

**PROBLEMS ENCOUNTERED IN CATFISH CULTURE BY THE
FARMERS OF TRISHAL UPAZILA UNDER MYMENSINGH
DISTRICT**

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CERTIFICATE

*This is to certify that the thesis entitled, "PROBLEMS ENCOUNTERED IN CATFISH CULTURE BY THE FARMERS OF TRISHAL UPAZILA UNDER MYMENSINGH DISTRICT" submitted to the faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science (MS) in Agricultural Extension**, embodies the result of a piece of bona fide research work carried out by **MD. SHATHIL TALUKDER**, Registration No. 18-09164, under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.*

I further certify that any help or sources of information, as has been availed of during the course of investigation have been duly acknowledged.

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DEDICATION

DEDICATED TO

THIS THESIS IS LOVINGLY DEDICATED TO MY PARENTS

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ABBREVIATIONS USED

GDP	Gross Domestic Product
BBS	Bangladesh Bureau of Statistics
NGOs	Non-Government Organizations
GOs	Government Organizations
FFS	Farmers Field School
BRRRI	Bangladesh Rice Research Institute
PEI	Problems Encountered Index
SAU	Sher-e-Bangla Agricultural University
OLS	Ordinary Least Squares
DoF	Department of Fisheries
SAAO	Sub-Assistant Agriculture Officer
SPSS	Statistical Package for Social Sciences
SD	Standard Deviation
Ag. Ext. Ed.	Agricultural Extension Education
Ag. Ext. and Info. Sys.	Agricultural Extension and Information System
B	Multiple regression
MoYS	Ministry of Youth and Sports
AIS	Agriculture Information Service
<i>et. al</i>	All Others
DAE	Department of Agriculture Extension

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ABSTRACT

The objectives of this study were to describe the selected characteristics of farmers; to assess the extent of problems encountered in catfish culture by the farmers; to explore the contribution among each of the selected characteristics of farmers with their problems encountered and to compare the problems encountered by the farmers in catfish culture. The study was conducted with randomly selected 120 catfish cultivars in Trishal upazila under Mymensingh district. A pre-tested interview schedule was used to collect data from the respondents during 24th March, 2020 to 25th April, 2020. Problems encountered in catfish culture was the dependent variable and its was measured by on basis of problem encountered scores. Problems encountered in catfish culture and the 11 selected characteristics of the respondents contributed the independent variables of the study. Multiple regression was used to examine the contribution of the selected characteristics of the respondents. The majority (60.00%) of the farmers encountered medium problem while 22.50% percent of the farmers encountered low problem. Comparatively few farmers (17.50%) encountered high problem in catfish culture. Four characteristics of the respondent's viz. media contact for fish farming information, training exposure, level of education and organizational participation had significant positive contribution with their Problems encountered in catfish culture. On the basis of PEI, it was observed that "high price of feed" ranked first followed by "unavailability of quality feed", "high price of vaccine and medicine", "low production and lack of local market" and "disability of producing required fish eggs" were the least problems encountered by the farmers in catfish culture.

CHAPTER I

INTRODUCTION

1.1 General Background of the Study

Bangladesh is a South Asian country located in between latitude 20°34' and 26°39' north and longitude 80°00' and 92°41' east. The country is crisscrossed with hundreds of rivers. The climate of Bangladesh is unique for aquaculture and fisheries resources management. The Bay of Bengal is situated at the south of the country. Winter lasts only for about 2 months in the country. Temperature and rainfall range from 07° to 40°C and 1170 to 3400 mm respectively (DoF, 2018).

The country has an exclusive economic zone of 1,18,813 square kilometers which is 73% of the country's land area. On the other hand, Bangladesh is a small and developing country overloaded with almost unbearable pressure of the human population. In the past, the people of Bangladesh were mostly dependent upon land-based proteins. But, the continuous process of industrialization and urbanization which consumes these limited land areas (DoF, 2018).

Bangladesh is surrounded by rivers and various types of water sources like pond, stream, and lakes. Major parts of the total population of this country are directly or indirectly involved with fish or fish related business. It is blessed with huge open water resources with a wide range of aquatic diversity. Bangladesh ranked 3rd in inland open water capture production and 5th in world aquaculture production. Currently, Bangladesh ranks 4th in Tilapia production in the world and 3rd in Asia (DoF, 2018).

Fisheries are one of the major components of agricultural activities, playing a significant role in nutrition, employment, income generation, foreign exchange earnings and in the economy of Bangladesh as a whole. Fish and Fisheries sector play an immensely important role on the socio-economic development of

Bangladesh from time immemorial and it is the part of our cultural heritage (Akter *et al.*, 2015). It also plays an important role in nutrition, employment and export earnings in Bangladesh. This sector provides a major (60.0%) share of animal protein. It contributes 3.57 percent to our national GDP and around one-fourth (25.3%) to the agricultural GDP. Bangladesh is one of the world's leading fish producing countries with a total production of 42.77 lakh MT in which the production of catfish around 5.22 lakh MT in FY 2017-18, where aquaculture production contributes 56.24 percent of the total fish production. The average growth performance of this sector is 5.26 percent for last 10 years. Aquaculture shows a sturdy and consistent growth, average growth rate is almost 10 percent during the same timeframe. It is believed that if the increasing trend of fish production continues, it will be possible to achieve the projected production target of 45.52 lakh MT by 2021. After 46 years of independence, Bangladesh becomes a self-sufficient country in fish production, with a per capita fish consumption of 62.58 g/day against set target of 60 g/day (DoF, 2018).

There are two types of aquaculture practices are going on in Bangladesh - freshwater and coastal aquaculture. There is no marine aquaculture currently practiced in the country and no marine or coastal finfishes are farmed. Freshwater aquaculture comprises mainly pond farming of carps (indigenous and exotic), Mekong pangasius catfish, Tilapia, Mekong climbing perch and a number of other domesticated fish though in lesser scale (Hossain, 2014). Now a day's the demand of catfish become high for this reason commercial and small-scale catfish farming business is gaining popularity. There are several catfish species available in Bangladesh. Among those species, some are very large in size and some species are smaller.

Catfish is a species-rich and exceptionally diverse group of fishes constituting the order Siluriformes. Fishes of this group are easy to identify because their body is usually naked (without scales) or covered with bony plates and the majority of them have barbels (whiskers) around their mouths (Talwar and

Jhingran, 1991). This large group of fish is numerously represented in Bangladesh (Rahman, 2005) and all over the world (Lundberg and Friel, 2003). Because of their worldwide distribution and diversity, catfishes are of great interest to ecologists and evolutionary biologists, and are important in studies of biogeography from regional to global (Lundberg and Friel, 2003). Many catfishes around the world have huge economic value and are fished for human consumption and pet trade or recreation (Lundberg and Friel, 2003). After Cypriniformes and Perciformes, the two largest orders of fishes in terms of a number of species, Siluriformes, i.e. the catfish group, is very prominent in the freshwater fish fauna of Bangladesh. At least 55 species of catfishes belonging to 35 genera have been recorded so far in Bangladesh (Rahman, 2005).

Catfish species of Bangladesh show a great diversity in size. Boal also called freshwater shark (*Wallago attu*), Ayre (*Sperata aor*), Baghair (*Bagarius bagarius*), Rita (*Rita rita*) and Pangas (*Pangasius pangasius*) are among the largest sized members of the catfish group, often attaining over one meter in length, whereas *Amblyceps mangois*, *Hara hara*, *Hara jerdoni* etc. are among the smallest, rarely exceeding 5 cm in length (Rahman, 2005). In Bangladesh Pabda (*Ompok Pabda*), Shing (*Heteropneustes fossilis*), Magur (*Clarias batrachus*), Tengra (*Mystus vittatus*) are also found.

The catfish species are widely distributed in the rivers, haors, baors, beels and floodplains of Bangladesh and generally they grow with natural care and most of the indigenous catfish production comes from these natural sources. In the present time, catfish are highly available in the market and most of the people love this fish on their table. Although the number of catfish in the natural water bodies is reducing day by day due to overfishing, faulty management policy, and natural causes like siltation of water bodies etc. Nowadays siltation has threatened the existence of most of the river and many are gradually being turned into small canals through which the inland open water fisheries have declined significantly during the last 3 to 4 decades. Other reasons are uncontrolled use

of chemicals, fertilizers and insecticides, destruction of natural breeding and feeding grounds, harvesting of wild brood fishes (Azher *et al.*, 2007). But now people are becoming interested in catfish farming and establishing large or small-scale catfish farm commercially. On these considerations, the present researcher felt the necessity to conduct this research on “Problems Encountered in Catfish Culture by The Farmers of Trishal Upazila under Mymensingh District”.

1.2 Statement of the Problem

Catfish culture in different region of Bangladesh is increasing day by day. Catfish culture become very profitable for its higher consumer demand and higher market price. But there are also some factors like high price of feed, medicine and vaccines, high price of fish fry etc. which affect the catfish culture and cause fish farmer’s economic losses. The development of a catfish farm has been influenced by production inputs, availability of water, fish diseases, and farmer’s knowledge on catfish culture (Ahmed *et al.*, 2007). In view of the foregoing discussion, it is necessary to increase catfish culture in Bangladesh. It is assumed that notable improvements can takes place in fisheries sectors of Bangladesh. The purpose of the study was to assess the problems encountered in catfish culture by the farmers and also its associated factors. Analyzing the issues from farmers of catfish culture, the study was designed to find out the following research questions regarding Problems encountered in catfish culture by the Farmers:

1. What is the extent of problems encountered in catfish culture by the farmers of Trishal Upazila?
2. What are characteristics of the farmers?
3. Is there any contribution of the farmers selected characteristics with their problems encountered?

These questions point to the need for a research study with the title “Problems encountered in Catfish Culture by the Farmers of Trishal Upazila under Mymensingh District” in order to have an understanding the problems of catfish

farm owners in catfish culture. This type of research information will be helpful to the catfish farm owners, policy makers and government and non-government organizations dealing with catfish production in this country.

1.3 Objectives of the Study

The following specific objectives were formed to give proper direction to the study:

1. To describe the following selected characteristics of the farmers;
The selected characteristics include:
 - i. Age
 - ii. Level of education
 - iii. Experience in catfish culture
 - iv. Dependency ratio
 - v. Area under catfish culture
 - vi. Annual family income
 - vii. Annual income from catfish culture
 - viii. Organizational participation
 - ix. Cosmopolitaness
 - x. Training exposure
 - xi. Media contact for fish farming information
2. To assess the extent of problems encountered in catfish culture by the farmers;
3. To explore the contribution of the selected characteristics of farmers with their problems encountered; and
4. To compare the problems encountered by the farmers in catfish culture.

