

Present Status of Fish Farming and Livelihood of Fish Farmers in Barisal Sadar Upazila of Barisal District, Southern Bangladesh

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Abstract: The present investigation was conducted to assess the status of fish farming and livelihood of fish farmer in the Barisal Sadar Upazila, Southern Bangladesh for a period of ten months from March 2015 to January 2016. Well-structured questionnaire was applied for primary data collection from fish farmer. The survey revealed that average pond size was 0.12 ha with 85% of the farmers having ponds of single ownership. Majority farmer (94%) preferred poly-culture system where maximum pond was seasonal (84%). Most of the fish farmers were belonged to the age groups of 36 to 50 years (52%), represented by 80% Muslims. Majority farmer (68%) had tin-shed house where majority were taken health facilities from Upazila doctor (32%). Most of the farmer (55%) lived in joint families where majority family members (41%) were between 4 -5. About 7% had no education while 11%, 49%, 21% and 12% had primary, secondary, higher secondary and bachelor level of education respectively. Fish farming was main occupation of 24% farmer where majority (30%) was involved with agriculture. Majority farmer (74%) had semi-pucca toilet where 16% had own tube-well. 53% farmer were used wood as cooking fuel where 74% of farmers used their own money for fish farming. 37% were capable to save money in bank or different types of NGOs where 95% farmers improve their socio-economic conditions by fish farming. Majority fish farmer (84%) achieved training on fish farming from NGOs where 9% had not received any training. Majority households (94%) had electricity facility where most of the farmer (70%) had ordinary social status. Seasonal flood (26%), non-availability of fish fry (25%), insufficient water in dry season (12%), lack of money (11%), Fish disease (9%), pouching (8%), lack of quality feed (5%) and poor technical knowledge (4%) for fish farming was identified as the major constraints.

Key words: Fish Farmer • Livelihood Status • Production • Fish Farming • Bangladesh

INTRODUCTION

Bangladesh is considered as one of the most favorable countries in the world based on its existing

resources and agro-climatic conditions [1-2]. Among them fisheries sector is providing the largest diversity of aquatic resources [3-8] which helps to develop socioeconomic conditions, nutrition supplementation, employment

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generation, poverty alleviation and foreign exchange earning of Bangladesh [10-13].

Now, fish and fisheries are ineluctable part in the life and livelihoods of the people of Bangladesh since time immemorial [14]. It's also remarkable that fish alone contributes about 60% of animal protein to the diet of the people of country [15]. Pond fish farming act as a vital role for improving socioeconomic status of farmer in Bangladesh. Pond fish farming has already been proved to be a profitable business than rice cultivation. So, large numbers of farmers in rural areas are converting their rice field into aquaculture pond [16]. Majority of pond fish farmers in rural areas have taken fish farming activities as their secondary occupation and most of the people involved in fish farming improved their socioeconomic condition through pond fish farming activities [17-18].

Aquaculture contributes to the livelihood of the poor farmers through improved food supply, income and employment [19]. Over the last three decades, there has been a steady increase in inland freshwater aquaculture production. In Bangladesh, there are about 371309 ha pond area available and the annual production was 3896 Kg/ha [20]. The main production systems for freshwater aquaculture in Bangladesh are semi-intensive and extensive pond poly-culture of carps which accounts for 80% of the total freshwater aquaculture production [21-23]. The rest 20% are mainly from pangus, tilapia, small indigenous species (SIS) of fish and rice-fish farming [24]. It has been estimated that about 138.68 lakh people are fish farmers are involved with fish farming in Bangladesh [20].

Barisal sadar Upazila can be considered as one of the ideals fish production area in the southern region of Bangladesh. According to statistical data 2011, about 8774 ponds are which comprised 545.344 ha available in the Barisal sadar Upazila. Most of the ponds are suitable for fish culture. Pond owner of this area has great opportunity to improve their socioeconomic conditions through fish culture following scientific technique. In aspect of Bangladesh, the major constrains to increase fish production are lack of technical knowledge non-availability of credit and multi-ownership of ponds [25].

Fisher personages are considered as one of the most backward sections in our society. Insufficient and authentic information on socio-economic condition of the target population is one of the serious hindrances in the successful implementation of developmental programed [26]. Aquaculture practice has exhibited promising and truthful methodology to achieve self-sufficiency in food

sector and also to alleviate poverty in a developing country like Bangladesh [25, 27-32]. Sustainability of livelihood is possible when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in future [33-34]. The social content is mainly important to access arrangement and assessments of benefits to livelihood [35]. Considering the overall facts, the present study was carried out to assess the status of fish farming and livelihood of fish farmer in the Barisal sadar Upazila of Barisal district in southern Bangladesh.

