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Management Knowledge of Pond Owners on Pond Fish Farming

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Abstract

The study was conducted to determine the pond owners' management knowledge on fish farming. The study also attempted to describe some selected characteristics of the pond owners and to explore their relationships with the management knowledge on fish farming. Data were collected by structured interview schedule during 20 October to 12 November, 2009 from 118 randomly selected pond owners of Dewanganj Upazila under Jamalpur District. Management knowledge of farmers was computed by asking questions about five major aspects of pond management such pond preparation, fry release, fish feed, fish disease, and harvesting and marketing of fish. Data revealed that the highest proportion (43%) of the pond owners had relatively low knowledge while 27% of them had medium knowledge and about 30% of them had high to very high knowledge on pond fish farming. Knowledge achieved by pond owners on "fish feed" dimension had highest score followed by "pond preparation" dimension score. Education, family size, farm size, pond area, annual income, credit availability, extension media contact, training exposure and cosmopoliteness of the pond owners had significant positive relationship with their management knowledge in pond fish farming.

Keywords: *Pond owners, management knowledge, pond fish farming.*

Introduction

Fisheries are one of the major components of agricultural activities, playing a significant role in nutrition, employment, income, generation, foreign exchange earnings and in the economy of Bangladesh as a whole. Fish and fish products accounted for about 4.07 percent of the GDP and 4.90 percent of total export earnings in 2006-07. In 2007-08 this earning amounted to TK.335.29 million from the export of 73,704 mt of fish and fish products (BBS, 2008). The demand of fish has increased due to increase in population. Annual total fish demand is 25.50 lakh mt and per capita fish requirement is 18.0 kg, but the current consumption is only 16.62 kg. Average annual growth rate of fish production is around 5%. Inland open water is the major source of fish production in the country. But the production from closed water bodies is increasing very sharply due to dissemination of adaptive technologies and effective extension services rendered by the Department of Fisheries. Pond fish farming in Bangladesh is mainly a major carps and exotic carps oriented farming. At present major carps such as Rui (*Labeo rohita*), Katla (*Catla catla*) and Mrigal (*Chirrhinus cirrhosus*) along with exotic carps such as Silver Carp (*Hypophthalmichthysmolitrix*), Grass Carp (*Ctenopharyngodon idella*), Bighead Carp (*Aristicthys nobilis*) and Common Carp (*Cyprinus carpio*) are cultured in polyculture system in ponds and gained much popularity because of their easy

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culture system, rapid growth, disease resistance and high market price.

Most of the freshwater pond fish farming systems in Bangladesh are either extensive or semi-intensive and in very few cases are intensive. In semi intensive culture system, ponds are stocked mainly with Indian major carps and exotic carps, fertilizers (mainly cowdung, urea and TSP) are used irregularly and supplemental feed consisting of rice-bran and oilcakes are given. In extensive method, fishes are grown on natural feeds and fertilizers are rarely used, if used, then also in small quantity and or irregular basis. The stocked fish are not specifically selected, predator are not eliminated and are not fertilized or managed throughout the production cycle. In general fish culture in Bangladesh is characterized by the use of both extensive and semi-intensive systems, and semi-intensive farming which began from 1993 onwards has produced an increase in production (Mazid, 2002). In view of this context, the study was conducted with the following objectives; i) to determine and describe some selected characteristics of the pond owners; ii) to determine the management knowledge of the pond owners on pond fish farming; and iii) to explore relationships between each of the selected characteristics of the pond owners and their management knowledge on pond fish farming.

Methodology

Study Area, Population and Sampling

The study was conducted in two unions namely, Chukaibari and Chikajani of Dewanganj upazila under Jamalpur district. The pond owners of these two unions, whose ponds were currently in culture, were considered as the population for this study. Multi stage random sample procedure was followed in selecting samples. In the first stage, two unions out of seven unions of Dewanganj upazila were randomly selected. The selected two unions were Chukaibari and Chikajani. In the second stage, the total number of pond owners in these two unions was identified and listed with the help of Upazila Fisheries Officer and his field staffs. The number of pond owners in Chukaibari was 114 and that in Chikajani 149. Thus, the target population of the study was 263. In the third stage, about 45 percent of the target population was selected as sample by following stratified random sampling method, considering the unions as strata. Thus, the total sample size stood at 118 taking 67 from Chikajani and 51 from Chukaibari union.

