

Assessment of the livelihood status of the fish farmers in some selected areas of Rajshahi districtM.H. Ali, M.A.H. Chowdhury¹, M.A. Kabir and N.N. Nur²PFP-Shiree Project, Nilphamari, ¹Practical Action Bangladesh, ²Department of Aquaculture, Bangladesh Agricultural University, Mymensingh

Abstract: The present investigation was carried out to assess the livelihood status of the fish farmers in Puthia and Durgapur upazilla of Rajshahi district for a period of 6 months from January to June 2009 and the study was conducted through the use of well structured questionnaire. Fifty farmers were included in this study; almost all of them were directly involved in fish farming. Average pond size was 0.19 ha with 52% having single ownerships and 48% having multiple ownerships. About 60% of the ponds were seasonal and 40% were perennial. Most of the fish farmers belonged to the age category of 31 to 40 years and average education level is moderate, represented by 92% Muslims and 8% Hindus. About 72% of the farmers have tin shed house while 20%, 2% and 6% of the farmers have half-building, building and *kacha* house, respectively. Average annual incomes of majority of fish farmers were above Tk. 75,000 per annum and 2% of them earned only Tk. 24,000 or below per annum. It was found that 62% of the farmers used semi-pucca sanitary, 24% used pucca sanitary while only 14% used *kacha* sanitary. About 62% of the farmers had electricity facilities while 38% did not have electricity connection. About 92% of the farmers used own tube-well, while 8% of the farmers used Neighbor's tube-well. It was observed that 46% of the farmers received health service from village doctor or kobiraj, 20% have access to upazilla health complex, 10% went to district hospital, 22% consulted with MBBS doctor and 2% of the farmers do not take any treatment due to lack of money. Lack of scientific knowledge on pond fish farming, multiple ownerships of the pond and lack of capital for fish culture were the major constraints.

Key words: Constraints, fish farmers and livelihoods

Introduction

Livelihood comprises the capabilities, the assets (natural, physical, human, financial and social capital), the activities and the accesses to these (mediated by institutions and social relations) that together determine the living gained by the individual household (Chambers and Conway, 1992). About 12 million people derive their livelihood directly or indirectly from this sector. There are over 1.2 million fishermen in the country but almost two-thirds of the rural households get involved in fishing during the monsoon (DoF, 2005). Fish and fisheries are indispensable part in the life and livelihoods of the people of Bangladesh since time immemorial. It is the part of our cultural heritage. Fisheries sector is the most important sub-sectors of the national economy in Bangladesh and plays very important role in the socio-cultural and economic life of Bangladesh and it contributes 4.92% to the gross domestic product (GDP) and 5.71% to the export earnings of the country (DoF, 2005). About 12 million people (10% of total population) directly or indirectly depend on fisheries sector for their livelihood (DoF, 2005). Considering the financial hardship and other complexities of the rural fish farmers, it is important to analyze their livelihood status. In view of the above consideration; the present study was undertaken to determine small-scale freshwater rural aquaculture for sustainable livelihood status of fish farmers, determine the livelihood status of fish farmers and to identify the socio-economic problems / constraints associated with fish farming.

Materials and Methods

Two upazilla (i. e. Puthia and Durgapur) under Rajshahi district were selected for the study, because; pond fish culture is heavily concentrated in this area, various NGOs and DoF have been working with fish farmers to increase fish production, well communication facilities, relatively homogenous physiographic condition and finally, suitable for research work in this area. Data were collected during January to June 2009 in Puthia and Durgapur upazilla of Rajshahi district. Fifty farmers were randomly selected from the study areas. Fish pond with different types of culture system, management practices and farmers age,

number of family member; religious status, income level, health facilities, sanitary facilities, get a technical assistance, electricity facilities etc were included in the sample. For data collection, a set of interview schedule was designed. Fish farmers' data were collected using questionnaire interviews, Participatory Rural Appraisal (PRA) tool such as Focus Group Discussion (FGD) and Cross-check interview with key informants. Data were processed and finally analyzed using tabular method.

Results**Livelihood Assets**

Human Capital: Age distribution: Out of 50 farmers, 56% belonged to the age group of 31 to 40 years whereas only 6% are found in the group of above 51 years (Table 1).

