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BUILDING RESILIENCE OF FISHERY AND CHANGING LIVELIHOOD STATUS OF THE FISHERMEN IN BANGLADESH

MD. SHAJAHAN Kabir
Dept of Rural Sociology, Bangladesh Agricultural University, (BANGLADESH)
E-mail: mskabir786@gmail.com

RADOVIĆ-MARKOVIĆ Mirjana
Faculty of Economics and Engineering Management, Novi Sad (SERBIA)
E-mail: mradovic@gmail.com

ABSTRACT

The agricultural sector faces various challenges, including climate change, natural disasters, diseases, and water pollution. Resilience is essential for fish farming in Bangladesh as the sector is vulnerable to a range of environmental, social, and economic stresses. In line with this, building resilience is critical for the long-term sustainability of fish farming in Bangladesh. This study was conducted to assess the significance of fish farming in changing the livelihood status of the fishermen in Mymensingh district of Bangladesh. Our article is based on information collected from randomly selected sixty fishermen. Research used a well-structured questionnaire from July to December 2017. The survey identified that fishermen faced various problems such as social, economic, and technical ones. In our study was discovered that mostly of respondents had lack of capital, and illiteracy on fish farming. However, there is few institutional supports. The study revealed that fish farming firmly had a significant contribution in changing livelihood status of the fishermen in the study area.

Keywords: *Innovation, technology, fishermen, fish farming, livelihood.*

JEL classification: Q55, Q22

INTRODUCTION

Bangladesh is a country of agricultural where majorities of the rural people depend on natural resources (land, aquatic resources, forests, livestock etc.) for their livelihoods. Livelihood comprises the capabilities, the assets (natural, physical, human, financial and social capital), the activities and the accesses to these that together determine the living gained by the individual household [1]. Livelihood comprises the capabilities, the assets (natural, physical, human, financial and social capital), the activities and the accesses to these that together determine the living gained by the individual household [2]. Their income from this brought remarkable positive change in their life and they had better control over their decisions and income [3,4]. This is particularly important for women and poorer households as they have few opportunities of income generation for their livelihoods. Therefore, income generation through women's participation has become not only a global and Bangladesh issues in current time, as well as a great concern for the future [5].

Fisheries and aquaculture are one of the most upgrading sub-sectors of agriculture throughout the world. Fish farming, also known as aquaculture, can play a significant role in improving livelihoods in Bangladesh, which is a country that relies heavily on fisheries for both food and income. For example, during the last two decades, the fishery sector has expanded significantly [19].

Here are some ways in which fish farming can increase livelihoods in Bangladesh:

- **Increased production:** Fish farming can increase the production of fish, which can help to meet the growing demand for fish in the country. This can create more job opportunities for people involved in the farming, processing, and marketing of fish.

- **Improved nutrition:** Fish is a rich source of protein and essential nutrients such as omega-3 fatty acids, which are important for maintaining good health. Fish farming can increase the availability of fish for consumption, particularly for those who cannot afford to purchase fish from markets.

- **Diversification of income**: Fish farming can provide an additional source of income for small-scale farmers, particularly those who have limited land for agriculture. Fish farming can be done in ponds, tanks, and even in small water bodies, making it accessible to many people.

- **Reduced pressure on wild fisheries**: Overfishing is a major problem in Bangladesh, and fish farming can help to reduce the pressure on wild fisheries by providing an alternative source of fish.
- **Increased exports:** Bangladesh is a major exporter of fish and fish products, and fish farming can help to increase exports, which can generate income for the country.
- **Increased employment:** The development of aquaculture has generated considerable employment opportunities in Bangladesh.

In summary, fish farming can provide a sustainable way to improve livelihoods in Bangladesh by increasing fish production, improving nutrition, diversifying income, reducing pressure on wild fisheries, and increasing exports and employment. In line with this, the aim of this paper is to investigate how is possible to improve the position of fishermen and their standard of living and reduce the gap for developed countries.