Variables of the study and their Measurement

The various characteristics of the pond owners were considered as the independent variables of the study. The characteristics were age, education, family size, farm size, pond area, annual family income, credit availability, extension media contact, training exposure and cosmopoliteness. The management knowledge of pond owners on pond fish farming, was considered as the dependent variable. The measurement of the independent variable was done following the methodology developed by Sobhan (1975), Pandey (1989), Hossain and Mahbub (1986), Hossain and Crouch (1992). The measurement of dependent variable, on the other hand, was measured by computing a "management knowledge score". For computing this score, five major dimensions

of pond management such as, pond preparation, fry release, fish feed, disease, and harvesting and marketing were selected. For each dimension, a specific number of questions were asked to the pond owners and the total number of questions was 30. The number distribution for each question was based on the deepness of the knowledge. Each question was assigned specific marks on the basis of its importance and the total assigned marks were 60. A respondent was given marks to each of the questions according to the correctness of their responses. The management knowledge score of a pond owner was obtained by adding the marks for all the 30 questions. This score could range from 0 to 60, where 0 indicated no knowledge and 60 indicated very high knowledge.

Data Collection and Analysis

Data were collected personally by the principal researcher himself through face-to-face interview from the selected pond owners within the period from 20 October to 12 November, 2009 by structured interview schedule. Qualitative data were converted into quantitative data by means of suitable scoring technique wherever necessary. Pearson's Product Moment Coefficient of Correlation (r) was used in order to explore the relationships between the concerned variables. Five percent (0.05) level of probability was the basis for rejecting any null hypothesis. The SPSS computer package was used to analyze data.

Findings and Discussion

Selected Characteristics of the Pond Owners

Ten characteristics of the pond owners were selected to find out their relationships with management knowledge of pond owners on pond fish farming. The selected characteristics included their age, education, family size, farm size, pond area, annual income, credit availability, extension media contact, training exposure and cosmopoliteness. The pond owners were categorized into different categories for different characteristics and their distributions are presented in Table 1.

The pond owners were 38.94 years on the average and the overwhelming majority (91.5 percent) of the pond owners were middle aged to young. Their mean education was 6.22 years of schooling and the highest proportion of 40.7% of them had education up to secondary level. The pond owners had an average family size of 6.55 members and the majority (82.2 percent) had medium to large families. The proportions of the female members were more in the large families (52 percent). They had on an average of 0.639 hectares of land and four-fifths (80.50 percent) of them possessed small farms compared to one-fifth (19.5 percent) of them having medium farms. None had large farms. Their average pond area was 0.188 ha and most of the pond owners' (81.35 percent) had small pond. The highest proportion of the pond owners had high annual income was 6.8 percent and three-fourths (74.6 percent) of the pond owners had low income of TK 18-100 thousand compared to 19% of them having medium income. More than two-thirds (70.3 percent) of the pond owners did not receive any credit. The proportion of the pond owners who received low and medium credits was 18.64% and 8.47%, respectively. The proportion of 45.8% of the pond owners

had very low extension media contact compared to 22.8% of them having low media contact. Only one-tenth (10.2 percent) of them had medium contact. Slightly over one-fifth (21.2 percent) of the pond owners did not have any contact with any of the selected extension media. The pond owners' average training exposure score was 3.41. The highest (79.7 percent) of the pond owners did not receive any training. The average cosmopoliteness score was 10.63 and only 12.72% of the pond owners were highly cosmopolite.

Table 1. Distribution of the pond owners according to their characteristics profile (n=118)

Characteristics	Categories	Percent	Mean	SD
Age	Young (up to 35 yrs)	36		
	Middle- aged (36-50 yrs)	55	38.94	7.09
	Old (> 50 yrs)	9		
Education	Illiterate (0)	4		
	Can sign only (0.5)	20		
	Primary level (1-5)	15	6.22	4.03
	Secondary level (6-10	41		
	Above secondary level (> 10)	20		
Family size	Small family (up to 4)	18		
	Medium family (5-6)	34	6.55	2.08
	Large family (above 6)	48		
Farm size	Small farm (0.21- 1.0 ha)	81		
	Medium farm (1.01- 3.0 ha)	20	0.639	0.522
	Large farm (> 3.0 ha)	0		
Pond area	Small pond (0.02- 0.30 ha)	81		
	Medium pond (0.31- 0.49 ha)	16	0.188	0.165
	Big pond (0.49-0.97 ha)	3		
Family income	Low income (up to Tk. 1,00,000)	74		
	Medium income (Tk. 1,00,001-	19	82.74	68.78
	2,00,000)	7		
	High income (> Tk. 2,00,000)			
Credit	No credit receiver (0)	70		
availability	Low credit receiver (1-21)	19	20.71	16.44
	Medium credit receiver (22-42)	8		
	High credit receiver (43-64)	3		
Extension media	No contact (0)	21		
contact	Very low contact (up to 5)	46	5.79	3.49
	Low contact (6-10)	23		
	Medium contact (>10)	10		
Training	No training experience (0)	80		
exposure	Low training experience (1-3)	14	3.41	1.13
	Medium training experience (4-6)	5		
	High training experience (>6)	1		
Cosmopoliteness	Poorly cosmopolite (0-8)	36		
	Moderately cosmopolite (9-16)	51	10.63	4.20
	Highly cosmopolite (>16)	13		

