

Aquaculture Management Practices Followed by the Fish Farmers

M. Rahman¹, M. J. Hoque² and M. A. M. Miah³

Abstract

The purposes of the study were to determine the extent of use of aquaculture management practices followed by the fish farmers and to find out the relationship between the selected characteristics of the fish farmers with their extent of use of aquaculture management practices. Data were collected from 96 randomly selected fish farmers (out of 651) from two unions of Pakundia upazila under Kishoreganj district. A pre-tested and structured interview schedule was used to collect data from the fish farmers during October, 2010. The extent of use of aquaculture management practices was the dependent variable of the study. To measure the dependent variable, a total 15 aquaculture management practices were selected and each of the aquaculture management practices was put against a four-point rating scale. The independent variables were measured by using suitable scales and techniques. Correlation Coefficient (r) was used to explore relationships between the concerned variables. The findings indicate that majority of the respondents (64.60 percent) had moderate extent of practice of aquaculture management while 35.42 percent of them having high extent of practice. On the other hand, there were no respondents having low extent of aquaculture management practice. Out of nine selected characteristics, the fish farmers' educational level, farm size, extension media contact, social mobility, training exposures and knowledge on aquaculture management practices showed significant positive relationship with their extent of use of aquaculture management practices. Age of the fish farmers had negatively significant relationship with their extent of use of aquaculture management practices.

Keywords: *Aquaculture, management, practice, fish farmer.*

Introduction

Production statistics showed that total fish production in Bangladesh has increased but not sufficient to fulfill our demand. As a result we are facing the protein and calorie malnutrition problem resulting from low per capita consumption of protein because fish is the main source of animal protein and essential nutrients in the people's diet. At present per capita annual fish demand is 18 kg where the actual consumption is 16.62 kg (DoF, 2008). Thus, to ensure the consumption of required level of protein and other essential nutrients, more fish production is one of the important strategies in Bangladesh. Considering this fact, carp oriented farming practice and some exotic

carp species of fish such as silver carp, grass carp, common carp and thai sarpunti have been introduced in Bangladesh for their aquaculture potentials. Use of high yielding and fast growing fish species with proper combinations and stocking densities along with appropriate production technologies may help to boost up fish production. And as such, practice of polyculture on scientific basis by the fish farmers. Fisheries scientists of Bangladesh Agricultural University (BAU) and Bangladesh Fisheries Research Institute (BFRI) have developed different production technologies for enhancement of fish production in the country. The

¹Former MS Student, ²Associate Professor and ³Professor, respectively, Dept. of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

predisposition for higher fish production is to ensure the use of better aquaculture management practices by the fish farmers. Aquaculture management practices such as control of predatory animal by rotenone, use of lime, fertilization of pond with urea and TSP, selection of appropriate fish species, supplementary feeds, preventive measures against outbreak of disease, water quality parameters, partial harvesting and restocking etc. are quite suitable for sustainable aquaculture development. Among the aquaculture management practices most of these are not properly practiced by the fish farmers. It was found that 54% of the farmers used lime in their ponds at the rate of 0.5kg/decimal, 48% of farmers used lime at the rate of 1kg/decimal and 4% at the rate of 2kg/decimal. On the other hand 4% of the farmers have no idea about the benefits of liming (Rahman, 2009). Practicing insect and predator control measure also varied in a great extent. Only 29% of the respondent use rice and wheat bran, and oil cake as supplementary feed in carp fish culture (Rahman 2003). Study showed that 25% of the respondents did not adopt insect control measure, 28% had high level of adoption and 32% had medium level of adoption

(Mohammd, 1974). On the other hand, higher rate of practices were recorded with fish farmers in pond fertilization and supplying irrigation water (Parvin, 1995). Due to lack of knowledge on aquaculture management practices such as fish disease control, fish farmer never thought that diseases were the major constraints for higher fish production (Brown and Brooks, 2002). Thus, from the previous study it is clear that the fish farmers were not practicing the aquaculture management practices properly. So, for improving fish production it is necessary to ensure better use of best aquaculture management practices by the fish farmers considering some relevant facts, those can influence the extent of use of aquaculture management practices such as fish farmers socio-economic condition, their relationship with their extent of use of aquaculture management practices. In view of the foregoing discussion, the study aimed: to determine the extent of use of aquaculture management practices followed by the fish farmers; and to explore the relationships between the selected characteristics of the fish farmers and their extent of use of aquaculture management practices.

