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Assessment of the Livelihood Status of the Carp Fish Farmers in Two Unions of Puthia Upazila Under Rajshahi District, Bangladesh

Md. Benjir Ahmed[1*], Md. Abdul Hannan[2] and Md. Shafiul Alam[3]

[1]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, Email: benjirahm@gmail.com
[2]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, Email: tareq.hannan@gmail.com
[3]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh, Email: shafiulalam.dof@gmail.com

*Correspondence: benjirahm@gmail.com, Tel: +8801934267328

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Abstract: Nowadays, carp culture has become an important sector in terms of nutrition supply, income generation, and increasing scope of employment in Bangladesh. The present survey was conducted to evaluate the livelihood condition of the carp fish farmers in the Shilmaria and Valukgasi unions of Puthia upazila under the Rajshahi district. The survey was done for a period of 6 months from January to June 2023. All the necessary data were collected through a structured questionnaire. Sixty farmers were included in this study. Thirty farmers were taken from the Shilmaria union and another thirty farmers were taken from the Valukgasi union. All of them were involved in carp fish farming. The average pond size of the study area was 0.35 ha. The ponds are belonging to both single (23%) and multiple ownership (77%). The majority of the carp farmers were under the age group of 41 to 50 years and had a level of education up to primary (23%). Most of the farmers were Muslims (98%) and few of them were Hindus (2%). The annual incomes of the majority of carp farmers (30%) were above Tk. 1,00,000. Sixty-seven percent of the carp farmers used semi-pucca sanitary, 22% used pucca sanitary, and 12% used kacha sanitary. Among the sample farmers, about 32% had half-building house while 14%, 11%, and 3% of the farmers had tin shed, building, and kacha house (made of mud and straw) respectively. Ninety-eight percent of the carp fish farmers availed of electricity facilities and 2% of them did not have. Most of the carp farmers (92%) used their tube well, while a few numbers of them (8%) used a neighbor's tube well for drinking water. About 60% of the carp farmers took health services from village doctors, 22% went to the upazila health complex, 8% went to the district hospital and 10% had access to the MBBS doctors in private clinics. The major constraints were the lack of scientific knowledge, the high price of fish feed, and a lack of capital for carp fish culture. So, the livelihood status of the carp fish farmer can be increased through proper training on carp fish culture and providing additional Government and Non-Government support.

Keywords: Carp fish farmers; Lack of capital; Sanitation; High feed price.

INTRODUCTION

A livelihood is sustainable when it can recover from stresses, cope with shocks, and maintain or enhance its assets both now and in the future (Chambers and Conway, 1992). A livelihood includes the abilities, the assets (human, physical, natural, social, and financial capital), the accesses to these, and the activities that together indicate the living status gained by the individual household (Chambers and Conway, 1992). About 19.5 million people including 1.4 million women (12% of the total population) depend on the fisheries sector for their livelihood (DoF, 2023). Fisheries is an important sector for the development of the livelihood status of the people of Bangladesh. Different methods have been adopted for sustainable rural development and poverty elimination. The "Sustainable Livelihood Approach" is expanding gradually with its core principles for poverty-focused development (DFID, 1998). This approach is based on the principle of analyzing capital assets (i.e., physical capital, human capital, social capital,

financial capital, and natural capital) regarding the surrounding environment. A sustainable livelihood approach is thinking of the scope, objectives, and priorities for the development, to enhance the process of poverty elimination (Scones, 1998). In Bangladesh, a large number of fish farmers are involved in carp farming. However, there is no complete study on the effect of carp farming on the livelihood status of fish farmers. Because of the rural carp farmers' financial hardship and other complexities, it is essential to analyze their livelihood conditions. Considering the above situation, the present study was done to assess the livelihood condition of the carp farmers and to determine the positive and negative effects of carp farming on their livelihood.

MATERIALS AND METHODS

In the present study, DFID's "Sustainable Livelihood Approach" was followed to determine the livelihood status of the carp fish farmer. Data regarding natural capital, human capital, physical capital, social capital, and financial capital of carp fish farmers in the study area were collected and analyzed to trace out the level of livelihood status of the carp fish farmer.