Overall management knowledge of pond owners on pond fish farming

Pond owners' knowledge scores could theoretically range from 0 to 60. But their observed knowledge scores ranged from 8 to 56, the mean being 28.12 and standard deviation 13.14. Based on the theoretical scores, the pond owners were classified into three categories as: "low knowledge" (below 40 % of the highest possible score i.e<24), "medium knowledge" (40% to below 60 percent of highest possible score i.e 24 to <36), "high knowledge" (60% to below 75% of the highest possible score i.e 36 to <45), "very high knowledge" (75% and above of the highest possible score i.e 45 and above). The distribution of the pond owners according to their knowledge level is shown in Table 2.

Findings concerning management knowledge of pond owners show that slightly more than two-fifths (43.2%) of the pond owners possessed low knowledge, 27.1 % medium knowledge and only 29.7 percent of them had high to very high knowledge. Thus, a proportion of 70.3 percent of the pond owners had low to medium management knowledge on various aspects of pond fish farming.

Table 2. Distribution of the pond owners according to their management knowledge on pond fish farming

Pond owners knowledge level	Pond owners (n=118)		Mean	SD
	Number	Percent		
Low knowledge (<24)	51	43.2	28.12	13.14
Medium knowledge (24 to <36)	32	27.1		
High knowledge (36 to <45)	17	14.4		
Very high knowledge (45 and above)	18	15.3		

Dimension-wise management knowledge of pond owners

Pond owners' management knowledge was measured by using a total of 30 questions divided into five broad dimensions (aspects) of pond fish farming: 1. pond preparation (11 questions), 2. release of fish fry (6 questions), 3. fish feed (5 questions); 4. fish diseases (4 questions); and 5. fish harvesting and marketing (4 questions). For getting a deeper insight into the management knowledge level on different dimensions, the researchers made specific dimension-wise and/or specific question-wise analyses of the management knowledge of the pond owners. The results of these analyses are presented in Table 3.

The pond owners achieved the maximum of 57% knowledge of the highest possible knowledge score in "fish feed" dimension followed by "pond preparation" dimension (50%). The knowledge level was the lowest in the dimension of "fish harvesting and marketing" (39.20%) and "fish disease" (39.78%). In the dimension of "pond preparation" the pond owners had comparatively poor knowledge on such aspects as: the advantages of applying cowdung in ponds, necessity of repairing pond bottom and pond embankments before

fry release, and harmful effects of aquatic weeds. In the dimension of "release of fish fry", the pond owners' knowledge was very poor on such aspects as: points be considered while releasing fish fry, disadvantages of releasing too many fry without proper estimation, and the suitable time of releasing fry in ponds. Regarding the dimension of "fish feed" the pond owners seemed to have satisfactory knowledge. Their knowledge was comparatively poor in the dimension of "fish diseases". They lacked knowledge on how to identify diseased fishes, preventive and curative measures to be taken against fish diseases and naming the diseases of fishes. The pond owners were quite unaware about the disadvantages of harvesting all fishes of a pond at a time. Similarly, they had less knowledge regarding what points are to be kept in mind while marketing their harvested fishes.

Table 3. Distribution of the pond owners according to their level of knowledge on specific dimensions and questions

Questions	Assigned Number	Mean obtained number	% of number obtained
A) Pond preparation			
1. Mention 3 reasons for the necessity of repairing pond bottom.	3	1.12	37.33
2. Mention the harmful effect of jungle and branches of big trees on the pond embankments.	2	0.78	39.00
3. Mention two aquatic weeds in fish ponds.	2	1.19	59.5
4. Mention two of the harmful effects of aquatic weeds in fish culture in ponds.	2	0.81	40.5
5. What is a predatory fish? Name two predatory fishes.	3	2.33	77.66
6. Mention two of the damages a predator cause in pond fish culture.	2	1.11	55.5
7. Is it necessary to apply lime in ponds for fish culture? Yes/No. If yes, please mention two necessity of using lime.	3	1.52	50.66
8. Mention dose of lime application in ponds per decimal.	1	0.50	50.00
9. What major fertilizers are required to be applied for fish culture.	3	1.85	61.66
10. Mention one advantage of applying cow dung in ponds.	1	0.34	34.00
11. How will you examine if there is enough natural food in the pond water?	2	0.38	19.00
Total	**24**	**11.93**	**49.70**