Family size: About 62% of the respondents had 4-5 family members, 24% had small family with 2-3 members, while 14% had more than 6 family members (Table 2).

Table 1. Age distribution of the fish farmers in the study area

Age group (years)	Puthia (n-25)	Durgapur (n-25)	Total (N-50)
20 to 30	4 (16%)	5 (20%)	9 (18%)
31 to 40	13 (52%)	15 (60%)	28 (56%)
41 to 50	7 (28%)	3 (12%)	10 (20%)
51 to above	1 (4%)	2 (8%)	3 (6%)

**Figure in the parenthesis indicate percentage of total

Table 2. Family size of the fish farmers in the study area

Family size	Puthia (n-25)	Durgapur (n-25)	Total (N-50)
2-3	7 (28%)	5 (20%)	12 (24%)
4-5	15 (60%)	16 (64%)	31 (62%)
> 6	3 (12%)	4 (16%)	7 (14%)

**Figure in the parenthesis indicate percentage of total

Family status: Data in Table 3 indicated that 40% farmers lived with joint families and 60% lived with nuclear families. The highest number of farmers with nuclear family structures was found in Puthia (72%) than Durgapur upazilla (48%).

Table 3. Family status of the fish farmers in the study area

Family type	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Joint family	7 (28%)	13 (52%)	20 (40%)
Nuclear family	18 (72%)	12 (48%)	30 (60%)

**Figure in the parenthesis indicate percentage of total

Education: Fifty two percent of the fish farmers had education up to S.S.C level, while 18% had H.S.C level of education. About 4% of the farmers were illiterate, 6% of the respondents possessed bachelors' degree (Table 4).

Religious status: It was found that maximum fish farmers were Muslim (92%) while small proportions (8%) were Hindus (Table 5). Highest percentage of Muslims fish farmers were found in Puthia (96%) whereas the increased number of Hindus (12%) fish farmers are found in Durgapur upazilla.

Table 4. Educational status of the fish farmers in the study area

Educational level	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
No education (Illiterate)	1 (4%)	1 (4%)	2 (4%)
Only signature	2 (8%)	1 (4%)	3 (6%)
Up to Primary	3 (12%)	4 (16%)	7 (14%)
S.S.C	12 (48%)	14 (56%)	26 (52%)
H.S.C	5 (20%)	4 (16%)	9 (18%)
Bachelor	2 (8%)	1 (4%)	3 (6%)

**Figure in the parenthesis indicate percentage of total

Table 5. Religious status of the fish farmers in the study area

Religion	Puthia (n -25)	Durgapur (n-25)	Total (N=50)
Muslims	24 (96%)	22 (88%)	46 (92%)
Hindus	1(4%)	3 (12%)	4 (8%)

**Figure in the parenthesis indicate percentage of total

Natural Capital: Pond size

The average pond size in the study area was found to be 0.19 ha. The average pond size in Puthia was 0.18 ha which was lower than in Durgapur upazilla (0.20 ha).

Table 6. Size of ponds (ha) in the surveyed area

Parameter	Puthia	Durgapur	Total (average)
Range (ha)	0.06 – 0.28	0.05 - 0.30	0.19
Average pond size (ha)	0.18	0.20	

Type of pond: In the study area, 60% of the pond were seasonal and 40% pond were perennial (Table 7). The water level in the perennial ponds declined significantly during dry season and become unsuitable for fish culture. Some of the farmers filled their ponds up to 3-4ft level by pumping water from the nearly deep tube-well. Seasonal ponds become totally unsuitable for fish culture during dry season.

Table 7. Distribution of the type of pond in the study area

Pond type	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Seasonal	16 (64%)	14 (56%)	30 (60%)
Perennial	9 (36%)	11 (44%)	20 (40%)

**Figure in the parenthesis indicate percentage of total

Physical Capital: Housing conditions

The majority (72%) of the respondents had tinshed, 20% had half building, 2% had building and only 6% had kacha house (Table 8).

Table 8. Housing condition of the fish farmers in the study area

Housing condition	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Kacha	2 (8%)	1 (4%)	3 (6%)
Tinshed	17 (68%)	19 (76%)	36 (72%)
Half building	5 (20%)	5 (20%)	10 (20%)
Building	1 (4%)	0 (0%)	1(2%)

**Figure in the parenthesis indicate percentage of total

Health facilities: When the farmers face health problem then initially most of them go to the village doctor / kobiraj (46%). If the problem is severe then they go to upazilla health complex (20%), district hospital (10%), and MBBS doctor (22%). But a few farmers do not get any treatment (2%) due to lack of money (Table 9).