Methodology

The Pakundia upazila of Kishoregonj district are increasing pond fish culture day by day. The study was conducted at two unions namely Jangalia and Pakundia of Pakundia upazila under Kishoregonj district. The reasons for selecting the study area, this area is famous for aquaculture and no previous research was conducted in this area. All of the fish farmers of the selected two unions were the population of the study. A list of whole fish farmers in the selected unions was prepared with the help

of the Upazila Fisheries Officer (UFO). Thus, total population size was 651. About 15 percent of the fish farmers were selected randomly as a sample of the study. Thus, the sample size constituted 96 fish farmers. Moreover, a reserve list of 10 fish farmers was prepared for accidental use. In order to collect relevant data for the study, a structured interview schedule was carefully prepared during the period from 06 October to 24 October, 2010. The researcher did not face any major problem in collecting data.

At the end of data collection, the collected data were coded, compiled, tabulated and analyzed. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring technique. Descriptive statistical measures such as range,

frequency, number, percentages, mean, standard deviation and rank order were used for categorization and describing the variables. analysis Pearson's Product Moment Correlation Coefficient (r) was used for testing the relationships between the concerned variables.

Findings and Discussion

Extent of Use of Aquaculture Management Practices Followed by the Fish Farmers

The possible score of the extent of use of aquaculture management practices followed by the fish farmers ranged from 0-45. The

observed range of the fish farmers was 18-39, with the average score of 27.03 and the standard deviation was 4.71. Based on scores, the fish farmers were classified into three categories as shown in Table 1.

Table 1 Distribution of fish farmers according to their extent of use of aquaculture management practices (N = 96)

Respondent categories based on aquaculture practice use	Range		Respondents percent	Mean	SD
	Expected	Observed			
Low practice (<14)	0-45	18-39	00	27.03	4.71
Moderate practice (15-29)			64.60		
Higher practice (above 29)			35.40		

Data contained in Table 1 indicate that most of the respondents (64.60%) showed moderate extent of practice compared to 35.42% of them having high extent of practice and there were no respondents under low extent of practice category. Findings clearly indicate that the entire respondent followed moderate to high aquaculture management practices. Ahmed (2006) observed that the overwhelming majority (87%) of the farmers practice shrimp farming.

Extent of Use of Individual Aquaculture Management Practices by the Fish Farmer

To determine the extent of use of aquaculture management practices by the fish farmer, the researcher divided practices into two broad categories such as pre-

stocking and post-stocking management practices. Table 2 shows that the frequency of use of each aquaculture management practices along with their mean.

Presented data in the Table 2 indicate that among 8 aquaculture management practices under pre-stocking management. Highest number of the respondent properly selected suitable pond site, because soil type of the selected study area was loamy to clay-loamy and free from flood. Lowest number of respondents used 'prepared pond by dry method' because loamy and clay-loamy soil holding water all the year round including the dry season, less than average respondents practiced dike reconstruction during dry season. On the other hand, highest number of the respondents harvested appropriate size of

fish under post-stocking management, because most of the farmers were commercial in nature. Application of supplementary feed was found as lowest post-stocking management practice followed by the fish farmers. This is due to

the reason that supplementary feed is costly and unavailable in the market. A few numbers of respondent practices maintain natural productivity of food by supplying fertilizers and exchange water during winter.

Table 2 Extent of use of individual aquaculture management practices by the fish farmers with their average use score