1.4 Scope of the Study

The fisheries development is an important economic activity in Bangladesh. It is a powerful economic generator stimulating a number of subsidiaries, such as manufacture of fishing boats and fishing gear, construction of ice factories, cold storage plants, fish processing plants and other selected facilities. In order to

meet the shortage of fish and increasing demand resulting from population growth, it is essential to increase pond fish production in Bangladesh. Increased aquaculture production, mainly pond fish production in Bangladesh can help meet the increased domestic demand for fish. In order to meet the shortage of fish, the Department of Fisheries (DoF) of Bangladesh is encouraging people to increase fish production in their surrounding water areas such as ponds, haors, baors, beels etc. With this background in view, many NGOs, national and international organizations are working to develop the fisheries sector in Bangladesh. During the last decade, catfish culture has brought considerable increase in fish production. Production from ponds has increased dramatically. People are also experimenting with catfish monoculture, poly-culture with carp. When all these activities have gained remarkable popularity, the economic consequences of these activities are not properly known to the people. This study is expected to determine the problems encountered in catfish culture by the farmers which may give proper guidance to the farmers for increasing income from pond fish production and which would in turn contribute to higher national product and income.

1.5 Limitation of the Study

The present study provides some important information for producers, extension workers and decision makers regarding catfish culture. Almost all the research works have limitations in terms of time, money and personnel. Considering the time, money and other resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as noted below:

1. Necessary data were collected from a limited area covering a small number of samples in Trishal upazila under Mymensingh district.
2. The characteristics of the farmers in the study area were many and varied but only twelve characteristics were selected for investigation in this study as stated in the objectives.

3. The researcher relied on the data furnished by the catfish farmers from their memory during interview.
4. For some cases, the researcher faced unexpected interference from the over interested side-talkers while collecting data from the target populations. However, the researcher tried to overcome the problem as far as possible with sufficient tact and skill.
5. Reluctance of catfish farmers to provide information was overcome by establishing proper rapport.
6. In spite of the above limitations, some of the findings of the study may be helpful for decision-makers, fish producers, GO and NGO officials. It may also serve as guideline for further research.

1.6 Assumptions of the Study

“An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence” (Goode and Hatt 1952). The researcher had the following assumptions in mind while undertaking this study:

1. The selected respondents were competent enough to reply the queries made by the researcher.
2. The responses furnished by the respondents were valid and reliable.
3. Information furnished by the respondents included in the sample was the representative opinion of the whole population of the study area.
4. The researcher who acted as interviewer was well adjusted to social and environment condition of the study area. Hence, the data collected by him from the respondents were free from bias.
5. All the data concerning all the variables of the study were normally and independently distributed.

1.7 Definition of Important Terms

The terms which have been frequently used throughout the thesis are defined and interpreted below:

Age: Age of a respondent was defined as the span of his/her life and was operationally measured by the number of years from his/her birth to the time of interview.

Education: Education referred to the development of desirable change in knowledge, skill, attitude and ability in an individual through reading, writing, working, observing and other related activities. It was operationalized by the formal education of pond farmers by taking into account of years he/she spent in formal educational institutions.

Experience in catfish culture: Experience as a general concept comprises knowledge of or skill of some thing or some event gained through involvement in or exposure to that thing or event. Experience in Catfish Culture is the knowledge and skill that is gained through time spent doing catfish culture.

Dependency ratio: The dependency ratio is an age-population ratio of those typically not in the labor force (the dependent part ages 0 to 14 and 65+) and those typically in the labor force (the productive part ages 15 to 64). It is used to measure the pressure on the productive population. It is normally expressed as a percentage:

$$\text{Dependency Ratio} = \frac{(\text{No. of people aged 0 to 14}) + (\text{No. of people aged 65 and above})}{\text{Number of people aged 15 to 64}} \times 100$$

Area under fish culture: It refers to the area owned by the farmer on which he cultured catfish during the season of collection of data for this study.

Annual family income: The term annual family income referred to the total earning of the respondent himself/herself from agriculture, livestock, fisheries and other accessible sources (business, service, daily labor etc.) during a year. It was expressed in Thousand Taka.

Annual income from catfish culture: It referred to the earning of the respondent from selling of catfish and catfish fry and it was expressed in Thousand Taka.

Organizational participation: It was defined as the degree to which an individual's orientation is external to a particular organization. Empirically it referred to the number of times a person pays participate in the activities of different organizations.

Cosmopolitaness: The term cosmopolitaness was used to refer to the degree to which an individual's orientation was external to a particular social system. Cosmopolitaness of a respondent is measured by computing a cosmopolitaness score. The cosmopolitaness score is assigned on the basis of different places and frequency of his visit extent to and outside of his own social system.

Training exposure: It was used to refer to the completion of an activity by the farmers which were offered by the government, semi-govt. or non-government organization (s) to improve the knowledge & skills of farmers for better performing an agricultural job. It was measured by the number of days of training received by the respondent.

Media contact for fish farming information: It referred to an individual's (farmer) exposure to or contact with different communication media, source and personalities being used for dissemination of new technologies.

Problem encountered in catfish culture: Problem referred to a difficult situation about which something to be done. It referred to the extent of problems encountered by a respondent in catfish culture in terms of social, technical, economical, marketing and psychological problems.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review the researchers conducted in line of the major focus of study. This study as already indicated, was undertaken to have an understanding of the problems faced by the farmers in catfish culture and its relationship with the selected characteristics. Literature having relevance to the present study has been reviewed in three sections. The first section deals with the literature on the constraints faced by the farmers in fish culture and the second section deals with review of studies dealing with the relationships between selected characteristics and faced constraints in catfish culture. The third section deals with the conceptual framework of the study. However, the available reviews of literatures in connection with this study are briefly discussed below:

2.1 Problems Encountered in Catfish Culture

Mushagalusa (2019) showed that constraints facing fish production system in DR Congo as similar to those obtained by Inyang, (2007) in Akwa Ibom State in Nigeria was the development of quality seeds and the establishment of fishponds would make it possible to create new ecological niches for fish (FAO, 2010a), misunderstanding of the biology of the fish selected for production.

Das (2018) the major problems faced by the pond fish farmers in the study area were low quality seed, insufficient loan facilities, lack of technical knowledge, multiple ownership of pond etc. Though industrial pollution remains in low risk until now rapid growing industries in the study area could lead a serious problem in near future. Similar types of pond farming constraints were found by Mazumder (2013) which are major hinders for the progress of pond fish farming in Bangladesh.

Bendangjungla Pongener (2018) showed that the foremost problems with 45.00 percent of the total fishery growers were faced as constraints as high

price fluctuation of fish cost as well as due to the lack of proper domestic market and poor market facilities in the area and also due to the lack of regulated market facilities were identified in the study area. 30.00 per cent were faced the problems due to the lack of approach road to the fishery ponds, followed by 25.00 per cent of the fishery growers were identified the problems of lack of standardization and grading facilities, due to that fair price were not in force to paid the fishery growers and remaining 17.50 per cent were facing the problem of unavailability of transport facilities due to that small grower has to pay more and finally producers have to scarify their share of profit.

Shofiquzzoha (2017) About 68.57% of the farmers were reported that fish disease as the single most problem for fish farming while 8.57%, 11.14%, 14.28%, 2.85% respondents identified the non- availability of fish seed during stocking period, feed problems, natural disasters like flood, drought and others respectively.

Abdullah (2016) revealed that about 50.5 percent of the pond farmers had medium problem compared to 40.6 percent of them having low problem and only 8.9 percent having high problem. Thus, the vast majority (91.1 percent) of the pond farmers had low to medium problem.

Paudel (2016) the fish industry in Nepal has been the identification of heavy metal contamination in fish sold at some major urban centers. For example, some fish were found to have been contaminated with Manganese, Lead and Chromium at Kathmandu.

Gautam (2015) showed that lack of marketing infrastructure, lack of cold storage facilities, poor quality fingerlings and fish feed and lack of technical knowledge are other major issues the fish industry is facing.

Shitote (2013) showed that the problems of catfish farming in Western Kenya were dominated by some factors that are: (1) lack of good quality of seed (2) disease (3) medicine price paid to the farmers for catfish.

Gurung et al. (2010) revealed that the major problem is the lack of sustainable fingerlings supply system.

Yulafc and Cinemre (2007) conducted a study to explore marketing structures of fresh fruits and vegetables, which are produced in Carsamba plain (Turkey), to determine marketing problems and to put forward solution suggestions. According to brokers, the most important problem of fresh vegetable and fruit marketing was not being able to find quality crops. Producers had only limited power in setting the prices of vegetables and fruits which in the market was estimated around 6-7 percent. The most important problem in the market was said to be not having enough standard size. In addition to this, there were some deficiencies related with infrastructure of the market area.

Pandey (2006) showed that the problems of catfish farming in Western Kenya were dominated by some crucial factors that are: (1) lack of finance or bank loan (2) lack of water management or multiple use of pond (3) lack of modern technology knowledge or traditional culture practices.

Uddin (2004) in his study identified five aspects of constraints in commercial cultivation of vegetables viz. seed constraints, disease and insect infestation constraints, field management constraints, marketing of vegetable constraints and extension work constraints. Among these aspects of constraints, they revealed marketing problem severely faced by the farmers.

Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: i) low production due to limited use of fertilizer (ii) lack of organic

matter in soil, (iii) lack of Government support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) marketing facilities.

Erbe and Neubauer (2002) reported that potato production area in Germany increased by 2.1% to 288000 ha in 2002 compared to production area in 2001. The area reduced in 2001 because of marketing problems. The greatest reduction (14%) was in Sachsen- Anhalt. The main varieties are Agria (7.3% of total area), Kuras (5.4%), Cilena (4.1%), Marabel (3.9%) and 20 other varieties. Seventeen new varieties were approved for 2002, including 1 very early, 3 early, 10 semi-early (5 for consumption and 5 for processing), and 3 semi-late and late ripening, while 5 varieties were removed from the German national list.

Pramanik (2001) conducted an extensive study on the twenty-four problems of farm youth in Mymensingh villages relating to different problems in crop cultivation and marketing. Out of twenty-four problems top five problems in rank order were; i) local NGO take high rate of interest against a loan, ii) lack of agricultural machinery and tools, iii) lack of cash iv) financial inability to procure improved seeds, fertilizers and irrigation v) marketing facilities.

Ali and Rahman (1986) stated that the non- availability of good quality fingerlings was the major problem in Lalmonirhat district. Unavailability of fish hatchery was the main crisis of fish seed and they had to import fish fry from far distance such as Bogra and Mymensingh resulting to increase the price of fish seeds.

2.2 Relationship between selected characteristics of the farmers and their Problem Encountered

2.2.1 Age and problem

Ali (2014) revealed that age had no relationship with their problem faced in cotton cultivation.

Azad et al. (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and their faced constraints in vegetable cultivation and marketing.

Anisuzzaman (2008) found that age had no noteworthy association with their problem faced in tuberose cultivation.

Aziz (2006) found that age of the farmers had no significant relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem faced in selected agricultural production activities and marketing.

Bhuiyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraints in banana cultivation and marketing. A similar finding was obtained by Rahman (1996) in his respective study.

Rahman (1995) conducted a study to identify the relationship between the personal characteristics and constraints facing in cotton cultivation of Muktagacha Thana under Mymensingh district. He found that there was no significant relationship between the age of the farmers and their faced constraints in cotton cultivation. Similar findings were obtained by Ali (1999), Rashid (1999), Pramanik (2001), Ahmed (2002), Hossain (2002), Salam (2003) and Halim (2003) in their respective studies.

