thus the household having larger family land holdings showed negative significant relationship with income from fish farming.

DISCUSSION

Due to increasing demand of fish for the growing population of Bangladesh, fish farming becoming popular to the farmers of rural Bangladesh. Considering economic profitability of fish farming compared to cultivating rice or any other crops, farmers are converting their rice fields into pond. The study of Sarker *et al.* (2006) reported that though fish farming is a raising sector in Bangladesh but it has some strong barriers those are hindering its growth among which income from fish farming is very important. The present study explored the factors that can influence income from fish farming. These factors need to be addressed properly to make fish farming more profitable that may only encourage more farmers on fish farming.

CONCLUSION

The study provides enough evidence that fish farming in Bangladesh is very productive and brings increased income among the fish farmers. Results of the study revealed that respondent farmers are earning a significant income from fish farming. It was also observed by the researchers that due to having better communication facilities in the study area ,fish farmers can easily send their harvested fish to the capital city, thus the respondent fish farmers are enjoying a better income security. The earning from fish farming is also contributing significantly to their household income which is ultimately improving the lives of the poor farmers. Thus, the farmers in the study area are increasingly adopting fish farming as a better choice for their livelihoods. The findings of the study also

identified the significant factors (i.e., age, pond size, training on fish farming and access to information on fish farming) can influence the income from fish farming significantly. Thus, these factors should be addressed properly to make fish farming more cost-effective. Thus, it can be concluded that through adopting fish farming farmers can improve their income in a sustainable manner that might be the key to mass reduction of poverty among the poor farmers in rural Bangladesh. However, the study also explored that farmers have training need on fish farming as they have limited access to information regarding fish production and marketing. Thus, Department of Fisheries and the concerned NGOs should concentrate on providing sufficient training to the fish farmers on fish farming as well as they need to create better access of the fish farmers to fish farming information.

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