SL No.	Aquaculture Management Practices	Extent of Practices (N=96)				Mean
		Frequently	Occasionally	Rarely	Not at all	
Pre-stocking management practices						
1.	Site selection based on suitable soil type and availability of sunlight.	72	22	2	0	2.73
2.	Prepare pond by dry method.	3	15	39	39	0.83
3.	Dike reconstruction during the end of the dry season.	3	54	57	2	1.40
4.	Control of aquatic weed by physical and biological methods before preparing pond.	23	62	8	3	2.10
5.	Control of undesirable fish species by netting and using rotenone.	31	58	7	0	2.26
6.	Apply lime to control disease and toxic gases.	33	44	19	0	2.15
7.	Apply fertilizer to increase natural food and fertility of soil.	40	53	3	0	2.39
8.	Select standard quality fish seed for culture (eg. size 4-5cm).	36	51	9	0	2.28
Post-stocking management practices						
1.	Apply supplementary feed two times per day.	0	7	46	43	0.65
2.	Maintain dissolved O ₂ through water shaking manually.	6	66	24	0	1.81
3.	Checking growth of fish regularly by sampling (1time/week).	14	73	9	0	2.05
4.	Regular checking of fish diseases by sampling (1time/week).	8	63	25	0	1.82
5.	Maintaining natural productivity of food by supplying fertilizers (1 time/month).	1	12	62	21	0.93
6.	Exchanging water during winter (1 time/year).	2	24	47	23	1.05
7.	Harvest appropriate size of fish (>23cm for carp).	60	34	2	0	2.60

Note: Means were calculated on the basis of a four-point ratings scale: 0 = Not at all; 1 = Rarely; 2 = Occasionally and 3 = Frequently

Selected Characteristics of the Fish Farmers

The distribution of the farmers according to their selected characteristics have been shown in the Table 3.

The findings indicate that the highest proportion (44.80%) of the fish farmers

were in the middle aged category compared to 36.46 percent belonging to old aged category and 18.75 percent to young aged category. An overwhelming majority (36.46%) of the fish farmers had higher secondary education. It is noted that only

Table 3 Salient feature of the selected characteristics of the fish farmers

Selected Characteristics	Unit of measurement	Expected range	Observed range	Respondent Categories	Respondents percent (N=96)	Mean	SD
Age	Year	Unknown	25-90	Young (25-30 years)	18.75	47.42	13.95
				Middle (31-50 years)	44.80		
				Old (above 50 years)	36.46		
Educational level	Score	Unknown	0-16	No education	5.2	8.19	5.34
				Primary (1-5)	27.08		
				Secondary (6-10)	31.25		
				Higher secondary (above 10)	36.46		
Family size	Number	Unknown	2-15	Small (up to 5)	38.54	6.53	2.55
				Medium (6-8)	39.58		
				Large (above 8)	21.88		
Farm size	Hectare	Unknown	0.29-3.00	Small (0.2-1)	16.70	1.29	.53
				Medium (1-3)	82.29		
				Large (above 3)	1.04		
Annual family income	'000' Tk	Unknown	50-1000 thousand Tk.	Low (50-100)	30.21	199.84	138.16
				Medium (101-250)	50.00		
				High (above 250)	19.79		
Extension media contact	Score	0-33	0-21	No contact	37.5	7.56	6.94
				Low (1-11)	32.3		
				Moderate (12-23)	30.2		
				High (above 23)	00		
Social mobility	Score	0-18	0-12	No mobility	59.4	2.49	3.44
				Low (1-6)	28.1		
				Moderate (7-12)	12.50		
				High (above 12)	00		
Training exposure	Days	Unknown	0-45	No exposure	63.50	3.39	7.24
				Low (0-4)	9.4		
				Medium (5-9)	21.88		
				High (above 9)	5.20		
Knowledge on aquaculture management practices	Scale score	0-20	8-17	Low (1-7)	00	13.53	2.25
				Medium (8-14)	57.29		
				High (above 14)	42.71		

5.2% of the respondents were illiterate, while 27.08% had primary education and 31.25 having secondary education level. Compare to national average literacy rate

(62%; BBS, 2008) it is easily visible that the fish farmer's educational situation is acceptable. The majority of the fish farmers (39.58%) had medium sized family, 38.54%

had small and 21.88% had large family. Data indicate that the average family size of the respondents in the study area was 6.53 which was quite higher compare to the national average of 4.9 (BBS, 2008). Data reveal that majority of the fish farmers (82.29%) had medium farm size, 16.70% had small and only 1.04% had large farm size. The average farm size of the fish farmers was 1.29 ha, which was more large than that of the national average (0.46 ha; BBS, 2007). The findings indicate that majority of the fish farmers (50 %) had medium annual family income; while 30.21% had low annual income and 19.79% of the respondents had higher annual income. The average per capita family income of the respondent was 1,99,8400, which was higher than the national average of Tk. 41,103 (BBS, 2008). It is found that majority of fish farmers (37.5%) had no extension media contact, 32.3% had low, 30.20% had moderate and no respondent had high extension media contact. Data contained in the Table 3 show that majority of the respondents (59.40%) had no social mobility as compared to 28.1% had low 14.58% moderate and not any respondent had high social mobility. Data presented in Table 3 show that only 27.08% respondents had medium to high training exposure. On the other hand, 63.5% of the respondents had no training exposure. The possible knowledge score of the fish farmers ranged from 0-20, 0 indicating no knowledge and 20 indicating very high knowledge on aquaculture management practices. The computed knowledge scores of the fish farmers ranged from 8-17 the mean being 13.53 with a standard deviation of 2.25. Data indicate that most of the respondents (57.29%) were medium knowledge, 42.71% had high knowledge and there were no respondents having low knowledge on aquaculture management practices.