Shahidullah (1987) in his study of production consumption and marketing behavior of the poultry farmers found negative relationship between age of the farmers and production, consumption and marketing behavior. Similar finding was obtained by Ali (1999), Pramanik (2001), Ahmed (2002), Hossain (2002), Salam (2003) and Halim (2003) in their respective studies.

Sarker (1983) observed that the age of the farmers had significant negative relationship on their poultry problem faced. These findings indicate that the facing of problem in poultry raising decreases at the age increases or the farmers.

2.2.2 Education and problem

Azad et al. (2014) also found that age of the vegetable growers has no significant relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) conducted a study to identify the relationship between the personal characteristics and constraints facing in vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the education of the farmers and their faced constraints in vegetable cultivation and marketing.

Bashar (2006) found that education of the farmers had significant negative relationship with their problem confrontation in mashroom cultivation.

Aziz (2006) found that education of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district.

The study of Ismail (2001) revealed that there was no significant relationship between education and problem confrontation of farm youth. Similar findings were obtained by Halim (2003) in their respective studies. Thus, it could be concluded that an overwhelming majority of the researchers found a negative relationship between these two variables.

Karim (1996) in his study found that education of the farmers had significant negative relationship with their problem faced.

Rahman (1995) in his study on problem faced by the pineapple growers found a significant negative relationship between education of the farmers and their problem faced.

2.2.3 Experience in catfish culture and problem

Ali (2014) found in his audit a colossal association between contribution in betel leaf cultivation of the farmers and their issue faced in betel leaf cultivation of Natore district in Bangladesh.

2.2.4 Dependency ratio and problem

Dependency ratio is a value comes from family size. So, literature related to family size and effectiveness are mentioned below:

Rahman (2006) found that family size of the farmers had no critical association with their imperatives confronted in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

Bashar (2006) found that family size of the farmers had no huge association with their issue encounter in mushroom cultivation.

Aziz (2006) found that family size of the farmers had high huge negative association with their requirements confronted in potato cultivation in Jhikargacha upazilla under Jessore locale.

Salam (2003) in his study found a positive significant relationship between family size and their constraint in adopting environment friendly farming practices.

Haque (1995) found that there was no significant relationship between family size and problem confrontation of the Mohila Bittaheen Samaybaya Samittee. Similar findings were obtained by Rashid (1999), Bhuiyan (2002) and Halim (2003) in their respective studies.

2.2.5 Area under Fish culture and problem

No study was found on the study of relation between problems faced in wheat cultivation and wheat cultivation area. However, there is other study relevant to problem faced by wheat farmers have been stated below:

Azad et al. (2014) also found that farm size of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) found a significant negative relationship between farm size and problem faced of the vegetable growers in vegetable cultivation.

Lionberger (2009) after reviewing the situational factors from the related literature in the field of adoption of new ideas and practices concluded that size of farm was nearly always positively related to the adoption of new farm practices.

Nahid (2005) conducted a study and found that there was a significant negative relationship between cotton farm size of the cotton growers and their problem confrontation in cotton production.

Bhuiyan (2002) in his study found no significant relationship between area under banana cultivation of the farmers and their constraints in banana cultivation.

Rahman (1995) found a significant and negative relationship between area under cotton cultivation of the farmers and their faced constraint.

2.2.6 Annual family income and problem

Azad et al. (2014) also found that annual income of the vegetable growers has significant negative relationship with problem faced in vegetable cultivation.

Pandict et al. (2013) found a significant negative relationship between the family income and problem faced of the vegetable growers in vegetable cultivation and marketing.

Bashar (2006) found that annual family income high significant negative relationship with problem confrontation in mushroom cultivation.

Huque (2006) found that annual family income of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management.

Hague (2001) found in his study that annual income of FFS farmers had a positive significant effect on their problem confrontation.

Karim (1996) found in his study that annual family income of the farmers had a significant negative effect on their problem confrontation in kakroal cultivation.

Sarker (1983) in his study found that there was no relationship between the income of the farmers and their poultry problem confrontation.

Ali (1978) in his study found that there was no significant relationship between the annual family income of the farmers from the cattle and the problem confrontation of farmers.

Kashem (1977) in his study examined the relationship between annual family income of landless laborers and their problem confrontation. Though the relationship was not statistically significant, the data indicated an appreciable negative trend between the two variables.

Rashid (2003) in his study found that there was no relationship between annual family incomes the farmers and their agricultural problem confrontation. Though the relationship was not significant, relevant data indicated a considerable negative trend between income of the farmers and agricultural problem confrontation of the farmers.

2.2 7 Annual Income from catfish culture and problem

There was no available review of literature on annual income from catfish culture and problem.

2.2 8 Organizational participation and problem

Huque (2006) found that organizational participation of the fanners had no significant relationship with their problem faced in using integrated plant nutrient management.

Rahman (2006) found that organizational participation of the farmers had significant negative relationship with their constraints faced in Banana cultivation of Sunargaon Upazilla under Narayangonj district.

Bashar (2006) found that organizational participation of the farmers had high significant negative relationship with their problem confrontation in mushroom cultivation.

Aziz (2006) found that organizational participation of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district.

Nahid (2005) conducted a study and found that there was a very high significant negative relationship between organizational participation of the sugarcane growers and their problem confrontation in sugarcane production.

Karim (1996) found that organizational participation of the farmers had significant negative relationship with their problem confrontation.

Rahinan (1995) concluded in his study that there was no relationship between the organizational participation of the farmers and their faced constraints in cotton cultivation.

Rahman (1995), Sarker (1983), Saha (1997) and Ali (1978) also found similar findings in their respective studies.

Raha (1989) and Islam (1996) found that there was no significant relationship between the organizational participation of the farmers and their problem confrontation. Rashed (1975) found similar finding.

Mansur (1989) in his study indicated that organizational participation of the farmers had a significant negative relationship with their problem confrontation.

2.2.9 Cosmopolitanism and problem

No literature was found on the study of relation between problems faced in wheat cultivation and cosmopolitanism. However, there is other study relevant to problem faced by wheat farmers have been stated below:

Rashid (1999) found that there was a negative relationship between cosmopolitanism of the farmers and their agricultural problem confrontation.

Pramanik (2001) found that Cosmopolitanism of the farm youth had significant negative relationship with their crop cultivation problems.

Bashar (2006) found that cosmopolitanism of the farmers had significant negative relationship with their problem confrontation in mushroom cultivation.

Hoque (2006) in his study revealed a strong positive relationship between cosmopolitanism of the cane growers and their constraint in sugarcane cultivation. Similar findings were obtained by Islam (1993), Khan (1998) and Parveen (1993) in their respective studies.

Kashem (1977) found that there was a negative relationship between cosmopolitanism of the landless labours and their constraints faced. There was however, a negative trend between the two variables.

2.2.10 Training and problem

Azad et al. (2014) also found that training exposure of the vegetable growers has no relationship with problem faced in vegetable cultivation.

Bashar (2006) found that training exposure of the farmers had high significant negative relationship with their problem confrontation in mushroom cultivation.

Walt (2005) as cited by Ortmann and King (2007) indicated that poor management, lack of training, conflict among members (due mainly to poor service delivery), and lack of funds were important contributory factors to the smallholder cooperative failures in Limpopo province.

Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the sugarcane growers and their problem confrontation in sugarcane production.

Hossain (2002) found that the length of the training of the respondents had positive relationship with their knowledge of crop cultivation and marketing.

Ali (1999) found that training experience of the rural youth had no relationship with their anticipated problem confrontation in self-employment by undertaking selected agricultural income generating activities.

Saha (1997) found that training experience of the youth had no relationship with their problem confrontation.

2.2.11 Media contact and problem

Pandict et al. (2013) found a significant negative relationship between the extension media contact and problem faced of the vegetable growers in vegetable cultivation and marketing.

Huque (2006) found that extension media contact of the farmers had high significant negative relationship with their problem faced in using integrated plant nutrient management.

Nahid (2005) conducted a study and found that there was a very high significant negative relationship between extension media contact of the sugarcane growers and their problem confrontation in sugarcane production.

The study of Ismail (2001) revealed that there was not significant relationship between farm youths' extension contact and their agricultural problem confrontation. Similar findings were obtained by Raha (1989) and Hoque (2001) in their respective studies.

Rahman (1995) in his study conducted that extension contact of the farmers had significant negative relationship with their faced constraints in cotton cultivation. Similar findings were obtained by Rahman (1996), Faroque (1997), Pramanik (2001), Hossain (2002), Bhuyian (2002), Ahmed (2002), Salam (2003) and Halim (2003) in their respective studies.

2.3 The conceptual framework of the study

It is evident from the past studies that every occurrence or phenomenon is the outcome of a number of variables, which may or may not be interdependent or interrelated with each other. In other words, no single variable can contribute wholly to a phenomenon. Variables together are the cause and the phenomenon is effect and thus, there is cause- effect relationship everywhere in the universe.

The conceptual framework of Rosenberg and Holland (1960) was kept in mind while framing the structural arrangement for the dependent and independent variables. The present study was concerned with the problem confrontation by the farmers in floating vegetable cultivation. Thus, the problem confrontation was the main focus of the study and constituted the dependent variable. The characteristics of the farmers were considered as the independent variables. It is not possible to deal with the characteristics in a single study. It was therefore, necessary to limit the characteristics, which include age, education, experience in cat fish farming, dependency ratio, area under cat fish culture, annual income, annual income from catfish culture, organizational participation cosmopolitaness, training exposure and media contact. Based on this discussion and review of literature the conceptual model of this study has been formulated and shown in the Figure 2.1