Table 9. Health service received by the fish farmers in the surveyed area

Health service	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Village doctor / kobiraj	10 (40%)	13 (52%)	23 (46%)
Upazila health complex	7 (28%)	3 (12%)	10 (20%)
District hospital	3 (12%)	2 (8%)	5 (10%)
MBBS doctor (private)	5 (20%)	6 (24%)	11 (22%)
Do not get any treatment	0 (0%)	1 (4%)	1 (2%)

**Figure in the parenthesis indicate percentage of total

Drinking water facilities: In the study area, 92% of the fish farmers used own tube-well and 8% of the farmers used neighbor's tube-well for collecting drinking water.

Table 10. Drinking water facilities of the fish farmers in

the study area

**Figure in the parenthesis indicate percentage of total

Source of drinking water	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Own tube-well	24 (96%)	22 (88%)	46 (92%)
Neighbor's tube-well	1 (4%)	3 (12%)	4 (8%)

Electricity facilities: It was found that 62% of the surveyed fish farmers have electricity facilities, whereas, 38% had no electricity facilities at their residence (Table 11). The farmers in Puthia upazilla had more access to electricity (76%) as compared to those in Durgapur upazilla (48%).

Table 11. Status of electricity facilities of the fish farmers in the study area

Electricity facilities	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Yes	19 (76%)	12 (48%)	31 (62%)
No	6 (24%)	13 (52%)	19 (38%)

**Figure in the parenthesis indicate percentage of total

Sanitary facilities: It was observed that the farmers' sanitary conditions were very poor in the surveyed area and only 24% stated that they had these (Table 12). The farmers had higher access to good sanitation in Durgapur (28%) than Puthia (20%). A few farmers noted that the households of fish farmers often suffered from diarrhea and cholera due to lack of good sanitary facilities.

Table 12. Use of sanitary facilities by the fish farmers in the study area

Sanitary facilities	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Katcha	4 (16%)	3 (12%)	7 (14%)
Semi-pucca	16(64%)	15 (60%)	31 (62%)
Pucca	5 (20%)	7 (28%)	12 (24%)

**Figure in the parenthesis indicate percentage of total

Cooking fuels: At about 50% of respondents stated that they mainly used paddy straw, while 22% and 28% used wood and cow-dung, respectively (Table 13).

Table 13. Use of cooking fuels by the fish farmers in the study area

Cooking fuel	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Cow-dung	8 (32%)	6 (24%)	14 (28%)
Paddy straw	11 (44%)	14 (56%)	25 (50%)
Wood	6 (24%)	5 (20%)	11 (22%)

**Figure in the parenthesis indicate percentage of total

Social Capital

It was found that 60% of the farmers got technical assistance or advice on aquaculture from friends and neighbors. About 16% of the farmers acquired technical assistance from others (self-study), while 12% of the farmers got technical assistance from DoF and NGO.

Table 14. Source of technical assistance on aquaculture in the study area

Source of technical assistance on aquaculture	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
DoF	4 (16%)	2 (8%)	6 (12%)
NGO	3 (12%)	3 (12%)	6 (12%)
Friends and neighbors	14 (56%)	16 (64%)	30(60%)
Others	4 (16%)	4 (16%)	8 (16%)

**Figure in the parenthesis indicate percentage of total

Financial Capital: Annual house hold income

The selected fish farmers were grouped into five categories based on the level of their annual income. The 1st category included the fish farmers having annual income up to 24,000 Tk. The 2nd, 3rd, 4th and 5th categories had income levels of Tk. 25,000-50,000; Tk. 51,000-75,000; Tk. 76,000-1,00,000 and > 1,00,000 respectively (Table 15). The majority of the respondent farmers belonged to 4th category. The 4th category had the highest proportion (32%) of farmers while the lowest proportions of farmers (2%) were in the 1st category.