Study area: Two unions (Shilmaria and Valukgasi) in Puthia upazila under Rajshahi district were selected for the study, because; carp farming is heavily concentrated in this area, various NGOs and DoF have been working with carp farmers to increase fish production, well communication facilities, relatively homogenous physiographic condition and finally, suitable for researcher to work in this area. Data were collected from January to June 2023 in Shilmaria and Valukgasi unions.

Data collection: Sixty carp fish farmers were randomly selected from the Shilmaria and Valukgasi unions of Puthia upazila. Carp farmers with different ages, family sizes, religious statuses, income levels, sanitary facilities, health facilities, culture systems, electricity facilities, access to technical assistance, etc. were selected to collect data. Data were collected from the carp fish farmers using a set of interview questions. Participatory Rural Appraisal (PRA) tools like Focus Group Discussion (FGD) and Cross-check interviews were done to verify the collected data.

Data analysis: All the collected information was accumulated and analyzed by MS-Excel and then presented in tabular forms to understand the present status of the livelihood status and constraints of the carp fish farmers of the studied area.

RESULTS

Livelihood Assets

Human Capital: Family type

The families of the carp fish farmers were categorized into two types. Seventy-five percent of the sampled farmers lived in nuclear families, while 25% of them lived in joint families (Table 1).

Table 1. Family type of the carp fish farmer

Type of family	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Nuclear family	22(73%)	23(77%)	45(75%)
Joint family	8(27%)	7(23%)	15(25%)

*s=Sample number and S=Total sample number

Family size: Sixty-seven percent of the sample farmers had 4-5 family members, while 18% had 2-3 members, and 15% had large families with more than 6 family members (Table 2).

Table 2. Family size of the carp fish farmer

Size of Family	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
2 to 3	5(17%)	6(20%)	11(18%)
4 to 5	21(70%)	19(63%)	40(67%)
≥ 6	4(13%)	5(17%)	9(15%)

*s=Sample number and S=Total sample number

Age distribution:
Thirty-seven percent of 60 farmers are under the age group of 41 to 50 years and only 15% of them were in the group of 20 to 30 years (Table 3).

Table 3. Age group distribution of the carp fish farmer

Age group (years)	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
20 - 30	5(17%)	4(13%)	9(15%)
31 - 40	5(17%)	6(20%)	11(18%)
41 - 50	12(40%)	10(33%)	22(37%)
51 and above	8(27%)	10(33%)	18(30%)

*s=Sample number and S=Total sample number

Education: The majority of the carp fish farmers (38%) had an education level of up to S.S.C, and 17% of them had H.S.C level of education. Two percent of the carp fish farmers were illiterate, and 8% of the farmers had bachelor's degrees (Table 4).

Table 4. Educational status of the carp fish farmer

Level of educational	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Illiterate	1(3%)	0(0%)	1(2%)
Only signature	1(3%)	1(3%)	2(3%)
Up to Primary	10(33%)	9(30%)	19(32%)
S.S.C	11(37%)	12(40%)	23(38%)
H.S.C	4(13%)	6(20%)	10(17%)
Bachelor	3(10%)	2(7%)	5(8%)

*s=Sample number and S=Total sample number

Religion: Ninety-eight percent of carp farmers were Muslim and a very small number of them (2%) were Hindus (Table 5).

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Table 5. The status of the religion of the carp fish farmer

Status of religion	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Muslims	29(97%)	30(100%)	59(98%)
Hindus	1(3%)	0(0%)	1(2%)

*s=Sample number and S=Total sample number

Natural Capital: Pond type

Seventy-eight percent of the ponds in the survey area were perennial, whereas 22% of ponds were seasonal (Table 6). The level of water in the perennial ponds is reduced during the dry season making the pond unsuitable for fish culture. Most of the farmers used pumps to fill their ponds up to 4-5ft level. On the other hand, seasonal ponds are suitable for fish culture for only 5-6 months.