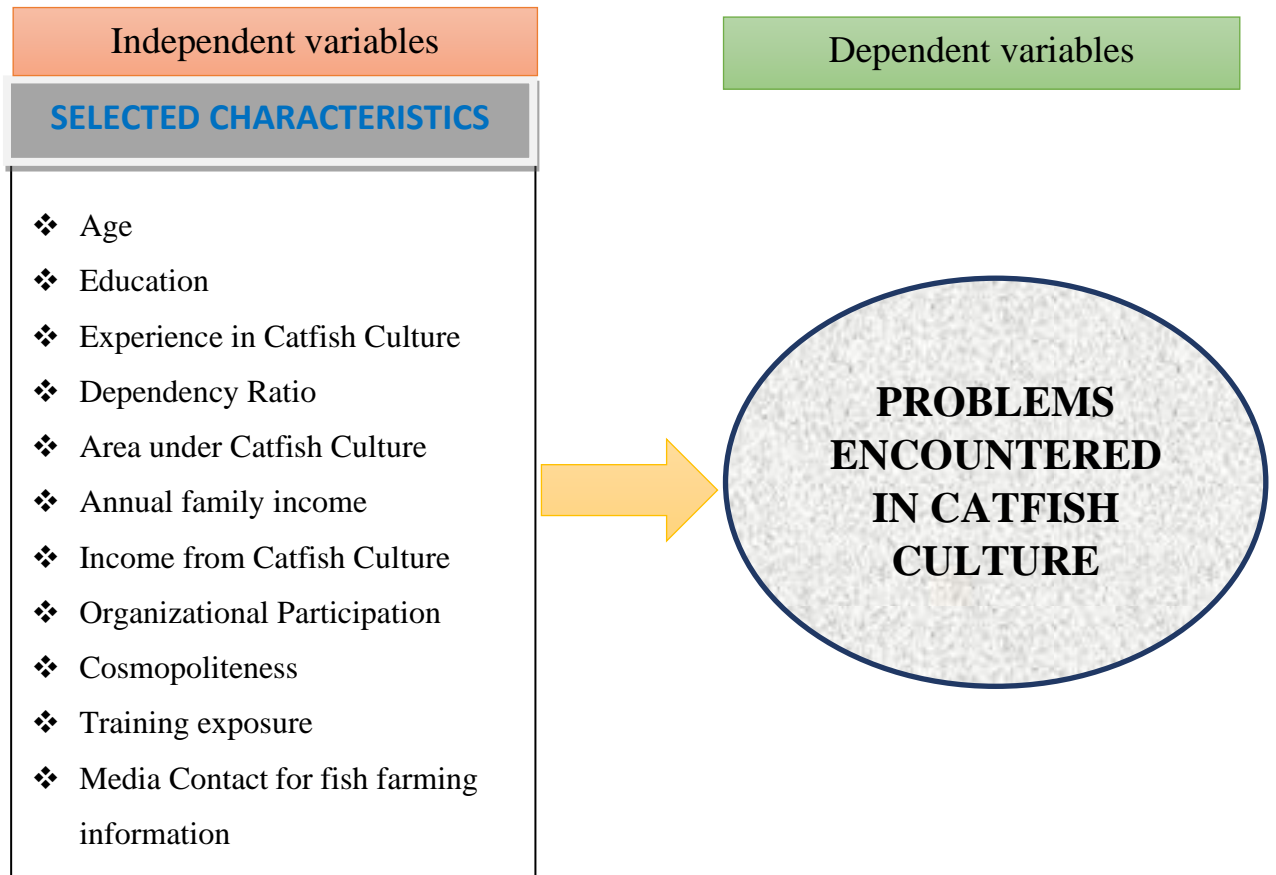


Figure 2.1: The Conceptual Framework of the Study

CHAPTER III

MATERIALS AND METHODS

Methods play an important role in scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g., selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 Locale of the Study

The study was conducted in the Trishal upazila under Mymensingh district. The area of Trishal upazila (Mymensingh district) is 338.98 sq km, located in between 24°28' and 24°41' north latitudes and in between 90°18' and 90°32' east longitudes. It is bounded by Mymensingh sadar upazila on the north, Bhaluka and Gaffargaon upazilas on the south, Ishwarganj, Nandail and Gaffargaon upazilas on the east, Fulbaria upazila on the west.

The present study was conducted at three unions of Trishal upazila under Mymensingh District. The researcher randomly selected these unions from the upazila namely Dhanikhola, Bailar and Kanthal. The selected study areas are much improved in catfish culture. The map of the study area is shown in figure 3.1 & 3.2

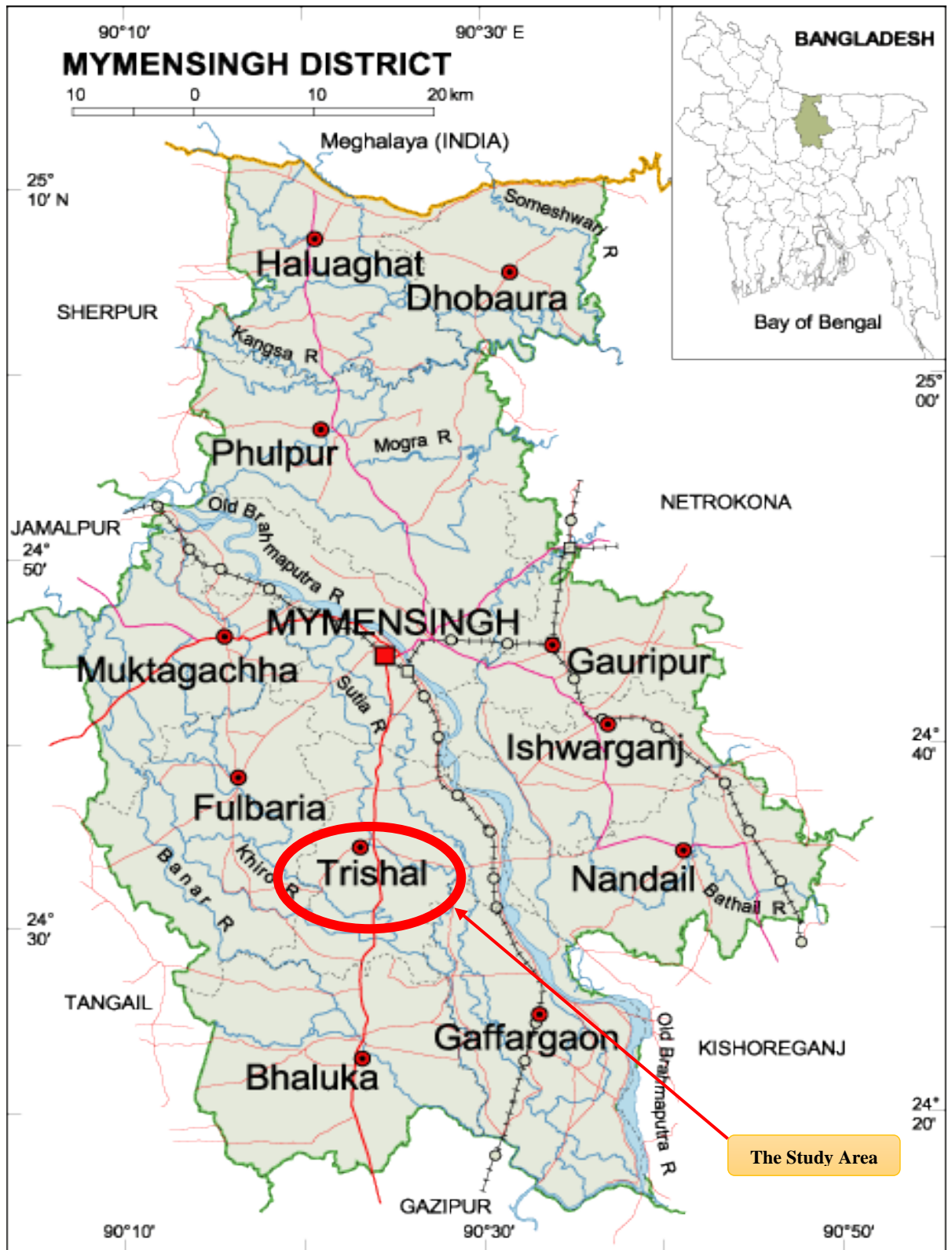


Figure 3.1 Map of Mymensingh District showing the study area - Trishal Upazila

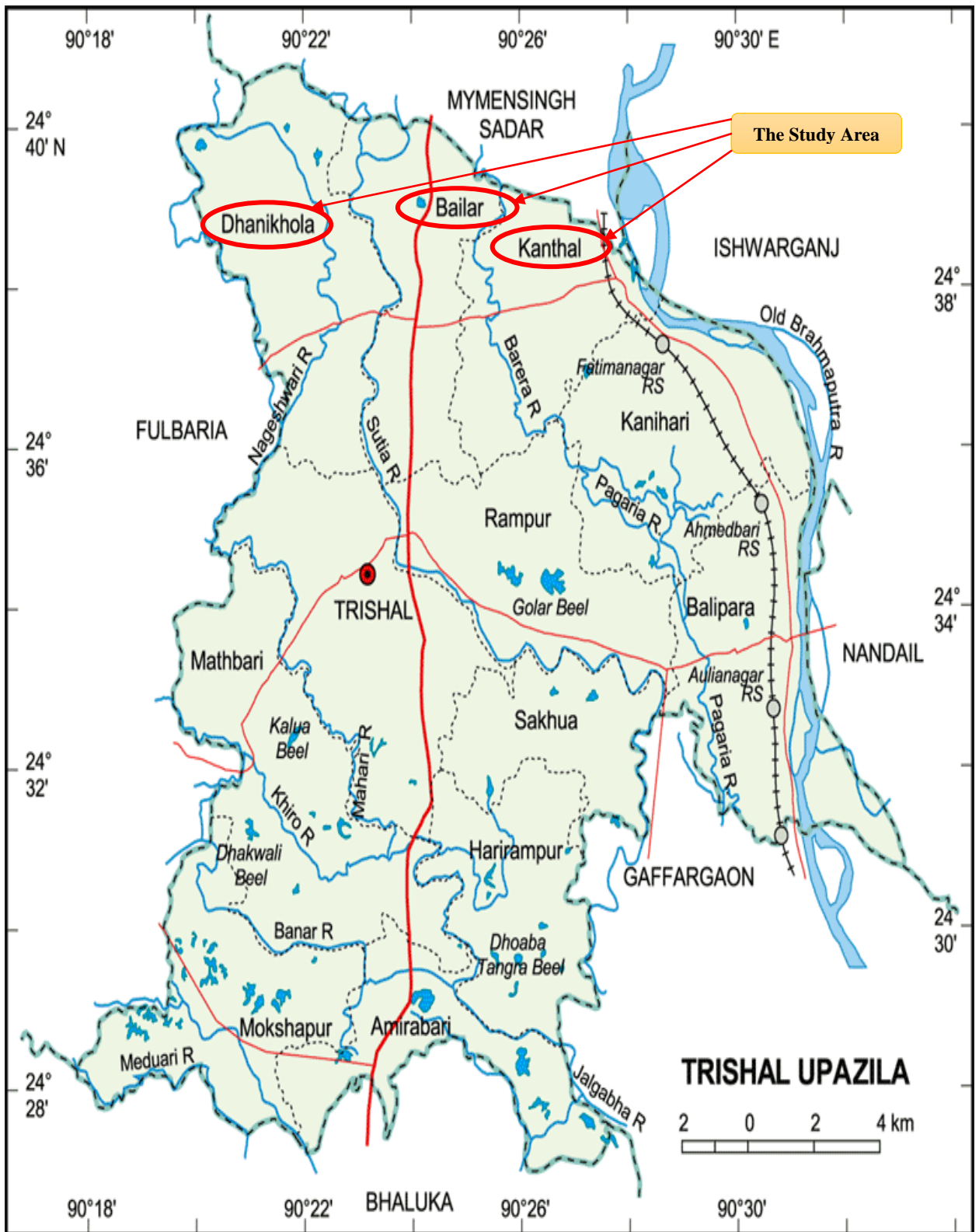


Figure 3.2 Map of Trishal Upazila showing the study area - Dhanikhola, Bailar and Kanthal Union

3.2 Population and Sample of the Study

All the farmers who permanently reside in the selected unions of Dhanikhola, Bailar and Kanthal union of Trishal upazila and culture catfish were constituted the active population of this study. The fish farmers who culture catfish of Jhaiyarpar, Vaualiapara villages of Dhanikhola union, Bashkuri, Charpara villages of Bailar unions and Ainakhet, Beelboka villages of Kanthal union of Trishal upazila under Mymensingh district were the population of the study. However, representative sample from the population were taken for collection of data following random sampling technique. One farmer (who mainly operated the catfish culture) from each of the families was considered as the respondent. Updated lists of all the fish farmers of the selected villages were prepared with the help of Extension Officer of DoF and local leaders. A purposive sampling procedure was followed to select one district from the whole of Bangladesh, and the same method was used to select the area of the district as well as the villages as the study group. The total number of catfish culture farmers of the selected villages were 120; where 20 farmers from Jhaiyarpar, 20 farmers from Vaualiapara of Dhanikhola union, 20 farmers from Bashkuri, 20 farmers from Charpara of Bailar union and 20 farmers from Ainakhet, 20 farmers from Beelboka of Kanthal union which constituted the population of the study. Thus, 120 farmers constituted the population of the study which is shown in the following Table 3.1.