MATERIALS AND METHODS

Study Area: The present investigation was imposed on some selected areas of Barisal Sadar Upazila of Barisal district in Bangladesh for a period of ten months from March 2015 to January 2016. A total of 100 pond fish farmer were chosen for questioner interview from three selected Union under Barisal Sadar Upazila namely Sayestabad, Lamchori and Chairbaria.

Collection of Data: Present study was based on primary and secondary data. For collecting primary data, a draft questionnaire was developed which was pre-tested with a few pond fish farmers. In the pre-testing, much attention was given to any new information in the draft questionnaire in order to reach the objectives of the study. The final questionnaire was improved, rearranged and Modified based on the experience gained in pre-testing. Participatory Rural Appraisal (PRA) tools such as Focus Group Discussion (FGD) and Crosscheck Interviews (CI) were applied to gathered primary data from the households of pond fish farmer.

Data Analysis: Collected primary data were accumulated and analyzed by MS-Excel and then presented in textual, tabular and graphical forms to understand the present socioeconomic status of pond fish farmers in the studied area.

RESULTS AND DISCUSSION

Fish Farming Status

Cultured System: The pond fish farmer of the studied area was practiced different types of culture system. Most of the farmer (94%) preferred poly-culture system where small portion of farmer (6%) were practiced monoculture of tilapia. To utilized maximum food resource majority farmer preferred poly-culture system.

Cultured Fish Species and Stocking Density: In the studied area, Perennial pond farmer cultured fish all the year round but seasonal pond owner cultured fish in April to December. Farmer were used different types of fish species in their poly-culture ponds mainly Indian major carps viz., rohu, (*Labeo rohita*), catla (*Gibelion catla*), mrigal (*Cirrhinus cirrhosus*), kalibous (*Labeo calbasu*) and Exotic fish common carp (*Cyprinus carpio var communis*), bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), pangas ((*Pangasius hypophthalmas*), tilapia (*Oreochromis mossambicus*), Nilotica (*Oreochromis niloticus*), Monosex Tilapia, thai-puti. Native species foli (*Notopterus notopterus*) was also cultured in the studied area. Farmer of the studied area was fully depended on hatchery producer seed. The Average Stocking density was found to be 14832 fry/ha. Alam [36] found the average stocking density was 17,262 fry/ha which was higher than present findings but Pravakar *et al.* [30] recorded similar result Chandpur District.

Feed and Feeding Practices: For increasing production in culture system first requirement is to supply feed with balanced nutrients. Majority farmers (88%) were depended on supplementary feed where least number of farmers (12%) was depended on natural feed. Majority farmer were preferred handmade feed (rice bran, mustard oil cake) than commercial feed because of high costing of feed. Alam [36] found that 80% of the farmers applied supplementary feed such as rice bran and mustard oil cake. Farmers had not followed any slandered feeding resume in the studied area.

Fish Production and Harvesting: Present study recorded average yield of fish from studied area in about 2845kg/ha/yr. Recent production was comparatively low than findings of Rahman *et al.* [37] (2925 Kg/ha/yr.) and Pravakar *et al.* [30] (2900Kg/ha/yr.) due to poor management and feeding practice. Fish production varies from species to species and area to area because of the variation of pond size, depth, species, management, feeding practice. They harvest fish all the year round for consumption but the peak season was recorded October to January. Similar harvesting period was shown by Alam [36] from the Rangpur district. Farmers harvested fish by using cast net and seine net locally known as Berjal. Harvested fish were kept in plastic bag, bamboo baskets, Plastic container or aluminum containers.

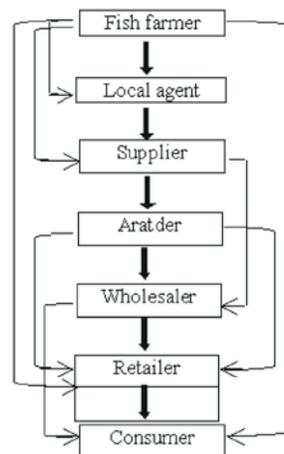


Fig. 1: Marketing channel of pond cultured fish

Marketing Channel: In the studied area, Harvested fish are marketed by following various channels. Fishermen were consumed about 25% of fish and another 75% fish were passes farmer to consumer by crossing different agents like local agent, aratder, supplier, wholesaler and retailer (Figure 1).