Table 15. Annual incomes of the fish farmers in the study area

Annual house hold income (Tk.)	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Up to 24,000	1 (4%)	0 (0%)	1 (2%)
24,001-50,000	8 (32%)	4 (16%)	12(24%)
50,001-75,000	5 (20%)	10 (40%)	15 30%)
75,001-1,00,000	9 (36%)	7 (28%)	16(32%)
> 1,00,000	2 (8%)	4 (16%)	6 (12%)

**Figure in the parenthesis indicate percentage of total

Occupation: Primary occupation: Almost all respondents (56%) reported agriculture is their primary occupation. However, as a primary occupation, 28% of respondents stated that fish farming is their primary occupation, while 14% and 2% are occupied in business and service, respectively (Table 16).

Table 16. Primary occupation by fish farmers in the surveyed area

Occupation	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Agriculture	12(48%)	16 (64%)	28 (56%)
Fish culture	9 (36%)	5 (20%)	14 (28%)
Business	3 (12%)	4 (16%)	7 (14%)
Service	1 (4%)	0 (0%)	1 (2%)

**Figure in the parenthesis indicate percentage of total

Secondary occupation: Fifty two percent of respondents stated that their secondary occupation is agriculture while 20% and 24% are occupied in fish farming and business respectively.

Table 17. Secondary occupation by fish farmers in the surveyed area

Occupation	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Agriculture	11 (44%)	15 (60%)	26 (52%)
Fish culture	7 (28%)	3 (12%)	10 (20%)
Business	5 (20%)	7 (28%)	12 (24%)
Service	2 (8%)	0 (0%)	2 (4%)

**Figure in the parenthesis indicate percentage of total

Savings: It was found that 52% of respondents had savings (Table 18). The farmers could save some from agriculture, fish culture, business, service and other activities. Savings were used for many purposes like, basic needs such as, children's education, health, loan payment, housing, food consumption, clothes etc. However, the rest of 48% farmers could not save money due to poor resources and household expenses.

Table 18. Savings by farmers in the study area

Savings	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Yes	15 (60%)	11 (44%)	26 (52%)
No	10 (40%)	14 (56%)	24 (48%)

**Figure in the parenthesis indicate percentage of total

Pond ownership: In the study area 52% of the ponds were under single ownerships and 24% under multiple ownerships (Table 19).

Table 19. Ownership of the ponds in the study area

Ownership	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Single	14 (56%)	12 (48%)	26 (52%)
Multiple	11 (44%)	13 (52%)	24 (48%)

**Figure in the parenthesis indicate percentage of total

Credit facilities: It was found that 76% of farmers used their own money for fish farming, while the rest (24%) of the farmers received loans. In recent years several institutions such as, banks, NGOs, moneylenders (mohazon) etc. are providing credit to the farmers. The amount of loan for fish farming varies from farmer to farmer, depending on production costs, production systems, pond size and pond management.

Table 20. Lone received by farmers for farming in the study area

Received loan	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Yes	5 (20%)	7 (28%)	12 (24%)
No	20 (80%)	18 (72%)	38 (76%)

**Figure in the parenthesis indicate percentage of total

Constraints of fish production: A number of constraints and risks were reported by the farmers which among others were inadequate technical knowledge, multiple ownership, theft, poisoning, lack of money, poor quality of fish seed etc (Table 21). The single largest problem reported by 48% of respondents as lack of technical knowledge. Multiple ownership of pond was also a big problem (20%).

Table 21. Key constraints for fish farming in the study area

Key constraints	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Multiple ownership	6 (24%)	4 (16%)	10 (20%)
Lack of scientific knowledge	11(44%)	13 (52%)	24(48%)
Lack of quality seed	4 (16%)	2 (8%)	6 (12%)
Lack of equipment for harvesting	1 (4%)	3 (12%)	4 (8%)
Lack of feed	0 (0%)	1 (4%)	1 (4%)
Lack of marketing facilities	3 (12%)	2 (8%)	5 (10%)

**Figure in the parenthesis indicate percentage of total

Livelihood Outcomes: The survey suggests that farmers have improved their livelihood conditions through fish farming, as confirmed by 68% of fish farmers. As Table 22 shows that the percentage of positive response was higher in Durgapur (72%) upazilla than that in Puthia (64%). Only 32% of farmers could not improve their livelihood conditions due to poor knowledge on fish farming, flood, and lack of money for fish farming.