THEORETICAL OVERVIEW

Fish farming has become an important source of food and income for millions of people in Bangladesh, a country that is highly vulnerable to the impacts of climate change. With its extensive network of rivers, canals, and ponds, Bangladesh has the potential to become a major player in the global aquaculture industry. It has farming has been identified as a key strategy for improving food security and resilience in Bangladesh. It has the potential to provide a source of high-quality protein for millions of people, especially those living in rural areas where access to nutritious food is limited. In addition, fish farming can help to diversify the incomes of smallholder farmers, who are often dependent on a single crop.

One of the benefits of fish farming is its ability to adapt to changing environmental conditions. Fish can be raised in a variety of different environments, including ponds, lakes, and rivers. This flexibility means that fish farmers can adjust their practices in response to changes in weather patterns, such as increased flooding or drought. Another advantage of fish farming is that it can be integrated with other agricultural activities, such as rice farming. For example, fish can be raised in the same ponds as rice, with the fish providing natural fertilizer for the rice and the rice providing shade and a source of food for the fish.

Despite its potential benefits, fish farming in Bangladesh faces a number of challenges, including disease outbreaks, overfishing, and competition from imported fish. In addition, the impacts of climate change, such as rising temperatures and increased flooding, could make it more difficult to raise fish in certain areas. Fish farming, marketing and associated activities has become an integral part of human life and livelihood of the rural people of Bangladesh [5],[6]. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets in both now and future [7].

Despite women's position having gradually improved in developing countries, the women remain far behind women in developed nations because of their low socio-economic, legal status, and lack of knowledge. Namely, many women in developing nations continue to lack education and higher paying salaries, role models and mentorship in rural entrepreneurship [8]. In addition, in these countries, women are more dependent on agriculture and water resource than men [9]. In this regard, of great importance is recognizing the gender roles and priorities in the design of agricultural programs and initiatives [10]. They should have an equal right to education and possibility to progress, the same as workers who work in employer's premises and who are subject to the same evaluation policies as those workers.

In many Asian countries, schools are increasingly being established that focus on offering educational programs in the form of short distance learning courses. It provides training for virtual assistants, who remotely help people manage their businesses. Among other things, these programs include the acquisition of communication skills, ethics, time management, etc. "The skills gap is very present in Cambodia, and teaching people to become virtual assistants is the perfect area for training" [11, p.2]. These programs are well accepted especially among young people there. Also, to address these challenges, the government of Bangladesh has implemented a number of policies and programs to promote sustainable fish farming practices. For example, the government has provided training and technical assistance to fish farmers, established regulations to prevent overfishing and protect the environment, and invested in research to develop new fish species that are more resilient to changing environmental conditions. In addition, there are several institutions and organizations that research the resilience of farming in Bangladesh, including such as follow:

- Bangladesh Agricultural Research Institute (BARI) - BARI conducts research on developing resilient crops, such as flood-tolerant rice varieties, to cope with the challenges of climate change.

- International Maize and Wheat Improvement Center (CIMMYT) - CIMMYT works with farmers and research institutions in Bangladesh to develop and promote sustainable and resilient maize and wheat farming systems.

- International Center for Tropical Agriculture (CIAT) - CIAT conducts research on improving the resilience of smallholder farming systems in Bangladesh, particularly in the face of climate change.

- International Food Policy Research Institute (IFPRI) - IFPRI conducts research on improving the resilience of food systems in Bangladesh, including through improved agricultural productivity, market access, and nutrition outcomes.

These institutions and organizations, among others, are working to develop and promote resilient farming systems in Bangladesh to help farmers cope with the challenges of climate change and other environmental and economic pressures. The recent studies compare decision making linked to the agricultural activities by women with those by men, ignoring the majority of agricultural households in which are both involved in production. In Bangladesh, men have greater access to education and modern agricultural technology compared to women. Keeping in mind that men usually make decisions about the sale of agricultural products, and, generally, decisions on farming issues which require finance, it can be assumed that they most probably keep more returns from the farms than women [12].

Reducing gender gap is recognized as priority task to contribute to agricultural growth and development especially in developing countries [12-14]. Simultaneously, women's empowerment is broadly viewed as a key factor of achieving gender equality, improving productivity in agriculture, and advancing broader development outcomes [16].