Human Capital

Religion and Age Structure: Religion is considered as the vital factor which acts as a notable constraint and modifies social pattern of people in a certain area. Muslims were represented as the majority percentage of fish farmer in the study area. Recorded 80% fish farmer were Muslim where 20% were Hindus respectively. Age groups are categories in different ways; young (20-35 years), middle aged (36-50 years) and old (51-65 years) to examine the age distribution. It seems (Figure 2) that middle age group of fish farmer was the highest (52%) and old age group was the lowest (20%) considering all fish farmers. Khatun *et al.* [29] represented 46% fish farmers belonged to age group of 36-50 in Noakhali district. Ali *et al.* [38] reported that age structure of fishermen at Tarakanda upazila of Mymensingh district was ranged from 20 to above 60 years which more or less agreed with the present findings.

Family Size and Type: Present study classified fish farmer families into two types as nuclear family and joint family. Majority farmer (55%) lived in joint families where 45% in nuclear families. Joint family was predominant in the study area which also correspondents well with the findings of Ali *et al.*, 2010. Families sized of the fishermen were

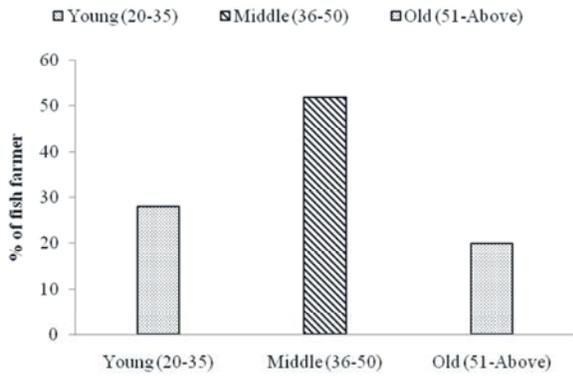


Fig. 2: Age distribution of fish farmers in the study area

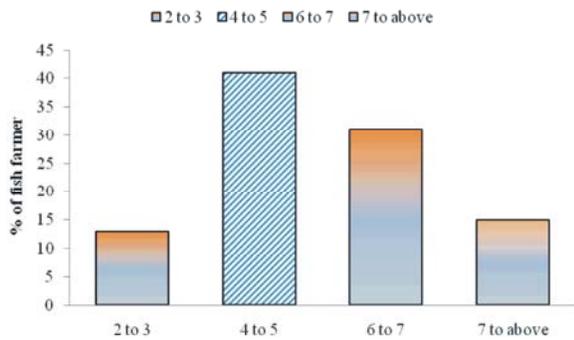


Fig. 3: Family size of the fish farmer in the study area

divided into four categories based on number of the family member (Figure 3). The highest percentage was obtained in the 4 to 5 member's family (41%) and lowest was in the 2 to 3 member (13%) family. About 45% of the fish farmer had 4 to 5 family members and 15% had 2 to 3 members in Mymensingh district which was more or less similar with present findings [38].

Education: Education attainments help to develop conceptual skill and also facilitate the acquisition of technical skill, which have direct benefit on income generation, expenditure and saving activities. Education level of the fish farmer was recorded by categorizing the fishermen into five education level. Majority farmer (49%) were Secondary school educated where few numbers of fish farmer (7%) were illiterate (Table 1). Present study reported higher literacy rate than the national adult literacy level (65%). Sohel *et al.* [14] reported 13% illiterate farmer from Bogra. Zaman *et al.* [25] found that 23.3% farmers were illiterate which value was higher than present findings.

Physical Capital: Physical capital is the infrastructure and tools used to support livelihoods.

Table 1: Education level of fish farmer in the studied area

Education level	Number of fish farmer	% value of fish farmer
Illiterate	7	7
Primary	11	11
Secondary	49	49
Higher secondary	21	21
Bachelor	12	12