Table 3.1 Population of the study area

Name of the selected upazila	Name of the selected union	Name of the selected area	Number of the respondents
Trishal Upazila	Dhanikhola	Jhaiyarpar	20
		Vaualiapara	20
	Bailar	Bashkuri	20
		Charpara	20
	Kanthal	Ainakhet	20
		Beelboka	20
Total			120

3.3 Data Collection Tools

Structured interview schedules were prepared to reach the objectives of the study. The schedule was prepared containing open and closed form of questions. The open questions allowed for the respondents to give answers using their own language and categories (Casley and Kumar, 1998). The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive. The instruments were first developed in English and then translated into Bengali. The survey tools were initially constructed based on an extensive literature review and pre-tested. The schedule was pre-tested with 20 randomly selected catfish culture farmers in the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires were also checked for validity by supervisor and co-supervisor at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from field staff of different GOs and NGOs and local leader. The primary data were collected from 2 March to 5 March, 2020. Books, journals, reports and internet documents were used as secondary sources of data supporting or supplementing the empirical findings of the study. The final data collection was started from 24 March and completed in 25 April, 2020.

3.4 Variables and their Measurement Techniques

The variable is a characteristic, which can assume varying, or different values in successive individual cases. A research work usually contains at least two important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces,

removes or varies the independent variable (Townsend, 1953). In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last he had selected 11 independent variables and one dependent variable. The independent variables were: age, education, experience in catfish culture, dependency ratio, area under fish culture, annual family income, annual income from catfish culture, organizational participation, cosmopolitaness, training exposure and media contact for fish farming information. The dependent variable of this study was the 'problems encountered in catfish culture by the farmers. The methods and procedures in measuring the variables of this study are presented below:

3.4.1 Measurement of Independent Variables

The 11 characteristics of the floating vegetable farmers mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.4.1.1 Age

Age of the farmers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the rural people (MoYS, 2012). A score of one (1) was assigned for each year of one's age. This variable appears in item number 1 in the interview schedule as presented in Appendix-I.

3.4.1.2 Level of Education

Education was measured by assigning score against successful years of schooling by a farmer. One score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a farmer passed the final examination of class five or equivalent examination, his/her education score has given five (5). Each farmer of can't read and write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5. If a farmer did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number 2 in the interview schedule as presented in Appendix-I.

3.4.1.3 Experience in catfish culture

Experience in catfish culture of the farmer was determined by the total number of years involved in catfish culture. A score of one (1) was assigned for each year catfish culture. If someone has 6 months experience then the score will be 0.5. This variable appears in item number 3 in the interview schedule as presented in Appendix-I.

3.4.1.4 Dependency ratio

The dependency ratio is a measure of the number of dependents aged zero (0) to 14 and over the age of 65, compared with the total population aged 15 to 64. The scoring was made by the actual number of family members expressed by the farmers. This variable appears in item number 4 in the interview schedule as presented in Appendix-I.

3.4.1.5 Area under fish culture

Area under fish culture of a farmer referred to the total area of land on which his/her family carried out the fish culture, the area being in terms of full benefit to the family. The data was first recorded in terms of measurement unit i.e. decimal. This variable appears in item number 5 in the interview schedule as presented in Appendix-I.

3.4.1.6 Annual family income

Annual family income of a fish farmer was measured in Thousand Taka. The total yearly earning from agricultural (field crops, vegetables, fruits, spices, livestock and fisheries) and nonagricultural sources (service, business, and others) by the respondent himself and other members of his family was determined. Thus, yearly earning from agricultural and nonagricultural sources were added together to obtain annual family income of a fish farmer. A score of one was given for each Tk. 1,000 to compute the annual income scores of the respondents. This variable appears in item number 6 in the interview schedule as presented in Appendix-I.

3.4.1.7 Annual income from catfish culture

Annual income from catfish culture was measured in Thousand Taka. It refers to the earning of the respondent from selling of catfish and catfish fry. A score of one was given for each Tk. 1,000 to compute the annual income scores of the respondents. This variable appears in item number 7 in the interview schedule as presented in Appendix-I.

3.4.1.8 Organizational participation

Organizational participation of a respondent was measured on the basis of the nature of his involvement in different organizations found operating in the study area. Organizational participation scores were assigned in the following manner for activities of individual respondents in each group or organization. Score of one (1) was assigned for ordinary member, score of two (2) was assigned for executive committee member, Score of three (3) was assigned for executive committee officer. Depends on availability the researcher identified 4 organizations in the study area as shown in item number 8 in the interview schedule as presented in Appendix-I.

3.4.1.9 Cosmopolitaness

Cosmopolitaness of a respondent was measured in terms of his nature of visits to the eight different places external to his own social system and as shown in item number 9 in the interview schedule. The respondents indicated whether they visited those places frequently, occasionally, rarely and not at all. Weights assigned to these visits were 3, 2, 1 and 0 respectively. A respondent's cosmopolitaness score was obtained by adding the weights for his visits to all the places listed in the instrument. The cosmopolitaness score of the respondents could range from 0 to 24, where 0 indicating no cosmopolitaness and 24 indicating high cosmopolitaness.

3.4.1.10 Training exposure

Training exposure of farmers was determined by the total number of training relative to catfish culture received in his/her life regarding catfish culture activities. A score of one (1) was assigned for per day of each type of training attended. This variable appears in item number 10 in the interview schedule as presented in Appendix-I.

3.4.1.11 Media contact for fish farming information

This variable was measured by computing a media contact for fish farming information score on the basis of a respondent's extent of contact with 5 selected media as obtained in response to item number 11 of the interview schedule as presented in Appendix-I. Each respondent was asked to indicate the frequency of his contact with each of the selected media. With four alternative responses as 'regularly', 'occasionally', 'rarely' and 'not at all' basis and weights were assigned as 3, 2, 1 and 0 respectively. The media contact score of a respondent was determined by summing up his/her scores for contact with all the selected media. Thus, possible media contact score could vary from zero (0) to 15, where Zero indicated no media contact and 15 indicated the highest level of media contact.

3.4.2 Measurement of dependent variable

Problems encountered in the catfish culture by the farmers is the dependent variable of the study.

3.4.2.1 Problems encountered in catfish culture

Problems encountered in catfish culture of a respondent was dependent variable of the study and it was determined by providing score. Problems encountered in catfish culture of a farmer was measured by computing problem score on the basis of their nature of problems. Each farmer was asked to indicate his nature of problems in catfish culture with 4-point rating scale like high, medium, low and not at all basis to each of the twenty problems and score of three, two, one and zero were assigned for those alternative responses, respectively. These four options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of problems in catfish culture. Input problems of the farmer was measured by adding the scores of twenty selected input problems. Thus, input problems score of a farmer could range from 0 to 60, where zero indicated no problem and 60 indicated high problems encountered in catfish culture. This variable appears in item number 12 in the interview schedule as presented in Appendix-I. Based on the available information cited by the farmers, they were classified into three categories (Mean \pm Standard Deviation) namely 'low', 'medium' and 'high' problems encountered in catfish culture.

3.5 Rank order of problems faced by the farmers

To ascertain the best problems faced by the farmers' strategies Problems Encountered Index (PEI) was computed. The farmers implement different extent of problems faced by them against different problems. A Problems Encountered Index (PEI) was computed by using the formula:

$$PEI = PH \times 3 + PM \times 2 + PL \times 1 + PNA \times 0$$

Where,

PH = High extent of problems

PM = Medium extent of problems

PL = Low extent of problems

PNA = Not at All of problems

Problems Encountered Index (PEI) for each problem's strategy could range from 0 to 360, where 0 indicating lowest extent and 360 indicating highest extent of problems. Rank order was prepared for problem faced in catfish culture.

3.6 Hypothesis of the study

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis.

3.6.1 Research hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

“Each of the 11 selected characteristics (age, education, experience in catfish culture, dependency ratio, area under fish culture, annual family income, annual income from catfish culture, organizational participation, cosmopolitaness, training exposure and media contact for fish farming information) of the farmers has significant contribution to their problems in catfish culture.”

However, when a researcher tries to perform statistical tests, then it becomes necessary to formulate null hypothesis.

3.6.2 Null hypothesis

A null hypothesis states that there is no contribution between the concerned variables. The following null hypothesis was formulated to explore the contribution of the selected characteristics to their problems in catfish culture. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows:

“There is no contribution of the selected characteristics (age, education, experience in catfish culture, dependency ratio, area under fish culture, annual family income, annual income from catfish culture, organizational participation, cosmopolitaness, training exposure and media contact for fish farming information) of farmers to their problems in catfish culture.”

3.7 Data processing and analysis methods

Bogdan and Biklen (2006) insist that data analysis is an on-going part of data collection. Initially, all collected data were carefully entered in Access, exported to Microsoft Excel. Exported data were checked randomly against original completed interview schedule. Errors were detected and necessary corrections were made accordingly after exporting. Further consultation with research assistants and in some cases with the community people were required. Finally, data were exported from the program Microsoft Excel to SPSS/windows version 22.0, which offered statistical tools applied to social sciences. Qualitative data were converted into quantitative numbers, if required, after processing, scaling and indexing of the necessary and relevant variables to perform subsequent statistical analysis for drawing inferences.

As outlined earlier, there are many different forms and methods that can be used to analyze both quantitative and qualitative data in accordance with the objectives of the study. Both descriptive and analytical methods were employed in order to analyze the data. Descriptive techniques have been used to illustrate current situations, describe different variables separately and construct tables and

graphs presented in results. These included: frequency distribution, percentage, range, mean, median, standard deviation and coefficient of variance.

In most cases the opinions of respondents were grouped in broader categories. Analytical techniques have been utilized to investigate the contribution of the selected characteristics of the farmers to their problems in catfish culture. Statistical test like regression was used in this study. Each statistical technique is used under specific conditions and depends on the measurement scale of different variables.