Table 3 (Continued)

Questions	Assigned Number	Mean obtained number	% of number obtained
B) Release of fish fry			
12. What is the suitable time of fry release in ponds?	1	0.37	37.00
13. Mention two of the matters one should consider while releasing fish fry.	2	0.48	24.00
14. Mention two of the harms caused due to release of too many fry without proper estimation.	3	0.80	26.66
15. In polyculture, how many fries of what species are to be released per decimal of pond water?	5	3.00	60.00
16. What the main advantage of polyculture in ponds?	1	0.56	56.00
17. Mention two means of ways of identifying good quality of fish fry?	2	0.99	49.50
Total	**14**	**6.20**	**44.28**
C) Fish feed			
18. Mention two natural fish feed.	2	1.05	52.50
19. Mention 3 of the ingredients used for preparing feed for fished.	3	1.54	51.33
20. How will you understand that gas has formed at the bottom of the ponds?	1	0.77	77.00
21. How will you understand that there is lack of oxygen in pond water?	1	0.72	72.00
22. Why is it necessary to netting a pond occasionally?	1	0.47	47.00
Total	**8**	**4.55**	**56.87**
D) Fish disease			
23. Mention two fish diseases.	2	0.83	41.50
24. Why disease occurs in fish?	1	0.48	48.00
25. Mention two means of identifying of diseased fish?	2	0.67	33.50
26. What preventive and curative measures are required be taken against fish disease?	2	0.72	36.00
Total	**7**	**2.78**	**39.71**
E) Fish harvesting and marketing			
27. What is the suitable time of fish harvesting?	1	0.53	53.00
28. Use of what gears is harmful for fish cultures please mention 2 of them?	2	1.15	57.50
29. What is the disadvantage of harvesting all fishes at a time?	2	0.36	18.00
30. Mention what matters are to be kept in mind while marketing fishes.	2	0.71	35.50
Total	**7**	**2.75**	**39.28**

Relationship between selected characteristics of the pond owners and their management knowledge oo pond fish farming

Pearson's Product Moment Correlation Co-efficient (r) was computed in order to explore the relationships between the selected characteristics of pond owners and their management knowledge on pond fish farming. The findings are presented in Table 4, which reveal that except age of the pond owners, all other characteristics such as education, family size, farm size, pond area, annual income, credit availability, extension media contact, training exposure and cosmopoliteness of the pond owners had significant positive relationship with their management knowledge on pond fish farming. Rahman, *et al.* (1995) reported similarly that farmers' education, annual income, cosmopoliteness and extension media contact had significant positive relation with their technical knowledge in fish culture. This means that the management knowledge of pond owners is influenced by many of their personal characteristics and situational factors in varying degrees.

Table 4. Co-efficient of correlation (r) between selected characteristics of pond owners and their management knowledge on pond fish farming (n=118)

Characteristics of pond owners	Co-efficient of correlation (r)
Age	0.145
Education	0.500**
Family size	0.189*
Farm size	0.647**
Pond area	0.682**
Annual family income	0.728**
Credit availability	0.725**
Extension media contact	0.606**
Training exposure	0.622**
Cosmopoliteness	0.745**

* = Significant at 0.05 level, ** = Significant at 0.01 level

Conclusion

Knowledge is an important factor for pond fish farming but more than two-thirds (70.3 percent) of the pond owners had low to medium management knowledge on various aspects of pond fish farming. Their knowledge was particularly lower in such aspect of pond management as fish disease management, fish harvesting and marketing and release of fish fry in ponds. Thus, there is ample scope to increase the management knowledge of pond owners for pond fish farming through training and other means of knowledge improvement. Correlation analysis indicates that among ten selected characteristics of pond owners, nine characteristics such as education, family size, farm size, pond area, annual income, credit availability, extension media contact, training exposure and cosmopoliteness had significant positive relationships with their management knowledge on pond fish farming. This finding leads to a conclusion that improvement of the above aspects of pond owners by concerned authorities will definitely increase the management knowledge for pond fish farming. Thus, the production of pond fisheries will not be possible to improve to a significant extent unless the concerned authorities take proper steps to improve pond owners' knowledge in overall pond management and in particular the aspects in which their knowledge is specifically poor. Any programme aiming at increasing pond fish production through enhancement of management knowledge of the pond owners is likely to be successful if there is adequate provision for easy availability of credit to the pond owners.

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