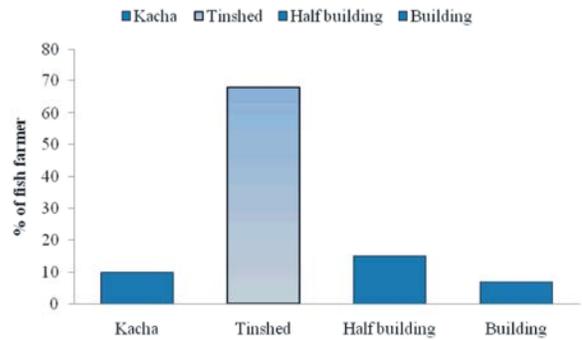


Fig. 4: Housing conditions of the fish farmer in the study area

Housing Condition: House act as the indicator of social status of a people. For justify social status of pond fish farmer, attempts were considered to find out the condition of living house of the fish farmer. Majority fish farmer (68%) had tin-shed house (Figure 4) followed by half building (15%), kacha (10%) and building (7%). Ali *et al.* [33] reported 54% of the farmers were tin-shed house while 26, 14 and 6% of the farmers were half-building, building and kacha house.

Health Facilities: Health facilities of the fish farmer were not very poor because of the study area is located under Barisal Sadar Upazila. 32% were dependent on upazila health complex while 5% did not get any health facilities (Figure 5) due to lack of money. Ali *et al.* [33] reported 46% fish farmer of Bagmara upazilla under Rajshahi district were dependent on village doctor or kobiraj, 18% upazila health complex, 14% district hospital, 20% MBBS doctor and 2% of the farmers did not take any treatment due to lack of money.

Drinking Water Sources: The provision of clean and safe drinking water is considered as the most valued elements in the society. Present findings shown that, the entire fish farmer used tube well water as their drinking water source which indicates a positive sign for health facilities in the study area. 16% of them had own tube-well and 38% of them collected drinking water from neighbors' tube-well (Figure 6). Kabir *et al.* [37] also represented that

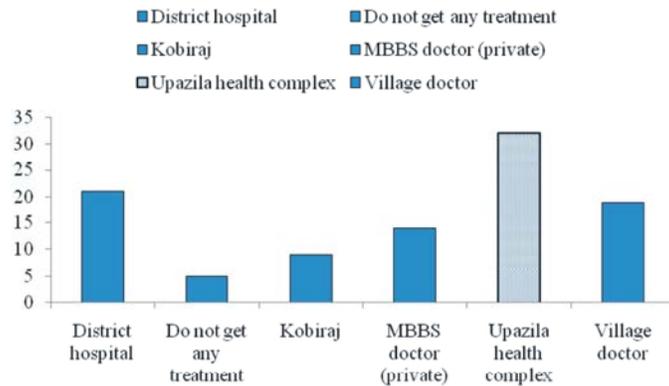


Fig. 5: Health facilities of fish farmer in the studied area

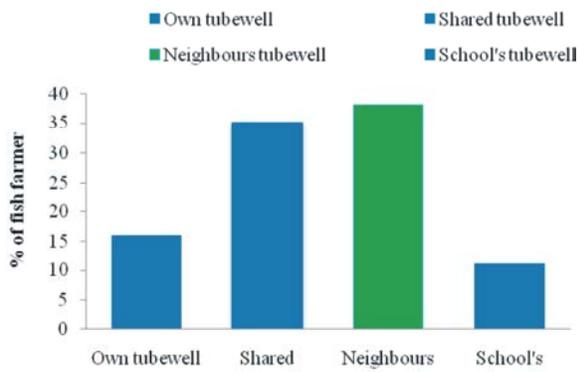


Fig. 6: Drinking water facilities of the fish farmer in the study area

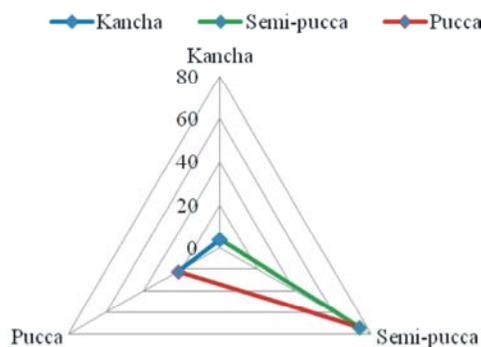


Fig. 7: Sanitary facilities of the fish farmer in the study area

Table 2: Use fuel for cooking by the fish farmers in the study area

Cooking fuel	No. of respondents	Percent (%) value
Cow-dung and paddy straw	5	5
Paddy straw	4	4
Wood	53	53
Dry leaf	7	7
Fuel gas	6	6
Dry leaf and wood	14	14
Wood and paddy straw	11	11
Total	100	100

100% fishermen’s household used tube-well water for drinking purposes, among them 40% had their own tube-well, 50% used shared tube-well and remaining 10% used neighbors’ tube-well.