Relationship between the Selected Characteristics of the Fish Farmers and their Extent of Use of Aquaculture Management Practices

The purpose of this section is to determine the relationships between the selected characteristics of the fish farmers and their extent of use of aquaculture management practices. The characteristics included age, educational level, family size, farm size, annual family income, extension media contact, social mobility, training exposure and knowledge on aquaculture management practices. Each of the characteristics was considered as an independent variable, while the extent of use of aquaculture management practices followed by the fish farmers was the only dependent variable in this study.

Table 4 Correlation between dependent and independent variables (N=96)

Independent variables	Correlation coefficient (r)
Age	-0.344**
Educational level	0.520**
Family size	0.119
Farm size	0.228*
Annual family income	0.162
Extension media contact	0.750**
Social mobility	0.786**
Training Exposure	0.398**
Knowledge on aquaculture management practices	0.793**

**Significant at 0.01 level of probability; table value at 0.01 level = 0.262 with 94 df

*Significant at 0.05 level of probability; table value at 0.05 level = 0.199 with 94 df

Dependant variable: Extent of use of aquaculture management practice followed by the fish farmers.

Data in Table 4 reveal that educational level, farm size, extension media contact, social mobility, training exposure and knowledge on aquaculture management practices of

the fish farmers showed significant positive relationship with their extent of use of aquaculture management practices. Only age showed negatively significant relationship. On the other hand, family size and annual family income of the respondents did not show any significant relationship with their extent of use of aquaculture management practices.

The more the education of the respondents the more will be their use of communication media in aquaculture management practices. Education upgrades individuals in all aspects. Education enables individuals to gain knowledge and thus, increase their level of understanding, consequently broadened their outlook and horizon of knowledge is expanded. The educated persons used to have frequent contact with radio, TV, progressive farmers, printed materials and are exposed to various external sources which increase

their power of understanding compared to the individuals with less educational background. Farm size plays a significant role in the use of communication media in practising aquaculture management practices. Medium large farmer use more communication media in practising aquaculture management practices.

The finding indicates that with the increase of social mobility of the farmers, the increase of practicing aquaculture management practices. A highly communicate person communicates with different external sources. He used to visit his own union, other upazilas and important places. This helps to be exposed to different media. The results indicate that the training exposure of the farmers helped them to improve their outlook and exposure towards improved farming practices which lead them to practice aquaculture management practices.

Conclusion

The findings of the study indicate that more than half of the respondents (64.60%) had moderate extent of practice and 35.42% had high extent of practice in aquaculture management. So, there is an ample scope of increasing the extent of practice of aquaculture management techniques. Which result in improving aquaculture production and socio-economic status of the fish farmers. Knowledge of the fish farmers had a significant positive relationship with their extent of use of aquaculture management practices. The statistical analysis showed significant positive relationship of level of education, farm size, extension media contact, social mobility and training exposure of the farmers with their aquaculture management practices. Therefore, it may be concluded that these characteristics of the fish farmers can play an important role to their extent of use of aquaculture management practices. The

findings indicate that the large proportion (63.55%) of the fish farmers were middle to young aged category. Age of the fish farmers had significant negative relationship with their extent of use of aquaculture management practices. So, it can be concluded that the extent of use of aquaculture management practices of the fish farmers gradually decrease with the increase of their age.

Thus, it could be said that to increase the extent of aquaculture management practices by the respondents it should be provided need based education and training on aquaculture management practices by the DoF as they can improve their livelihood. Simultaneously, communication exposure has to be increased as the respondents depend on it for collecting information relevant to aquaculture management practices.

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