Table 6. Type of ponds in the study area

Pond type	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Perennial	22(73%)	25(83%)	47(78%)
Seasonal	8(27%)	5(17%)	13(22%)

*s=Sample number and S=Total sample number

Pond size:

In the present study average pond size of the selected area was 0.35 ha (86 decimals). In Shilmaria the average pond size was 0.37 ha and in Valukgasi it was 0.33 ha (Table 7).

Table 7. Pond size (ha) in the study area

Pond size	Shilmaria (s=30)	Valukgasi (s=30)	Total (Average)
Range (ha)	0.04-0.69	0.06-0.6	0.35
Average (ha)	0.37	0.33	

*s=Number of samples

Physical Capital: Housing conditions

Fifty-three percent of the framers lived in a building house, 23% of them lived in a tin shed house, 18 % lived in a building house and only 5% lived in a kacha house (Table 8).

Table 8. Housing condition of the carp fish farmer

Condition of house	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Building	6(20%)	5(17%)	11(18%)
Half building	14(47%)	18(60%)	32(53%)
Tin shed	9(30%)	5(17%)	14(23%)
Kacha	1(3%)	2(7%)	3(5%)

*s=Sample number and S=Total sample number

Drinking water: Most of the sampled carp farmers (92%) used their own tube well, whereas 8% of them used a neighbor's tube well (Table 9).

Table 09. Source of drinking water for the carp fish farmer

Drinking water source	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Own tube-well	27(90%)	28(93%)	55(92%)
Neighbor's tube-well	3(10%)	2(7%)	5(8%)

*s=Sample number and S=Total sample number

Health facilities: The majority of the carp fish farmers (60%) took health services from the village doctor. Twenty-two percent of them went to Upazila Health Complex for medical service, 8% went to the district hospital, and the rest of them (10%) went to the MBBS doctors (Table 10).

Table 10. Level of health service taken by the carp fish farmer

Level of health service	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Village doctor	19(63%)	17(57%)	36(60%)
Upazila health complex	6(20%)	7(23%)	13(22%)
District hospital	3(10%)	2(7%)	5(8%)
MBBS doctor (private clinic)	2(7%)	4(13%)	6(10%)

*s=Sample number and S=Total sample number

Sanitary: In the study area majority (67%) of the framers used semi-pucca, 22% used pucca and only 12% of them used kacha toilets (Table 11).

Table 11. Status of using sanitary by the carp farmer

Status of sanitary	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Kacha	3(10%)	4(13%)	7(12%)
Semi-pucca	21(70%)	19(63%)	40(67%)
Pucca	6(20%)	7(23%)	13(22%)

*s=Sample number and S=Total sample number

Electricity: Among the sampled carp farmers 98% had electricity facilities, but 2% of them had no electricity at their residences (Table 12).

Table 12. Level of access to electricity facilities of the carp fish farmer

Status of electricity	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Yes	29(97%)	30(100%)	59(98%)
No	1(3%)	0(0%)	1(2%)

*s=Sample number and S=Total sample number

Cooking fuels: Thirty-eight percent of the sampled carp farmers used straw for cooking, 35% used wood, 18% used cow dung, and 8% used gas (Table 13).

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Table 13. Status of using cooking fuels by the carp farmer

Name of cooking fuel	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Cow-dung	6(20%)	5(17%)	11(18%)
Straw	12(40%)	11(37%)	23(38%)
Wood	10(33%)	11(37%)	21(35%)
Gas	2(7%)	3(10%)	5(8%)

*s=Sample number and S=Total sample number

Financial Capital: Annual income

In the survey area, most of the carp fish farmers (30%) had an income level of Tk. 1,00,001-1,50,000, 25% of them had income level of Tk. 50,001-1,00,000, while 25%, 15%, and 5% had income levels of Tk. 1,50,001-2,00,000, ≤50,000 Tk. and >2,00,000 Tk. respectively (Table 14).