Sanitary Facilities: Present study recorded three types of toilets from the studied area those are Kancha, Semi-Pucca and Pucca. kancha toilet was made of bamboo with leaf shelter, plastic bag and inadequate drainage disposal where semi-pucca toilet was made of tin or wood with inadequate drainage disposal and pucca toilet was made of brick with good drainage disposal. It was shown that 4%, 74% and 22% of fish farmers used kancha, semi-pucca and pucca toilet respectively (Figure 7). Sanitary conditions of the fish farmers were relatively satisfactory than fish farmers in Mymensingh district where Ali *et al.* [38] in his study found that 62.5% of the farmers had semi-pucca, 25% had kancha and 12.5% had pucca toilet.

Electricity Facilities: Present study revealed 94% electricity facility from fish farmer households where 6% had no electricity facility. Ali *et al.* [38] represented 95% fish farmers had electricity facilities from Tarakanda upazila of Mymensingh district.

Used Fuel for Cooking: From the survey, it was found that most of the households (53%) used wood where minimum 4% used only paddy straw (Table 2) as their cooking fuel. Ali *et al.* [38] represented majority households (72.5%) were used wood where minimum households (12.5%) were used cow-dung in the Mymensingh district.

Financial Capital

Sources of Credit: It was found that 74% of farmers used their own money for fish farming while 8% of the farmers

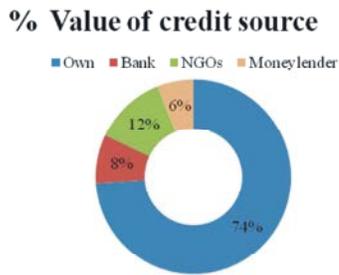


Fig. 8: Credit source of fish farmer in the studied area

Table 3: Annual incomes of the fish farmers in the studied area

Annual household income (BDT) (1 US\$ @ 80 BDT)	No. of respondents	% value of fish farmer
Up to 300	4	4
300.01-625	26	26
625.01-937.50	27	27
937.51-1250	31	31
>1250	12	12

received loans from bank, 12% from NGOs and 6% from moneylender and relatives (Figure 8). Different NGOs and banks provided credit facilities to the fish farmer based on the pond size, land ownership, production and management practice. Quddus *et al.* [40] represented that, only 34% farmers got bank loan for fish culture while majority (53%) of farmers expend from their own sources.

Annual Income: Fish farmers were grouped into five categories based on their annual income level (Table 3). Annual income of fish farmers was varied from 300-1250 US\$. Majority fish farmers (31%) earned BDT 75,000 to 1,00,000 per year which was higher than the national average BDT 28,430 [43]. The present findings of annual income of fish farmers match well with the findings of Khatun *et al.* [29].

Occupational Status: Besides fish farming, pond fish farmer was also involved with various types of activities (Figure 9). Agriculture was the main occupation of

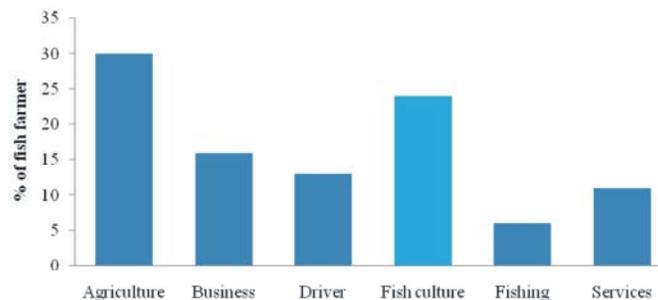


Fig. 9: Occupation status of the fish farmers

majority fish farmer (30%) where fish farming was the main occupation of 24% farmer. Present findings showed more or less similarity with Pravakar *et al.* [30] findings.

Savings of the Farmer: In the studied area, majority farmers (63%) were not capable to save their earning money due to poor socioeconomic condition and maximum expenditure for joint family. Besides pond fish farming, farmer was also involved with various types of activities. As a result, 37% were capable to save money in bank or different types of NGOs. Sohel *et al.*, [14] represented more or less similar result from Bogra.

Natural Capital:

Pond Size and Depth: Pond size and depth plays a vital role in case of properly pond management. Efficiency of fish culture depends on the size of ponds [41]. The average pond size in the study area was found to be 0.12 ha (29 decimals). The average pond size (0.24ha) in Chandpur District was recorded by Pravakar *et al.* [30] which was larger than present findings. In the studied area, Average pond depth was recorded 3.38 meter. DoF [20] represented average pond depth in Bangladesh ranges between 2 to 5 meters.