3.8 Statistical analysis

Regression analysis was used to identify the linear combination between independent variables used collectively to predict the dependent variables (Miles and Shevlin, 2001). Regression analysis helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Ordinary Least Squares (OLS) is used most extensively for estimation of regression functions. In short, the method chooses a regression where the sum of residuals, $\sum U_i$ is as small as possible (Gujarati, 1995). The factors that contribute to the problems encountered by the farmers in catfish culture are analyzed using a regression model. The overall quality of fit of the model has been tested by ANOVA specifically F and R^2 test.

The data were analyzed in accordance with the objectives of the proposed research work. The factors that contribute to the problems encountered by the farmers in catfish culture are analyzed using a regression model, multiple regression analysis (B) was used. Throughout the study, five (0.05) percent and one (0.01) percent level of significance were used as the basis for rejecting any null hypothesis. If the computed value of (B) was equal to or greater than the designated level of significance (p), the null hypothesis was rejected and it was concluded that there was a significant contribution between the concerned

variable. Whenever the computed value of (B) was found to be smaller at the designated level of significance (p), the null hypothesis could not be rejected. It was concluded that there was no contribution of the concerned variables.

The model used for this analysis can be explained as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + e$$

Where,

Y= is the problems encountered by the farmers in catfish culture;

Of the independent variables,

x_1 is the age of farmer,

x_2 is education,

x_3 is experience in catfish culture,

x_4 is dependency ratio,

x_5 is area under fish culture,

x_6 is annual family income,

x_7 is annual income from catfish culture,

x_8 is organizational participation,

x_9 is cosmopolitaness,

x_{10} is training exposure and

x_{11} is media contact for fish farming information.

On the other hand, b_1 , b_2 , b_3 , b_4 , b_5 , b_6 , b_7 , b_8 , b_9 , b_{10} , and b_{11} are regression coefficients of the corresponding independent variables, and e is random error, which is normally and independently distributed with zero mean and constant variance.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion of the findings was made with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this Chapter.

4.1 Characteristics of the catfish farmers

Behavior of an individual is determined to a large extent by one's personal characteristics. There were various characteristics of the respondents that might have consequence to catfish culture. But in this study, 11 characteristics of them were selected as independent variables, which included their age, education, experience in catfish culture, dependency ratio, area under fish culture, annual family income, income from catfish culture, organizational participation, cosmopolitaness, training exposure and media contact for fish farming information those might be influenced the problem of the catfish culture.

In this section the results, the salient features of the catfish cultivars selected characteristics have been discussed. The salient feature of the selected characteristics has been presented in Table 4.1.

Table 4.1 Salient features of the selected characteristics of the catfish cultivars

Categories	Measuring unit	Rang		Mean	S D
		Possible	Observed		
Age	Years	-	25-75	40.75	9.62
Level of education	Year of schooling	-	0-18	5.42	5.28
Experience in catfish culture	Score	-	1-25	10.23	6.17
Dependency ratio		-	0-250	61.16	46.83
Area under fish culture	Ha	-	0.05-5.26	.47	.719
Annual family income	('000' Tk)	-	30-1200	265.42	231.65

Annual income from catfish culture	('000' Tk)	-	50-1400	372.50	358.91
Organizational participation	Score	-	0-10	2.18	1.91
Cosmopolitaness	Score	0-24	4-23	11.29	4.68
Training exposure	No. of days	-	0-8	2.60	2.46
Media contact for fish farming information	Score	0-15	1-12	4.45	2.82

4.1.1 Age

The age of the respondents has been varied from 25 to 75 years with a mean and standard deviation of 40.75 and 9.62 respectively. Considering the recorded age, the respondents were classified into three categories namely 'young', 'middle' and 'old' aged. The distribution of the respondents in accordance of their age is presented in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Category	Range (years)		Respondents		Mean	SD
	Year	Observed	Number	Percent		
Young aged	≤ 35	25-75	36	30.00	40.75	9.62
Middle aged	36-50		64	53.33		
Old aged	> 50		20	16.67		
Total			120	100.0		

From Table 4.2 it was revealed that the middle-aged respondents comprised the highest proportion (53.33 percent) followed by old aged category 16.67 percent) and 30.00 percent of the respondents were in the young aged category. Data indicates that young and middle-aged respondents were more involved in catfish culture than the old aged respondents.

4.1.2 Level of education

The level of educational scores of the respondents ranged from 0 to 18 with a mean and standard deviation of 5.42 and 5.28 respectively. Based on the educational scores, the respondents were classified into five categories. The

distributions of respondents according to their level of education are presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their level of education

Category	Range (years)		Respondents		Mean	SD
	Score	Observed	Number	Percent		
Can't read and sign	0	0-18	9	7.50	5.42	5.28
Can sign only	0.5		43	35.83		
Primary education	1-5		18	14.67		
Secondary education	6-10		27	22.50		
Above secondary	>10		23	19.67		
Total			120	100.0		

Table 4.3 shows that respondents under can sign only category constituted the highest proportion (35.83 percent) followed by secondary education (22.50 percent) category. On the other hand, the lowest 7.50 percent in can't read and sign category. Education broadens the horizon of outlook of respondents and expands their capability to analyse any situation related to catfish culture. To adjust with same, they would be progressive minded involve with modern cultural, processing of catfish culture. The majority of respondents (42.17 percent) had above secondary education because most of them live in village, comparatively poor and they do not get any opportunity to receive education facilities.

4.1.3 Experience in catfish culture

The experience score of the respondents ranged from 1 to 25. The mean score was 10.23 with the standard deviation 6.17. On the basis of experience, the respondents were classified into three categories namely, low experience, medium experience and high experience, as shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their experience in catfish culture

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 4)	23	19.67	10.23	6.17
Medium (5-16)	75	62.50		
High (above 16)	22	18.33		
Total	120	100		

Data contained in the Table 4.4 revealed that the majority (62.50 percent) of the farmers had medium experience as compared to (19.67 percent) and (18.33 percent) having low and high experience in catfish culture respectively. The majority (82.17 percent) of the respondents had low to medium experience in catfish culture

4.1.4 Dependency ratio

Dependency ratio of the farmers ranged from 0 to 250 with the mean and standard deviation of 61.17 and 46.83, respectively. According to dependency ratio of the farmers were classified into three categories (Mean \pm Standard Deviation) viz. 'low', 'medium' and 'high' dependency. The distribution of the cultivators according to their dependency ratio are presented in Table 4.5.

Table 4.5 Distribution of the farmers according to their dependency ratio

Categories	Farmers		Mean	SD
	Number	Percent		
Low (up to 15)	16	13.33	61.17	46.83
Medium (16-107)	93	77.50		
High (above 107)	11	9.67		
Total	120	100		

Table 4.5 indicate that the medium dependency ratio constitutes the highest proportion (77.50 percent) followed by the low dependency ratio (13.33 percent). Only 9.67 percent of the farmers had high dependency ratio.

4.1.5 Area under catfish culture

Area under catfish culture of the respondents varied from 0.05 to 5.26 hectare and the average being 0.47 hectare and standard deviation of 0.71. Depending on

the area under catfish culture, the respondents were classified into three categories according to DAE (1999) as appeared in table 4.6.

Table 4.6 Distribution of the farmers according to their area under catfish culture

Categories (hectare)	Farmers		Mean	SD
	Number	Percent		
Marginal area (up to 0.20 ha)	59	49.17	0.47	.71
Small land (up to 0.21-1.00 ha)	47	39.17		
Medium land (1.01-3 ha)	12	10.00		
Large land (above 3 ha)	2	1.66		
Total	120	100		

Similar result was observed Nasreen et al. (2013) where highest respondents were marginal area. Data contained in table 4.6 indicates the 49.17 percent of the farmers had marginal area under catfish culture while 39.17 percent of them had small area under catfish culture, 10 percent and only 1.66 percent of them had medium and large area under catfish culture respectively.

4.1.6 Annual family income

The annual family income of the farmers ranged from Tk. 30 thousand to Tk. 1200 thousand with an average of Tk. 265.42 thousand and standard deviation of 231.65 thousand. Based on their observed range, the farmers were divided into three categories as shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their annual family income

Categories ('000' Tk.)	Farmers		Mean	SD
	Number	Percent		
Low (up to 400)	91	81.67	265.42	231.65
Medium (401-800)	16	13.33		
High (above 800)	13	10.83		
Total	120	100		

Reza (2007) found the similar result where highest number of respondents were low annual income. From the Table 4.7 it was observed that the highest portion

(81.67 percent) of the farmers had low annual family income compared to 13.33 percent having medium and only 10.83 percent had high annual family income.

4.1.7 Income from catfish culture

The annual family income of the farmers ranged from Tk.50 thousands to Tk. 1400 thousand with an average of Tk. 372.50 thousand and standard deviation of 358.91 thousand. Based on the observed range, the farmers were divided into three categories as shown in Table 4.8.

Table 4.8 Distribution of the farmers according to their income from catfish culture

Categories ('000' Tk.)	Farmers		Mean	SD
	Number	Percent		
Low (up to 466)	89	74.17	372.50	358.91
Medium (467-933)	16	13.33		
High (above 933)	15	12.50		
Total	120	100		

From the Table 4.8 it was observed that the highest portion (74.17 percent) of the farmers had low income from catfish cultivation compared to 13.33 percent having medium and only 12.50 percent had high income from catfish cultivation.

4.1.8 Organizational participation

The score of organizational participation of the farmers ranged from 0 to 10, the mean being 2.18 and standard deviation of 1.91. Based on observed range, the farmers were classified into three categories as shown in Table 4.9.

Table 4.9 Distribution of the farmers according to organizational participation

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
No participation (0)	4	3.33	2.18	1.91
Low participation (1-3)	95	79.17		
Medium participation (4-6)	15	12.50		
High participation (above 6)	6	5.00		
Total	120	100		

Data contained in Table 4.9 indicates that 79.17 percent of the farmers had low participation; while 12.50 percent of the farmer had medium organizational participation and 3.33 percent had no organizational participation and only 5.00 % of the farmers had high organizational participation. Thus, about 91.67% of farmers had low to medium organizational participation.

4.1.9 Cosmopolitaness

The score of cosmopolitaness of the farmers ranged from 4 to 23, the mean being 11.29 and standard deviation of 4.68. Based on training exposure, the farmers were classified into three categories (Mean±SD) as shown in Table 4.10.

Table 4.10 Distribution of the farmers according to their cosmopolitaness

Categories (scores)	Farmers		Mean	SD
	Number	Percent		
Low (upto 7)	37	30.83	11.29	4.68
Medium (8-15)	63	52.50		
High (above 15)	20	16.67		
Total	120	100		

Data contained in Table 4.10 indicates that 52.50 percent of the farmers had medium cosmopolitaness; while 30.83 percent of the farmers had low cosmopolitaness and 16.67 percent had high cosmopolitaness. Thus, about 83.33% of farmers had low to medium cosmopolitaness.

4.1.10 Training exposure

The score of training exposure of the farmers ranged from 0 to 8 days, the mean being 2.60 and standard deviation of 2.46. Based on observed range, the farmers were classified into three categories as shown in Table 4.11.