Table 14. Annual incomes of the carp fish farmer

Annual income (Tk.)	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
≤50,000	4(13%)	5(17%)	9(15%)
50,001-1,00,000	6(20%)	9(30%)	15(25%)
1,00,001-1,50,000	10(33%)	8(27%)	18(30%)
1,50,001-2,00,000	8(27%)	7(23%)	15(25%)
> 2,00,000	2(7%)	1(3%)	3(5%)

*s=Sample number and S=Total sample number

Primary occupation: Carp fish culture was the primary income source for the majority of the respondents (48%). Agriculture was the primary occupation for 32% of them, while 15% and 5% of the respondents were involved in business and service respectively as their primary income source (Table 15).

Table 15. Status of primary occupation of the carp farmer

Name of occupation	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Fish culture	14(47%)	15(50%)	29(48%)
Agriculture	10(33%)	9(30%)	19(32%)
Business	4(13%)	5(17%)	9(15%)
Service	2(7%)	1(3%)	3(5%)

*s=Sample number and S=Total sample number

Secondary occupation: Most of the respondents (52%) said that their secondary occupation is fish culture whereas 28%, 15%, and 5% were involved in agriculture, business, and service respectively (Table 16).

Table 16. Secondary occupation by carp farmers in the survey area

Occupation	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Fish culture	16(53%)	15(50%)	31(52%)
Agriculture	9(30%)	8(27%)	17(28%)
Business	4(13%)	5(17%)	9(15%)
Service	1(3%)	2(7%)	3(5%)

Savings: Fifty-seven percent of the sampled carp fish farmers had savings (Table 17). On the other hand, 43% of them had no savings because of household expenses.

Table 17. Status of savings of the carp fish farmer

Savings	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Yes	18(60%)	16(53%)	34(57%)
No	12(40%)	14(47%)	26(43%)

*s=Sample number and S=Total sample number

Ownership of the ponds: Most ponds (77%) were under multiple ownership, whereas 23% were under single ownership (Table 18).

Table 18. Status of pond ownership of the carp fish farmer

Status of ownership	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Single	8(27%)	6(20%)	14(23%)
Multiple	22(73%)	24(80%)	46(77%)

*s=Sample number and S=Total sample number

Loan facilities: Among the carp fish farmers 85% took loans from different sources like banks, NGOs, local people, etc., whereas 15% of them did not take any loan because of their financial solvency (Table 19).

Table 19. Loan receiving status of the carp fish farmer

Received loan	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Yes	26(87%)	25(83%)	51(85%)
No	4(13%)	5(17%)	9(15%)

*s=Sample number and S=Total sample number

Social Capital

Forty-five percent of the carp fish farmers took carp fish culture-related technical help from friends and neighbors, while 25%, 15%, and 15% of them got technical assistance from DoF, NGOs, and others (self-study) sequentially (Table 20).

Table 20. Status of getting technical assistance on carp farming

Source of technical help	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
DoF	7(23%)	8(27%)	15(25%)
NGO	4(13%)	5(17%)	9(15%)
Friends and neighbors	14(47%)	13(43%)	27(45%)
Others	5(17%)	4(13%)	9(15%)

*s=Sample number and S=Total sample number

Problems of carp fish culture: Carp fish farmers faced several problems and risks during carp fish culture. The high lease value of the pond, low-quality fish seed, the high

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price of feed, poisoning, and lack of money were the major problems for carp farming (Table 21). Rapid raising of the feed price is the biggest constraint reported by 35% of the sampled farmers, whereas 25% of them mentioned the high lease value as a big problem.

Table 21. Key constraints for carp fish farming

Received loan	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Multiple ownership	5(17%)	3(10%)	8(13%)
Lack of scientific knowledge	3(10%)	4(13%)	7(12%)
Lack of quality seed	2(7%)	3(10%)	5(8%)
The high price of feed	11(37%)	10(33%)	21(35%)
High lease value of the pond	8(27%)	7(23%)	15(25%)
Lack of marketing facilities	1(3%)	3(10%)	4(7%)

*s=Sample number and S=Total sample number

Livelihood Outcomes: In the present study, 72% of carp fish farmers confirmed that they have improved their livelihood status through carp fish farming. However, 28% of them could not improve their livelihood technical knowledge about carp farming, lack of good quality feed & seed, and lack of money for fish farming (Table 22).