Pond Type and Ownership: Present study represented 84% seasonal pond where only 16% was perennial pond. In the dry season sufficient level of water was not available in the pond of study area. For fish culture and domestic purpose, they often pumped water from nearest canal or riverine source. As a result, farmers were not capable to earn expected output from those culture ponds. Pravakar *et al.* [30] represented 90% seasonal pond from Bogra. Observed highest number of ponds (85%) was occupied by the single owners followed by joint or multiple owners (15%). Ali *et al.* [38] represented 70% of the ponds under single ownership from Tarakanda Upazila of Mymensingh district.

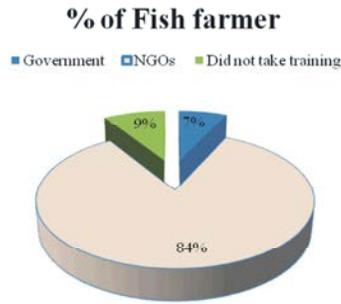


Fig. 10: Training exposure of fish farmer in the studied area

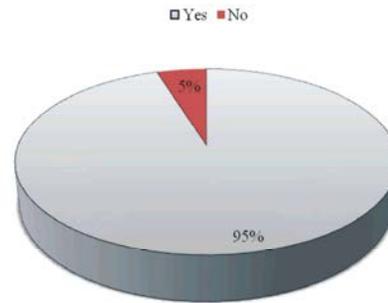


Fig. 11: Improved socio-economic condition through fish farming

Table 4: Problems faced by the fish farmers in the study area

Problem	% of fish farmers
Fish disease	9
Insufficient water in dry season	12
Lack of quality feed	5
Lack of money	25
Non availability of fish fry	11
Poor technical knowledge	4
Pouching	8
Seasonal flood	26

Social Capital

Training on Fish Farming: Technical based training is most effective for pond fish farming. 84% fish farmer achieved training on fish farming from NGOs (AIN Project, WorldFish) where 7% from Upazila Fishery Office (Figure 10). Though, training exposure of fish farmer was comparatively higher than others district namely Chandpur District but production was low due to insufficient capital and seasonal flood. Pravakar *et al.* [30] represented, 34% of the fish farmers received necessary training on improved fish farming from Upazila Fishery Office.

Social Status of Fish Farmers: Majority fish farmers (70%) had ordinary social status, 11% were local leaders and 19% were respectable persons in the society.

Constraints of Fish Farming: Pond fish farmer were faced various types of problem during culture period such as economical, technical, social and environmental problem. Majority farmers (26%) regarded seasonal flood as the single most vital problem where another problems were Lack of money (25%), insufficient water in dry season (12%), Non availability of fish fry (11%), Fish disease (9%), Pouching (8%), Lack of quality feed (5%), Poor technical knowledge (4%) respectively (Table 4). Ali and Rahman [39] reported lack of scientific knowledge,

multi- ownership of ponds, attack of fish disease and non-availability of good quality fish fry were the major problems in pond fish culture in Bangladesh.

Livelihood Outcomes and Improved Socio-Economic Condition: Livelihood outcomes can be considered as the poverty reducing indicator of a society. Eradication of poverty and food insecurity depends on equitable access to resources, access of disadvantaged groups to sufficient, safe and nutritionally adequate food [42]. Livelihood outcomes of pond fish farming were positive and most of the people had increased their income through fish farming. For sustainable livelihood of pond fish farmer, it should be required to government support by providing loan without interest, Extension facility, Technical support. Present study revealed improved their socioeconomic conditions of fish farmer through fish farming, as ensured by 95% fish-farmers (Figure 11). Only 5% of the farmers had not improved their socio-economic conditions due to lack of money, Seasonal flood, poor knowledge on fish farming and high price of fish feed and poor marketing facilities.

CONCLUSION

By analyzing different types of parameters during the study period Barisal sadar Upazila found to be potential area for fish culture. For improving culture practice in scientific way government should provide training facilities, credit facility without interest, motivated to utilize all types of water bodies for fish culture as well as integrated culture should be adopted. Any kind of fish hatchery was not available in the study area. For providing good quality seed hatchery should be established in the studied area. All the water resources should be utilized for fish culture to get maximum production by using scientific technology. Maximum utilization of water resource by following

scientific technique should be ensuring to improve the socioeconomic conditions of pond farmer.

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