One number of researchers concluded in their studies that in spite of the importance of fishing in national and local economies [17],[18], this sector is poorly planned and supported, and inadequately funded

METHOD

During collection of data, both primary and secondary sources were considered. Primary data were collected from fishermen. Based on the objectives of the study several visits were made to the study area to collect

information. The data were collected from July to December 2017 after randomly selecting sixty respondents. For the collection of data, a range of Participatory Rural Appraisal (PRA) tools and personal interview were applied with different degree of effectiveness.

Questionnaire survey was conducted to collect data on fish culture techniques, production rate, farming constraints, production costs and benefits, vulnerability concern, gender issues, financial issues, livelihood outcomes, sustainability etc.

Participatory Rural Appraisal (PRA), tools such as Focus Group Discussion (FGD) and Cross-check interviews with key informants was performed. FGD was used to get an overview of particular issues such as existing fish farming and marketing systems, socio economic condition of farmers etc. Cross-check interviews were conducted after collecting the data with key informants such as up a zila fisheries officer, researchers, non-government organization (NGO) workers for confirmation of the collected information. Further assessment was carried out when information was found to be contradictory. A total of 16 keyinformants were interviewed.

Secondary data were collected through literature and publications available from fisheries office, quarterly and annual reports; Books of Bangladesh Bureau of Statistics was used to cross- check, complement or illustrate the primary data obtained through the questionnaire survey and group discussion. Family size of the respondents were ranged from 2 to 9 and family size of the fishermen was divided into three categories on the basis of the number of family members such as nuclear family (up to 4), medium family (5-6) and joint family (>6) The data represent that majority (48.3%) of the respondents belongs to nuclear family followed by medium (41.7%) and joint family (10%).The above findings are similar with the result of (reported that about 42% of the fishers lived in nuclear family, while about 57.50% in the joint family in the district of Mymensingh [13].

The collected data were summarized and scrutinized before the final tabulation. The tabulation and graphical representations of the data were performed by Microsoft Excel-2013 and statistical analysis of the recorded data was performed by Statistical Package for Social Science (SPSS 10.5).

KEY FINDINGS

In current study total 60 fishermen were interviewed and data on various socio-economic conditions like age, education, family and farm size, area of fish farming, knowledge and experience in fish farming, training exposure, annual income, organizational participation, extension media contact etc. were collected. A detailed analysis is made in respect of the aims and objects of the study.

The potentiality of human resources can be estimated by the information of age distribution. In this study age of the respondents ranged from 25 to 65 years with an average of 40 years. The investigation showed that majority of the fishers belongs to the age of 36-50 (50%), while youth having a range of 18-35 years belongs (28.3%) and 51-65 aged class had the lowest involvement (21.7%). It indicates that number of workable people is high.

Present study result indicates that joint family are continuously decreasing in the fishermen society in the study area may be due to economic condition but medium to large sized family got extra facilities from the other members of their family in fish farming activities than that of the nuclear family.

In the study area it was found that, most of the farmer were very poor who hadn't enough money for fish farming, so they had to receive loan from bank, NGOs and money lenders. The study revealed that about 43.3% of the farmers had their own money, while about 30% of the farmers received loan from bank for fish farming, about 16.7% received loan from NGOs and rest of them received loan from a rotdar (moneyed man).

Training exposure score of the respondents ranged from 0 to 13 days. Data contained showed that 43.3% of the respondents had no training exposure, while 23.4%, 25%, 5% received short-term, mid-term, long-term training exposure respectively which indicates the lack of long-term training exposure by the respondents may be due to lack of organizational facilities.

Area under fish farming of the respondents ranged from 0.36 to 1.66 hectares. Average farm size of the respondents was about 0.67 hectares. Based on their farm size, the fish farmers were classified into three categories which showed that the majority of the respondents as 56.7% had marginal sized farm, while 16.7% had medium farm and 26.6% had small sized farm.

The information indicates that majority of the respondents had marginal and small farm may be due to financial aspect. On the other hand, based on survey data pond ownership of the respondents classified into four types' viz., single ownership, multiple ownership, single lease and multiple leases. Where about

50.7% of operators had ponds of single ownership, while about 20.7% had ponds of multiple owner ship, and about 11.7%, 16.9% were involved in single lease and multiple lease ponds respectively (Figure 9) indicates the less percentage of multiple ownership which may play a vital role for individual success in fish farming.