Table 22. Improved livelihood conditions through fish farming

Improved livelihood conditions	Puthia (n -25)	Durgapur (n-25)	Total (N-50)
Yes	16 (64%)	18 (72%)	34 (68%)
No	9 (36%)	7 (28%)	16 (32%)

**Figure in the parenthesis indicate percentage of total

Discussion

Human capital represents the farmer's age, education, family size and status, religious status etc. Ahmed (2001) reported that human capital is skills, knowledge, education, ability of labor and good health that together enable people to pursue their livelihood strategies. As well as being of intrinsic value, human capital is required in order to make use of any of the four other types of assets. From the present study it was found that, only 22% got health service from MBBS doctors, while 46% of fish farmers were dependent on village doctors. The poor health and inadequate nutrition of the children, women and old-aged members of farming communities also inhibits their development. The poor health facilities, sanitary facilities and inadequate access to safe drinking water make their human assets and consequently the livelihoods more vulnerable. The similar views were also expressed by Hossain (2007), Sarker (2007) and Ail *et al* (2008). Natural capital of farmers represents the natural resources such as land, water, timber and wider environmental goods

that are critical for farmers and associated groups, to support the production. People often sell their timber to make up for income shortfalls, resulting in a loss of biodiversity. Rapid population growth has to some extent led to accelerate natural capital depletion that has affected their income. Presence of canal; beels and existence of others resources in the vicinity of the study area offer tremendous scope for harnessing natural resources for sustainable livelihood management of the fish farmers and fishing community (Ali *et al*, 2008). The physical capital of fish farming is transport, drinking water supply, sanitary facilities, shelter, roads, market, electricity etc (DFID, 2000). The study showed that 92% of the farmers' household used their own tube-well for drinking water, while 8% used neighbor's tube-well. About 62% of the respondents stated that they had electricity. Poor physical capitals in turn affect higher production costs and lower production. Similar findings also reported by Ali *et al* (2008) at Bagmara upazilla, Rajshahi.

Almost all fish farming people are disadvantaged in social capital such as the networks, groups, trust, access to institutions etc. Result of the present study showed poor existence of social organizations of the farmers. The lack of social capital has affected livelihoods of poor people in fish farming communities. The present findings agreed well with the findings of Zaman (2006) and Hossain (2007); while the opposite picture was noted by Sarker (2007) in Trishal upazila under Mymensingh district. The apparent difference in the functioning of social capital seems to be related with the localities and proximity to district town. Financial capital of fish farmers represents income, occupation, savings, credit etc. The fish farming sector has the potential to generate considerable amounts of financial capital to the resources of associated groups. However, the study showed that small farmers suffer more from lack of adequate financial resources. The similar situations were also noted by Sarker (2007) and Ali *et al* (2008).

From the study, it was found that multiple ownership, lack of technical knowledge, lack of quality seed, high price of feed, lack of money etc. were the main constraints of fish production in the surveyed area. Rahman (2003) stated that the major constraints of carp farming were lack of money and higher production cost. Khan *et al*. (1998) found that the lack of extension work for fisheries improvements caused the highest difficulty in pond fish culture. The problems encountered by the fish farmers in the surveyed area are almost similar to those recorded by Hossain (2007), Sarker (2007) and Ail *et al* (2008).

Transforming structures and process (TSP) directly influence livelihood outcomes. Policy, institutions and processes (PIP) are the key determinants of livelihood outcomes (DFID, 2000). Livelihood outcomes can be thought of as the inverse of poverty. Contributing to the eradication of poverty and food insecurity depends on equitable access to resources, access of disadvantaged groups to sufficient, safe and nutritionally adequate food (Scones, 1998). In spite of poor resources livelihood outcomes of fish farming are positive and most of them increased their income, food security and basic needs. The survey suggests that 68% of fish farmers have improved

their socio-economic condition through fish farming. Now, they have better food, cloths, housing conditions and children education. However, 32% farmers have not yet improved their status. Impact of fish farming were reflected in the process of increased saving, investment and purchasing capacity which have been increased and unemployment problem was decreased for both man and women. Further studies are needed to precisely determine the prospect for enhancement of livelihood management strategies of the fish farming communities in the Puthia and Durgapur upazilla under Rajshahi district.

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