Table 22. Changes in livelihood conditions through carp fish farming

Status of livelihood conditions	Shilmaria (s=30)	Valukgasi (s=30)	Total (S=60)
Yes	22(73%)	21(70%)	43(72%)
No	8(27%)	9(30%)	17(28%)

*s=Sample number and S=Total sample number

DISCUSSION

Human capital includes age distribution, family type, educational level, religion, etc. of a community. Ahmed (2001) stated that human capital is good health, skills, education, knowledge, and ability of labor that helps people to improve their livelihood status. In this study, it was found that most of the carp fish farmers (58%) depended on village doctors for their treatment, while only 42% of them had access to MBBS doctors. Inadequate treatment facilities, and poor nutrition for the children, and women of the carp fish farmers' family make the human capital vulnerable. Similar results were found by Hossain (2007), Sarker (2007), and Ali *et al.* (2010). The natural capital of carp fish farmers includes environmental resources like water, land, and other related elements. These resources are crucially important for fish cultivation. Climate change and growth of population depleting natural resources. As a result, carp fish production and the income of carp farmers are reducing daily. The existence of canals, bells, and other natural resources in the study area is helping for sustainable livelihood management of the fish farmers (Ali et al, 2008). Transportation, supply of drinking water, condition of houses, market, sanitary, electricity facilities, etc. are considered as physical capital for carp fish farmers (DFID, 2000). In the study area, 92% of the carp fish farmers had their own tube well as a source of drinking water and 8% of them used a neighbor's tube well. Ninety-eight percent of the carp fish farmers had electricity facilities at their homes. But, 2% of them had no electricity. Unavailability and limited access to physical capital reduce the level of livelihood status of carp fish farmers. Similar findings were also reported by Ali *et al.* (2008) at Bagmara Upazila, Rajshahi.

Most of the carp fish farmers had limited access to social capital like fish farmer groups, networks, access to technical support, etc. In the present study, it was observed the carp fish farmers had no established organization or group to exchange their opinions. The poor communication facilities made them isolated from the exchange of carp culture-related technical knowledge. They were not aware of their livelihood condition. The result of this study was similar to the result found by Hossain (2007). Carp farming has a noticeable effect on producing financial capital for the fish farming group. This study showed that carp fish farmers did not have sufficient financial capabilities. They also did not get sufficient financial support from any organization. Similar results were also found by Sarker (2007).

The study showed that the high lease value of the pond, lack of carp fish culture-related technical knowledge, lack of quality seed, increasing price of feed, lack of sufficient money, lack of loan facilities, etc. were the main obstacles to fish production in the study area. Rahman (2003) noted that lack of money and high production costs were the main constraints for fish farming. Almost similar results were noted by Hossain (2007), Sarker (2007), and Ali *et al.* (2008). Livelihood outcomes are considered as the contribution to the reduction of poverty. Easy access of the disadvantaged groups to resources, safe, sufficient, and nutritional food helps them to contribute to reducing poverty (Scones, 1998). Although the resources were limited, the livelihood outcomes of carp fish farmers were positive. Most of them improved their food security and income. This study shows that 72% of carp fish farmers have good housing conditions, better clothes and food. But, 28% of them were unable to change their livelihood condition. The effect of carp fish farming was revealed through positive changes in savings, investment, and purchasing capacity. It has decreased the unemployment problem for both men and women. Further studies are required to determine the prospect for the enhancement of livelihood management strategies for the carp farmers in the Shilmaria and Valukgasi Unions of Puthia Upazila under the Rajshahi district.

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CONCLUSION

Despite poor resources, most of the carp fish farmers increased their income, basic needs, and food. The study shows that carp farming has improved the livelihood status of the majority of the carp fish farmers (72%). Now, they have safe sanitation, sufficient food, clothes, and social status. However, 28% of the carp fish farmers were unable to improve their status yet. Several constraints are reducing the chances of the development of the livelihood status of carp fish farmers. Both Government and Non-Government support are required to enhance their socio-economic condition.

Conflict of Interest

The authors declared that there is no conflict of interest.

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