Table 4.11 Distribution of the farmers according to training exposure

Categories (days)	Farmers		Mean	SD
	Number	Percent		
No training (0)	42	35.00	2.60	2.46
Low training (up to 1-3)	38	31.67		
Medium training (4-6)	26	21.67		
High training (above 6)	14	11.67		
Total	120	100		

Data contained in Table 4.11 indicates that 35.00 percent of the farmers had no training exposure; while 31.67 percent of the farmers had low training exposure and 21.67 percent had medium training exposure and only 11.67% of the farmers had high training. Thus, about 66.67% of farmers had no to low training exposure.

4.1.11 Media contact for fish farming information

The observed media contact scores of the farmers ranged from 1-12 against the possible range of 0 to 15, the mean being 4.45 and standard deviation of 2.82. According to their observed ranged of media contact scores, the farmers were classified into three categories (Mean±SD) as shown in Table 4.12.

Table 4.12 Distribution of the farmers according to media contact

Categories	Farmers		Mean	SD
	Number	Percent		
Low (1-8)	32	26.67	4.45	2.82
Medium (9-16)	60	50.00		
High (>16)	28	23.33		
Total	120	100		

Similar result was observed Poddar (2015) where highest respondents were medium media contact. Data presented in the Table 4.12 indicated that 50.00 percent of the farmers had medium media contact compared to having 26.67 percent low and 23.33 percent had high media contact. Findings again revealed that almost all (76.67 percent) of the farmers had low to medium media contact.

4.2 Problems encountered in catfish culture

Problems encountered in catfish culture of farmers were measured through 20 items scale. The problems score ranged from 28 to 53 against the possible range of 0-60. The average was 42.75 and standard deviation was 5.82 respectively.

Table 4.13 Distribution of the farmers according to problems encountered in catfish culture

Categories (score)	Farmers		Mean	SD
	Number	Percent		
Low (up to 37)	27	22.50	42.75	5.82
Medium (38-47)	72	60.00		
High (>47)	21	17.50		
Total	120	100		

Data presented in the Table 4.13 shows that the majority (60.00%) of the farmers encountered medium problem while 22.50% percent of the farmers encountered low problem. Comparatively few farmers (17.50%) encountered high problem in catfish culture. The findings again revealed that an overwhelming proportion (82.50 percent) of the farmers faced medium to low problem in catfish culture.

4.3 The Contribution of the selected characteristics of the respondents to their problems encountered in catfish culture

In order to estimate the problems encountered in catfish culture, the multiple regression analysis was used which is shown in the Table 4.14.

Table 4.14 Multiple regression coefficients of the contributing variables related to problems encountered in catfish culture

Dependent variable	Independent Variable	β	P	R^2	Adj. R^2	F
Problems encountered in Catfish Culture	Age	-0.027	0.801	0.584	0.542	13.797
	Level of education	-0.199	0.040*			
	Experience in catfish culture	0.165	0.123			
	Dependency ratio	0.076	0.296			
	Area under fish culture	0.087	0.230			
	Annual family income	0.060	0.409			
	Annual income from catfish culture	0.059	0.223			
	Organizational participation	-0.218	0.042*			
	Cosmopolitaness	0.090	0.357			
	Training exposure	-0.236	0.012*			
	Media contact for fish farming information	-0.370	0.002**			

** Significant at $p < 0.01$;

*Significant at $p < 0.05$

Table 4.14 shows that media contact for fish farming information, training exposure, level of education and organizational participation of the respondents had significant negative contribution with their problems encountered in catfish culture. Of these, media contact for fish farming information was the most important contributing factors (significant at the 1% level of significant) and training exposure, level of education and organizational participation of the respondents were less important contributing factors (significant at 5% level of significant). Coefficients of other selected variables don't have any contribution on their problems encountered in catfish culture.

The value of R^2 is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of $R^2 = 0.542$ means that independent variables account for 54% of the variation with their encountered in catfish culture. The F ratio is 13.797 which is highly significant ($p < 0$).

However, each predictor may explain some of the variance in respondents their encountered in catfish culture simply by chanced. The adjusted R^2 value penalizes the addition of extraneous predictors in the model, but value 0.542 is still show that variance is farmers their encountered in catfish culture can be attributed to the predictor variables rather than by chanced (Table 4.14). In summary, the models suggest that the respective authority should be considers the farmers' media contact for fish farming information, training exposure, level of education and organizational participation of the respondents on their problems encountered in catfish culture and in this connection some predictive importance has been discussed below:

4.3.1 Significant contribution of media contact on the farmers' problems encountered in catfish culture

From the multiple regression, it was concluded that the contribution media contacts on the farmers' problems encountered in catfish culture was measured by the testing the following null hypothesis;

“There is no contribution of media contact on the farmers' problems encountered in catfish culture”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the media contact was significant at 1% level (.002)
- b. So, the null hypothesis could be rejected.
- c. The direction between media contacts and problems was negative.

The b-value of media contact was (-0.370). So, it can be stated that as media contact increased by one unit, farmers' problems encountered in catfish culture decreased by -0.370 units.

Based on the above finding, it can be said that farmers had more media contact decreased farmers' problems encountered in catfish culture. So, media contact has high significantly contributed to the farmers' problems decreased.

4.3.2 Significant contribution of training exposure on the farmers' problems encountered in catfish culture

From the multiple regression, it was concluded that the contribution of training exposure on the farmers' problems encountered in catfish culture was measured by the testing the following null hypothesis;

“There is no contribution of training exposure on the farmers' problems encountered in catfish culture”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the training was significant at 5% level (0.012)
- b. So, the null hypothesis could be rejected.
- c. The direction between training exposure and problem was negatives.

The b-value of training exposure was (-0.236). So, it can be stated that as training exposure increased by one unit, farmers' problems decreased by -0.236 units.

Based on the above finding, it can be said that farmers had more training decreased the problems encountered in catfish culture. So, training has high significantly contributed to the farmers' problems. Training helps farmers to gather more knowledge on catfish culture which ultimately helps farmers to reduce their problems encountered in catfish culture.

4.3.3 Significant contribution of education on the farmers' problems encountered in catfish culture

The contribution of education to farmers problems encountered in catfish culture was measured by the testing the following null hypothesis;

“There is no contribution of education to the farmers' problems encountered in catfish culture”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the education was at 5% significance level (.040)
- b. So, the null hypothesis could be rejected.
- c. The direction between education and problems was negatives.

The b-value of level education is (-0.199). So, it can be stated that as education increased by one unit, farmers' problems encountered in catfish culture decreased by -0.199 units.

Based on the above finding, it can be said that farmers' education decreased the farmers' problems encountered in catfish culture. So, education has significantly contributed to the farmers' problems in guava marketing. Education plays an important role to reduce problems encountered in catfish culture in many cases. Education enhances knowledge on many aspects such as training, participation, media contact and so on.

4.3.4 Contribution of organizational participation to their encountered in catfish culture

From the multiple regression, it was concluded that the contribution of organizational participation to their encountered in catfish culture was measured by the testing the following null hypothesis;

“There is no contribution of organizational participation to their encountered in catfish culture”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the organizational participation was significant at 5% level (.042)
- b. So, the null hypothesis could be rejected.
- c. The direction between organizational participation and problem was negative.

The b-value of organizational participation is (-0.218). So, it can be stated that as organizational participation increased by one unit, farmers' problem decreased by -0.218 units.

Based on the above finding, it can be said that farmers' had more organizational participation decreased farmers' problems encountered in catfish culture. So, Organizational participation has high significantly contributed to the farmers' problem decreased. Organizational participation increases farmer's knowledge about various aspects which helps farmers make enough reduce their problem encountered in catfish culture.

4.4 Comparative severity among the problems encountered in catfish culture

The observed Problem Encountered Index of the problems ranged from 124 to 360 against the possible range of 0-360. Problem Encountered Index (PEI) of the selected problems is shown in Table 4.15.

On the basis of PEI, it was observed that “high price of feed” ranked first followed by “unavailability of quality feed”, “high price of vaccine and medicine”, “low production and lack of local market” and “disability of producing required fish eggs” were the least problems encountered by the farmers in catfish culture.

Table: 4.15 Problem Encountered Index (PEI) with Rank Order

Statement on problems	Extent of problem 5130				Computed score	Rank order
	High	Medium	Low	No		
High price of feed	105	10	5	0	340	1
Unavailability of quality feed	101	10	5	4	328	2
High price of vaccine and medicine	97	16	3	4	326	3
Low production and lack of local market	97	15	4	4	325	4
Low market price in respect of production cost	84	21	10	5	304	5
High price of fish fry	76	24	12	8	288	6
Lack of quality fish fry	69	27	14	10	275	7
Lack of growth regulatory knowledge	69	26	15	10	274	8
Unavailability of fish fry in time	63	31	10	16	261	9
Lack of knowledge of feed production	61	27	20	12	257	10
Lack of available number of hatcheries	53	40	13	14	252	11
Lack of feed storage knowledge	49	39	19	13	244	12
Unavailability of vaccine	49	35	21	15	238	13
Unavailability of medicine	43	34	31	12	228	14
High mortality rate	42	32	35	11	225	15
Lack of fish health knowledge	40	29	37	14	215	16
Transportation is risky	37	30	41	12	212	17
High production cost	38	35	27	20	211	18
Low body weight	33	25	54	8	203	19
Disability of producing required fish eggs	25	20	9	66	124	20

CHAPTER V
SUMMARY OF THE FINDINGS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Individual characteristics of the farmers

Age: Age of the respondents ranged from 25 to 75 years with an average of 40.75 years. Majority of the respondents (53.33 percent) were middle aged followed by 30 percent and 16.67 percent young and middle-aged respectively.

Education: Education of the farmers ranged from 0 to 18 years of schooling having an average of 5.42 years with a standard deviation of 5.28. respondents under can sign only category constituted the highest proportion (35.83 percent) followed by secondary education (22.50 percent) category. On the other hand, the lowest 7.50 percent in can't read and sign category.

Experience in catfish culture: The majority (62.50 percent) of the farmers had medium experience as compared to (19.67 percent) and (18.33 percent) having low and high experience in catfish culture respectively.

Dependency ratio: The medium dependency ratio constitutes the highest proportion (77.50 percent) followed by the low dependency ratio (13.33 percent). Only 9.67 percent of the farmers had high dependency ratio.

Area under catfish culture: Majority 49.17 percent of the farmers had marginal area under catfish culture while 39.17 percent of them had small area under catfish culture, 10 percent and only 1.66 percent of them had medium and large area under catfish culture respectively.

Annual family income: Annual income score of the respondents ranged from 45 to 258 with an average of 122.38. Majority of the respondents (80.1 percent) had medium income followed by 14.9 percent and 5 percent low and high income respectively.

Income from catfish culture: The highest portion (74.17 percent) of the farmers had low income from catfish cultivation compared to 13.33 percent having medium and only 12.50 percent had high income from catfish cultivation.