The findings also showed that about 66.66%, 23.33% and 10% of the respondents had moderate, high and low annual income. Our finding showed that majority of the respondents had moderate to high annual income due to medium family size along with more earning members and upgrading socioeconomic conditions as well.

Our survey revealed that 40% of the respondents had no organizational participation, whereas 25% had medium, 33.3% had low organizational participation, and only 6.7 % had high organizational participation may be due to unconsciousness and lower level of education. On the other hand, majority of the respondents about 60% had low extension media contact, while 35% had medium but 5% had high media contact. In current study area a few pen farmers had low extension media contact as a consequence of communication gap between the fish farmers and extension agent.

The correlation co-efficient (r) between age of the fish farmers and their changing of livelihood pattern through fish farming was 0.134. The computed `r' value indicates that age of the fish farmers had no direct relationship with their changing livelihood pattern through fish farming. The value of (r) between education and changing livelihood pattern of the fish farmers was 0.372 which indicates a positive and highly significant relationship. This is due to educated persons of the study area have frequent contact with extension agents, TV programs, which lead them towards better culture method and increase livelihood pattern compared to the individuals with less educational background. But the value of (r) between family size, farm size and changing livelihood pattern of fish farmers were found to be -0.208, 0.584 respectively that indicates respondents' family size was negatively and farm size was positively correlated with their changing pattern of livelihood through fish farming. On the other hand, the value of (r) between knowledge in fish farming, training exposure and their changing livelihood pattern were 0.311 and 0.243 respectively.

The respondents' changing livelihood scores in all twelve selected characteristics ranged from 0 to 30, with an average of 17, where '0' indicating no change and '30' indicating a very high change. Score of problems of the respondents in fish culture ranged from 7 to 25. Based on the scores, the respondents were classified into three categories as low changes confrontation

(up-to 10), medium changes confrontation (11-20) and high changes confrontation (21-30). The percentage of changes of livelihood through fish farming of the respondents were about 58.30%, 31.70% and 10.00% considered as medium, high and lower level of changes respectively which indicates that due to various constrains as mentioned earlier nearest to high level of changes was insignificant in the study area.
Results of the current study are similar with the findings of Ali et.al., **[13]** stated that 50% of the fishers belong to age group of 31-40 years in the district of Mymensingh. Religion is important in the socioeconomic life of people that can act as a notable constraint or modifies in social change. In our study area, majority fish farmers about 56.7% were Muslims, while 43.3% were Hindus with the absence of Buddhists or Christians.

CONCLUSION

The paper analyses the socio-economic and livelihood status of the fishermen in Mymensingh district in Bangladesh and revealed that socio-economic and livelihood status of the fishermen. Our conclusion can be supported by our analysis of survey data. Namely, it was noticed that annual family income, organizational participation had a positive correlation with the changing livelihood pattern of the selected respondents through fish farming as the value of (r) were 0.752, 0.69 respectively may be due to the active participation by the fishers with various organization which is very much needed for sustainable development of the fishers.
In addition, the study has shown that the fishermen were deprived of many facilities. The level of education of the fishers was inadequate, besides lack of fish farming techniques, media coverage, unawareness about health and poor economic condition hinders their progress [1**5**].
Therefore, the following recommendations can be made to upgrade the socio-economic status of the fishermen:

i. Collaboration and active community participation amongst relevant stakeholders including government, NGOs is crucial to ensure their basic needs.

ii. Educational facilities should be increased by the government, NGOs to increase their level of understanding.

iii. Increase of public awareness through training exposure, media coverage, various publications are highly required.

iv. Adequate bank credit under easy terms should be ensured by the Government so that they can use their resources properly.

v. The respondents should be encouraged in good aquaculture practice for maximum production along with marketing and related facilities should be improved.

vi. Fish farmers can increase their resilience by strengthening their market linkages, such as establishing direct marketing channels and engaging in value-added activities such as processing and packaging.

By adopting a range of measures, fish farmers can enhance their capacity to cope with and recover from shocks and stresses, ensuring a stable and secure source of food and income for millions of people. Overall, fishers and fish farming have the potential to play an important role in building resilience in Bangladesh, helping to ensure that the country's food systems are able to adapt to the challenges posed by climate change.

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