Media contact: Media contact score of the respondents ranged from 1-12 with an average of 4.45. Majority of the respondent's 50.00 percent of the farmers had medium media contact compared to having 26.67 percent low and 23.33 percent had high media contact.

Cosmopolitaness: Cosmopolitaness score of the respondents ranged from 4 to 23 with an average of 11.29. Majority of the respondent's 52.50 percent of the farmers had medium cosmopolitaness; while 30.83 percent of the farmers had low cosmopolitaness and 16.67 percent had high cosmopolitaness.

Training exposure: Training exposure score of the respondents ranged from 0 to 8 with an average of 2.60. Majority of the 35.00 percent of the farmers had no training exposure; while 31.67 percent of the farmers had low training exposure and 21.67 percent had medium training exposure and only 11.67% of the farmers had high training.

Organizational participation: Organizational participation of the farmers ranged from 0 to 10, the mean being 2.18 and standard deviation of 1.91. The majority of the farmers 79.17 percent of the farmers had low participation; while 12.50 percent of the farmer had medium organizational participation and 3.33

percent had no organizational participation and only 5.00 % of the farmers had high organizational participation.

5.1.2 Problems encountered in catfish culture

The observed problem encountered in catfish culture scores of the catfish farmers in selected cultivation ranged from 28 to 53 against the possible score ranged of 0 to 60. The mean was 42.75. The highest proportion (60.00%) of the farmers encountered medium problem while 22.50% percent of the farmers encountered low problem. Comparatively few farmers (17.50%) encountered high problem in catfish culture.

5.1.3 Contribution of the selected characteristics of the farmers and their problems encountered in catfish culture

Among 11 selected characteristics of the farmers 4 characteristics namely, media contact for fish farming information, training exposure, level of education and organizational participation of the respondents had significant negative contribution with their problems encountered in catfish culture. and the rest 7 characteristics namely, age, experience in catfish culture, dependency ratio, area under fish culture, annual family income, income from catfish culture and cosmopolitaness had non-significant contribution with their problems encountered in catfish culture.

5.1.4 Comparative severity among the problems encountered by the farmers in catfish culture

The observed Problems Encountered Index (PEI) of the farmers ranged from 124 to 340 against the possible range of 0-360. On the basis of PEI, it was observed that “high price of feed” ranked first followed by “unavailability of quality feed”, “high price of vaccine and medicine”, “low production and lack of local market” and “disability of producing required fish eggs” were the least problems encountered by the farmers in catfish culture.

5.2 Conclusions

Following conclusions were drawn on the basis of findings, logical interpretation and other relevant facts of the study:

1. The findings of the study revealed that vast majority of the farmers (77.50 percent) had medium to high problem encountered in catfish culture. Therefore, it may be concluded that it would be a wiseful thinking to improve the overall situation of problem encountered in catfish culture by taking care of the factors related to the increase of problem encountered among the farmers.
2. The majority 76.67 % of the farmers had low to medium extension media contact. Findings expressed that extension media contact of the farmers had significant negative contribution with their problems encountered in catfish culture. So, it may be concluded that if the farmer come in more contact of extension provider, electronics, and printed media and extends their organizational participation they will face less problems encountered in catfish culture.
3. Most of the catfish farmers (66.67%) had no training to low training. Findings expressed that training exposure of the farmers had significant negative contribution with their problems encountered in catfish culture. So, it may be concluded that the farmers having lower training exposure faced more problems in case of catfish culture and vice-versa.
4. The majority less than half (35.83 percent) of the farmers can sign only. There existed a negative significant contribution between level of education and their problems encountered in catfish culture. Therefore, it may be concluded that an appreciable proportion of the farmers will not continue to face problems in catfish culture, if suitable steps are taken to remove illiteracy from the farmers.

5. Organizational participation of the respondents had negative contribution with their problem encountered in catfish culture. This leads to the conclusion that higher organizational participation reduces the problem encountered in catfish culture.
6. On the basis of PEI, the farmers faced serious problems in high price of feed, unavailability of quality feed, high price of vaccine and medicine, low production and lack of local market and disability of producing required fish eggs. Therefore, it may be concluded that necessary steps should be taken by the concerned authorities to minimize these problems with priority.

5.3 Recommendations

Recommendations based on the findings and conclusions of the study have been presented below:

5.3.1 Recommendation for policy implication

1. The findings indicated that an overwhelming majority of the farmers encountered medium to high problem. So, it may be recommended that necessary steps should be taken by concerned authority to remove these problems so that they can make their catfish culture profitable by increasing yield with less production cost.
2. The findings extension media contact had a significant negative contribution with their problems encountered by the farmers in catfish culture. So, it may be recommended that the extension workers of the concerned authority should increase the contact with farmers personally and motivate them to be connected with electronic and printed media that can help them to exchange related information which will reduce their problems.
3. The findings revealed that the training exposure had a significant negative contribution with the problems encountered by the farmers in catfish culture. So,

it may be recommended that the concerned authority should increase training facilities to develop skills of the farmers technologically so that they can minimize their problems.

4. The findings of the study indicated that education had significant negative contribution with problems encountered by the farmers in catfish culture. Therefore, it may be recommended that the concerned authorities should take the special mass education program for the illiterate and low lettered farmers for solving their problems.

5. The findings indicated that organizational participation had a negative significant contribution with the problems encountered by the farmers in catfish culture. Therefore, it may be recommended that the extension provider of concerned authority should select those farmers with priority that has more attraction, eagerness and attention toward new technologies of more yield and income so that they can overcome their problems.

5.3.1 Recommendations for further study

1. The study was conducted on the farmers of only one selected area of Trishal Upazila under Mymensingh district. Finding of the study need verification by similar research in other areas of the country including areas where catfish culture is yet to get popularity.
2. Contributions of 11 characteristics of farmers with their problems encountered in catfish culture have been investigated in this study. Further research should be conducted to find out contribution of the other personal characteristics of the farmers with their others' problems.

3. In addition to problems encountered in catfish culture, the farmers also faced other problems such as social, economic, housing, sanitation, nutrition and domestic etc. Therefore, it may be recommended that research should be conducted relation to other problems of the farmer.

4. The research was conducted to find out the problems encountered in catfish culture of the farmer. Further research should be taken related to other issues like inter cropping, another crop marketing etc.

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Appendix-A

English Version of the Interview Schedule
 Department of Agricultural Extension and Information System
 Sher-e-Bangla Agricultural University, Dhaka-1207
 Interview Schedule On

PROBLEMS ENCOUNTERED IN CATFISH CULTURE BY THE FARMERS OF TRISHAL UPAZILA UNDER MYMENSINGH DISTRICT

(Confidentiality will be maintained and all information will be used only for study purpose)

Serial No:.....	
Name Of the respondent:.....	Contact No:.....
Village:.....	Union:.....
Thana:.....	District:.....

(Please answer the following questions. Give tick (✓) marks in the appropriate place)

1. Age

How old are you? years.

2. Level of Education

Please mention your level of education.

- a) I can't read and write
- b) I can sign only
- c) I read up to class.....
- d) I have passed... class.

3. Experience in Catfish Culture

How many years have you been engaged with catfish Culture?.....years

4. Dependency Ratio

Please mention numbers of the family members

$$\text{Dependency Ratio} = \frac{(\text{No. of people aged 0 to 14=}) + (\text{No. of people aged 65 and above =})}{\text{Number of people aged 15 to 64 =}} \times 100$$

5. Area under Fish Culture

Please indicate the area of lands under Fish Culture

Sl. No.	Types of resources	Area (ha)
1	Ponds	
2	Others	
Total Area		

6. Annual Family Income

Please state the income from different sources during the last one year

Sl. No.	Sources of Income	Monthly income (Tk)	Annual income (Tk)
1	Agriculture		
	➤ Rice		
	➤ Jute		
	➤ Vegetables		
	➤ Fruits		
	➤ Livestock		
	➤ Poultry		
	➤ Nursery		
2	Business		
3	Service		
4	Day Labour		
5	Others		
Total Income			

7. Annual Income from Catfish Culture

Please state the income from catfish culture during the last one year

Sl. No.	Name of Catfish Species	Annual Income (Tk)
1	Pangas	
2	Shing	
3	Magur	
4	Tengra	
5	Pabda	
6	Boal	
7	Rita	
9	Ayre	
10	Others	
Total Income		

8. Organizational Participation

Please mention the nature and duration of your participation in the following organizations.

Sl. No.	Name of Organizations	Nature of Participation			
		Ordinary member (3)	Executive committee member (2)	Executive committee officer (1)	Not at all (0)
1	Fish farmers' cooperative committee				
2	Mosque/Madrashah/Mondir/Church/Pagoda committee				
3	NGO				
4	Union Parishad				

9. Cosmopolitaness

Please indicate the number of times you have visited the following places for agricultural purposes:

Sl. No.	Place of Visit	Nature of Visit			
		Frequently (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1	Relative or other known persons located outside of your own village	5-6 times/month	3-4 times/month	1-2 times/month	0 times/month
2	Own Union parishad office	8-10 times/year	5-7 times/year	1-4 times/year	0 times/year
3	Other Union parishad office	8-10 times/year	5-7 times/year	1-4 times/year	0 times/year
4	Own Upazila sadar	5-6 times/month	3-4 times/month	1-2 times/month	0 times/month
5	Other Upazila sadar	5-6 times/month	3-4 times/month	1-2 times/month	0 times/month
6	Own District sadar	4 times/year	3 times/year	1-2 times/year	0 times/year
7	Other District sadar	4 times/year	3 times/year	1-2 times/year	0 times/year
8	Capital city	3 times/year	2 times/year	1 times/year	0 times/year

10. Training Exposure

Do you have participated in any training relative to Catfish Culture?

Yes No.

If yes, mention the following information

Sl. No.	Subject of Training	Duration of Training (Days)

11. Media Contact for Fish Farming Information

Please state the extent of your contact with the following personnel

Sl. No.	Media Contacts	Extent of Participation			
		Regularly (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Model fish farming				
2	Input dealer				
3	NGO worker				
4	Field worker of fisheries department				
5	Upazila fisheries officer				

12. Problems encountered in Catfish Culture

Please state the extent of the following problems encountered in Catfish Culture

Sl. No.	Types of Problems	Extent of Problems			
		High (3)	Medium (2)	Low (1)	Not at all (0)
A	Fish Fry Related				
	High price of fish fry				
	Lack of quality fish fry				
	Unavailability of fish fry in time				
	Lack of available number of hatcheries				
B	Growth Related				
	High mortality rate				
	Low body weight				
	Disability of producing required fish eggs				
	Lack of growth regulatory knowledge				
C	Feed Related				
	High price of feed				
	Lack of knowledge of feed production				
	Unavailability of quality feed				
	Lack of feed storage knowledge				
D	Health Related				
	Unavailability of vaccine				
	Unavailability of medicine				
	High price of vaccine and medicine				
	Lack of fish health knowledge				
E	Production, Marketing and Transport				
	High production cost				
	Transportation is risky				
	Low production and lack of local market				
	Low market price in respect of production cost				

Thank you for your kind co-operation in data collection.

Dated:.....

(Signature of the interviewer)